GUMELNIȚA: RESEARCH RESULTS OF THE 2018 AND 2019 FIELDWORK SEASONS

Cătălin Lazăr[*], *Vasile Opriș*[**], *Theodor Ignat*[**], *Bogdan Manea*[*], *Ovidiu Frujină*[*], *Cristina Covătaru*[*], *Adelina Darie*[**], *Adrian Bălășescu*[***], *Valentin Radu*[****], *Gabriel Vasile*[***], *Mihaela Golea*[***], *Monica Mărgărit*[*****], *Gabriel Popescu*[*], *Mădălina Dimache*[******], *Dan Pîrvulescu*[**], *Marius Streinu*[*******], *Bogdan Șandric*[*******], *Marian Tufaru*[*******], *Alina Iancu*[*******], *Georgiana Dinu*[*******], *Valentin Parnic*[********], *Carol Căpiță*[*********], *Theodor Zavalaș*[******], *Andreea Dima*[**********], *Tiberiu Sava*[**********]

Keywords: *Eneolithic, Gumelnița culture, bioarchaeology, geoarchaeology, radiocarbon data.*

Cuvinte cheie: *Eneolitic, cultura Gumelnița, bioarheologie, geoarheologie, date radiocarbon.*

Abstract: *The* tell *settlement from "Măgura Gumelnița" is the eponymous site of the Eneolithic civilization with the same name. It is probably the most significant* tell *settlement north of the Danube, and it belonged to the Kodjadermen - Gumelnița - Karanovo VI cultural complex that occupied the Balkan area in the second half of 5th millennium BC. During 2018 and 2019, the research of the Gumelnița site continued, the present study presenting the preliminary interdisciplinary results obtained in the respective archaeological seasons.*

Rezumat: *Așezarea de tip* tell *de la „Măgura Gumelnița" este situl eponim al civilizației eneolitice cu același nume. Aceasta este probabil cea mai mare așezare de tip* tell *de la nord de Dunăre și aparține complexului cultural Kodjadermen - Gumelnița - Karanovo VI care a ocupat zona Balcanică în a doua jumătate a mileniului al V-lea BC. În perioada 2018-2019, cercetarea sitului Gumelnița a continuat, studiul de față prezentând rezultatele interdisciplinare preliminare obținute în respectivele campanii arheologice.*

I. Introduction

The archaeological site at Gumelnița (Călărași County, Romania) is known to specialists as the eponymous site of the Gumelnița culture. The site is composed of the *tell* type settlement belonging to the Kodjadermen-Gumelnița-Karanovo VI communities, two

[*] University of Bucharest, ArchaeoSciences Division – ICUB.
[**] Bucharest Municipality Museum.
[***] "Vasile Pârvan" Institute of Archaeology.
[****] National Museum of Romanian History.
[*****] "Valahia" University, Department of History.
[******] Gumelnița Civilization Museum, Oltenița.
[*******] National Heritage Institute.
[********] Lower Danube Museum Călărași.
[*********] University of Bucharest, Department of Ancient History.
[**********] "Horia Hulubei" National Institute for Nuclear Physics and Engineering.

necropolises corresponding to the respective settlement, along with a Boian (Vidra phase) occupation, a Cernavoda II cemetery, a Bronze Age settlement (Tei culture), and occupations corresponding to the first Iron Age and to the 7th-11th centuries AD[1].

Recently, in 2017, the Museum of Gumelnița Civilization in Oltenița, in partnership with the Bucharest Municipality Museum and the National Heritage Institute reopened the excavations at the Gumelnița site, as an interdisciplinary research program called *Multidisciplinary Research Gumelnița Archaeological Site*[2].

Initially, to adequately assess the site's current archaeological potential, it was decided to organize a two-week archaeological evaluation and diagnosis seasons during September and October 2017. Based on these results, in 2018, a new systematic research of the site was started, proposing a modern and interdisciplinary approach.

II. Archaeological field research

The current study will present the research results from 2018 and 2019 at this emblematic archaeological site[3]. In 2020, no field research was conducted due to the unusual situation imposed by the COVID-19 pandemic.

Field investigations

For proper management of the field work, the site was organized in three main investigation areas (Fig. 1) as defined in 2017[4]:

Zone 1: the Tell settlement: Based on the complex interdisciplinary data resulting from the 2017 evaluation season, in 2018 it was decided to open an area that would allow extensive research of the investigated features in the previous year.

In this regard, the S1 area (16 × 8 m) was opened in the southeast part of the *tell*. A cross balk was kept for proper control of horizontal and vertical stratigraphy, thus obtaining four (I-IV) sectors (Fig. 2). Area S1 was divided into 2 × 2 m squares, marked alpha-numerically. We specify that the new surface also included the area investigated in 2017, adequately integrated into the new surface. During the 2018 and 2019 seasons, the removal of the top soil in all four sectors of S1 was completed. Once removed, a layer of colluvium (US 1011) was identified, characterized by numerous archaeological finds in secondary position (ceramic fragments, flint pieces, grinders, faunal remains, etc.). This colluvium was entirely removed in sectors I-II and partially in sectors III-IV. After removing the colluvium, an anthropic level was identified in the first two sectors, corresponding to the Gumelnița culture, which contained a series of archaeological features.

Zone 2: the Off-tell area: In this sector, the investigations undertaken in the 2018 and 2019 seasons were conducted at a smaller scale, consisting of field surveys and four mechanized cores, which are still under processing. Also, topographic measurements and the acquisition of geo-spatial UAV data were continued.

---

[1] Lazăr *et alii* 2019, 2020.
[2] Lazăr *et alii* 2017.
[3] Lazăr *et alii* 2019, 2020.
[4] Lazăr *et alii* 2017.

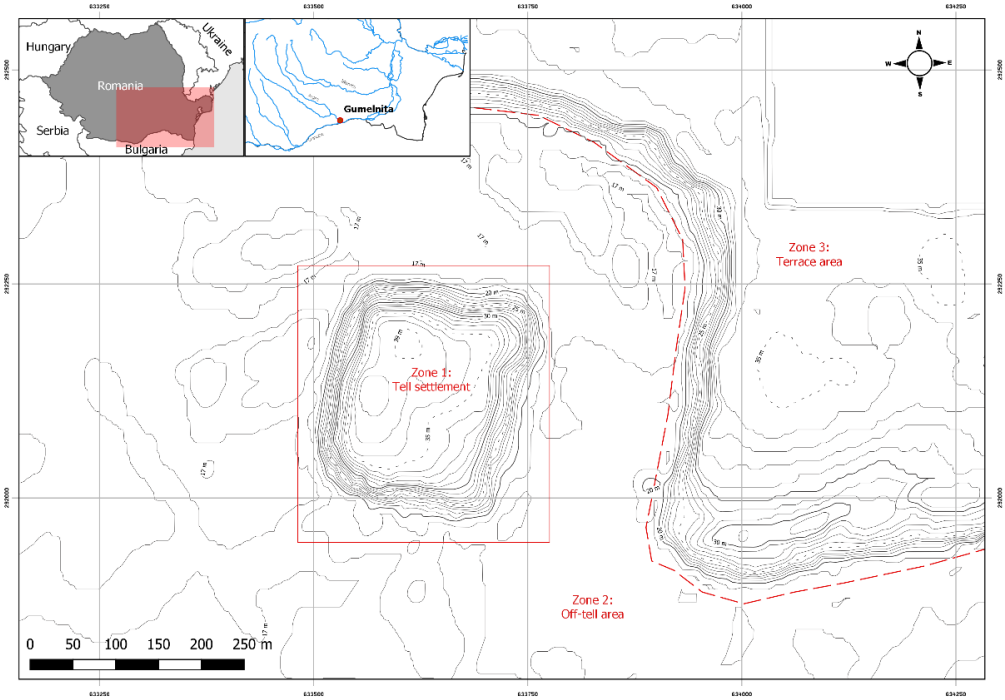

Fig. 1. Research areas and location of the Gumelnița site.

Zone 3: the Terrace area: Here, due to significant changes in land configuration compared to the 1960's when Silvia Marinescu-Bâlcu and Ersilia Tudor investigated the necropolis area, the research had to be adapted to current conditions, including the existence of an acacia forest. In these circumstances, in 2018, it was decided to open a newtrench, in the area where the surveys from the 2017 campaign had been carried out. This new trench, marked Son 9 (20 × 3 m), oriented NE-SW, incorporated the previous year's sondage (Fig. 4). At its SW limit, another trench marked Son 10 (4 × 1 m) was opened.

Our research interest expanded in this area, as 340 m to the north of the necropolis we discovered that massive illegal excavation (ca. 110 × 30 m) disturbed several prehistoric features such as pits and graves.

Carrefully inspecting the profiles of this huge pit we have identified several pits in the southren profile and a tomb in the western profile. Thus two small sondages were opened - Son 11 (4 × 2 m) and Son 12 (2.6 × 1.7 m) - to properly investigate the newly discovered features (Fig. 4).

In 2019 the research carried on with two new sections, north-east to the excavation previously made in 2018. These two sections, marked Son 13 (18.6 × 2.30 m) and Son 14 (18.6 × 2.20 m), oriented NE-SW, took into account the land and trees' configuration in the area (Fig. 4).

Methodological approach

From a methodological point of view, the archaeological research undertaken at the Gumelnița site involved an interdisciplinary approach that included non-intrusive prospections (e.g., magnetometry), GIS integration of topographical data, zooarchaeological, malacological, archaeoihtyological, anthropological, palynological, carpological, and sedimentological analyses, alongside the techno-typological and functional study of the artefacts, raw material determination alongside the compositional study, and radiocarbon dating.

The microstratigraphic method was used for excavation and the data was recorded by stratigraphic units (s.u.). The sediment from the funeral pits was wet sieved in order to recover all the small bones, seeds, charcoal, and small artefacts.

In general, the field research strategy has been adapted according to the particular situations that had been identified.

For the other types of research, the approached and methodology will be presented in the respective sections.

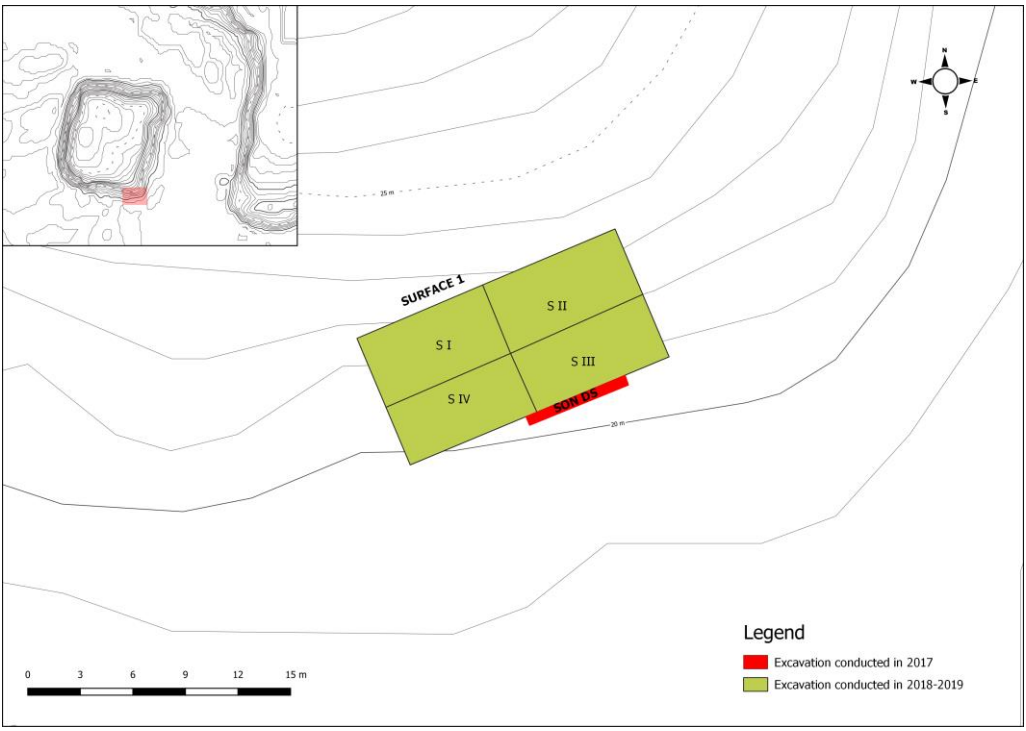

Fig. 2. Excavation areas conducted in Zone 1 of the Gumelnița site.

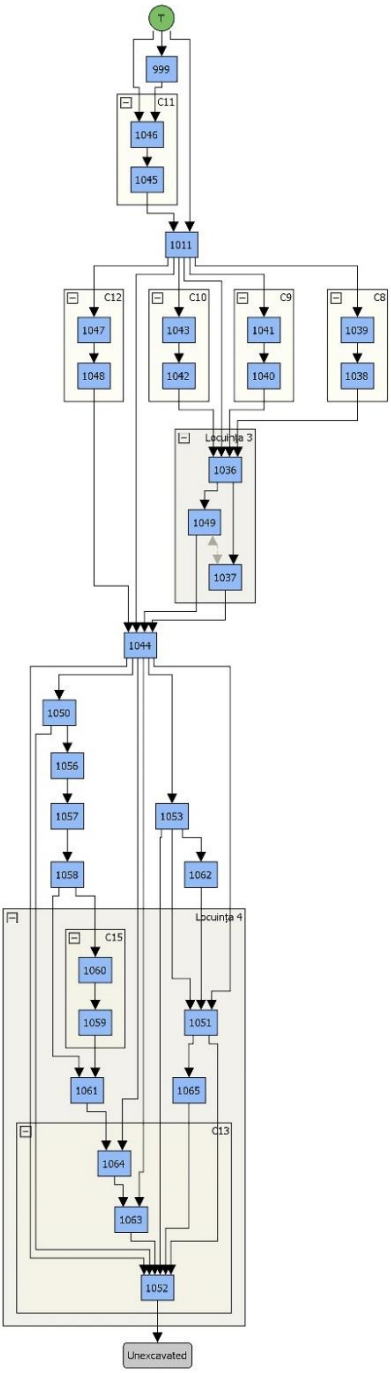

Fig. 3. Stratigraphic matrix of the archaeological features of the Gumelnița tell settlement (Zone 1, 2018-2019).

Archaeological features

The identified features are specific to domestic and funerary areas and will be presented on the defined research zones.

Zone 1: the Tell settlement: Mainly, in 2018-2019, removing the top soil in all four sectors of S1 was managed. After this level, a layer of colluvium was identified, characterized by the presence of numerous archaeological materials in secondary position (ceramic fragments, flint pieces, grinders, faunal remains, etc.). This colluvium was dismantled entirely in sectors I - II and partially in sectors III-IV. In the first two sectors, after removing the colluvium, an anthropic level was identified, corresponding to the Gumelnița culture, which contained a series of archaeological features. Of these, the unburnt dwelling L3, identified in sectors I-II, stands out.

Also here, in the proximity of L3, another unburnt house was identified (L4). It is worth mentioning that outside the eastern wall of L4 two post pits were identified (C13 and C15) that are related to it.

Both dwellings have a relatively poor degree of preservation, as they unfold beyond the profiles of section S1. At both dwellings (L3 and L4), only the destruction level of was cleaned. Based on the ceramic materials scattered in the destruction layers and also outside the dwellings, the respective constructions most probably belong to the A2 phase of the Gumelnița culture, most likely contemporary. The radiocarbon data of the collected samples will verify this hypothesis.

Along with these dwellings, a series of pits of various shapes and sizes (C8, C9, C10, and C12) which more or less affected the buildings, were identified.

Some of them (e.g., C8, C9 and C10) are rectangular, and they cut through the abandonment level of house L3. The filling consists of Gumelnița pottery, pieces of burnt adobe, shells and animal bones. From C9, a bone fragment was radiocarbon dated, and the obtained age indicates an interval between 4331-4060 cal. BC. (see Tab. 25)

The relative chronology of the *tell* excavation of 2018 and 2019 is illustrated by the stratigraphic matrix (Fig. 3).

Zone 2: Off-tell area: Currently, the cores and samples are work in progress and the results will be published when available.

Zone 3: the Terrace area: In Son 9 and Son 10 (Fig. 4), seven graves (M2-M8) were identified containing skeletons in different stages of preservation (Fig. 5). The burial pits are oval shaped, with dimensions fitting to the size of the deceased.

From the perspective of funerary treatment elements, all the graves contained individuals laid in crouched position, on the left side, oriented E-W. No grave goods were present in most cases. The exception is grave M8 that yielded a biconical ceramic object with a hole in the upper part and several tubular *Spondylus* beads located near the left forearm, but also traces of red ochre around the abdomen area.

Moreover, eight radiocarbon dates were performed on samples from graves M2, M3, M4, M5, M6 and M8, indicating a timespan between 4535 and 4169 cal. BC (Tab. 25, Fig. 47), falling within the time age of the Gumelnița culture (see section XII of current paper).

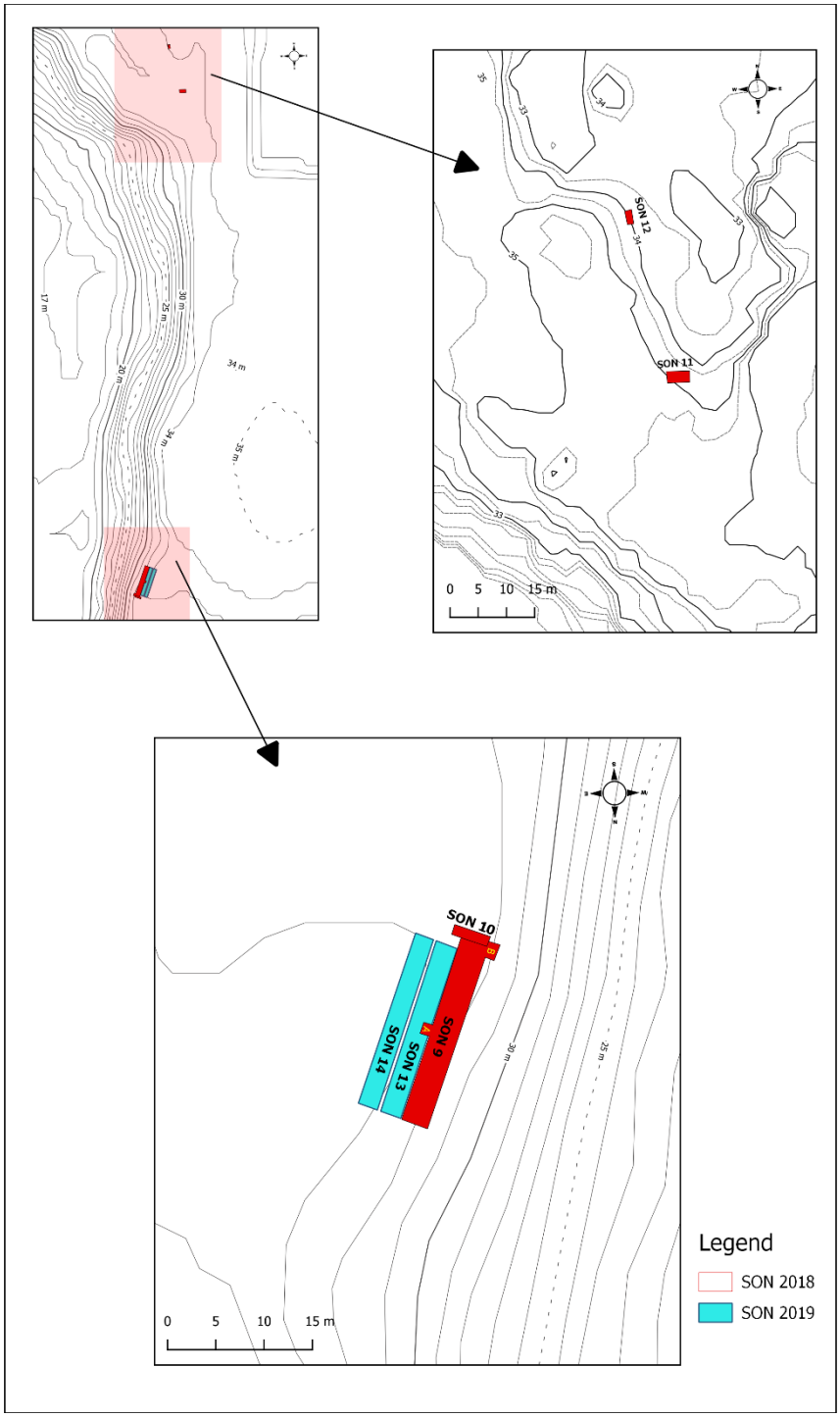

Fig. 4. Excavation areas conducted in Zone 3 of the Gumelnița site.

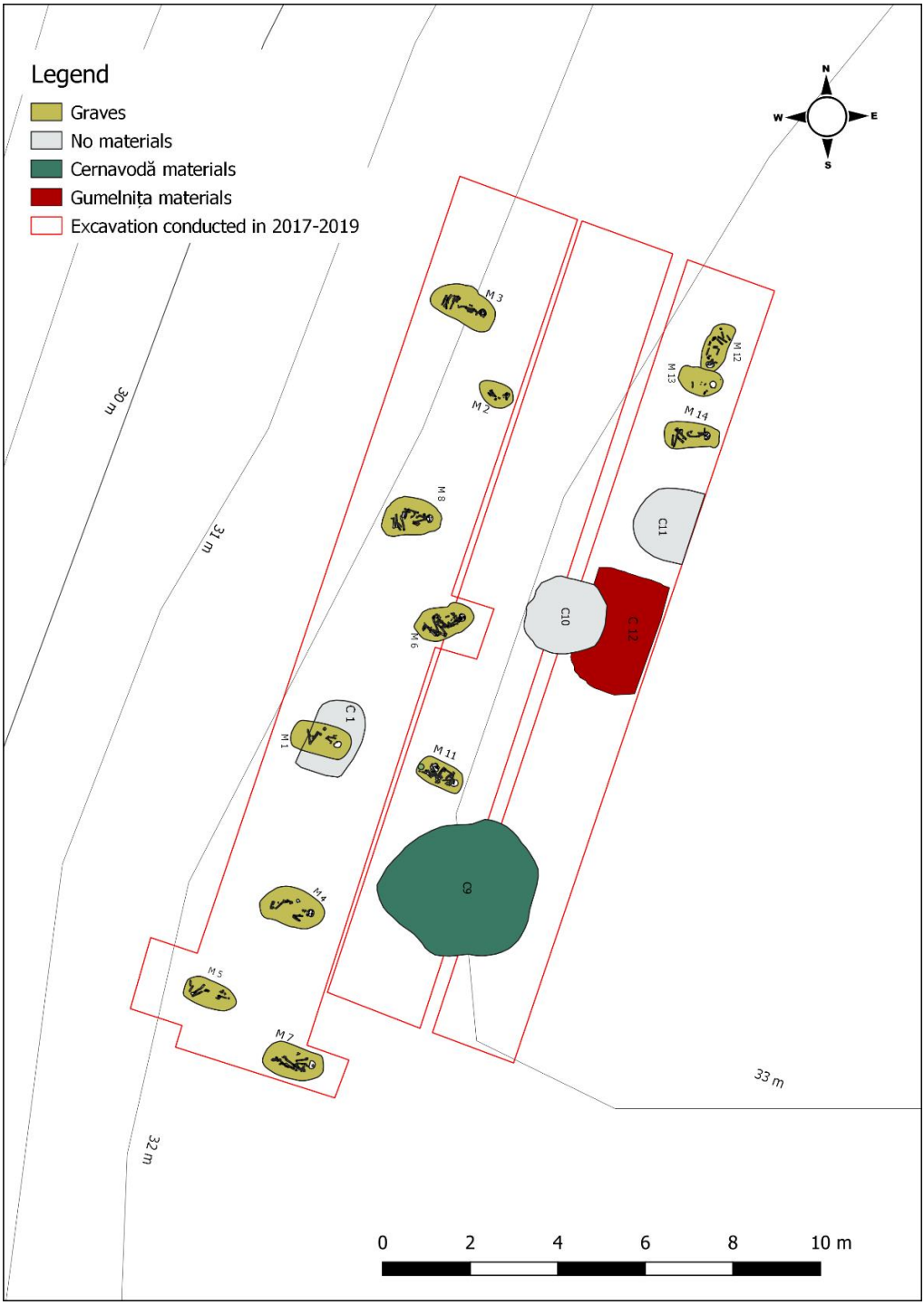

Fig. 5. The features excavated from the Gumelnița necropolis (Zone 3, 2018-2019).

We should also note that the graves of M1 and M3 contained bones of two individuals each, while M2 contained bones of three individuals (see section IV of current paper).

Moreover, eight radiocarbon dates were performed on samples from graves M2, M3, M4, M5, M6 and M8, indicating a timespan between 4535 and 4169 cal. BC (Tab. 25, Fig. 47), falling within the time age of the Gumelnița culture (see section XII of current paper).

In Son 11 (Fig. 4, 6) three overlapped circular pits were identified (C5, C6 and C8), and based on the pottery they yielded, we can assign them to the Gumelnița culture. Pit C6 overlapped the grave pit M10, which contained an articulated individual relatively well preserved, with the same funerary treatment elements (position and orientation) as those discovered in Son 9 (Fig. 6). No grave goods were identified here.

In the same area, in the western profile, another grave was identified at ca. 25 m NNW (M9). Unfortunately, as expected based on the preliminary observations on the profile, most of the grave was destroyed, leaving only the articulated lower limbs. Based on these elements, we could presume it was an individual placed in crouched position, head poiting more or less towards the E, as in the other cases. The grave goods were present. Based on these two graves and funerary treatment elements, we can assume that the necropolis from Gumelnița extended also to this area. A radiocarbon dating (4545-4363 cal. BC) (Tab. 25) on a bones sample of M10 grave confirmed the respective conclusion.

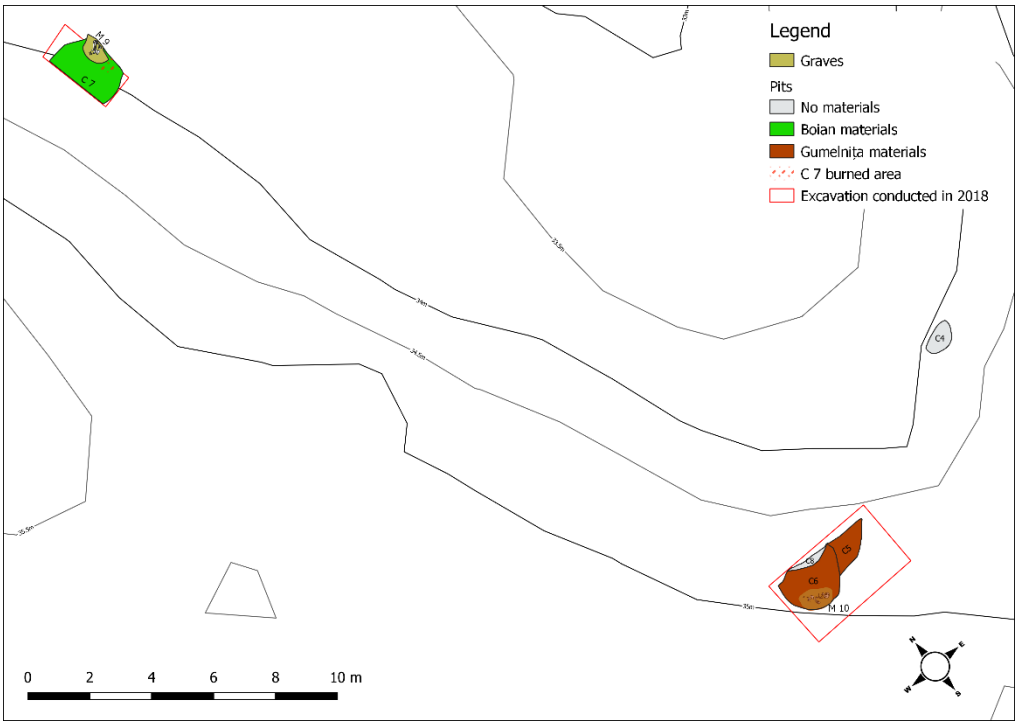

Fig. 6. Areas of rescue excavations in 2018 at Gumelnița (the landfill area from Zone 3).

In Son 12, below grave M9, another pit was identified. This feature (C7) preserved traces of burning on its bottom, association with ash, and pottery fragments specific to the

Boian culture. This situation does not surprise us, as excavations of the necropolis in the 1960s documented Boian features as well. However, pit C7 is the first feature of this kind investigated by our team and opens new avenues to follow in this project.

In Son 13 and Son 14, in 2019, were investigated four pits (C9, C10, C11, C12) attributed to the Gumelnița and Cernavoda I cultures (Fig. 5, 8). Also, four new burial graves were identified (M11, M12, M13 and M14) (Fig. 5, 8). Regarding the funerary treatment, all the investigated features contained individuals deposed in crouched position, on the left side, oriented E-W. No grave goods were noted except for grave M13 where a flat bone statuette (Fig. 42.8) specific to the Gumelnița communities was discovered, and M11 that yielded a fragmentary vessel which had been placed near the individual's lower limbs. Based on these two graves and the documented funerary treatment elements, we can assume that the necropolis of the Gumelnița settlement extended to this area.

The stratigraphic relations between the graves and the pits from Zone 3 are presented in the stratigraphic matrix (Fig. 7-8).

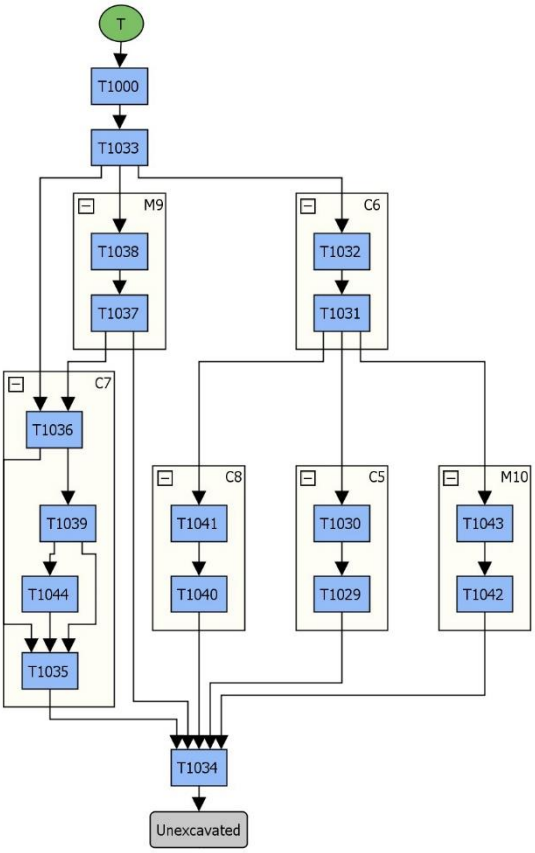

Fig. 7. Stratigraphic matrix for surveys 11-12 (the landfill area from the Zone 3).

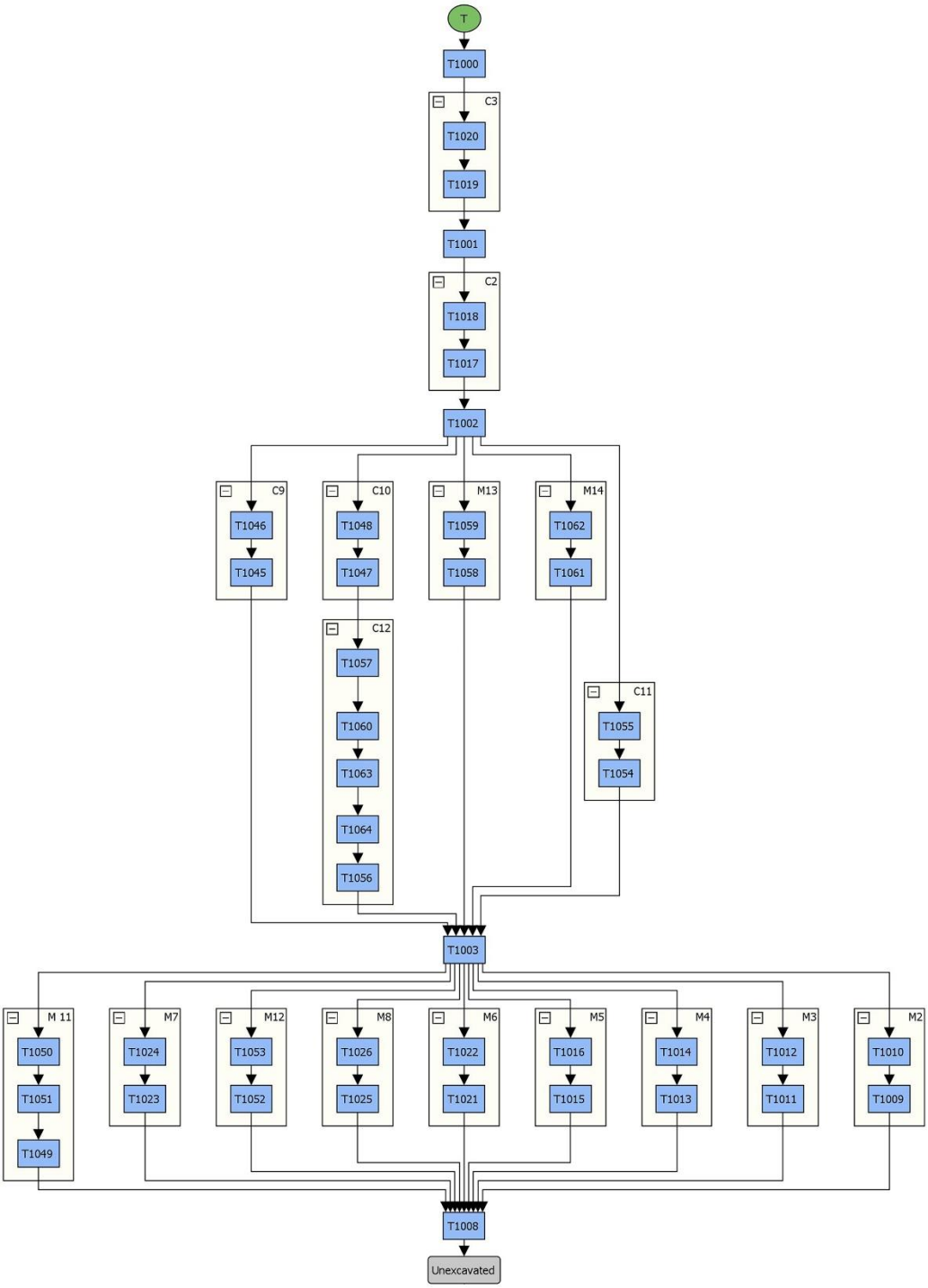

Fig. 8. Stratigraphic matrix for surveys 9-10 and 13-14 from Zone 3.

III. Geo-spatial analysis and landscape evolution

Spatial data acquisition and data processing

As previously mentioned[5], the area intended for investigation has a surface of 90 ha and was divided into three main research plots. In this respect, during the 2018-2019 archaeological seasons, the acquisition of topographical and archaeological data was made both at a micro and a macro scale.

At the micro research scale, we applied two methods of collecting topographical and archaeological data: recording data in an absolute geographic coordinate system with Total Station and photogrammetry using UAV. A Leica Total Station (TS06PlusR) was used to acquire absolute coordinate data for the archaeological finds, and the measurements were based on fixed reference points[6].

During the excavation, we used a drone to acquire imagistic data for the archaeological features such as pits or graves. We flew the drone from 2 m AGL[7] to obtain detailed and perfectly perpendicular photographs of the features. To obtain a better georeferencing of the features, we used 5 GCP[8] measured with a Total Station. Also, the excavation surfaces were documented from a 10 m AGL, and for each flight, we used 4 GCP placed at the corners of the section.

Inspired by the potential uses of remote sensing technology, our teams were interested to work at macro scale for the monitoring and documentation of the site area landscape. This type of survey has been carried out by two different teams, on different scales but with the same aims regarding the topography of the area. The first team was composed of specialists from the National Institute of Heritage in Bucharest (Romania), while the second team consisted of specialists from the University of Bucharest (Romania) and University College Gent (Belgium).

During our macro-scale research of the archaeological landscape, both teams used a DJI Phantom 4, a middle drone category with a rotary-wing system (vertical, small take-off and landing) with a weight of 1.4 kg and a 28-minute range. Due to the nature of the terrain and the large coverage surface, the survey was made without GCP. The advantage of UAVs is that it has an integrated GPS which provides absolute coordinates for the collected images. After the acquisition and downloading of all spatial data, data processing took place using Agisoft-Photoscan, a software-based Multi-image Photogrammetry (SfM-MVS) technique.

Our common goal was to continue the 2017 campaign objectives regarding the creation of a height altitude DEM of the site and its surroundings while obtaining new information regarding the later anthropic impact, in terms of both research, and military or civil interventions. At the same time, this survey was an experiment to see what results we could obtain according to several parameters.

The NIH missions stretched for two years, in 2017 and 2018. In the first year, during the archaeological campaign, NIH surveyed the *tell* settlement consisting of three flights that covered about 6.6 ha. They were made from different altitudes (100 m AGL; 120 m AGL; 127 m AGL) to see if it affected the processing of the data and the final

[5] Lazăr *et alii* 2017, p. 122.
[6] Lazăr *et alii* 2017, p. 125.
[7] Above ground level.
[8] Ground control points.

results. The next two flights were made in the second half of March 2018, but this time at a much higher resolution, from 16 m and 22 m AGL. Imagistic data were collected using Pix4Drone software, with an average flight speed, at a 90º camera angle, and 80% overlap. After processing the data collected from the field, it resulted in various models at different resolutions.

The second team applied this methodology in the early spring of 2019 and then in 2020 when the vegetation was not dense so it could not disturb and distort the terrain surface[9]. Even though the two surveys took place in different years, there is no major difference in the vegetation height and density.

Autonomous flight mode was enabled for the acquisition of data, using Ground Station Pro software from DJI, covering a total area of 174.82 ha. Both flights were made from 200 m AGL, at a speed of the platform of 15 m/s, and a GSD[10] of 8.7cm/px. Because of the speed of the aircraft, to prevent any blur motion when capturing the picture, we used the technique of hover and capture at a point[11]. To acquire data without gaps, the frontal overlap, as well as the side overlap, were established at 80% before the aircraft took off[12]. Using exported DEM and Orthophoto functions of the software, the model was saved at a 0.87 m resolution.

Unfortunately, as a result of not using GCP, the DEM and Orthophoto generated have also triggered the capabilities and limits of this data acquisition technique. In both cases, the absolute vertical accuracy of the DEM and Orthophoto has an error on X and Y coordinates between 0.1 and 4.7 meters.

At the same time, our teams had other objectives. While in 2017-2018 we only used temporary GCP to measure spatial data of the archaeological features, in 2019 one objective was to create a strong reference system for the site area by mounting permanent topographic control points. To achieve this objective, an important aspect taken into consideration was the topographic points' visibility and intervisibility, and their measurement was done with a total station, established in correlation with Stereo 1970 Romanian National System, and 1975 Black Sea Elevation System.

Simultaneously with the archaeological research carried out in Zone 1 and Zone 3, in 2019 the NIH team undertook a field survey that aimed to identify other anthropic traces of past communities. The research covered Zone 2: off-*tell* area, south of DN31 (Oltenița-Călărași) representing Area 1, divided into five other sectors (Sector 1-5). The division was made taking into account the configuration of the land and the modern plots of agricultural land. The survey method implemented was to divide the land into squares of 40 × 40 m covered by 4 people each[13].

As expected, most of Area 1 was covered by crops. As a result, we covered the land both on foot and from the air with a drone. We were able to investigate only two plots, one where the agricultural crop had been harvested (Sector 2), and the other with rare and small crops (Sector 3), thus allowing us to pursue our field evaluation.

---

[9] Campana 2009, p. 10-11.
[10] Ground sampling distance.
[11] This means that the aircraft stopped at predefined points to take the pictures.
[12] Eisenbeiss, Sauerbier 2011, p. 403.
[13] Vermeulen, Verhoeven 2006, p. 400.

The first plot surveyed is located in Sector 2, bordered to the north by DN 31, to the west by an agricultural dirt road which also represents the boundary between sectors 1 and 2, to the east by a plot on which corn was planted, and in the southern part by reed. Thus, the entire surface of the plot measuring ca. 90 m^2, was covered by 4 people, with a distance of approx. 2 m between each person, moving in E-W and W-E directions. The land lacks archaeological materials, the only anthropogenic traces identified were several modern concrete slabs.

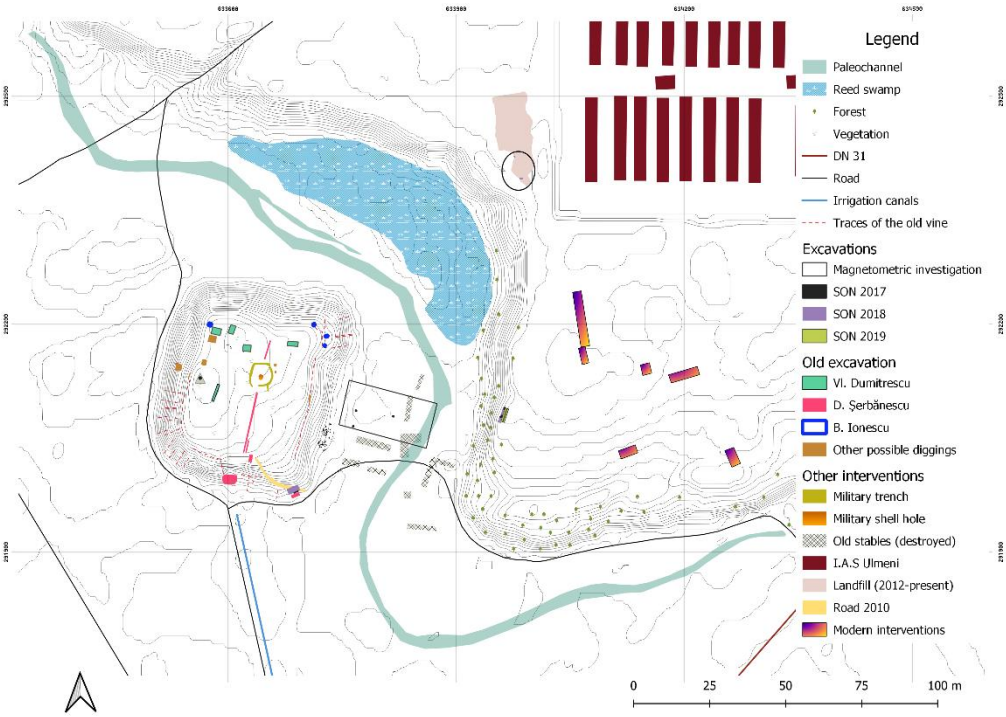

Fig. 9. New plan of the tell settlement and terrace at the Gumelnița site.

The second plot on which we were able to carry out surveys was sector 3, more precisely in its NE corner, with an area of ca. 53 m^2. In the northern part of the investigated land, we found the presence of rare glazed ceramic fragments, specific to the twentieth century, as well as sporadic fragments of modern and contemporary bricks. These finds are not accidental, given the fact that in the northern part, bordering the road DN31, there are large quantities of discarded household waste and modern construction debris.

Unfortunately, on the surveyed surfaces of the two plots there was no archaeological material to indicate traces of anthropogenic habitation.

While at a micro-scale this methodology helped to register spatial data with absolute precision and accuracy, on a macro scale, our team aimed to accurately determine the older excavation sections.

In order to observe the anthropic intervention of the Gumelnița site area, we also used satellite imagery (CORONA), and orthophotos. All of these were spatially referenced in the Stereo 70 coordinates system (EPSG:31700) and overlaid in GIS to observe the spatial relationships.

The comparative analysis of the spatial data was completed with bibliographic information[14].

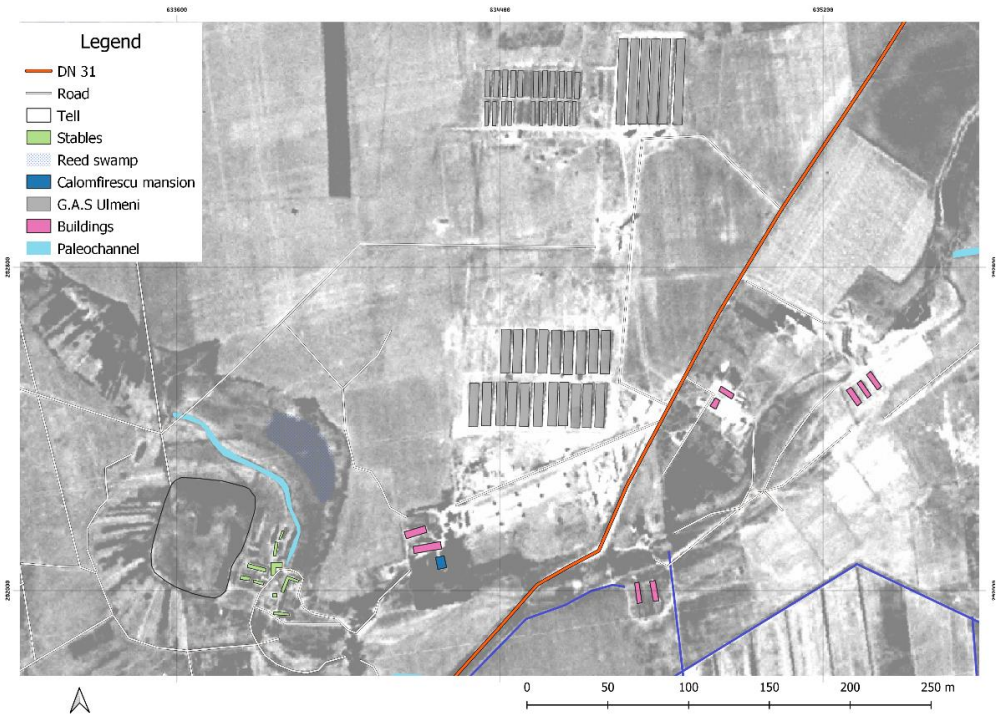

Fig. 10. CORONA image satellite (1964).

A comparative study. Results and discussion

After a comparative analysis of spatial and bibliographical data, we were able to identify some of the old excavations from the *tell* settlement but only speculate about the location of those from the terrace. To these we can add other modern anthropic interventions such as the traces from the former vine culture, the military trenches dug in the centre of the mound, and the road built by the Town Hall around 2011.

The importance of the site in the context of the wide landscape is stressed by the existence on the highest point of the mound of a geodetic reference point since 1898 up to at least 1974-1978 as it still present on the second edition of the Topographic Map of Romania 1: 25,000 (TMR).

[14] Dumitrescu 1925; Marinescu-Bîlcu 1962; Dumitrescu 1963; 1966; Dumitrescu, Marinescu-Bîlcu 2001; Lazăr 2001; Șerbănescu 2009; Amu 2015.

For the *tell* settlement dig, only two excavation plans were published[15] on which the geographical coordinates are reversed. Although the plans cannot be georeferenced, the description from the texts helped us to untangle these data and we were able to roughly identify them on the field as previously described[16] (Fig. 9-10).

The first excavations made on the properties of several inhabitants of rural Oltenița[17] were conducted by Barbu Ionescu on the slope of the mound and can be associated with the pits located by Vl. Dumitrescu in the eastern part of the X trench [18], i.e. in the NW area of the mound. Thus, the first excavations on *tell* are difficult to be precisely located, but traces of them are still visible in the northern part of the mound.

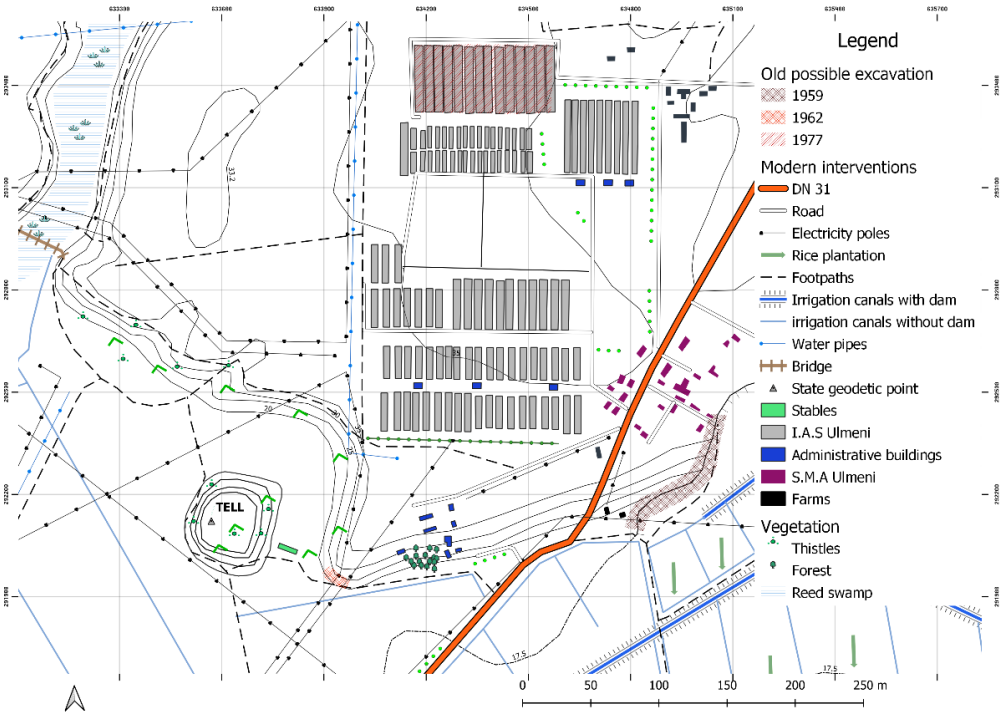

Fig. 11. Possible location of the old excavations on the terrace (after the Topographic Map of Romania 1:25,000, second edition, 1975-1987).

Although the exact location of Dinu V. Rossetti's excavations is unknown, it can be said that they were possible carried out in the south-eastern half of the mound, on the former Calomfirescu property[19], as shown in Dumitrescu`s 1960 plan. Another

[15] Dumitrescu 1925, p. 30; 1966, p. 52.
[16] Lazăr *et alii* 2017, p. 125.
[17] Șerbănescu 2009, p. 18.
[18] Dumitrescu 1925, p. 30.
[19] Property that was confiscated in 1948 and assigned to the zootechnical unit G.A.S Oltenița (according to Dumitrescu 1960, p. 51-52).

set of excavations that can be roughly located are those of Barbu Ionescu from 1963 in the NE area of the mound[20].

Major landscape alterations of the site area took place during the communist period, changes that led to new archaeological discoveries both on the settlement and the terrace sectors.

The vine culture attested on and around the *tell* settlement since 1898 on the Artillery Firing Plans was partially removed in 1960 with some plots still in use up until 1962-1963. This is also attested by the analysis of CORONA satellite imagery (1964) where the surface of the settlement seems to be smooth. Instead, the vineyard from the south-western side of the mound probably existed until the end of the 1960s.

The off-*tell* area was also slightly alternated by modern anthropic intervention as they appear in the CORONA imagery and the topographic maps (i.e. 1964-1977). For more than a decade G.A.S Oltenița stables functioned in this perimeter, and their delimitation in the SE of the mound explains the discoveries of modern constructions debris in SON3/2017[21].

Piecing together lacunar descriptions from the archaeological papers and unpublished notebooks, we were able to roughly determine the rescue excavations on the terrace sector from 1959-1977[22] as represented in Fig. 9. Thus, the only ravine of the terrace where the locals could have exploited clay is, according to the analysis of the Topographic Map of Romania 1: 25k, in the eastern region of the terrace, close to road DN31. In her notebooks, Marinescu-Bîlcu mentioned that the excavations from 1962 took place on the toe of the terrace, as it was uncultivated (Fig. 11). Regarding the excavation from 1977, it is difficult to estimate their location as they took place in a foundation trench on the north-eastern edge of the G.A.S Oltenița institution's premises. Between 1964 and 1977 the institution's unit houses almost doubled and if we just take into consideration the available description[23] and the cartographic analysis, then the excavated area is as represented in Fig. 11 in the far NE corner of the institution.

The most recent anthropic intervention that conducted to new archaeological discoveries was the waste deposit area, which according to the Google Earth and DTM orthophoto (2012-2016) analysis, appeared after 2012.

IV. Anthropological data

Material and methods

The current study presents the anthropological information obtained from the analysis of the skeletal remains from four inhumation burials, discovered in 2019 and denoted by the research authors as Graves (M) no. 11-14. The graves investigated in 2017 (M1) and 2018 (M2-M10) also benefited by anthropological analysis[24].

Prior to the actual anthropological analysis, the bone and dental fragments were cleaned with water, without using detergents and dried at room temperature. The next stage was to restore as much as possible the skeletal material, in order to take biometric

[20] Dumitrescu, Marinescu-Bîlcu 2001, p. 114.
[21] Lazăr *et alii* 2017, p. 130.
[22] Lazăr 2001, p. 173.
[23] Șerbănescu 1985, p. 25
[24] Vasile 2019; Lazăr *et alii* 2017.

data or to highlight morphological aspects, pathologies, epigenetic characters or markers of occupational stress.

To identify the skeletal remains, establish their symmetry and to determine the minimum number of individuals (MNI) within each funerary complex, we used specific osteology "laboratory" works from the anthropological literature, both for the subadults[25] and the adult individuals[26].

For the general evaluation of the conservation status of each individual, we applied an analysis model through which we recorded the degree of erosion and / or abrasion[27].

Also, some taphonomic aspects were investigated, such as discoloration and exfoliation of the bones, calcareous deposits or various imprints from the environment.

Sex determination was performed only in adult individuals and most often we investigated discriminant morphological differences in the pelvis (ventral arch: VA; subpubic concavity: SC; medial aspect of the ischiopubic ramus ridge: IR; greater sciatic notch: SN; preauricular sulcus: PS) and the skull (nuchal crest: NC; mastoid process: MP; supraorbital margin: SM; prominence of glabella:GL; mental eminence: ME)[28]. For the highest accuracy in assessing this parameter, we also used a series of recommendations for the diagnosis of sex, which also targets other skeletal segments[29].

Biological age was estimated by different methods, both according to the age group of the deceased and within the same age group (in the case of adult individuals). Thus, for subadult individuals, the estimation of age at death was made taking into account juvenile osteology works[30]. For adult individuals, age was estimated with predilection on the basis of some markers such as degenerative changes, in which case the range obtained is much wider compared to the ages of subadults. Therefore, for the greatest accuracy in assessing this parameter, we used several methods: diagnosing the morphology of pubic symphyses[31] and auricular surfaces[32] of the coxal bones, recording the degree of obliteration of cranial sutures[33] and observing the morphology of the costal sternal extremities[34]. The age categories used were: *infant* (I: 0-3 years); children (C: 3-12 years); adolescent (Ad: 12-20 years); young adult (YA: 20-35 years); mature adult (MA: 35-49 years) and old adult (OA: over 50 years)[35].

In addition to morphological observations, skeletal variability was highlighted using (bio)metric information, both in the skull[36] and in the postcephalic segment[37], according to recommendations from the anthropological literature.

---

[25] Schaefer *et alii* 2009.
[26] White, Folkens 2005.
[27] Brickley, McKinley 2004, p. 15-17.
[28] Buikstra, Ubelaker 1994, p. 16-21.
[29] Ferembach *et alii* 1980, p. 517-527; Acsádi, Nemeskéri 1970, p. 75-87.
[30] Schaefer *et alii* 2009.
[31] Brooks, Suchey 1990.
[32] Lovejoy *et alii* 1985.
[33] Meindl, Lovejoy 1985.
[34] Işcan *et alii* 1984.
[35] Buikstra, Ubelaker 1994, p. 9.
[36] Martin 1928, p. 625-678; Bräuer 1988, p. 160-192.
[37] Martin 1928, p. 1005-1052; Bräuer 1988, p. 193-232.

Based on regression equations, which take into account the sagittal diameter of the femoral head, the skeletal weight[38] could be calculated, exclusively for adult individuals.

The health and lifestyle of the Eneolithic populations were restored by observing some pathological aspects of bone and teeth. For this, we used a series of scientific works from the literature[39].

An approach that is quite difficult to achieve following osteological investigations is the attempt to capture the usual activities undertaken by an individual during life. For this, in our study, we recorded variations in markers of musculoskeletal stress[40] and calculated two metric indicators: bone asymmetry[41] and sexual dimorphism[42].

Last but not least, the analysis also took into account the registration of a set of epigenetic characters, which we find in the dento-maxillary segment, in the skull and in the postcranial sector[43].

The results of anthropological analysis

Grave M11. MNI: 1.

State of preservation: mediocre (grade 3), with mostly whitish (discoloured) skeletal remains. At the level of the skull (on the frontal and on the right parietal, exocranial), traces of a red (probably ochre) pigment are observed (Fig. 12).

Sex determination: male (VA = slight ridge; SC = absence; IR = broad; SN = 5; PS = 0; NC = 3; MP = 5; SM = 3; GL = 3; ME = 3).

Age at death: 50.5 years [45.6-54.5 years], older adult = 45.6 ± 10.4 years [27.0-66.0 years] (pubic symphysis, V phase); 54.5 years [50.0-59.0 years] (auricular surfaces, 7 phase); 51.5 ± 12.6 years (cranial sutures, 6 phase: 2-3-3-3-3-2-3 = 19); 50.0 ± 11.2 years [44.3-55.7 years] (costal sternal extremities, 6 phase).

Skeletal weight: 65.1 kg.

Skeletal inventory. Descriptive characters. The skeleton is approximately complete and has been restored. The neural skull is well preserved and represented, except for the left parietal, left temporal, and basilar part of the occipital bone, which are incomplete and fragmentary. It is very short (167.6 mm) and very narrow (135.0 mm), brachicran type (80.5). In the upper view is cryptozig. The forehead has a minimum width (89.9 mm) and a maximum width (108.5 mm), very narrow, has oval edges (82.9) and is metriometopic (66.6) and orthometopic (86.1). The parietals are convex (87.2), and the occipital is medium (75.2) in size and has a "house" shape. Only the left zygomatic, the hyoid and a fragment of the mandible were recovered from the facial skeleton. The dentition is permanent. Only one dental remain was recovered, probably a premolar. Eight teeth were lost antemortem: left I_1-M_1 and right I_1-I_2. The right orbit is very narrow (35.7 mm). We specify that the zygomatic, the place of origin of the masseter muscle, is very thick, which denotes a musculature and, at the same time, a pronounced masticatory activity.

---

[38] Auerbach, Ruff 2004, p. 336.
[39] Mann, Hunt 2005; Ortner 2003; Aufderheide, Rodriguez-Martin 1998.
[40] Myszka, Piontek 2012.
[41] Auerbach, Ruff 2006.
[42] Herrerin Lopez 2001, p. 237.
[43] Mann *et alii* 2016; Turner II *et alii* 1991; Hauser, De Stefano 1989; Finnegan 1978.

The postcranial skeleton is quite fragmentary; no whole long bone has been preserved. From the upper half is missing most of the vertebrae and ribs, the sternum, the right collarbone, the left ulna and the carpal bones. The pelvis is well represented, but incomplete. From the lower limbs are missing left patella, right fibula, metatarsals and phalanges of the foot. The right ulna is eurolenic (92.4), and the right femur, hyperplatimer (67,1).

Pathology. The individual had antemortem tooth loss in the left I_1-M_1 and right I_1-I_2.

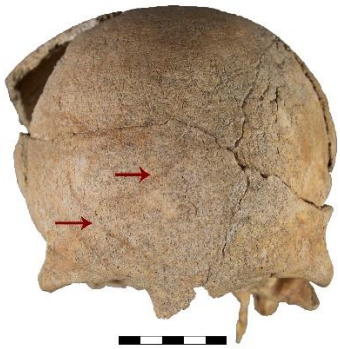

Fig. 12. M11. Traces of ochre on the frontal bone (skull, anterior view).

Fig. 13. M11. Cranial trauma in the stage of bone consolidation and remodelling (exocranial).

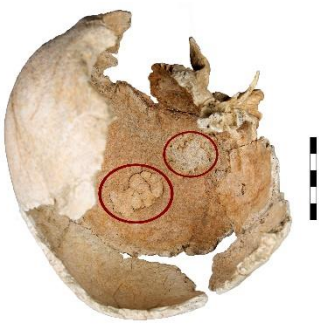

Fig. 14. M11. Cranial trauma with formation of bone callus (endocranial).

Fig. 15. M11. Osteoarthritis on the acromial facet (left scapula).

At the level of the calvaria, on the surface of the left parietal, multiple cranial traumas were observed: severe injuries, well expressed and showing signs of healing. We are talking about three penetrating, open, comminuted fractures, of the depressed type,

produced before death and which penetrated the inner lamina of the skull. The injuries were executed with a blunt object and were produced with a fast execution speed. On the exocranial side three impact areas are visible: the first, the largest of them, is located above the left temporal, and the other two, slightly smaller and closer to each other, are located at the parietal eminence (Fig. 13). Exclusively in endocranial aspect, phenomena of cell proliferation and new, consolidated bone formation are highlighted; the bone matrix shows obvious bony callus (Fig. 14). On the exocranial surface, the wound callus is not visible; here the processes of bone consolidation and remodelling took place. Morphologically, in the endocranial aspect, only two healing areas are visible: above the left temporalis (opposite to the first injury) and in the area of the parietal tuberosity, the result of the unification of the other two strikes. All these morphological features indicate that the individual certainly suffered significant brain damage, instead surviving long after the trauma, between a few months and a few years[44].

Other pathological manifestations observed are those related to osteoarthritis. These are expressed by porous surfaces, with irregular contour (at the level of the left acromial articular facet, Fig. 15) or by small osteophytes, observed on a thoracic vertebral body and on the first sacral vertebra. Osteophytes were also identified at the level of eight phalanges of the hands, palmar: two in the proximal row and one in the intermediate on the left, respectively three proximal and one intermediate on the right.

Epigenetic traits: a. cranial – supraorbital groove (bilateral); lambdoid ossicles (bilateral); styloid process (bilateral); mental foramen (one, left); mandibular torus (moderate, left); b. postcranial – exostosis in trochanteric fossa (right); third trochanter (right); lateral tibial squatting facet (bilateral); acromial articular facet (left); inferior talar articular surface (single, bilateral).

Grave M12. MNI: 1.

State of preservation: mediocre (grade 3), with mostly whitish (discoloured) skeletal remains. Bone fragments, especially those of the skull (exocranial and sutural) and diaphysis of long bones, have a calcareous crust.

Sex determination: female (SN = 2; NC = 2; MP = 3; SM = 2; GL = 2; ME = 2).

Age at death: 48.8 ± 10.5 years, mature adult = cranial sutures, 5 phase: 2-2-2-2-2-3-3 = 16.

Skeletal inventory. Descriptive characters. The skeleton is partially represented and has been restored. From the skull has been preserved, almost entirely, calvaria. The basal portion is almost exclusively destroyed. The skull has a medium minimum width (180.0 mm), is narrow (134.4 mm) and dolicocran type (74.7). The forehead has a maximum width (117.4 mm), narrow and is orthometopic (85.4). The parietals are medium (89.1) in size, and the occipital is also medium (75.0) and has a "house" shape. The visceral skull is represented only by a fragment of the left jaw and one of the mandible. The dentition is permanent. Ten teeth were recovered: left $C_{\#}$-P_1; left P_2, M_2-M_3 and right P_1-M_2.

The postcranial skeleton is generally incomplete and quite fragmentary; no whole long bone has been preserved. From the upper half were recovered some vertebral and costal fragments, the humerus, the radius and the ulna on the left. A fragment of the right ilium

[44] More information about this trauma will be the subject of a future study.

was identified from the pelvis. Only fragments of the femoral and tibial shafts and a tarsal bone are present in the lower limbs. The right tibia is eurycnemic (73.6).

Pathology. The individual has dental caries: root debris (left $C^{\#}$-P^{1}); distal (left P, right $C_{\#}$) and mesial (left M_3).

Epigenetic traits: a. cranial – superior sagittal sulcus curvature (bifurcated); mental foramen (one, bilateral).

Grave M13. MNI: 1.

State of preservation: precarious (grade 4), with mostly whitish (discolored) skeletal remains. On some of the bone fragments at the level of the skull, a particularly thick and adherent calcareous crust was deposited (Fig. 16); a fine calcareous crust, is also presents the diaphysis of the long bones.

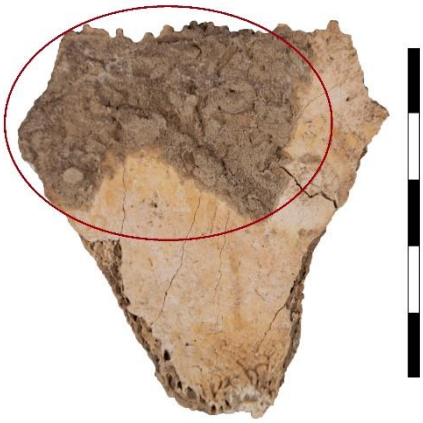

Fig. 16. M13. Consistent calcareous deposition inside the skull (endocranial).

Age at death: 1.0-3.0 years, *infant* = the right greater wing of the sphenoid is fused to the body; the oval and spinous foramina are complete.

Skeletal inventory. The skeleton is poorly represented, with the neural skull extremely fragmentary and probably approximately complete. The largest cranial squamous fragment has a length of 60.9 mm. The petrous pyramids of the temporals and a fragment of the sphenoid were also recovered from the skull. Fragments of the right femoral and tibial shafts and fragments of a fibula have been preserved from the postcranial skeleton.

Pathology. Periostitis: slight manifestations in the left tibial shaft.

Grave M14. MNI: 1.

State of preservation: mediocre (grade 3), with mostly whitish (discolored) skeletal remains. On some of the bone fragments at the level of the skull, exocranial, a particularly thick and adherent calcareous crust was deposited. Other skeletal elements affected by calcium carbonate deposits, however, less expressed, are the ribs and

diaphysis of the long bones. On the left humeral shaft, imprints of the roots can be seen on the entire surface of the bone.

Sex determination: female (SN = 1; PS = 1; NC = 2; MP = 3; SM = 2; GL = 1; ME = 1).

Age at death: 33.4 years [32.0-34.7 years], young adult = 32.0 years [30.0-34.0 years] (auricular surfaces, phase 3); 34.7 ± 7.8 years (cranial sutures, phase 2: 1-0-1-1-1-0-0 = 4).

Skeletal inventory. Descriptive characters. The skeleton is partially represented and has been restored. Almost the entire calvaria has been preserved from the skull. The basal portion is almost exclusively destroyed. The skull has a medium minimum length (179.5 mm), the forehead is orthometopic (89.6), and the parietals are convex (86.9). Only the right zygomatic and fragments of the mandible were recovered from the facial skeleton. The dentition is missing.

Fig. 17. M14. Lambdoid ossicles, right (skull, posterior view).

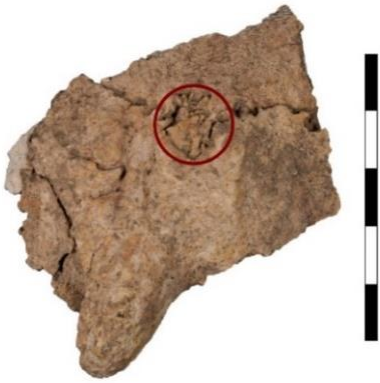

Fig. 18. M14. Ossicles inside the parietal groove (right temporal).

The postcranial skeleton is generally incomplete and quite fragmentary. No whole long bones have been preserved, the only relatively complete skeletal remains being the left humerus and femurs. From the upper half were recovered some vertebral and costal fragments, the left clavicle, scapulas, a fragment of a radial shaft and the humeri. A fragment of the left ilium was identified from the pelvis. Only fragments from the femoral, tibial and left peroneal shafts are present in the lower limbs. The left femur is eurimeric (85,1), and the left tibia, mesocnemic (68,3).

Skeletal weight: 58,7 kg.

Epigenetic traits: a. cranial – supraorbital groove (left); parietal foramen (right); lambdoid ossicles (right, Fig. 17); ossicles inside the parietal groove (right, Fig. 18); b. postcranial – septal aperture (right); preauricular sulcus (left).

Some discussions and remarks on anthropological data

So far, 14 inhumation tombs have been discovered in the Eneolithic necropolis from Gumelnița. The first were investigated in 2017 (M1) and 2018 (M2-M10)[45]. In the present study, the skeletal remains from four tombs (M11-M14) investigated in the 2019 campaign were analysed. In order to obtain a more authentic image that reflects the current state of the research of the Gumelniţa necropolis from the eponymous site, in the following we will try to make a general, brief presentation of the results obtained from the study of all skeletal remains discovered so far in this site. In short, the main anthropological information can also be found in the synoptic table (Tab. 1) at the end of this sub-section.

The skeletal fragments have been restored for most of the individuals (13). The restoration focused on the cephalic segment and less frequently on the postcranial skeleton.

Regarding MNI, skeletal remains from 18 individuals were identified in the 14 funerary graves, the probable result of post-depositional taphonomic activities, which are related to bioturbations produced by plant roots or animals. Therefore, three of the analysed funerary complexes show skeletal fragments from several individuals: MNI = 2 (M1 and M3) and MNI = 3 (M2).

The conservation status of the skeletal remains is generally mediocre (10 individuals – grade 3). In two situations, individuals are well preserved (grade 2), respectively poorly preserved (grade 4). Among the taphonomic markers identified on the surface of the bones we mention, in order of the frequency of occurrence: whitish periosteum, discoloured (in nine individuals); calcareous crust (in six individuals); exfoliated periosteum and imprints of plant roots (in five individuals each); traces of a red pigment, probably ochre (in three individuals); traces of secondary burns (in two individuals).

The sex of the individuals could be determined in 12 cases, resulting in eight female and four male individuals.

According to the estimated age at death, the following age classes were identified: *infant* (one individual); infant / child (one individual); child (one individual); young adult (five individuals); mature adult (three individuals); old adult (two individuals); adolescent / adult (an individual); adult (four individuals).

The high degree of fragmentation of the long bones allowed the calculation of the skeletal stature only for two individuals: a female (149.0 cm, middle category) and a male (164.8 cm, middle category). The weight could be calculated for six individuals: three females, with a range between 58.7-60.0 kg and three males (65.1-78.4 kg).

The pathological background of the Gumelniţa individuals includes a variety of dental and bone diseases. Among the dental diseases, antemortem dental loss (in three individuals) and dental caries (in two individuals) were identified. Bone pathologies are located at different levels and have the following substrates:

a) infectious: six of the analysed individuals were affected by periostitis, located exclusively in the lower limbs (on the femur, tibia and fibula);

b) articular: in two individuals, manifestations of osteoarthritis were observed, affecting the scapulas, spine and phalanges of the hands;

c) traumatic: one of the individuals, presents at the level of the skull, three traumatic lesions that show traces of healing, well expressed in both exocranial and endocranial aspect.

[45] Vasile 2019; Lazăr *et alii* 2017.

d) metabolic and endocrine: in one of the individuals were found possible manifestations associated with Paget's disease (*osteitis deformans*): obvious hyperostosis (thickening) of the frontal, left parietal and right femur bones.

Statistically, the interpretation of the presence of the markers of occupational stress (which reveals the repeated, constant, daily activities of individuals) or epigenetic characters (in order to establish inter– and intrapopulation biodiversity) is premature at this stage of research.

In the future, we look forward to further research on the Gumelniţa necropolis; the discovery of a larger number of individuals would lead to obtaining more conclusive information about the populations of Gumelniţa. Thus, we could calculate other parameters, such as, for example, the demographic ones (life expectancy at birth, mortality, etc.), thus being able to compare the necropolis from Gumelnița with other synchronous cemeteries or from different (pre)history periods.

Grave	**Sex**	**Age (years, months) / categories**	**Stature (cm)**	**Dental and bone pathology**
M.1 (I1)	F	33.0-45.0 years[46] / MA	–	–
M.1 (I2)	–	– / Ad-AD	–	–
M.2 (I1)	–	– /I-C	–	Periostitis
M.2 (I2)	–	AD	–	–
M.2 (I3)	–	AD	–	–
M.3 (I1)	F	34.7 ± 7.8 years / YA	–	–
M.3 (I2)	–	– / C	–	Periostitis
M.4	F	< 30.5 years / YA	–	Paget disease (?)
M.5	F	AD	–	Periostitis
M.6	M	51.5 ± 12.6 years / OA	164.8 ± 4.0	Antemortem tooth loss; periostitis
M.7	M	– / YA	–	–
M.8	M	30.5-32.0 years / YA		–
M.9	F	AD	149.0 ± 3.8	Periostitis
M.10	F	48.8 ± 10.5 years / MA	–	Dental caries; antemortem tooth loss; osteoarthrosis
M.11	M	45.6-54.5 years / OA	–	Antemortem tooth loss; cranial traumas; osteoarthrosis
M.12	F	48.8 ± 10.5 years / MA	–	Dental caries
M.13	–	1.0-3.0 years / I	–	Periostitis
M.14	F	32.0-34.7 years / YA	–	–

Tab. 1. Synoptic table with the main anthropological characteristics highlighted in the Eneolithic individuals from Gumelniţa.

V. Zooarchaeological data

The fauna discovered during the 2018 and 2019 archaeological seasons comes from the *tell* (Zone 1) and the *terrace* (Zone 3) areas[47]. Based on pottery charateristics (see chapter

[46] In the article signed by Lazăr *et alii* 2017, on page 132, an error has crept in: the estimated age of the individual M.1 (I1) is between 33.0-45.0 years, not between 33.0-35.0 years.
[47] See "*Archaeological features*" part of this paper.

VII) and radiocarbon dating (Tab. 25; Fig. 47), it was classified as belonging to the Boian-Vidra culture (Zone 3) and the Gumelnița culture, phase A2 (Zone 1 and 3). This is the third archaeozoological study conducted for this site after that of Necrasov and Haimovici[48] in 1966, and more recently, that of Lazăr and collaborators[49] in 2017.

The results of this study show that the faunal remains from the Gumelnița level are the most numerous, especially those coming from Zone 1 section (Fig. 19).

86 remains (0.444 kg) belonging to molluscs, fish, reptiles and mammals were recovered from the Boian level.

From the Gumelnița level, a total of 1907 remains with a weight of 18.61 kg were quantified (Fig. 19; Fig. 23), recovered directly from a series of stratigraphic units and archaeological features (see the archaeological part). From Zone 1 area we have identified remains from various classes of animals (Fig. 19): molluscs, fish, reptiles, birds and mammals. In Zone 3 area most of the remains come from mammals and molluscs.

These remains have all the characteristics of domestic waste (cutmarks from butchering - disarticulation and defleshing, burning traces and carnivore / pig tooth marks, etc.) and some have been transformed into tools for various activities.

Regarding the archaeozoological methodology, we used the methods presented in the works of Radu[50] for molluscs, fish and reptiles and of Bălășescu[51] for mammals.

	Gumelnița						**Boian**	
	Zone 1		**Zone 3**		**Total**		**Zone 3**	
NR		**%**		**%**		**%**		**%**
Mollusca	419	24.21	27	15.52	446	23.41	44	51.16
Pisces	41	2.37			41	2.15	8	9.30
Reptilia	22	1.27			22	1.15	2	2.33
Aves	4	0.23			4	0.21		
Mammalia	1245	71.92	147	84.48	1392	73.07	32	37.21
Total	**1731**	**100**	**174**	**100**	**1905**	**100**	**86**	**100**
Wheight (g)								
Mollusca	1818.43	10.94	154.62	7.75	1973.05	10.60	231.60	52.09
Pisces	132.73	0.80			132.73	0.71	6.00	1.35
Reptilia	31.50	0.19			31.50	0.17	5.00	1.12
Aves	7.84	0.05			7.84	0.04		
Mammalia	14628.00	88.02	1840.00	92.25	16468.00	88.48	202.00	45.43
Total	**16618.50**	**100.00**	**1994.62**	**100.00**	**18613.12**	**100.00**	**444.60**	**100.00**

Fig. 19. Distribution of the faunal remains from the 2018 and 2019 seasons at Gumelnița.

In the following we will present the material by animal classes, trying to describe some of the features of animal palaeoeconomy.

Molluscs. 490 mollusc shells were identified, of which 419 in Zone 1 area and 27 in Zone 3 area for the Gumelnița culture, and 44 for the Boian culture in the Zone 3

[48] Necrasov, Haimovici 1966.
[49] Lazăr *et alii* 2017.
[50] Radu 2011.
[51] Bălășescu 2014.

area (Fig. 19). Of these, the most numerous (274 and 35 respectively) belong to the three species of the river mussels of the genus Unio (*U. pictorum, U. tumidus and U. crassus*) followed by those of the lake mussel of the genus Anodonta (132 and 4) and Pseudanodonta (one fragment in the *tell* area, Fig. 21.1). The gastropod *Viviparus* sp. is also present with 30 shells and *Cepaea* sp. with 4 and 5 shells respectively (Tab. 1).

The ratio between the genus Unio and Anodonta was also followed for this sample. Thus, for the Gumelnița level, the remains of Unio reach 61.6% of the total molluscs and those of Anodonta 30.58%. The high percentage of the lake mussel (*Anodonta* sp.) is specific for areas of lakes and ponds with permanent water supply, according to current data from locations on the Danube[52].

For the Boian level the values are about 80% for Unio and 9% for Anodonta. Given the low number of remains (44) we can hypothesize, but with caution, that the remains come from individuals collected mainly from a river or a river branch with a slow flow.

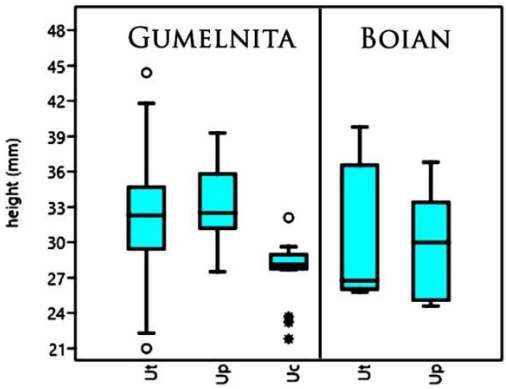

Fig. 20. The variation of the shell height of the genus Unio *(Ut*-Unio tumidus*; Up*-Unio pictorum*; Uc*-Unio crassus*) from Zone 1 (Gumelnița level, n = 92) and Zone 3 (Boian, n=15).*

The dimensions of the Unio individuals in Zone 1 fall into the middle category but small or large individuals are also present (Fig. 20). The shell height values of the 11 *Unio pictorum* individuals range between 27.5 and 39.3 mm (average 33.1), of the 65 *Unio tumidus* individuals between 21 and 44.4 mm (average 32.3) and of the 16 *Unio crassus* individuals between 21.8 and 32.1 mm (average 27.6 mm). These data fall within the limits recorded in previous studies of the Gumelnița A2 level[53]. For the Boian level the average data are close in the case of the *Unio pictorum* shell: 29.9 mm average height (minimum 24.3 and maximum 36.8 mm for 11 individuals). Regarding the *Unio tumidus*, the dimensions of the 4 individuals represent small values for three shells (24-26 mm) and large for the fourth (39.8 mm).

Fish. 41 remains from Zone 1 and eight from Zone 3 were identified (Tab. 2). They belong to three species: pike, carp and catfish (Fig. 21.2). Pike remains come from a medium-sized individual - 0.51 m TL (total length) and 0.9 kg from Zone 1 and two of similar size

[52] Radu 2011, p. 82.
[53] Lazăr *et alii* 2017.

from Zone 3 - 0.58 and 0.57 cm TL (1.2 kg). Carp is present with skeletal remains only from Zone 1. It was possible to estimate the dimensions for three individuals. Two of them were of medium length - 0.54 and 0.63 m TL (2.54 and 3.66 kg respectively) and one of large size- 0.76 m TL (6.32 kg). The remains of at least six catfish individuals also come from Zone 1. A small one, measuring 0.6 m TL (1.76 kg), four large individuals, between 1.31 and 1.45 m TL (16.75 and 22.47 kg) and another one, very large, reaching about 1.76 m TL (42 kg).

The reconstituted dimensions are medium and large, all the fish presented above falling into the category of breeding individuals.

Reptiles. The remains from the carapace and plastron (22 from Zone 1, respectively two from Zone 3) were identified as belonging to the aquatic turtle *Emys orbicularis* (Fig. 21.3).

Birds. Only four bird remains were identified. Three of these come from small individuals and one from a large individual.

Fig. 21.1. Shells of Anodonta *sp.,* Unio crassus, *and* Unio tumidus*; 2. Carp operculum (*Cyprinus carpio*), precaudal catfish vertebra (*Silurus glanis*); 3. Turtle shell bone plates (*Emys orbicularis*).*

Mammals. The fauna that comes from the Gumelnița levels is much richer, it counts 1392 remains that weigh 16468 g, contrasting the one from the Boian Vidra level, which counts only 32 remains that weigh 202 g. The archaeozoological material, much

more numerous compared to the other animal classes, will be presented on cultural levels, starting with Boian Vidra (Tab. 4) and ending with Gumelnița A2 (Tab. 3.1-2).

i. Boian Culture, phase Vidra

The fauna was discovered on Zone 3, in Sondage 12, feature no. 7 and is very low in number - 32 remains (202 g) of which 18 remains (56.2%) with a weight of 174 g (86.1%) were specifically identified. The list of species is very short, only three taxa have been identified precisely: domestic cattle, sheep and fox. Among the remains of indeterminate ovicaprines there might also be goat, as well (Tab. 3.1-2). The remains of ovicaprines (11) exceed those of cattle (6), but, by weight, those of cattle have the highest share (77%). The only wild species is the fox (a metapodial fragment) (Tab. 3.1-2). As minimum number of individuals, each species is present with only one individual. Thus, for cattle we have an adult, and for sheep and fox we have a subadult / adult individual.

Unfortunately, the extremely small faunal sample does not allow us to initiate other discussions, but we hope that in the future other samples will provide us new data that will permit the reconstruction of the palaeoeconomy of Boian Vidra communities at Gumelnița and their possible evolution.

ii. Gumelnița Culture, phase A2

Most of the Gumelniţa faunal sample comes from Zone 1- 1245 remains (89.4%) weighing 14628 g (88.8%) - and the rest from Zone 3 - 147 remains (10.6%) that have a weight of 1840 g (11.2%) - (Tab. 3.1-2). In Zone 1, the degree of taxonomic identification is 60.6%, while on the Zone 3 it is 61.2%. The list of identified taxa is much longer compared to the Boian Vidra level. Thus, we have five domestic species: cattle (*Bos taurus*), sheep (*Ovis aries*), goat (*Capra hircus*), pig (*Sus domesticus*), dog (*Canis familiaris*) and nine wild taxa: horse (*Equus ferus*), aurochs (*Bos primigenius*), red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*), fox (*Vulpes vulpes*), badger (*Meles meles*), beaver (*Castor fiber*) and hare (*Lepus europaeus*) (Fig. 22. 1-4). The genus *Bos* sp. and *Sus* sp. also appear in Figure 23 and bring together those remains of cattle (domestic cattle and aurochs) and pigs (domestic pig and wild boar) whose status could not be determined precisely due to increased fragmentation or young age, which does not allow the biometric separation of these taxa.

The ratio between domestic and wild mammals is clearly in favour of the domestic ones, which suggests that animal husbandry has played an important role in the Gumelnița community. Thus, in total, they represent as NR 91.8% (on Zone 1 the value is 91.2%, while on the Zone 3 we have 96.7%), and as W we have a total of 87.9% (Zone 1 - 86.4 %, Zone 3 - 98.9%). Among the domestic species, as NR, cattle predominate with 40.8% (Zone 1 - 41.2%, Zone 3 - 36.7%), being followed by ovicaprines with 32.6% (Zone 1 - 32.5%, Zone 3 - 33.3%) and pigs with 10.7% (Zone 1 - 10.5%, Zone 3 - 12.2%) (Fig. 23). By weight, the preponderance of cattle is even more highlighted, reaching values of 62.5% (Zone 1 - 62.3%, Zone 3 64.5%), being followed by pigs 11.4% (Zone 1 - 11%, Zone 3 - 14.5%) and then by ovicaprines 10.7% (Zone 1 - 10.1%, Zone 3 - 15.3%) (Fig. 23).

The dog is present with a relatively large number of remains compared to other Gumelnița sites with archaeozoological studies[54]. Thus, as NR, this species reaches 7.8% (Zone 1 - 7%, Zone 3 - 14.4%), while as W we have 3.2% (Zone 1 - 3%, Zone 3 - 4.6%)

[54] Lazăr *et alii* 2016.

(Fig. 23; Tab. 3.1-2). The taphonomic study of dog remains revealed, on two mandibular fragments (US 1044 and US 1053), the existence of defleshing cutmarks (which can also be interpreted as disarticulation) which suggests that the animal was consumed (Fig. 24). To these can be added an ulna shaft (US 1053) with defleshing cutmarks. The fact itself is not exceptional if we consider that the phenomenon of cynophagy has been identified in other Gumelniţa sites: Hârșova, Bordușani, Vitănești, Sultana, Taraschina, and Măriuța[55].

*22.1. Right pig (*Sus domesticus*) radius.*

*22.2. Aurochs (*Bos primigenius*) fused right distal metacarpus.*

*22.3. Wild horse (*Equus ferus*) lateral metapodial with cutmarks.*

*22.4. Hare (*Lepus europaeus*) left proximal fused femur.*

Fig. 22. Mammalian faunal remains discovered in the Gumelnița level.

[55] Bălășescu *et alii* 2005, p. 211-224; Bălășescu, Radu 2011, p. 395; Brehard, Bălășescu 2012, p. 3173.

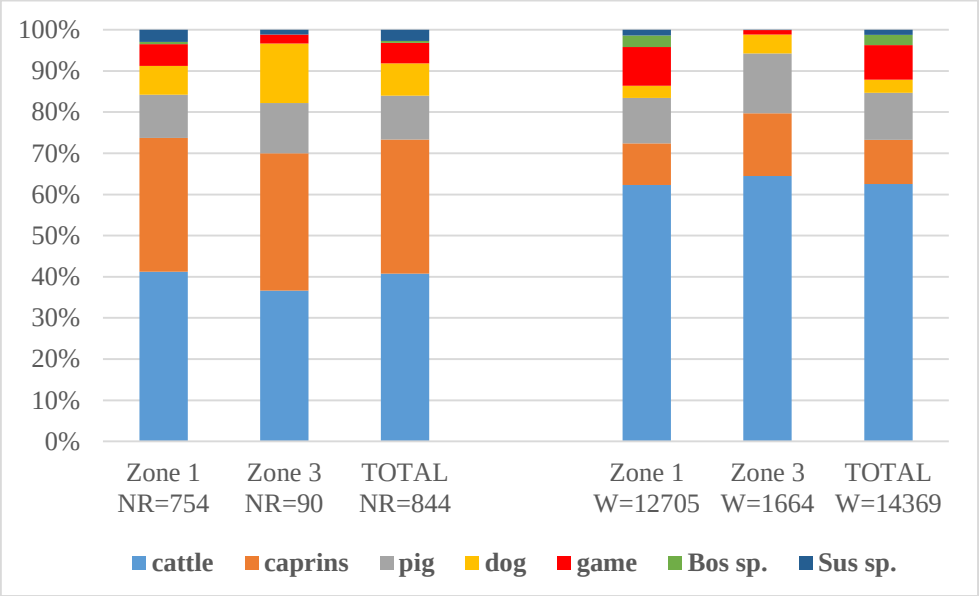

Fig. 23. Percentage distribution of mammalian remains (NR and W) in the Gumelnița level, phase A2.

Fig. 24. Right dog mandible with cutmarks (detail on the right).

Despite the samples of different sizes, the most obvious difference between Zone 1 (NR = 754, G = 12705 g) and Zone 3 (NR = 90, G = 1664 g) is that, as a percentage, the number of dog remains discovered in the Zone 3 are twice more numerous than on the Zone 1 (14.4% to 7% - Fig. 23). This inflated importance of the dog can also be caused by the small sample. Future faunal samples from the Zone 3, much more numerous, will bring new information to contest or confirm this high share of the dog.

Wild mammals are poorly represented as NR and W, but are relatively well represented as number of taxa (9 species). There are differences in the number of wild taxa present on Zone 1 (9) and Zone 3 (1), which can be closely related to the size of the sample from the Zone 3. The wild boar has the highest share as NR with 1.9%, and is followed by a group of species (red deer, roe deer, aurochs) with about 0.5%; as W, the wild boar leads with (3.4%) followed by the wild horse (1.9%) and the aurochs (1.7%). Apparently, very large and large species are the main game, as they have a relatively significant contribution to increasing the amount of meat consumed by these communities.

Although the faunal sample is relatively small, we have also tried to make a series of estimates of the minimum number of individuals (MNI). At this time of the study we did not construct slaughter profiles for the main species of domestic animals (cattle, ovicaprines and pigs) due to the insufficient number of dental remains that would have allowed us to accurately estimate the age at death for these species.

The differences between Zone 1 and Zone 3 sectors are much more obvious, but they need to be treated with caution, especially given the very small sample in the Zone 3 sector. The share of wild species based on MNI is much higher on Zone 1 (30.6%) than on Zone 3 (7.1%), the average being 24% of the total Gumelnița culture, but this may be the consequence of the large number of wild species discovered mostly on Zone 1 (Fig. 25 and 26).

Within domestic species it is observed that between Zone 1 and Zone 3 there are differences, in the sense that cattle predominate on Zone 1, followed by pigs and ovicaprines, while on Zone 3 we have ovicaprines followed by pigs and cattle (Fig. 25 and 26).

MNI	**Zone 1**	**Zone 3**	**total**	**%**
Bos taurus	6	2	8	16.0
Ovis aries	3	3	6	12.0
Capra hircus	1	1	2	4.0
Ovis/Capra	3	1	4	8.0
Sus domesticus	4	4	8	16.0
Canis familiaris	5	1	6	12.0
Equus ferus	1		1	2.0
Bos primigenius	1		1	2.0
Cervus elaphus	1		1	2.0
Capreolus capreolus	1		1	2.0
Sus scrofa	3		3	6.0
Vulpes vulpes	1	1	2	4.0
Meles meles	1		1	2.0
Lepus europaeus	1		1	2.0
Castor fiber	1		1	2.0
Bos sp.	1		1	2.0
Sus sp.	2	1	3	6.0
TOTAL	**36**	**14**	**50**	100.0

Fig. 25. Distribution of the minimum number of individuals (MNI) by studied sectors (Gumelnița culture, phase A2).

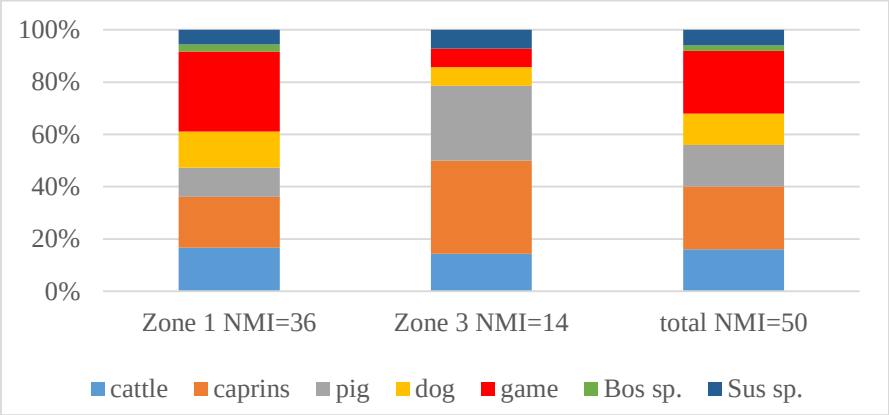

Fig. 26. Percentage distribution of the minimum number of individuals (MNI) by studied sectors (Gumelnița culture, phase A2).

Some final remarks about zooarchaeological data

We will refer mainly to the Gumelnița culture and less to the Boian Vidra culture, given the small sample of the latter. Thus, the exploitation of aquatic resources was carried out in the areas adjacent to the site. River mussels (*Unio* sp.) and lake mussels (*Anodonta* sp.) were consumed. The ratio between them (2: 1) shows us, according to current comparative data[56], that the harvesting places, most likely in the vicinity of the site, were lakes and ponds permanently supplied by an active branch of the river Argeș, which was probably flowing nearby. One argument would be the presence of over 7% of *Unio crassus* individuals in the total *Unio* shells. The preferred living conditions of this species are permanent, well-oxygenated waters with an active current, characteristic only of rivers or their branches. The aquatic turtle *Emys orbicularis* also prefers areas of ponds and lakes with a lot of aquatic vegetation but also sunny high shores for laying eggs. Fishing provides an important amount of protein by catching large individuals. So far, only three species have been identified: pike, carp and catfish. They prefer watercourses with a moderate water flow but also ponds or flooded areas.

Animal husbandry played an important role, the most important being the cattle, which are followed by ovicaprines and pigs disputing the second place depending on the quantification method (NR, W or MNI). The dog was consumed. Wild animals have a relatively small share in terms of number of remains and weight, but higher as MNI. Apparently, this activity has contributed to the enrichment of meat-based nutrition.

Preliminary data from this study fall within the characteristics of the animal palaeoeconomy of Gumelnița communities[57]. However, between the *tell* (Zone 1) and the *terrace* (Zone 3), the results of this study show some differences that will need to be carefully tracked in future research and which may influence the results related to the main features of animal palaeoeconomy and the evolution of the landscape during the two chronological episodes.

[56] Radu *et alii* 2016, Figure 4, p. 344.
[57] Bălășescu *et alii* 2005, p. 211-224.

	Gumelnița																	Boian		
NR	1011	L3 1036	C9 1041	C10 1043	1044	C12 1048	1050	1053	1058	**Total Zone 1**	C5 T1030	C12 T1057	C12 T1060	C12 T1063	C12 T1064	**Total Zone 3**	Total	C7 T1036	C7 T1039	**Total Zone 3**
Unio tumidus	8	7	1		18	1	4	43	1	83			3	4	1	8	91	2	4	6
Unio pictorum	1	1			5	1		10		18	1	1				2	20	5	6	11
Unio crassus	3	2	1		2	1	1	9		19							19			
Unio sp.	17	23		1	49	4	10	29		133		3	1	7		11	144	12	6	18
Anodonta sp.	11	25	2	3	44	6	9	31	1	132			2	2	1	5	137	2	2	4
Psudanodonta sp.					1					1							1			
Viviparus sp.	2	1		1	13	2		9	1	29				1		1	30			
Cepaea vindobonensis					3			1		4							4	3	2	5
Total Mollusca	**42**	**59**	**4**	**5**	**135**	**15**	**24**	**132**	**3**	**419**	**1**	**4**	**6**	**14**	**2**	**27**	**446**	**24**	**20**	**44**
Esox lucius					3					3							3		5	5
Cyprinus carpio		1	1		4	1	4	1		12							12			
Cyprinidae																			2	2
Silurus glanis	1	1			4	3		4		13							13			
Pisces ind.					7	4		2		13							13		1	1
Total Pisces	**1**	**2**	**1**		**18**	**8**	**4**	**7**		**41**							**41**		**8**	**8**
Reptilia (*Emys orbicularis*)			**1**	**1**	**9**	**5**	**5**	**1**		**22**							**22**		**2**	**2**
Aves					**2**	**1**		**1**		**4**							**4**			
Total	**43**	**61**	**6**	**6**	**164**	**29**	**33**	**141**	**3**	**486**	**1**	**4**	**6**	**14**	**2**	**27**	**513**	**24**	**30**	**54**
Mass (g)																				
Unio tumidus	51	45.8	7		124.05	2	15.8	244.33	9	498.98			32	32	3.1	67.1	566.08	10	25	35
Unio pictorum	5	4.4			34.4	4		56		103.80	2	10.2				12.2	116	18	38.1	56.1
Unio crassus	21	5	10		12.1	2	7	44.2		101.30							101.3			
Unio sp.	126	155.9		5	180.93	50	45	109.75		672.58		11.1	6.4	38		55.5	728.08	72	62	134
Anodonta sp.	29	78.2	7	1.5	121.42	18	30.7	102.28	0.63	388.73			6.9	8	1.72	16.62	405.35	2	1.5	3.5
Psudanodonta sp.					1					1.00							1			
Viviparus sp.	6	1		0.5	18	2		20.59	1.95	50.04				3.2		3.2	53.24			
Cepaea vindobonensis					2					2.00							2	2	1	3
Total Mollusca	**238**	**290.3**	**24**	**7**	**493.9**	**78**	**98.5**	**577.15**	**11.58**	**1818.43**	**2**	**21.3**	**45.3**	**81.2**	**4.82**	**154.62**	**1973.05**	**104**	**127.6**	**231.6**
Esox lucius					2.2					2.20							2.2		3	3
Cyprinus carpio		1	1.5		6.7	0.5	5	4		18.70							18.7			
Cyprinidae																			2	2
Silurus glanis	7	4.6			30.96	22		36.4		100.96							100.96			
Pisces ind.					4.5	4		2.37		10.87							10.87		1	1
Total Pisces	**7**	**5.6**	**1.5**		**44.36**	**26.5**	**5**	**42.77**		**132.73**							**132.73**		**6**	**6**
Reptilia (*Emys orbicularis*)			**1.5**	**1**	**12.9**	**6**	**7**	**3.1**		**31.50**							**31.5**		**5**	**5**
Aves					**4**	**1**		**2.84**		**7.84**							**7.84**			
Total	**245**	**295.9**	**27**	**8**	**555.16**	**111.5**	**110.5**	**625.86**	**11.58**	**1990.50**	**2**	**21.3**	**45.3**	**81.2**	**4.82**	**154.62**	**2145.12**	**104**	**138.6**	**242.6**

Tab. 2. Distribution of the faunal remains (molluscs, fish, reptiles and birds) discovered at Gumelnița (2018 and 2019).

NR	Zone 1													Zone 3								
Context		**L3**	**L3**	**C8**	**C9**	**C10**		**C12**						**C5**	**C6**	**C12**	**C12**	**C12**	**C12**			
Specie/SU	**1011**	**1036**	**1037**	**1039**	**1041**	**1043**	**1044**	**1048**	**1050**	**1053**	**1056**	**1058**	**Total**	**1030**	**1032**	**1057**	**1060**	**1063**	**1064**	**Total**	**TOTAL**	**%**
Bos taurus	63	34	1	1	8		80	23	32	63		6	311	1	16	1	3	10	2	33	344	40.8
Ovis aries	5						6	1	2	6			20	1	2			1		4	24	2.8
Capra hircus							3						3	1						1	4	0.5
Ovis/Capra	17	26				2	74	18	21	55	1	8	222	4	10		2	7	2	25	247	29.3
Sus domesticus	16	4			3	2	22	6	10	11		5	79	1	4		6			11	90	10.7
Canis familiaris	9	3					12	3	5	18		3	53		12		1			13	66	7.8
Equus ferus							1		1	1			3							0	3	0.4
Bos primigenius	2	1					1						4							0	4	0.5
Cervus elaphus	1						2			1			4							0	4	0.5
Capreolus capreolus	1	1						1		1			4							0	4	0.5
Sus scrofa	6				1		3		1	5			16							0	16	1.9
Vulpes vulpes								2					2		2					2	4	0.5
Meles meles				1						1			2							0	2	0.2
Lepus europaeus		1							1	1			3							0	3	0.4
Castor fiber		1								1			2							0	2	0.2
Bos sp.										4			4							0	4	0.5
Sus sp.					1		6	2	1	11		1	22	1						1	23	2.7
Total mammals determined	**120**	**71**	**1**	**2**	**13**	**4**	**210**	**56**	**74**	**179**	**1**	**23**	**754**	**9**	**46**	**1**	**12**	**18**	**4**	90	**844**	**100.0**
undetermined mammals big size	38	21		2	1		77	20	34	52		9	254	1	5	6	9		1	22	276	
undetermined mammals medium size	22	20		4	1	2	73	39	40	29		7	237	1	23	1	10			35	272	
Total mammals	**180**	**112**	**1**	**8**	**15**	**6**	**360**	**115**	**148**	**260**	**1**	**39**	**1245**	**11**	**74**	**8**	**31**	**18**	**5**	**147**	**1392**	

Tab. 3.1. Distribution of the number of mammal remains from the Gumelnița levels discovered at Gumelnița (2018 and 2019).

Wheight	Zone 1													Zone 3								
Context		**L3**		**C8**	**C9**	**C10**		**C12**		**L4**				**C5**	**C6**	**C12**	**C12**	**C12**	**C12**			
Specie/SU	**1011**	**1036**	**1037**	**1039**	**1041**	**1043**	**1044**	**1048**	**1050**	**1053**	**1056**	**1058**	**Total**	**1030**	**1032**	**1057**	**1060**	**1063**	**1064**	**Total**	**TOTAL**	**%**
Bos taurus	2427	569	12	19	123		1872	477	512	1847		54	7912	8	487	12	126	379	61	1073	8985	62.5
Ovis aries	85						46	44	19	63			257	15	89			11		115	372	2.6
Capra hircus							36						36	2						2	38	0.3
Ovis/Capra	127	81				5	366	80	74	243	1	19	996	10	52		21	32	22	137	1133	7.9
Sus domesticus	355	56			62	17	470	112	84	181		64	1401	1	54		187			242	1643	11.4
Canis familiaris	68	4					94	5	26	159		23	379		66		10			76	455	3.2
Equus ferus							250		20	7			277							0	277	1.9
Bos primigenius	80	30					136						246							0	246	1.7
Cervus elaphus	10						48			19			77							0	77	0.5
Capreolus capreolus	10	28						9		3			50							0	50	0.3
Sus scrofa	170				28		104		15	174			491							0	491	3.4
Vulpes vulpes								2					2		18					18	20	0.1
Meles meles				4						7			11							0	11	0.1
Lepus europaeus		12							5	1			18							0	18	0.1
Castor fiber		16								8			24							0	24	0.2
Bos sp.										350			350							0	350	2.4
Sus sp.					12		39	9	5	110		3	178	1						1	179	1.2
Total mammals determined	**3332**	**796**	**12**	**23**	**225**	**22**	**3461**	**738**	**760**	**3172**	**1**	**163**	**12705**	**37**	**766**	**12**	**344**	**422**	**83**	**1664**	**14369**	**100.0**
undetermined mammals big size	330	130		4	9		422	92	177	276		73	1513	3	54	21	50		5	133	1646	
undetermined mammals medium size	75	30		2	7	2	109	53	64	58		10	410	1	27	5	10			43	453	
Total mammals	**3737**	**956**	**12**	**29**	**241**	**24**	**3992**	**883**	**1001**	**3506**	**1**	**246**	**14628**	**41**	**847**	**38**	**404**	**422**	**88**	**1840**	**16468**	

Tab. 3.2. Distribution of the weight of mammal remains from the Gumelnița levels discovered at Gumelnița (2018 and 2019).

	NR	NR	Total NR	W	W	Total W
Boian Vidra	**son 12**	**son 12**		**son 12**	**son 12**	
Context	**C7**	**C7**	**C7**	**C7**	**C7**	**C7**
Specie/SU	**1036**	**1039**		**1036**	**1039**	
Bos taurus		6	6		134	134
Ovis aries		1	1		9	9
Ovis/Capra	4	6	10	13	17	30
Vulpes vulpes		1	1		1	1
Total mammals determined	**4**	**14**	18	**13**	**161**	174
undetermined mammals big size	1	3	4	4	10	14
undetermined mammals medium size	1	9	10	4	10	14
Total mammals	**6**	**26**	32	**21**	**181**	202

Tab. 4. Distribution of the mammal remains from the Boian feature discovered at Gumelnița (2018).

VI. Macrobotanical remains

In the current study we will discuss the samples taken from Gumelnița during the 2018 and 2019 seasons. Each season results will be analysed separately. All samples were processed through wet sieving and flotation. The resulted material was sorted and analized using a stereomicroscope (Optika ST–50Led) at the Bioarchaeology Department of the "Vasile Pârvan" Institute of Archaeology. Also, for the identification of the botanical macroremains different seed digital atlases were used[58].

During the 2018 season, 100 soil samples were taken from 10 features from Zone 3 (9 Gumelnița graves – M2, M3, M4, M5, M6, M7, M8, M9, M10 and a Boian-Vidra pit – C7). From these 100 samples, only 36 yelded macrobotanical remains. Except for features M2 and M3, all the features yielded macrobotanical remains from 28 samples. These samples have a total of 363 litres of collected sediment. All 183 macrobotanical remains are charred. The richest feature is C7 with 83 botanical macroremains, followed by M10 (39 remains), M9 (36 remains) and M6 (12 remains). The rest of the features have a total of 12 macrobotanical remains (see Tab. 5). Because of the poor conservation the bigest category of finds is "indetermined macroremains" with a representation of 45%, followed by the cereal category with 44% (see Fig. 27).

The cereal category is the most diverse, with species of wild and domesticated origin. Feature C7 has the largest variety of cereal species: brome grass (*Bromus* sp.), and needle grass (*Stipa* sp.) as wild herbacerous cereal species; einkorn (*Triticum monococcum*), spelt wheat (*Triticum* cf. *spelta),* naked barley (*Hordeum vulgare* var. *nudum*) and hulled barley (*Hordeum vulgare vulgare*). Other species identified are broomcorn millet (*Panicum miliaceum*) from grave no. 8 with one caryopse and from grave no. 10 with three caryopses, and foxtail millet (*Setaria italica*) discovered in grave no. 10. The largest quantity of macrobotanical remains were identified at the genus level, such as wheat (*Triticum* sp.) and barley (*Hordeum* sp.) but, also at the family level – Cerealia and Poaceae – for the domesticated cereals.

[58] Bojňanský, Fargšová 2007; Jacomet *et alii* 2006; Schoch *et alii* 2008.

Complex/feature			Total	Zone 3							
				C7	M4	M5	M6	M7	M8	M9	M10
Stratigraphical unit				suT 1039	suT 1014	suT 1016	suT 1022	suT 1024	suT 1026	suT 108	suT 1043
Square (□)					9	10	5 - 6	10	4	4	
volume of processed sediment (liter)			363	49	70	32	60	22	20	49	61
Number of samples processed			36	5	7	3	6	3	2	6	4
Plant concentration per liter			0.5	1.69	0.01	0.12	0.2	0.18	0.2	0.73	0.63
Total number of finds			183	83	1	4	12	4	4	36	39
Species	Organ	Preser-vation									
Cereals			81								
Poaceae	caryopse frg.	charred	17	2			3			4	8
Poaceae cf. Bromus sp.	caryopse	charred	1			1					
Poaceae cf. Bromus sp.	caryopse frg.	charred	1							1	
Poaceae cf. Bromus/Stipa	caryopse frg.	charred	1							1	
cf. Bromus sp.	caryopse	charred	3	3							
Stipa sp.	caryopse	charred	2	2							
Setaria italica	caryopse	charred	1								1
Cerealia	caryopse frg.	charred	18	15							3
Cerealia cf. Hordeum	caryopse frg.	charred	1				1				
Cerealia cf. Triticum	caryopse frg.	charred	2							2	
Panicum miliaceum	caryopse	charred	3						1		2
cf. Panicum miliaceum	caryopse frg.	charred	1								1
Triticum monococcum	caryopse	charred	3	1						2	
Triticum cf. spelta	caryopse frg.	charred	1	1							
Triticum sp.	caryopse	charred	1	1							
Triticum sp.	caryopse frg.	charred	4				1				3
Hordeum vulgare	caryopse	charred	1	1							
Hordeum vulgare	caryopse frg.	charred	1								1
Hordeum vulgare var. nudum	caryopse	charred	3	3							
Hordeum sp.	caryopse	charred	6	1		2				3	
Hordeum sp.	caryopse frg.	charred	7	5							2
cf. Hordeum sp.	caryopse	charred	2	1						1	
cf. Secale cereale	caryopse	modern ?	1		1						
Pulses			5								
Fabaceae	seed frg.	charred	2	1							1
Pisum cf. sativum	seed	charred	2				2				
Vicia ervilia	seed	charred	1	1							
Collected plants			6								
Prunus sp.	endocarp frg.	charred	2	1		1					
cf. Prunus sp.	endocarp frg.	charred	4	1						3	
Herbaceous plants			9								
Brasica sp.	seed coat fragment	charred	1							1	
Chenopodium album	seed	charred	3	3							
cf. Fallopia convolvulus	fruit	charred	1							1	
Galium cf. spurium	seed	charred	3	3							
Persicaria lapathifolia	seed	charred	1	1							
Indetermined macroremains			82								
Indet.	fragments	charred	82	36			5	4	3	17	17

Tab. 5. Macrobotanical remains identified at Gumelnița during the 2018 season (Zone 3).

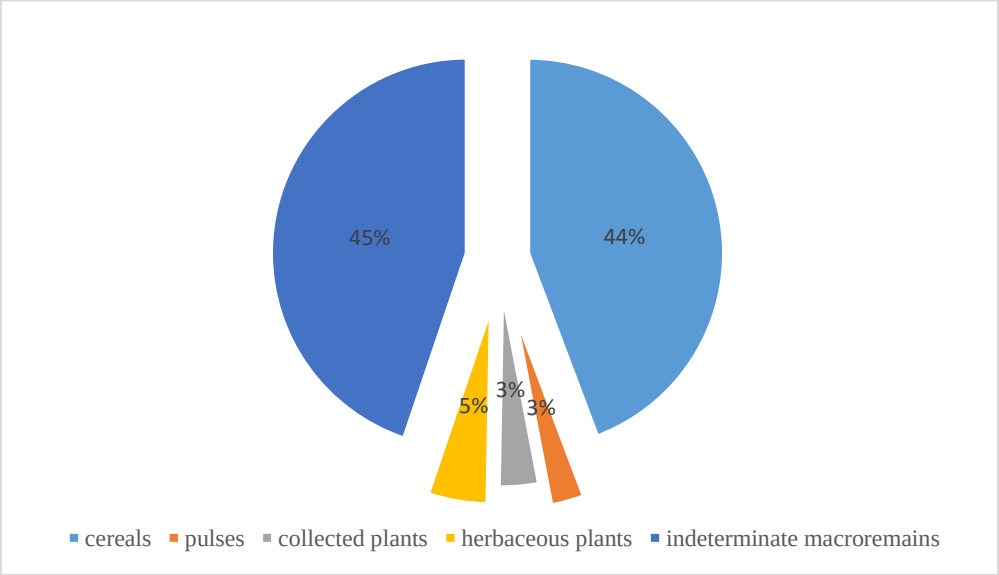

Fig. 27. Plant categories identified at Gumelnița archaeological site, 2018 season.

The pulses category, with a total representation of 3%, includes species such as: peas (*Pisum* cf. *satium)* with two seeds and bitter vetch (*Vicia ervilia*) with one seed (Fig. 29). The pea seeds were identified in grave no. 6 and the bitter vetch seed was found in feature C7. Another two fragments were identified only at the family level and one was found in feature C7 and another in grave no. 10, respectively. The collected plants category is represented by *Prunus* sp. species, with two fragments discovered in feature C7, one fragment from grave no. 5 and other three from grave no. 9.

The category of herbaceous plants has a total representation of 5%. The two botanical macroremains from grave no. 9 are *Brassica* sp. which is a species from the mustard family and black bindweed (cf. *Fallopia convolvulus*). The other species were found in feature C7; these species are: fat hen (*Chenopodium album*) wih three seeds, false cleaves (*Galium* cf. *spurium*) also with three seeds and pale persicaria (*Persicaria lapathifolia*) with one seed.

For the 2019 season, a total of 20 soil samples were processed and only one did not yielded any botanical macroremains. These samples were taken from the *tell* settlement – Zone 1 (four samples of 3 stratigraphical units) and from the terrace area – Zone 3 (6 samples from a grave - M14, 3 samples from feature C9 and 6 samples from feature C12, respectively).

The cereal category has the largest representation of botanical macroremains (55%), followed by the indetermined macroremains category (35%). The pulses category has a representation of 7%, the collected plants category has a 2% representation and lastly the herbaceous plant category with 1% (see Fig. 28). In the cereal category, the largest quantity of botanical macroremains is held by the Poaceae group (Tab. 6). *Hordeum* sp. (barley) is quantitified with 22 botanical macroremains (including the rahis chaff).

Complex/feature			Total	*Tell* (Zone 1)			Zone 3				
							M14	C9	C12		
Stratigraphical unit				s.u. 1044	s.u. 1050	s.u. 1053	s.u.T 1062	s.u.T 1046	s.u.T 1060	s.u.T 1063	s.u.T 1064
Square (□)				A7-8	A8	A7		7/8/9	4/5	5	5
volume of processed sediment (liter)			241	20	45	10	68	46	32	10	10
Number of samples processed			19	2	1	1	6	3	4	1	1
Plant concentration per liter (unit/liter)			1.1	2	0.2	6.4	0.07	0.15	1.6	2.1	7.6
Total number of finds			279	40	13	64	5	7	53	21	76
Species	Organ	Preserva -tion									
Cereals											
Poaceae	frg.	charred	81	10	5	18	1	2	15	6	24
Poaceae cf. Hordeum	caryopse frg.	charred	1		1						
Poaceae cf. Gramineae	caryopse frg.	charred	1	1							
Triticum monococcum, *1-seeded*	caryopse	charred	2	1		1					
Triticum monococcum, 1-seeded	caryopse frg.	charred	1			1					
Triticum monococcum	caryopse frg.	charred	1			1					
Triticum dicoccum	caryopse	charred	1			1					
cf. Triticum monococcum	caryopse	charred	2			2					
cf. Triticum monococcum	caryopse frg.	charred	2						2		
Triticum cf. spelta	caryopse frg.	charred	1	1							
Triticum *sp. naked*	caryopse frg.	charred	1			1					
Triticum sp.	caryopse frg.	charred	7	1		4			2		
Hordeum vulgare var. nudum	caryopse	charred	6	1	1					1	3
Hordeum vulgare var. nudum	caryopse frg.	charred	1			1					
Hordeum vulgare vulgare	caryopse	charred	8			1					7
Horduem vulgare vulgare	caryopse frg.	charred	5	1		1					3
Hordeum vulgare	caryopse	charred	2						2		
Hordeum sp. *hulled*	caryopse	charred	1	1							
Hordeum sp. *hulled*	caryopse frg.	charred	2	1	1						
Hordeum cf. distichum *hulled*	caryopse	charred	3						3		
Hordeum sp.	caryopse frg.	charred	21	1		10			2		8
cf. Hordeum sp.	caryopse frg.	charred	1								1
Panicum miliaceum	caryopse	charred	2						2		
Chaff											
Triticum cf. monococcum	spikelet base	charred	2	1		1					
Hordeum sp.	rahis	charred	1								1
Pulses											
Vicia ervilia	seed	charred	4			4					
Vicia sp.	cotyledon	charred	3	3							
Pisum sp.	cotyledon	charred	2							2	
Lathyrus sp.	cotyledon	charred	1			1					
cf. Lathyrus sp.	seed	charred	1			1					
Leguminosae	seed frg.	charred	1		1						
Leguminosae	cotyledon	charred	4	1		3					
Leguminosae	seed	charred	1	1							
Collected plants											
Prunus sp.	endocarp frg.	charred	5	1		4					
Sambucus cf. nigra	frg.	charred	1				1				
Herbacerous plants											
cf. Chenopodium album	seed	charred	1					1			
cf. Fallopia convolvulus	fruit	charred	1							1	
Persicaria hydropiper	fruit	charred	1				1				
Indetermined macroremains											
Indet.	frg.	charred	97	14	4	8	2	4	25	11	29

Tab. 6. Macrobotanical remains identified at Gumelnița in the 2019 season.

Other species included in this category are einkorn (*Triticum monococcum*) with 10 botanical macroremains, naked barley (*Hordeum vulgare* var. *nudum*) with 13 macroremains, hulled barley (*Hordeum vulgare vulgare*) with 7 macroremains, broomcorn milet (*Panicum miliaceum*) with 2 seeds, spelt wheat (*Triticum* cf. *spelta*), naked wheat (*Triticum* sp. naked) and emmer (*Triticum dicoccum)* all with one macroremain. The stratigraphical unit 1053 has the most diverse plant species, followed by the stratigraphical unit 1044 from the *tell* settlement. The three chaff macroremains were discovered in the *tell* stratigraphical units; the broomcorn milet was discoverd in feature C12, in the 1060 stratigraphical unit.

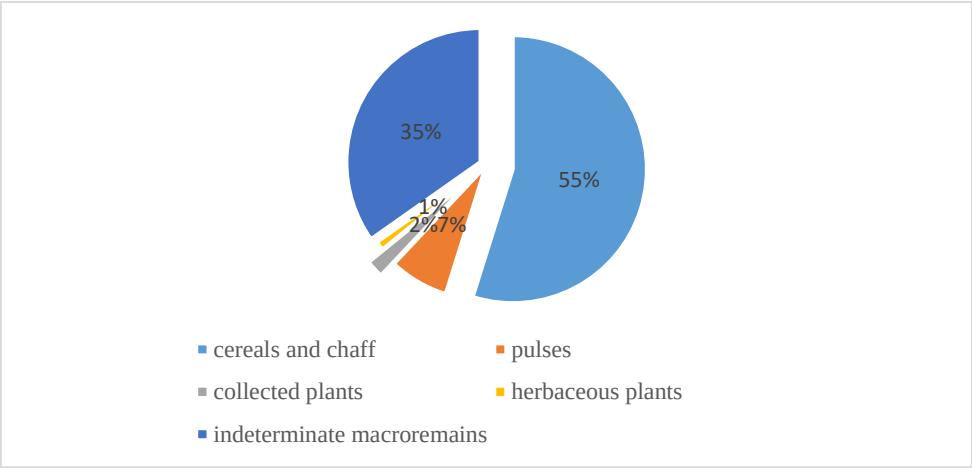

Fig. 28. Plant categories identified at Gumelnița archaeological site, 2019 season (Zones 1 and 3).

The pulses category is represented by bitter vetch (*Vicia ervilia*) with 4 seeds, pea (*Pisum* sp.) with 2 cotyledons and vetchling (*Lathyrus* sp. and cf. *Lathyrus* sp.) with 2 botanical macroremains. Except for the 2 cotyledons of pea that were discovered in feature C2, all pulses were identified in the stratigraphical unit of the *tell* settlement. The collected plant category includes 5 endocarp fragments of *Prunus* sp. and one fragment of elder (*Sambucus* cf. *nigra*). The *Prunus* sp. fragments were identified in two stratigraphical unit from the *tell* settlement and the elder fragment was determined in grave no. 14.

Finally, the herbaceous plant category is represented by fat hen (cf. *Chenopodium album*), black bindweed (cf. *Fallopia convolvulus*) and water pepper (*Persicaria hydropiper*) all with one botanical macroremain, respectively. The fat hen seed was discovered in feature C9, the black bindweed in feature C12 and the water pepper was determined in grave no. 14.

Conclusions on macrobotanical remains

The largest quantity and the largest diversity of species is found in pit feature C12 from the terrace area (Zone 3), investigated during the 2019 season. In this feature, the majority of the botanical macroremains are identified as barley (*Hordeum* sp.,

Hordeum vulgare vulgare and *Hordeum vulgare* var. *nudum*). Also, this feature has the only two remains of broomcorn millet (*Panicum miliaceum)* identified for the 2019 season. The samples from the *tell* settlement of Gumelnița yielded a large diversity of species that were identified. The three stratigraphic units contain the largest quantity of domesticated species from the 2019 season. Unfortunately, for the cereal category, most of these macroremains were determined at the genus level due to the poor conservation. Most probably, these macroremains are residue of human consumption. The presence of the water pepper fruit (*Persicaria hydropiper*) in M14 is due to taphonomical conditions. For the 2018 season, feature C7 had the largest diversity of species. Considering the small plant concentration per litre (see Tab. 6), the charred macroremains can be interpreted as human consumption residue. The species of fat hen (*Chenopodium album*), pale persicaria (*Persicaria lapathifolia*) and false cleaves *(Galium* cf. *spurium*) discovered in feature C7, can adapt easily as invasive species in crop fields[59]. Also, pale persicaria (*Persicaria lapathifolia*) can develop in wet terrestrial habitats and marine habitats[60]. Thus, the macrobotanical remains of these three species can be considered to have a segetal ecological niche. The herbaceous cereal plant species, brome grass (*Bromus* sp.) and needle grass (*Stipa* sp.) are species of temperate climate, the needle grass being well adapted to temperate and tropical steppe areas[61]. These two species can help in portraying a paleo environment of woodland steppe and also, they can be included in the segetal niche together with fat hen (*Chenopodium album*), pale persicaria (*Persicaria lapathifolia*) and false cleaves (*Galium* cf. *spurium*), identified in feature C7.

Broomcorn millet (*Panicum miliaceum*) has a sporadically appearance on the European continent from the Neolithic period on. These discoveries were interpreted as remains of herbaceous plants accidentally introduced in crop fields, thus having a segetal ecological aspect[62]. During Bronze Age, broomcorn millet (*Panicum miliaceum*) appeared more frequently and in larger quantities in different archaeological sites from centre, eastern and southern Europe[63]. The macrobotanical remains of *Panicum miliaceum* found in graves no. 8 and no. 10, most probably are the result of taphonomical conditions and can have a segetal ecology.

The domesticated plant species, discussed above, have been identified at other archaeological sites of the Gumelnița culture, such as: Bordușani – *Popină,* Ialomița county; Căscioarele, Călărași County; Geangoiești, Dâmbovița County; Grădiștea Ulmilor, Călărași County; Hârșova – *tell*, Constanța County; Ipoteși, Olt County; Pietrele, Giurgiu County; Sultana – *Malu Roșu*, Călărași County; Teiu, Argeș County; Vlădiceasca, Călărași County and Vitănești, Teleorman County[64]. Macrobotanical remains of broomcorn millet were found at Măgura Buduiasca (teleor 003), Teleorman County, from the Dudești culture[65]; at

[59] Panțu 1906, p. 276; Cabi.org 2019; Luontoportti.com 2019.
[60] Lansdown 2013.
[61] Sîvulescu 1972 p. 194.
[62] Kreuz *et alii* 2005; Walker, Bogaard 2011; Motuzaite – Matuzeviciute *et alii* 2013; Kučera *et alii* 2019.
[63] Wasylikova *et alii* 1991; Sitka, Heiss 2013.
[64] Cârciumaru 1996, p. 69-70, 78, 83, 85, 86, 119, 126-128; Monah 1999; Bogaard 2001; Toderaș *et alii* 2009; Golea *et alii* 2014; Popovici *et alii* 2014a; Popovici *et alii* 2014b.
[65] Walker, Bogaard 2011.

Văleni, Neamț County from the Precucuteni culture[66] and at Poduri – Dealul Ghindaru, Bacău County from the Cucuteni culture, A2 phase[67]. Other botanical macroremains of foxtrot milet (*Setaria italica*) were discovered in other Gumelnița settlements, specifically at Morteni, Dâmbovița County[68] and Hârșova-tell, Constanța County[69]. Until now, no other *Lathyrus* sp. remains were found in an eneolithic archaeological site in Romania.

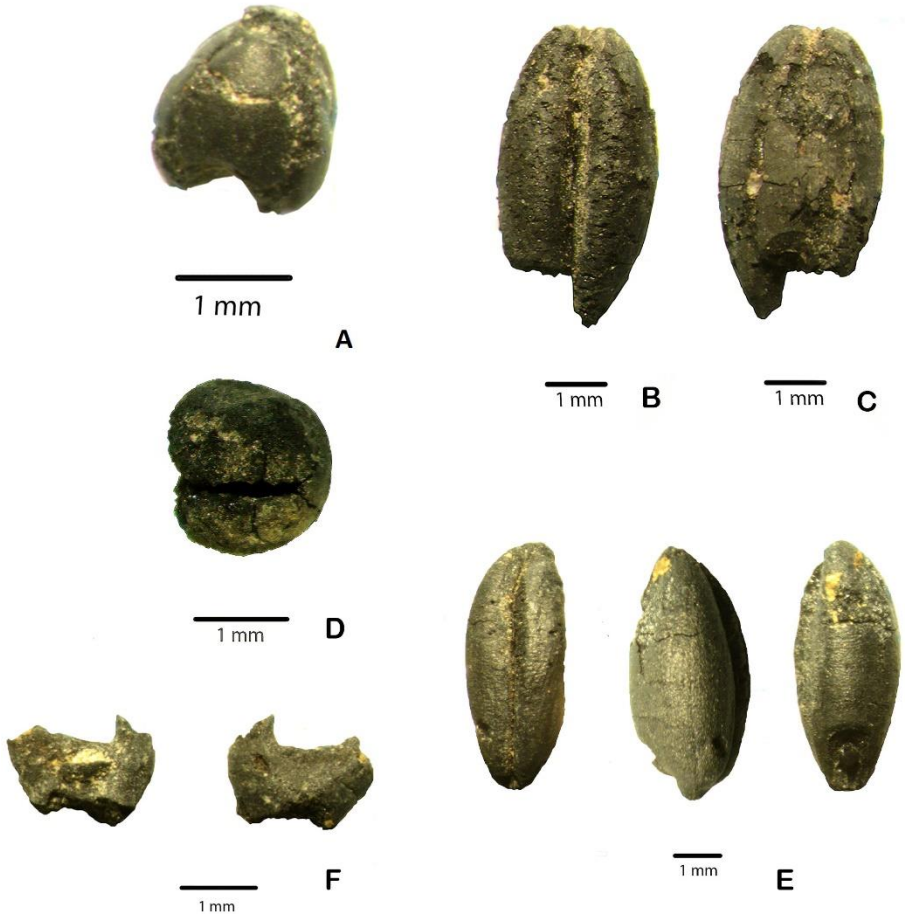

Fig. 29. Botanical macroremains discovered at Gumelnița, 2018 season: A.: broomcorn millet (Panicum miliaceum)*, B.: hulled barley, ventral side* (Hordeum vulgare vulgare)*, C.: hulled barley, dorsal side, D.: bitter vetch (*Vicia ervilia*); 2019 campaign: E.: einkorn caryopse* (Triticum monococcum)*, ventral side (left), lateral side (centre) and dorsal side (right) and F.: einkorn spikelet base* (Triticum cf. monococcum)*, adaxial view (left), abaxial view (right).*

[66] Cârciumaru 1996, p. 123.
[67] Monah, Monah 1995, p. 314.
[68] Cârciumaru 1996, p. 91-92.
[69] Cârciumaru 1996, p. 85-86.

Macrobotanical remains of false cleaves (*Galium spurium*) were identified at Radovanu, Călărași County from the Boian culture, Spanțov phase and at Izoare, Mărgineni and Văleni, all from Neamț County but from the Cucuteni culture[70]. Pale persicaria have been discovered at Pietrele, Giurgiu County[71] and at Sultana – *Malu Roșu*, Călărași County[72]. Macroremains of fat hen have also been discovered in archaeologial sites of the Gumelnița culture at: Căscioarele, Călărași County[73]; at Hârșova *tell*, Constanța County[74]; Lăceni, Teleorman County[75]; Morteni, Dâmbovița County[76]; Pietrele *Măgura Gorgana,* Giurgiu County[77]; Sultana – *Malu Roșu*, Călărași County[78] and Vitănești, Teleorman County[79]. Macroremains of water pepper were discovered for Gumelnița culture only at Sultana-*Malu Roșu*, Călărași County[80]. Remains of brome grass (*Bromus* sp.) were identified at Lăceni, Teleorman county, in a Gumelnița layer[81]. Until now, no botanical macroremains of needle grass (*Stipa* sp.) were found in archaeological sites for the Eneolithic period in Romania.

VII. Pottery

Materials and methods

Pottery was the most abundant category of artefacts discovered during the 2018 and 2019 archaeological seasons at Gumelnița. The pottery analysed in the current study was collected from clearly defined features, investigated both on the *tell* settlement and the terrace areas (Tab. 7). The total number of ceramic fragments counted 2012 distinctive individuals with a total weight of 25,775 g. Based on the overall characteristics, the ceramic fragments can be dated to the Eneolithic period, being representative of the specific local pottery traditions (also known as "cultures") such as Boian, Gumelnița and Cernavodă II, respectively (Tab. 7). The methodology used for the pottery analysis was the one applied in our previous study regarding the results of the 2017 season at Gumelnița[82]. Because the group of pottery from the Cernavoda II pit counted only 12 potsherds (Tab. 7), the decision was to not include them in the technological analysis. The quantified data on sherds size and weight will be presented for each feature. The data on pottery paste, forming, shapes, decoration and firing will be presented for each pottery tradition and regarded from the point of view of the place of discovery, resulting three groups: Boian-Vidra (feature C7), Gum A2-Terrace (feature C6) and Gum A2-*Tell* (features from the *tell* area). This type of grouping was chosen in order to highlight continuity and changes in the pottery production at Gumelnița, both in time and space.

---

[70] Cârciumaru 1996, p. 86, 91, 125.
[71] Toderaș *et alii* 2009.
[72] Golea *et alii* 2014.
[73] Cârciumaru 1996, p. 69-70.
[74] Monah 1999.
[75] Bogaard 2001, p. 125.
[76] Cârciumaru 1996, p. 91-92.
[77] Toderaș *et alii* 2009.
[78] Golea *et alii* 2014.
[79] Andreescu *et alii* 2001.
[80] Golea *et alii* 2014.
[81] Bogaard 2001.
[82] Lazăr *et alii* 2017, p. 142-143.

Pottery in archaeological contexts

Zone 3: Terrace area: Besides the Eneolithic graves, various pits were identified and completely investigated on the Terrace area (see **II. Archaeological field research**) during the 2018 and 2019 seasons, but only three of them contained pottery (Tab. 7).

A pit containing *Boian-Vidra* type pottery (denoted as C7, see Fig. 6) is the earliest feature discovered at Gumelnița so far. The pit infill was overlaid by an Eneolithic grave (M 9). Also, it was affected by previous unauthorized work and consequently the pottery assemblage is incomplete. Based on the pit shape and size, it is possible that it functioned initially as a pit-house. However, the 117 potshards collected from two stratigraphic units (SU) were discovered in a primary deposition, but they reached the pit infill as secondary refuse[83]. The same situation was observed at two other pits with pottery characteristic to Gumelnița A2 (pit C6) (Fig. 6) or Cernavoda II (pit C9) (Fig. 5) traditions. These assumptions were based on the high fragmentation, the lack of conjoins, the small dimensions and the reduced weight per fragment of the potshards (Tab. 7; Fig. 30).

Area	**Complex (C) / House (L)**	**SU**	**Tradition**	**<2.5 cm**	**<5 cm**	**<7.5 cm**	**<10 cm**	**>10 cm**	**Total**	
									No.	Grams
Zone 3 (terrace)	C7 (pit)	T1036	Boian-Vidra	13	37	12	1	1	64	1061
		T1039		15	29	3	4	2	53	943
	C6 (pit)	T1032	Gumelnița A2	21	66	38	15	1	141	2207
	C9 (pit)	T1046	Cernavoda II	0	7	5	0	0	12	139
Zone 1 (tell)	C8 (pit)	1039	Gumelnița A2	5	5	1	0	0	11	42
	C9 (pit)	1041		4	20	4	0	0	28	222
	C10 (pit)	1043		14	8	3	0	0	25	125
	C12 (pit)	1048		0	17	3	1	1	22	250
	L3 (house)	1036		51	181	41	16	3	292	3556
		1037		1	7	1	1	0	10	107
	Waste area	1044		116	401	95	25	6	643	6353
	L4 (house)	1050		59	218	42	12	3	334	3440
		1053		19	197	78	16	10	320	6024
		1058		0	28	19	9	1	57	1306
Total				**318**	**1221**	**345**	**100**	**28**	**2012**	**25775**

Tab. 7. Contextual distribution of the pottery by sherd size and total weight.

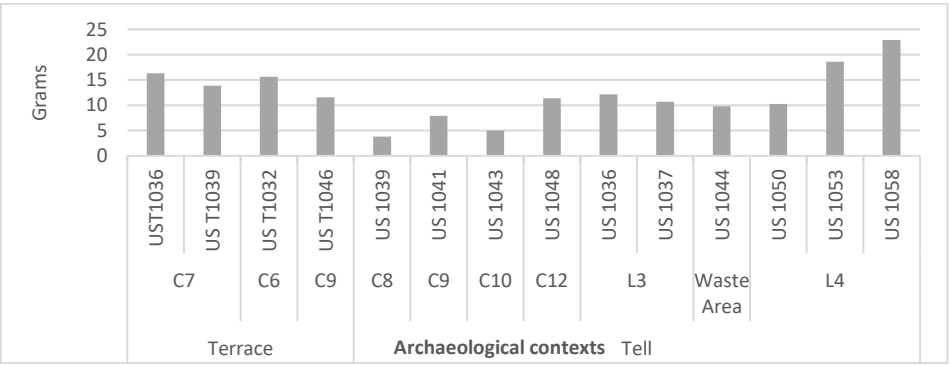

Fig. 30. Contextual distribution of the mean values of sherds weight (n=2012).

[83] Schiffer 1996, p. 58.

Zone 1 - Tell settlement: The pottery from the *tell* settlement was found in pit infills, abandonment layers, debris of unburnt houses and waste areas (Tab. 7). There are only few cases (SU 1053; SU 1058) with some conjoins between fragments. Also, a percentage between 17% and 72% of the potsherds in every SU had eroded margins and/or surfaces. The sherds size (Tab. 7) and the mean values of the sherds weight (Fig. 30) show a little variation from one feature to another. All together, these are indicative of pottery fragments discarded as secondary or tertiary refuse.

Paste analysis

Zone 3: Terrace – Boian-Vidra pottery paste (C7) (Tab. 8)

The current results show that the Early Eneolithic pottery from Gumelnița was tempered predominantly with grog (71%) or with a combination of grog and organic material (9.5%). More rarely, some of the vessels were made by using clay mixed with abundant organic matter (3.5%). Also, the category of fine wares is consistent (16%), having no temper added in the clay matrix. The inclusions that had no clear evidence of being intentional added were quantified as *natural or accidental*. The most common was the sparse organic matter, followed by sand (fine or coarse) and more rarely the sparse limestone (or carbonate concretions) was encountered.

Inclusions		**Paste categories**			**Total**	
Identified as	**Type**	**Fine**	**Semi-fine**	**Coarse**	**No.**	**%**
Temper	Grog	17	48	18	83	71
	Sand	0	0	0	0	0
	Organic	0	4	0	4	3.5
	Grog and organic	0	10	1	11	9.5
	None	19	0	0	19	16
Natural or accidental	Limestone	1	1	1	3	2.5
	Fine sand	7	11	0	18	15.5
	Coarse sand	0	3	0	3	2.5
	Organic	7	23	8	38	32.5
	None	21	24	10	55	47
Total		36	62	19	117	100

Tab. 8. Zone 3. Boian-Vidra pottery (feature C7). The distribution of identified inclusions within the main categories of paste.

Zone 3: Terrace – Gumelnița A2 pottery paste (C6) (Tab. 9)

The Gumelnița pottery from the Terrace area was predominantly tempered with grog and in very few cases grog was mixed with organic matter. Just one sherd had abundant organic matter added, while five of them were not tempered at all.

A quarter of the potsherds did not have any natural or accidental inclusions in their matrix, while sparse organic matter was identified in almost half of the group. The fine sand was also often encountered, followed by the presence of limestone and very rare by various inclusion mixtures (sand, pebbles, organic or limestone).

Inclusions (Terace)		Paste categories			Total	
Identified as	**Type**	**Fine**	**Semi-fine**	**Coarse**	**No.**	**%**
Temper	Grog	12	84	35	131	93
	Organic	0	1	0	1	0.7
	Sand	0	0	0	0	0
	Grog and organic	0	2	2	4	2.8
	None	3	2	0	5	3.5
Natural or accidental	Limestone	1	3	5	9	6.4
	Limestone and organic	0	2	0	2	1.4
	Fine sand	3	15	1	19	13.5
	Sand and pebbles	1	0	1	2	1.4
	Sand and limestone	0	0	0	0	0
	Sand and organic	1	1	1	3	2.1
	Organic	4	50	16	70	49.7
	Shell	0	0	0	0	0
	Organic and shell	0	0	0	0	0
	None	5	18	13	36	25.5
Total		15	89	37	141	100

Tab. 9. Zone 3. Gumelnița A2 pottery (feature C6). The distribution of identified inclusions within the main categories of paste.

Inclusions (Tell)		Paste categories			Total	
Identified as	**Type**	**Fine**	**Semi-fine**	**Coarse**	**No.**	**%**
Temper	Grog	282	1173	179	1634	93.9
	Organic	1	0	1	2	0.1
	San	0	2	0	2	0.1
	Grog and organic	0	4	4	8	0.4
	None	84	9	2	95	5.5
Natural or accidental	Limestone	22	124	20	166	9.5
	Limestone and organic	7	19	10	36	2.1
	Fine sand	26	76	11	113	6.5
	Sand and pebbles	3	18	8	29	1.7
	Sand and limestone	3	6	0	9	0.5
	Sand and organic	3	18	1	22	1.3
	Organic	127	438	72	637	36.7
	Shell	1	8	1	10	0.6
	Organic and shell	0	5	1	6	0.3
	None	174	474	62	710	40.8
Total		367	1188	186	1741	100

Tab. 10. Zone 1. Gumelnița A2 pottery. The distribution of identified inclusions within the main categories of paste.

Zone 1: Tell settlement – Gumelnița A2 pottery paste (Tab. 10)

The grog tempered pottery was predominant in the batches of Gumelnița A2 pottery from the *tell* area. Around five percent was not tempered. Very rare organic matter or sand were added in the ceramic paste.

Almost 60% of the pottery from the *tell* area had various types of natural or accidental inclusions in composition. The sparse organic matter was the most common, followed by rare limestone/carbonate concretions, fine sand, shell fragments or mixtures of them.

Forming techniques (Fig. 31) ***and constructed shapes*** (Tab. 11)

The high fragmentary state of the pottery was, again[84], an impediment in observing the forming techniques. However, for almost a quarter of the sherds one or more primary forming methods were identified. The most often observed was the coiling method, with shares between 16 and 28%. The slab building method had a low representation overall, while molding was present, with a very low frequency, only in Gumelnița A2 batches (used especially for large open forms, such as dishes and lids).

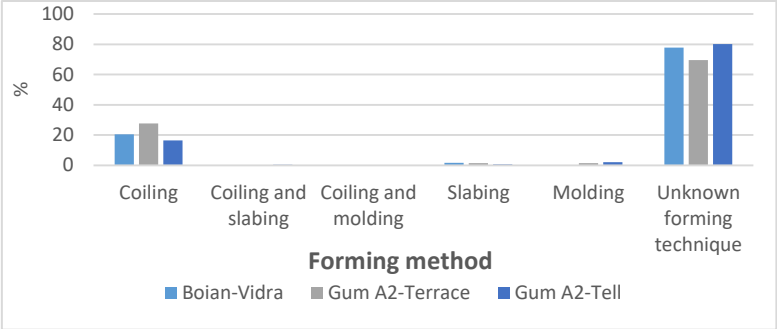

Fig. 31. The percentage distribution of primary forming methods regarding the pottery tradition and the research areas at Gumelnița in 2018 and 2019.

The percentage of fragments useful for shape determination (rims, bases or other specific features) was almost the same for each group, being indicative of homogeneity for the features formation and the deposition of potsherds as secondary refuse. However, the identified shapes are characteristic for the pottery tradition assigned for each feature: Boian-Vidra shapes[85] for feature C7 from the Terrace area and Gumelnița A2 shapes[86] for the features from both the *tell* and terrace areas.

Constructed shap	Boian-Vidra		Gum A2 – Zone 3		Gum A2 – Zone 1	
	No.	%	No.	%	No.	%
Dish	0	0	3	2.1	116	6.7
Beaker	2	1.7	0	0	0	0
Bowl	6	5.1	5	3.5	98	5.6
Pot	5	4.3	0	0	22	1.3
Storage vessel	1	0.9	5	3.5	58	3.3
Pear-shaped	0	0	4	2.8	22	1.3
Simply truncated	3	2.6	1	0.7	5	0.3
Lid	0	0	3	2.1	32	1.8
Stand-vessel	0	0	0	0	1	0.1
Pedestaled vessel	2	1.7	0	0	3	0.2
Zoomorphic	0	0	0	0	2	0.1
Undetermined shape	98	83.8	120	85.1	1383	79.4
Total	117	100	141	100	1742	100

Tab. 11. Distribution of the constructed shapes.

[84] Lazăr *et alii* 2017, p. 147.
[85] Comșa 1974, p 107-110.
[86] Voinea 2005, p. 41-47.

Surface treatments (Fig. 32, 33)

The surfaces finishing is a complex process of sequential actions that gave the final appearance of the vessel's walls. Each action usually cover the traces left by the former one. Scraping is a secondary forming procedure that is wiped by smoothing, smoothing by polishing and polishing by burnishing. The scraped surfaces had a low share overall. The external surfaces of Boian-Vidra pottery from feature C7 lacks scraping and were finished most often by burnishing, followed by smoothing and unorganized barbotine. Polished surfaces had a low representation on the outside but were often observed on the inside part of the vessels, as well as smoothing and burnishing. The batches of Gumelnița A2 pottery had close percentage of each finishing procedure, the only major difference being the low share of burnished surfaces of the potshards from the Terrace area (feature C6).

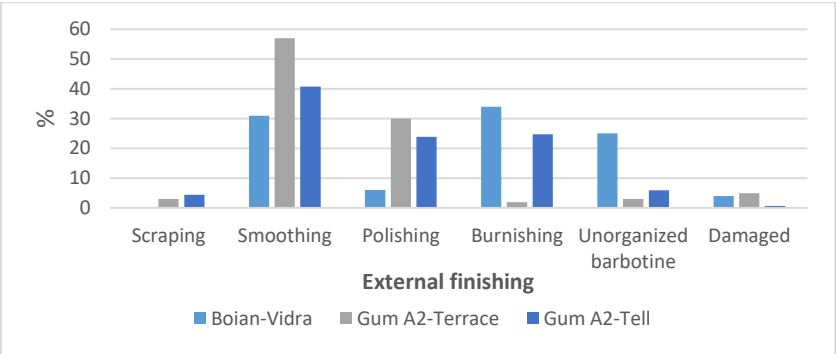

Fig. 32. Comparison of external finishing methods (%).

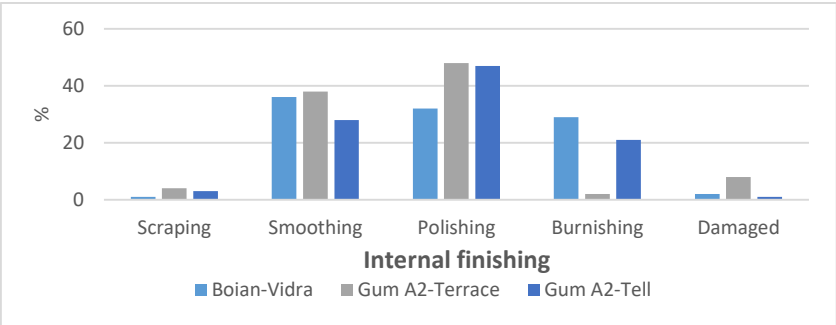

Fig. 33. Comparison of internal finishing methods (%).

Decoration methods (Tab. 12)

Almost half of the Boian-Vidra pottery from feature C7 had one or more type of decoration applied on the external surface. Organized barbotine was the most common, followed by channels, incision and excision. One fragment had traces of red paint.

The Gumelnița pottery from the Terrace area (feature C6) was decorated most often with organized barbotine and by incision. The channeling and excision methods were identified only in one case each. The absence of graphite painting is worth to be mentioned.

A large part of the Gumelnița pottery from the *tell* is undecorated (73.8%). However, this group showed the greatest variability in decoration methods and substances used for painting. The organized barbotine is the most frequently encountered, while the other techniques, such as channels, incised, excised and painting decoration had low shares.

Decoration type	Boian-Vidra		Gum A2-Terrace		Gum A2-Tell	
	No.	%	No.	%	No.	%
Organized barbotine	28	23.3	33	23.4	284	16.3
Channels	19	15.8	1	0.7	12	0.7
Excised	4	3.3	1	0.7	17	1
Incised	6	5	11	7.8	73	4.2
Painted White	0	0	0	0	5	0.3
Painted Red	1	0.8	0	0	4	0.2
Painted Graphite	0	0	0	0	60	3.4
Painted Clay	0	0	0	0	1	0.1
Undecorated surfaces	62	51.7	95	67.4	1286	73.8

Tab. 12. Distribution of the decorative methods.

Firing observations (Fig. 34)

The firing types were homogenous in the three groups analysed here. The majority of the sherds in each group came from vessels fired in an oxidizing atmosphere, resulting in a reddish to yellowish colour of the surfaces. When the core and the surfaces of the same potsherd had different colours (usually the core being grey, black or dark brown) the individual was counted in the incompletely oxidised category. The high incidence of this category suggests short firings that were most probably carried out in open air.

Around a quarter of the sherds from each group were black to grey in colour (both the core and the surfaces), an effect obtained by sooting or by the absence of oxygen during firing. Traces of secondary firing were most often observed on Gumelnița A2 pottery from the Terrace area, but they were also well represented in the two other groups.

A lot of the secondary fired potsherds were re-fired in fragmentary state. A low share of the pottery from each batch was completely oxidised and without traces specific to a secondary firing. Irregular firing had a very low frequency in all the three groups.

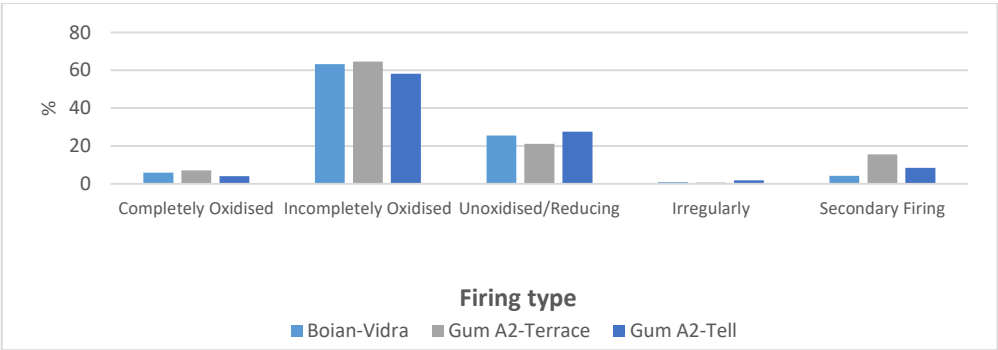

Fig. 34. Comparison of firing types (%).

Conclusions on pottery data

All the pottery from 2018 and 2019 seasons at Gumelnița reached the archaeological features as secondary or tertiary refuse. Data counted for the features investigated during the 2017 season showed that the formation processes of the features from the *tell* area – Zone 1 (excepting the burnt houses) were very similar to those presented in this study.

The technology of making pottery at Gumelnița did not changed significantly from the Early Eneolithic (Boian-Vidra) to the Middle Eneolithic (Gumelnița A2). The main traditions were the use of grog as temper, coiling as the most used primary forming method and the similarity in the shares of the firing types, while the changes can be observed in the constructed shapes, surfaces finishing and decoration methods. However, these continuities and changes are not specific only to this site and they were also noticed in other Eneolithic settlements from Southern Romania[87].

VIII. Flint artifacts

The chapter below is dedicated to a preliminary descriptive report, of the lithic assemblages discovered at Gumelnița during the 2018-2019 archaeological field seasons. Given the scarcity and non-diagnostic nature of the items discovered, the aim of this chapter is only descriptive in nature.

The lithic assemblages recovered from the Gumelnița site during the 2018-2019 archaeological field work, were rather small and scattered over various areas of the site (Tab. 13). Similarly, to the previous archaeological field season (2017), the assemblage recovered from the 2018-2019 ones is a little over 100 pieces (Tab. 13). This is in high contrast with the old collections discovered during the first researches undertaken at Gumelnița, which are in the range of hundreds or even thousands of pieces[88].

The lithic assemblage discovered in 2018-2019 is in its vast majority concentrated in the *tell* area - Zone 1, while only 12 artifacts were recovered from the Terrace area – Zone 3 (Tab. 13). One important note to make is that a fairly large number of lithic artifacts was recovered during the 2018 field season in what was designated as the '*Colluvium'* (SU 1011, see Fig. 3). However, those lithics are not considered in this report, because they lack secured contextual information. Of the entire assemblage, only a very small proportion of artifacts was recovered from "sealed" complexes or dwelling structures, as shown in Table 14, most of the lithics being scattered over the currently excavated site's areas.

Similarly, to the previous field season, the 2018-2019 lithic assemblage is dominated by blade blanks (61), which represents 55% of the entire assemblage, followed by flakes (26%) and bladelets (8.1%), the remaining of the assemblage's components representing only 8.9% altogether (Tab. 13-14). One thing to notice is the anecdotical presence of cores, with only one specimen. The presence of flakes is not particularly related to flake production, but rather as by-products of the blade reduction sequence.

[87] Opriș 2017, p. 118-128.
[88] Dumitrescu 1924, p. 325-329; 1925, p. 44-50; 1966, fig. 5; Lazăr *et alii* 2017.

One important characteristic of the lithic assemblages, in general, is establishing their overall completeness, which may help deciphering the potential taphonomical or intentional processes involved. In our case, it is too early to try to answer such a question, but it is important to account for it. Overall, the lithic assemblage recovered from the site is highly fragmented, only 18.9% of the specimens being complete, the remaining falling in various categories of fragmentation (Tab. 15). An overview on the most important (numerically) blank categories shows that blades and bladelets are the most fragmented of the whole assemblage. Only 18% of the blades were complete, and only 11.1% of the bladelets. This is not unusual for blade blanks and is rather ubiquitous mostly in Neolithic contexts, given fracture mechanics and the thinness of these blanks (see also Tab. 16), as well as intentional snapping, when potentially being used as sickle elements[89]. Mesial and distal fragments are the most present fragments overall. Flakes are also fragmentary, with only 28.6% being complete.

Dimension wise, there is an important degree of variability, which is expected given the degree of fragmentation and the blanks categories. As such the degree of variation around the mean (SD/mean) is obvious for all three most numerous blank categories (blades, flakes, and bladelets), and for all dimensions recorded, ranging from 0.56 through 1.83. The highest degree of variation is recorded for flakes length and thickness, and bladelet length and thickness.

Platform preparation is not well represented overall, this being mostly a reason of blank fragmentation. Of all the recognized platform by blank type only four fall within the prepared platform category, while the rest are either flat, point or missing (Tab. 17). As mentioned above, this cannot be securely related to a certain technological preference, but rather to the fragmentary state of the assemblage components.

Raw material is 98% dominated by flint, while quartzite has an anecdotical presence of nearly 2%. This is a very good quality flint, with fine texture and finely grained, displaying a yellow like honey color. This kind of raw material is known in the literature as “Balkan flint”. The raw material source is considered to be the area south of the Danube in Bulgaria[90].

Retouched elements count for a total of 35 pieces (31.5%) (most important categories) of the whole assemblage. This is a rather high percentage of “tools”, totaling for approximately 19.7%, if the 2017, 2018 and 2019 seasons are taken together. It is too early to draw conclusions related to the reason behind such an elevated degree of retouching. This is also related to the above-mentioned fragmentation of the assemblage, and the way in which counting of lithic specimens is made. Generally speaking, the presence of large number of mesial, as well as, proximal and distal fragments, overestimates the “real” total number of artifacts, an issue that is similarly encountered in zooarchaeological studies[91].

The retouched component of the assemblage is mostly represented by endscrapers (31.4%), followed by notches and denticulates (31.4% together), burins (20%) and sickle elements (17.10% each). In their vast majority the retouched pieces

[89] Andrefsky 2005.
[90] Bonsall *et alii* 2010, p. 9; Gurova 2012, p. 17.
[91] see e.g., Hiscock 2002; Popescu 2009.

are made on blades, one burin was made on flake and one notch was made on bladelet. The retouched component was made in its entirety on flint.

To sum up, one can argue that the 2018-2019 assemblage is in its general aspects similar to the assemblage recovered one year before. Given their scarcity and imbalance in terms of lithic categories discovered, it would be rather haphazard to draw any conclusive behavioral-cultural interpretation. Moreover, the obvious differences between these two recently uncovered assemblages and those form the earlier collections, require both newer data and an attempt to put together, if possible, both new and old collections. If such an attempt will be possible, more specific analyzes may be designed so that behavioral interpretations to be gleaned.

	Blade	Bladelet	Chisel	Core (1)	Flake	Fragment	Galet
Area (%)							
S1-Sector I	5 (8.2)	2 (22.2)			1 (3.4)		1 (50.0)
S1-Sector	54 (88.5)	6 (66.7)	1 (100.0)		19 (65.5)	2 (50.0)	
S1-Sondaj	1 (1.6)	1 (11.1)					
S2-Sector I					1 (3.4)		
S3-Sector I					1 (3.4)		
Terasa-S					1 (3.4)		
Terasa-S					1 (3.4)		
Terasa-S	1 (1.6)			1	5 (17.2)	1 (25.0)	1 (50.0)
Terasa-S						1 (25.0)	

Tab. 13. Lithic assemblage by site sector.

	Blade	Bladelet	Chisel	Core (1)	Flake	Fragment	Galet
Feature							
C12						1 (100.0)	
C12	2 (66.7)	1 (33.3)		1	7 (70.0)		
C6					1 (10.0)		
C8		1 (33.3)			2 (20.0)		
C9	1 (33.3)	1 (33.3)					

Tab. 14. Lithic assemblage by complex.

	Blade (61)	Bladelet (9)	Chisel (1)	Core (1)	Flake (29)	Fragment (4)	Galet (2)
Blank completeness (%)							
Complete	11 (18.0)	1 (11.1)	1 (100.0)	1 (100.0)	8 (28.6)		2 (100.0)
Distal	16 (26.2)				8 (28.6)		
Fragment						4 (100.0)	
Mezial	18 (29.5)	6 (66.7)			6 (21.4)		
Proximal	16 (26.2)	2 (22.2)			6 (21.4)		

Tab. 15. Blanks completeness by categories.

	Blade (61)	Bladelet (9)	Chisel (1)	Core (1)	Flake (29)	Fragment (4)	Galet (2)
Length (mean (SD))	46.85 (41.74)	16.93 (18.53)	34.10 (NA)	84.20 (NA)	31.75 (48.58)	34.70 (45.68)	70.45 (8.56)
Width (mean (SD))	21.72 (21.58)	5.82 (5.66)	26.00 (NA)	57.90 (NA)	21.82 (32.43)	23.85 (31.32)	56.00 (19.80)
Thickness (mean (SD))	5.46 (3.06)	1.71 (1.78)	11.50 (NA)	48.00 (NA)	9.49 (17.45)	13.70 (17.82)	41.60 (10.04)
Weight (mean (SD))	9.53 (7.31)	1.51 (1.05)	19.50 (NA)	155.70 (NA)	10.89 (12.33)	18.14 (30.62)	227.10 (152.59)

Tab. 16. Lithic assemblage dimensions by blank categories.

	Dihedral (1)	Faceted (3)	Flat (25)	Missing (28)	Point (6)
Blank_type (%)					
Blade		3 (100.0)	18 (72.0)	12 (42.9)	3 (50.0)
Bladelet			2 (8.0)	4 (14.3)	1 (16.7)
Core					
Flake			5 (20.0)	12 (42.9)	2 (33.3)
Flake.blade	1 (100.0)				
Fragment					
Galet					

Tab. 17. Platform type by blank type.

	Blade (61)	Bladelet (9)	Chisel (1)	Core (1)	Flake (29)	Fragment (4)	Galet (2)
Raw.material (%)							
Quartzite					1 (3.4)		1 (50.0)
Silex	61 (100.0)	9 (100.0)	1 (100.0)	1 (100.0)	28 (96.6)	4 (100.0)	1 (50.0)

Tab. 18. Raw material categories by lithic categories.

	Blade (61)	Bladelet (9)	Core (1)	Flake (30)	Flake.blade (1)	Fragment (2)	Galet (2)
Endscraper	11 (18.0)						
Burin	6 (9.8)			1 (3.3)			
Notch	7 (11.5)	1 (11.1)					
Denticulate	3 (4.9)						
Sickle	6 (9.8)						

Tab. 19. Retouched pieces categories by blank types.

IX. Hard animal material industry

Osseous artifacts

The osseous assemblage discovered during the archaeological research carried out in 2018 and 2019 in Zone 1 is composed of nine finished pieces, two preforms and two undeterminated pieces. The raw material used was mainly bone, only one item being made from antler. The artifacts seem to be concentrated especially in S.U. 1011 (Tab. 20).

S.U.				**1011**	**1030**	**1044**	**1059**
Typological category	**Raw material**	**Species**	**Type**				
Bevelled tool	bone	*Cervus elaphus*	ulna	1			
		large mammal	diaphysis	1	1		
Pointed tool	bone	large mammal	rib	1			
			diaphysis			1	1
Handle	bone	large mammal	tibia	1			
Figurine	bone	*Sus* sp.	metapodus	1			
Modified astragalus	bone	*Bos taurus*	astragalus	1			
Preform	bone	large mammal	rib	1			
			femur	1			
Undetermined object	bone	*Sus* sp.	metapodus	1			
	antler	*Cervus elaphus*	shed antler	1			

Tab. 20. Distribution of the osseous tools discovered at the site of Gumelnița (archaeological excavations from 2018 and 2019).

Bone

Bevelled tools (n=3)

The first item (Fig. 35.1) was made on the diaphysis of a large mammal. The piece is fractured longitudinally and transversally. Debitage edges were not regularized. For the shaping of the active end, distal abrasion (Fig. 35.2) was carried out. This is affected by the use-wear, acquiring a rounded and *emoussé* morphology. On the inferior side we were able to identify fine longitudinal striations (Fig. 35.3), resulting from the use of the item in a movement parallel to the main axis. The morphometric data are the following: length - undeterminable; width - 14 mm, thickness - 6 mm.

The second piece (Fig. 35.4) was also made from the diaphysis of a long bone from a large mammal. The blank is flat, obtained by longitudinal debitage bipartition by percussion. The debitage edges were subsequently shaped by longitudinal scraping (Fig. 35.5), including the proximal level, to create the convergence of the edges. The inferior side was flattened by abrasion (Fig. 35.6). A peripheral area of the active end is preserved, illustrating its shaping by abrasion (Fig. 35.7-8). The proximal extremity is also fractured, an argument for using this item as an intermediate piece in indirect percussion (as wedge). The actual length of the item is 78 mm, the width is 25 mm, and the thickness is 8 mm.

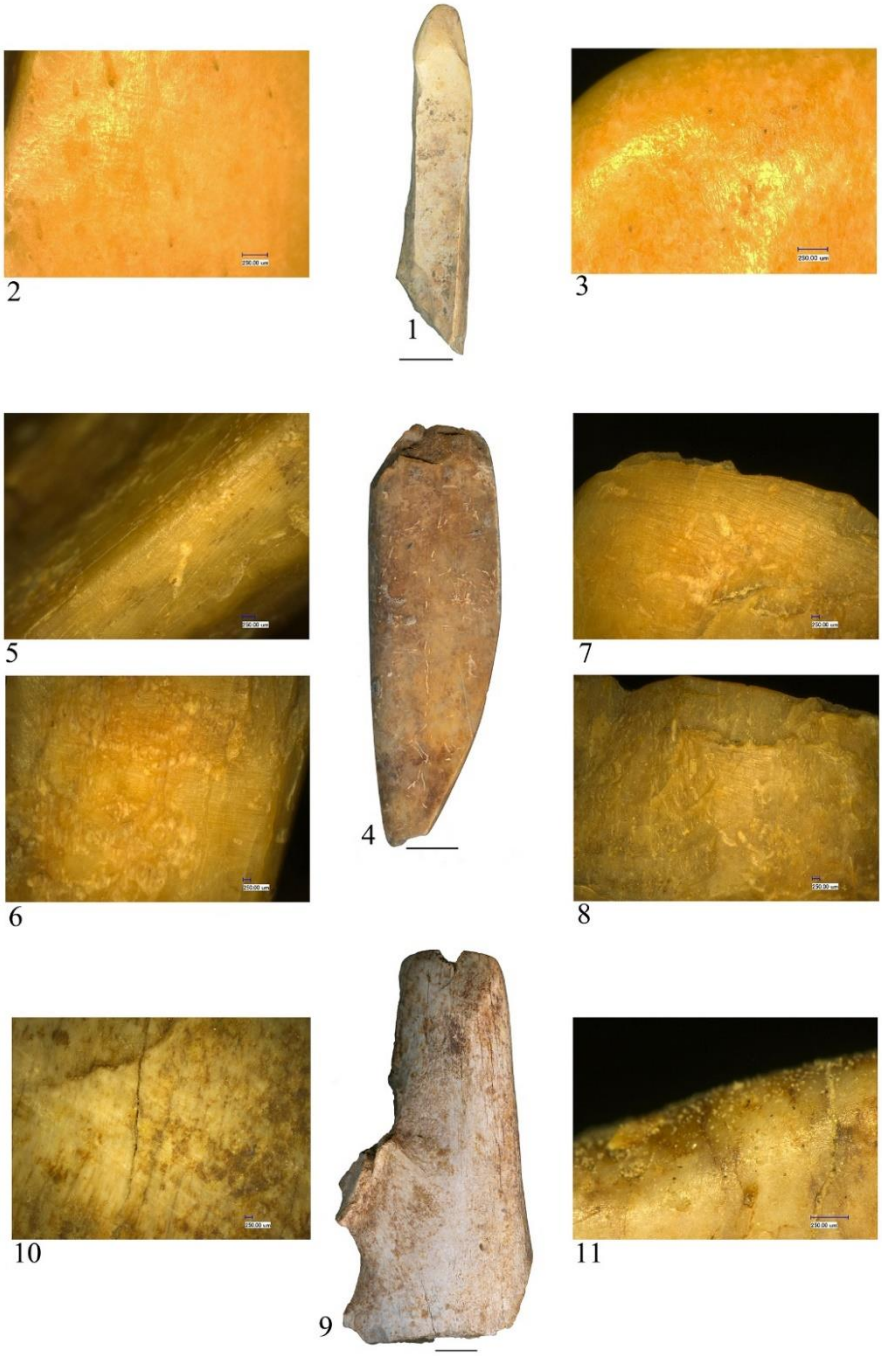

Fig. 35. 1, 4, 9. bevelled tools (scale=1 cm); 2, 6, 7, 10. abrasion marks; 3, 8, 11. active extremity details; 5. scraping marks.

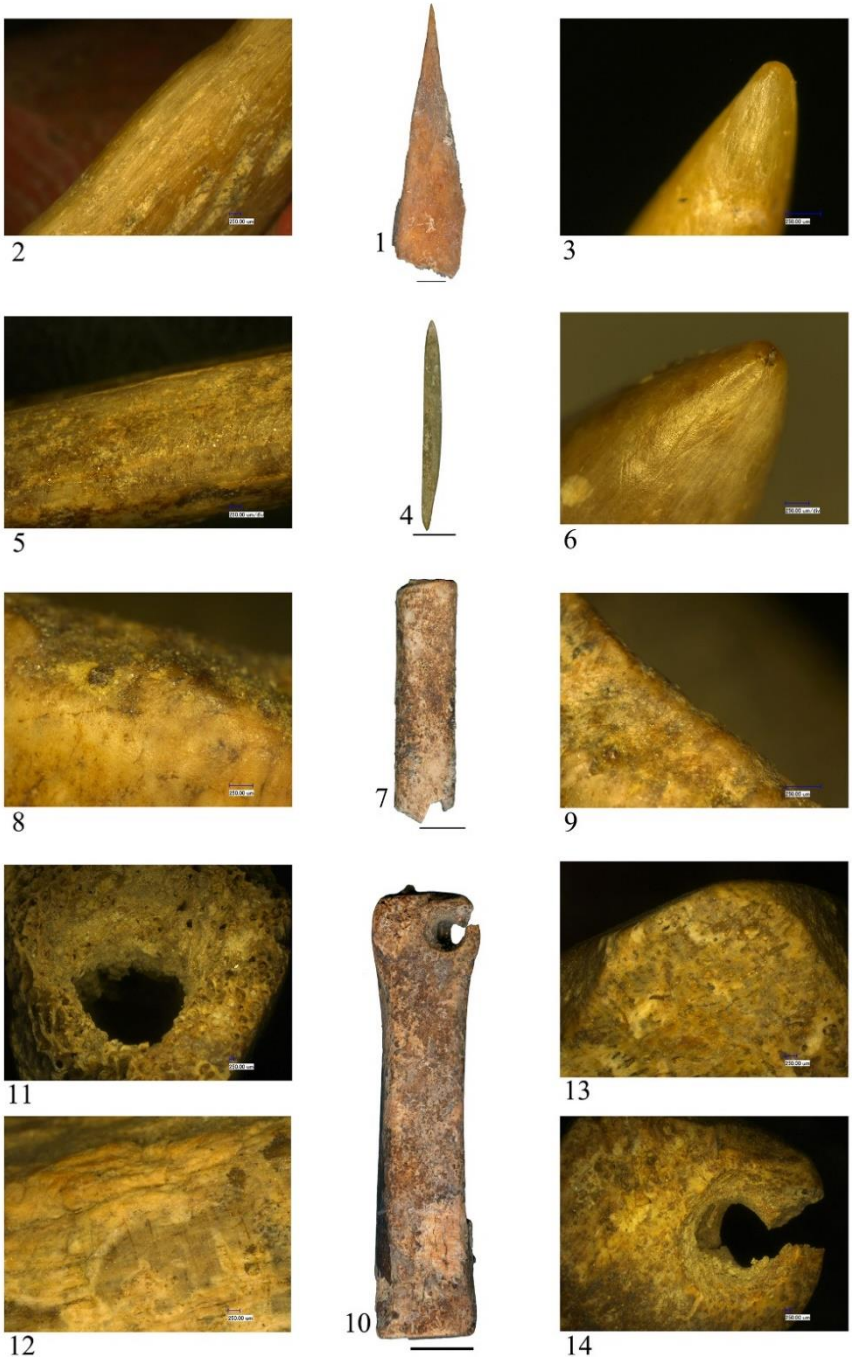

Fig. 36. 1, 4. pointed tools (scale=1 cm); 2. scraping marks; 3, 6. active extremity details; 7. haft (scale=1 cm); 5, 9, 12, 13. abrasion marks; 8. sawing marks; 10. bone figurine (scale=1 cm); 11. proximal extremity detail; 14. perforation detail.

The last bevelled tool (Fig. 35.9) is made from an ulna of *Cervus elaphus* and preserves the anatomical volume of the bone. At the proximal level, the epiphysis was eliminated by percussion, without continuing with the abrasion of the debitage plan. The active extremity was also created by percussion, followed by unifacial abrasion (Fig. 35.10). Along the *fil du tranchant* developed macroscopic polish, associated with fine striations located perpendicular to it (Fig. 35.11). The length of the piece is 91 mm, the width is 50 mm and the thickness is 16 mm.

Pointed tools (n=2)

The first specimen (Fig. 36.1) of this category was made on a large mammal rib, by longitudinal bipartition in percussion. In the second stage, new breaking by direct percussion was applied to ensure the convergence of edges. They have remained largely unshaped. Only at the level of the distal extremity it was intervened by bilateral scraping (Fig. 36.2) to create the pointed morphology of the active end. The piece is fractured proximally, so we do not know if the end was shaped. The active extremity is *emoussé* (Fig. 36.3), with fine striations, so it assumes that the piece has been used to drill. The length is undeterminable, due to the fracture, the width is 19.2 mm and the thickness is 5.2 mm.

A double point (Fig. 36.4) was obtained from the diaphyseal wall of a long bone. We do not know the procedures for obtaining the flat blank, because the debitage edges have been rigorously abraded (Fig. 36.5). Both extremities were also sharpened by bilateral abrasion to ensure the convergence of the edges. The functional end looks strongly worn, with fine striations developed parallel to the axis of the item (Fig. 36.6). The morphometric data are as follows: length - 50.45 mm, width - 4.39 mm, thickness - 3.46 mm.

The third pointed tool is unfortunately heavily fractured and burnt. It was made of the diaphysis of a large mammal. We can say that a flat blank obtained by quadri-partition was used. All the technological marks were erased.

Haft (n=1)

A tibia (Fig. 36.7) of a medium-sized mammal was used to make a hafting piece. The piece is fractured, but it can be seen that the blank was in volume and that the epiphysis was segmented by sawing (Fig. 36.8), with the segmentation plane shaped (Fig. 36.9). The medullary canal was probably used for hafting. The diameter of the piece is 13 mm.

Figurine (n=1)

The only prismatic figurine (Fig. 36.10) is a degraded piece, with exfoliation of the surface. At one end, the epiphysis was removed by percussion and the segmentation plan was abraded (Fig. 36.11). At the distal level, on three sides, the surface was flattened by abrasion (Fig. 36.12-13). Towards the extremity a unifacial perforation by rotation was performed (Fig. 36.14). The morphometric data are as follows: length - 67.5 mm, maximum width - 18 mm, thickness - 15 mm.

Modified astragalus (n=1)

Bos taurus astragalus (Fig. 37.1) - the anthropic intervention, respectively the abrasion of the surface, had as consequence the appearance of small flattened areas (Fig. 37.2-3) on the dorsal side. The length of the piece is 61 mm, the average width is 38 mm, the thickness is 34 mm.

Preforms (n=2)

The first piece (Fig. 37.4) was made from the rib of a large mammal. The rib was processed by longitudinal and transversal debitage in percussion, with the edges of

debitage remaining unshaped (Fig. 37.5). A bifacial rotation perforation, initiated from the inferior side, was made centrally (Fig. 37.6). The preform has a lenght of 37.5 mm, width - 18.3 mm, thickness - 2.9 mm, perforation diameter - 4 mm.

A fragment of femur (Fig. 37.7) was perforated by bifacial rotation, initiated from the inferior side. Its length is 126 mm, its width is 3.4 mm, its thickness is 6.2 mm and its diameter is 8 mm.

Undetermined object (n=1)

A *Sus scrofa* metapod was used to manufacture an implement (Fig. 37.8) with an obscure functionality. We could not determine whether it was a by-product or a finished item. The bone was longitudinally cut by quadri-partition, and the inferior side was regularized by abrasion (Fig. 37.9). Segmentation at one end was carried out by sawing, and at the other by percussion, followed by the regularization of the segmentation edges (Fig. 37.10). The morphometric data are the following: length - 43.5 mm; width - 9 mm, thickness - 3.5 mm.

Antler

Undetermined object (n=1)

Within the archaeological assemblage (Fig. 37.11) we identified one shed *Cervus elaphus* antler, fractured into several fragments, non-conjoining. In addition, the surface is strongly degraded. At the basal area, the marks of a perforation with rectangular morphology are preserved (see the arrow). We could not identify other marks, so it was impossible to determine whether it was a finished piece.

Personal adornments from the settlement

The adornments category is represented by various raw materials: stone, valve, tooth, bone and clay. Typologically, the most numerous are the cylindrical beads concentrated in two areas: S.U. 1017 and S.U. 1027, suggesting they are the remains of two necklaces. Other typological categories are present also such as: tubular beads, an *appliqué*, pendants and a disc.

Archaeological context						**C3**	**C4**	**C5**	**C6**	
S.U.				**-**	**1011**	**1017**	**1027**	**1030**	**1031**	**1044**
Typological category	**Raw material**	**Species**	**Type**							
Appliqué	tooth	*Cervus elaphus*	canine		1					
	stone		marble?		1					
Cylindrical bead	shell	*Unio* sp.	valve		1					1
	stone	-	-			18	9	1		
	clay						1			
Tubular bead	shell	*Spondylys*	valve						2	
Pendant (?)	shell	*Unio* sp.	valve		2					
Disc	bone	?	spinal disc	1						
Preform	bone	large mammal	diaphysis		1					

Tab. 21. Distribution of personal adornments discovered at the site of Gumelnița (archaeological excavations from 2017-2018).

Fig. 37. 1. modified astragalus (scale=1 cm); 2-3, 9. abrasion marks; 4, 7. preforms (scale=1 cm); 5. debitage edge; 6. perforation detail; 8. undetermined bone object (scale=1 cm); 10. sawing marks; 11. undetermined object.

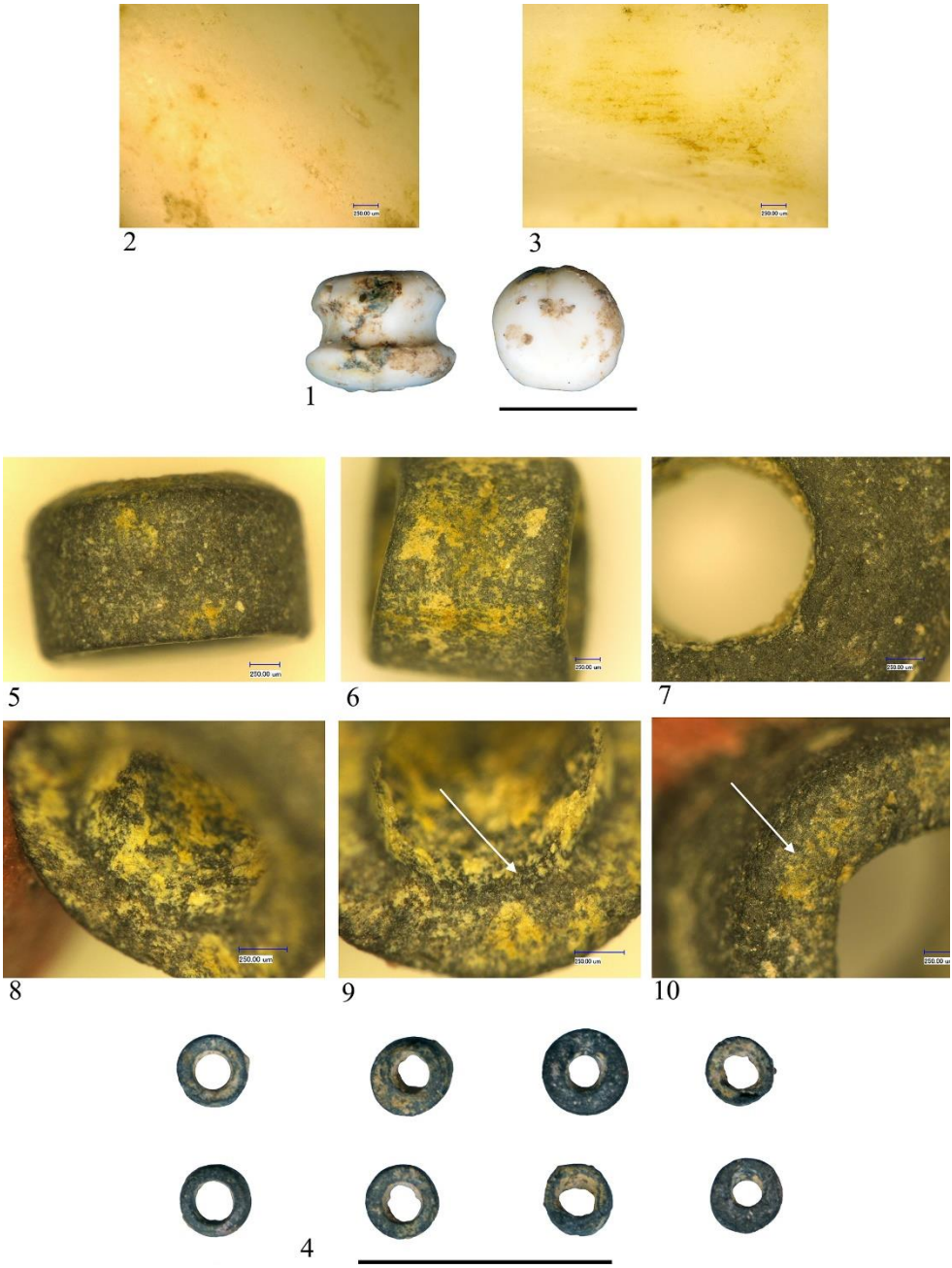

Fig. 38. 1. adornment made from marble (scale=1 cm); 2, 5-7. abrasion marks; 3. detail of the groove; 4. adornments made from stone (scale=1 cm); 8. perforation detail; 9-10. depression at the periphery of the perforation.

Stone artefacts

An extremely interesting piece was made of marble (Fig. 38.1). It is circular in section, with a median groove, facilitating its attachment. Most likely it is an *appliqué* piece. We do not know how the blank was obtained, because the surface of the piece was rigorously abraded (Fig. 38.2). In the middle, a groove was created by the use-wear technique as indicated by the presence of a polished wall with a slightly concave morphology and fine striations located transversally to the long axis of the piece (Fig. 38.3). The maximum diameter of the piece is 9.2 mm and the height is 7.5 mm.

28 whole pieces and fragments of cylindrical stone beads (Fig. 38.4) were recovered during the 2017-2018 archaeological excavations. The blanks obtained from the raw material have been rigorously abraded (Fig. 38.5-7) to acquire the circular section. We could not identify any debitage marks on the specimens, due to subsequent interventions to the shaping operation. All items have a circular perforation in the center (Fig. 38.8). The beads show use-wear marks confirming they had been worn. The perforations have small depressions (Fig. 38.9-10) characterized by wall deformation, the disappearance of the rotation striations and macroscopic polish. This type of use-wear appeared as a result of the stringing of several pieces on a thread in the shape of necklaces or bracelets. The determinable morphometric data are presented in Table 18 (all dimensions are expressed in mm):

No	Diameter	Thickness	Diameter of perforation
1.	2.52	1.26	1.38
2.	2.51	1,84	1,57
3.	2.87	1.01	1.68
4.	2.68	1.87	2.02
5.	2.52	1.60	1.34
6.	2.46	2.02	1.96
7.	2.62	1.66	1.72
8.	2.68	1.82	1.80
9.	2.87	1.42	2.08
10.	3.37	1.42	1.92
11.	2.60	1.96	1.80
12.	3.16	2.08	1.67
13.	2.84	1.92	1.46
14.	2.73	1.60	1.70
15.	2.80	1.38	1.38
16.	2.60	1.18	1.12
17.	3.2	2.1	2
18.	3.3	1.8	2.4
19.	2.9	1.6	1.8
20.	2.98	0.86	1.55
21.	2.62	1.37	1.24
22.	-	1.04	-
23.	-	1.50	-
24.	-	1.46	
25.	-	1.50	-
26.	-	2	-

Tab. 22. Dimensions of the beads made of stone, discovered at the site of Gumelnița.

Shell artefacts

Two cylindrical beads were obtained from *Unio* sp. valves (Fig. 39.1). The debitage operations for obtaining the blanks could not be determined. The interventions during the shaping operation destroyed previous marks. This operation consisted of the abrasion of the bead circumference (Fig. 39.2-3) in order to give of edges a circular morphology.

Abrasion was also applied to the superior side (Fig. 39.4-5), in order to thin the piece. The central perforation was made by bifacial rotation (Fig. 39.6-7) initiated from the inferior side. However, the items do not appear to have been used and the perforation does not show any traces of use-wear/deformation. The diameter of the pieces range between 9.2 mm and 8 mm; thickness of 2.1 mm and 2 mm, the perforation diameter of 4 mm and 3.5 mm respectively.

Two valves of the *Unio* sp. (Fig 39.8) have been perforated, perhaps to be transformed into ornaments. A third fragment of the valve preserves red pigment spots (Fig. 39.14) on the inside. At both valves, percussion was used and its marks are obvious. The punctual indirect percussion produced the perforation of a sub-circular outline, roughly irregular at the first item and with a bilobate outline when two working plans were used at the second item. The edges of the perforations present an irregular appearance, with numerous fissures starting from the impact point (Fig. 39.9-13). The morphometric data are as follows: 1. length – undetermined (fractured), maximum width - 34 mm, thickness - 3 mm, perforation diameter - 9x19 mm; 2. length - 59.2 mm, maximum width - 33 mm, thickness - 4 mm, perforation diameter - 11 mm.

The assembage is completed by two tubular beads (Fig. 40.1) made of *Spondylus* valves. Unfortunately, their surface is extremely degraded (Fig. 40.2-3), thus it was impossible for us to identify microscopically any technological or use-wear marks. Their dimensions are as follows: length - 5.36 mm, respectively 4.76 mm, diameter - 1.46 mm (indeterminable, at the longitudinal fractured item) and perforation diameter - 1.46 mm.

Bone artefact

A vertebral disc (Fig. 40.4) from a large mammal was transformed into an ornament. Centrally, the perforation was made by bifacial rotation (Fig. 40.5) started from the external side and slightly enlarged to the internal one. There are no other technological interventions. The diameter of the piece is of 39 mm, the thickness - 5.5 mm, the diameter of the perforation - 6.2 mm

Tooth artefact

A right canine of *Cervus elaphus* (Fig. 40.6) was transformed into an ornament, most likely to be sewn on garments. At the root level, two grooves were created through repeated passage of a lithic piece (Fig. 40.7). Only the second one encompasses the entire circumference. These would have allowed the winding of a thread, but we did not identify any traces of use-wear indicating use. The length of the piece is 26.8 mm, the maximum width is 11.5 mm and the thickness is 8 mm.

Clay artefacts

Among the cylindrical beads made from stone, there was also a clay specimen (Fig. 40.8-10). Its dimensions are as follows: maximum diameter – 1.56 mm, thickness – 1.86 mm, perforation diameter – 1.04 mm.

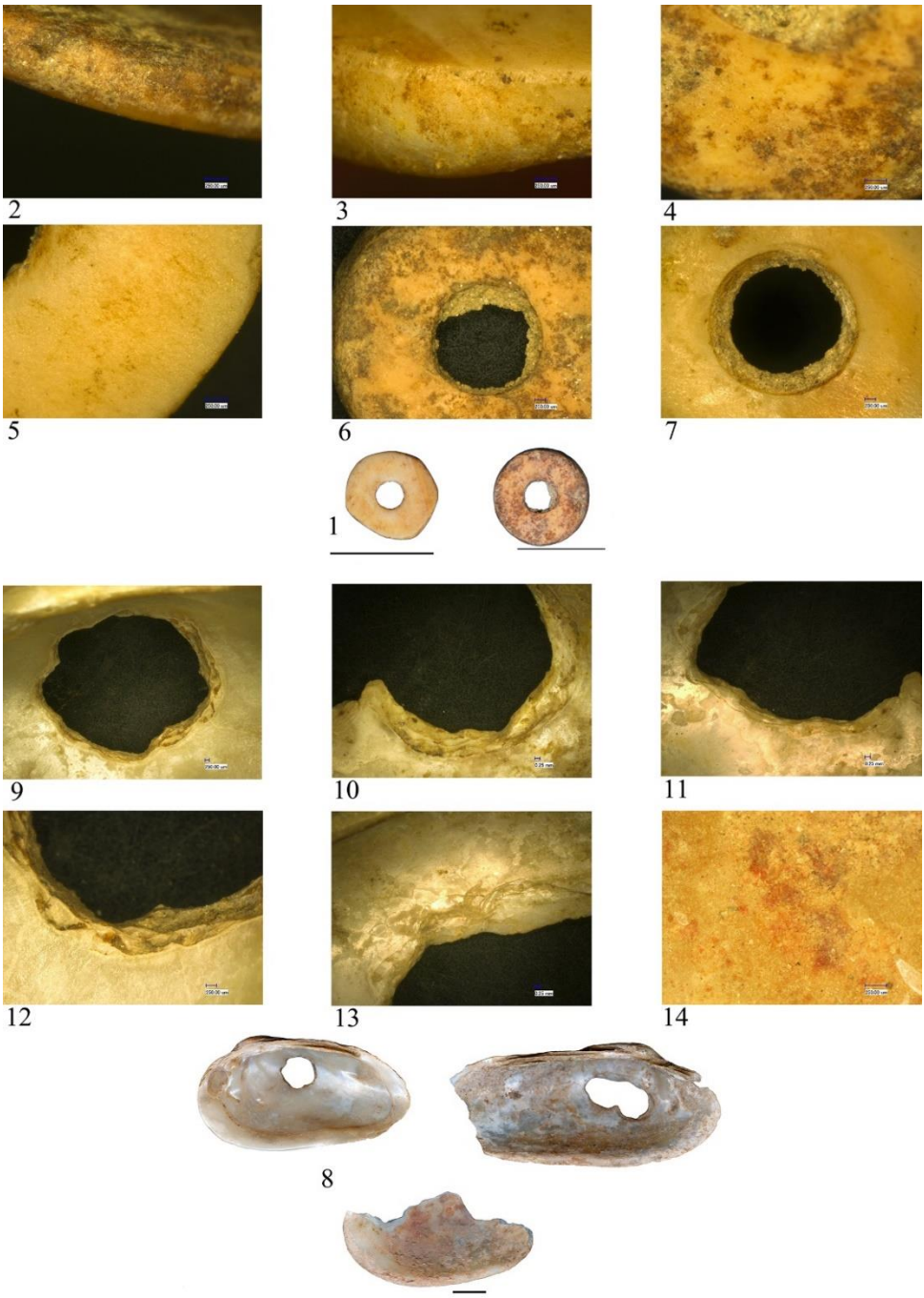

Fig. 39. 1. Unio *sp. beads (scale=1 cm); 2-3. abrasion of the edges; 4-5. abrasion of the surface; 6-7. perforation details; 8. perforated* Unio *valves (scale=1 cm); 9-13. perforation details; 14. red pigment spots.*

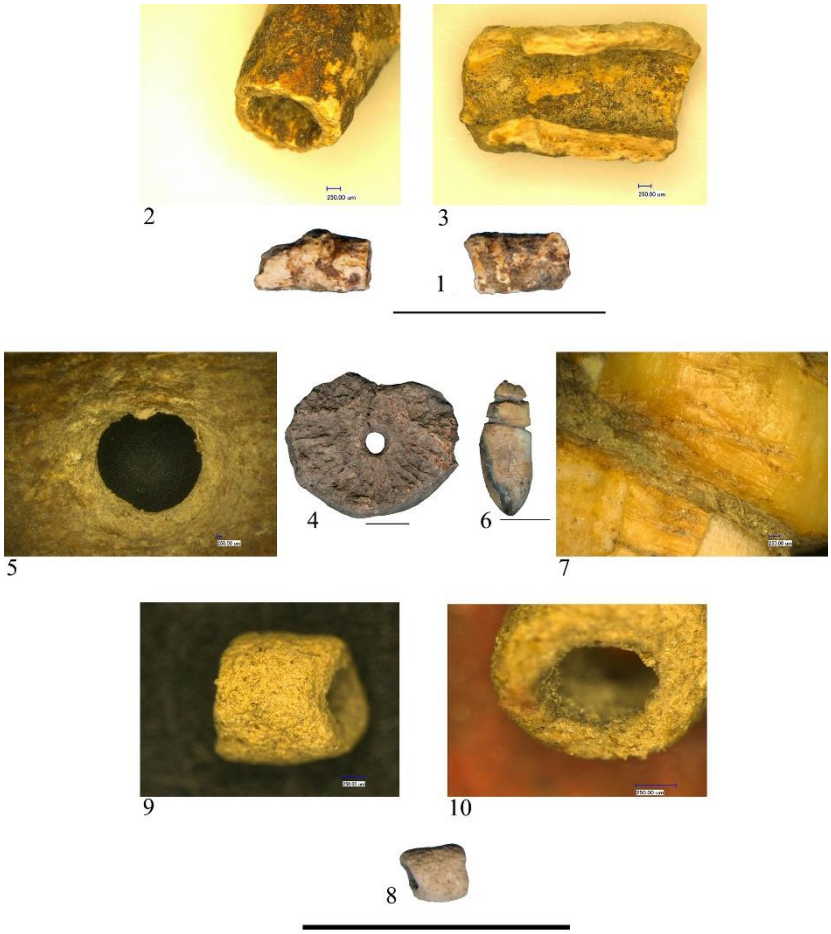

Fig. 40. 1. Spondylus *valve beads (scale=1 cm); 2-3. beads details; 4. bone disc (scale=1 cm); 5. perforation detail; 6.* Cervus elaphus *tooth (scale=1 cm); 7. sawing marks; 8. clay bead (scale=1 cm); 9-10. bead details.*

Personal adornments from funerary contexts (Zone 3)

Grave M8

From the tomb no. 8 come 4 beads made of *Spondylus* valves. Their surface is degraded and with variable degrees of fragmentation, destroying the technological and wear marks.

The first specimen has a fusiform shape (Fig. 41.1), an oval section and shows on its surface red pigment spots. It was discovered on the abdomen area of the deceased where presence of red pigment was also recorded. We could not identify the debitage procedures in this case either. The item has an advanced degree of use-wear, indicated by the almost absent rotation marks of the perforation (Fig. 41.2) and the disappearance/elimination of the raw material on the use-wear facet (Fig. 41.3-4). The

morphometric data are the following: length - 17 mm, average width - 8 mm, thickness - 6 mm, perforation diameter - 3.2 mm.

The burial yielded also two biconvex beads and a tubular one (Fig. 41.5), with morphological differences mainly given by the shaping procedure that created either rectilinear or convex sides. We also identified ochre/red pigment stains on these specimens. The procedures of the debitage operation could not be determined. The surface of the pieces was shaped, and a bifacial perforation (Fig. 41.6-8) was drilled centrally. Small concavities at the extremities (Fig. 41.9-10) and a flattened facet (Fig. 41.11) indicate the pieces were attached and worn. The dimensions of the items are as follows (Tab. 23):

No.	Diameter	Thickness	Perforation diameter
1	14	11.2	6
2	5.5	9	3.8
3	7	6.2	3.6

Tab. 23. Dimensions of the beads from grave M8.

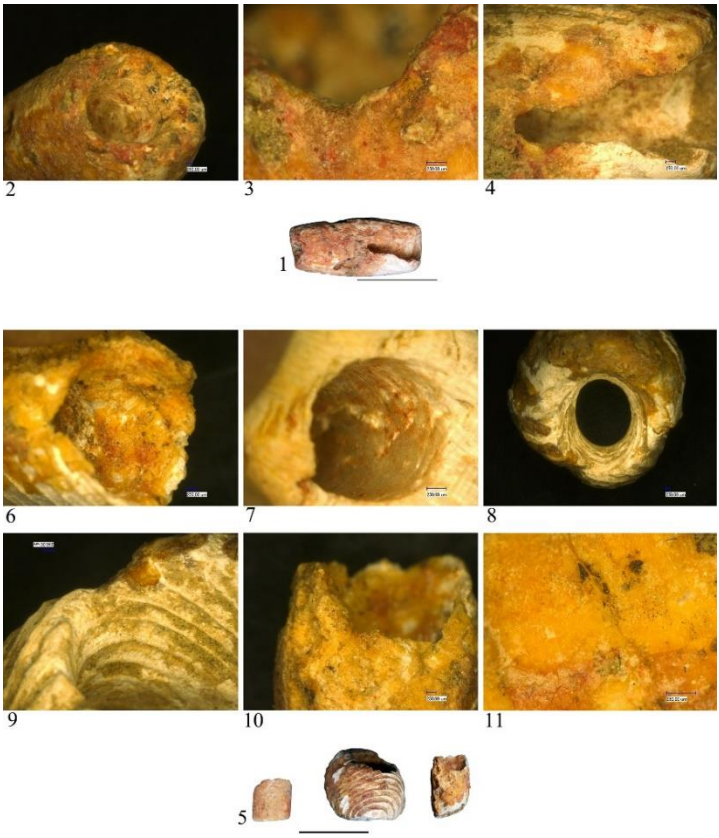

Fig. 41. 1, 5. Spondylus *valve beads (scale=1 cm); 2, 6-8. perforation details; 3-4, 9-10. use-wear depressions at the periphery of the perforation; 11. flattened facet.*

Grave M12

In this tomb there were 2 tubular ornaments made of the *Antalis* shell. One of them is composed of 2 pieces attached to each other (Fig. 43.1, 2) indicating the manner they were strung. We were able to identify elements that demonstrate the previously described situation: small concavities at the extremities (Fig. 43.3). The dimensions of the ornaments are: 1. lenght - 12 mm, maximum diameter - 2 mm, perforation maximum diameter - 1.8 mm; 2. lenght - 5 mm, maximum diameter - 2 mm, perforation maximum diameter - 1.4 mm.

Grave M13

26 tubular beads were obtained by the segmentation of the *Antalis* shells (Fig. 42.1). The items are quite degraded, so we could not identify how the ventral end at all specimens was segmented. In a few cases, marks of segmentation by sawing are preserved (Fig. 42.2), but we do not know if the procedure was the same for the other items. The segmentation edge was adjusted by abrasion (Fig. 42.4). At the dorsal end level, abrasion seems to have been applied directly to create the smoothed morphology (Fig. 42.2). We were able to identify at the ventral end small concavities (Fig. 42.5), that corresponds with a flattened area (Fig. 42.6) exhibiting macroscopic polish. Some shells are caught in one another (Fig. 42.7). The dimensions of the beads are shown in the table below:

No	Lenght	Maximum	Perforation
1	12.40	2.55	1.99
2	10.93	2.62	2.26
3	8.80	2.40	2.23
4	8.13	2.59	2.32
5	12.42	3.44	3.30
6	11.69	2.86	2.10
7	5.70	1.92	1.76
8	11	2.6	2
9	13	3	1.8
10	10.5	2.6	1.4
11	8.4	2.2	1.8
12	7	3	2
13	6.5	2	1.2
14	6.6	2	1.4
15	4	3	2
16	10.8	2	1.6
17	8.2	1.8	1.3
18	7.6	1.8	1.4
19	7.6	1.8	1.2
20	6	2.2	1.4
21	4.6	1.6	1.1
22	5	1.4	1
23	4	2.2	1.4
24	3	2.1	1
25	4	2	1.6
26	3	2.2	2

Tab. 24. Dimensions of the beads from grave M13.

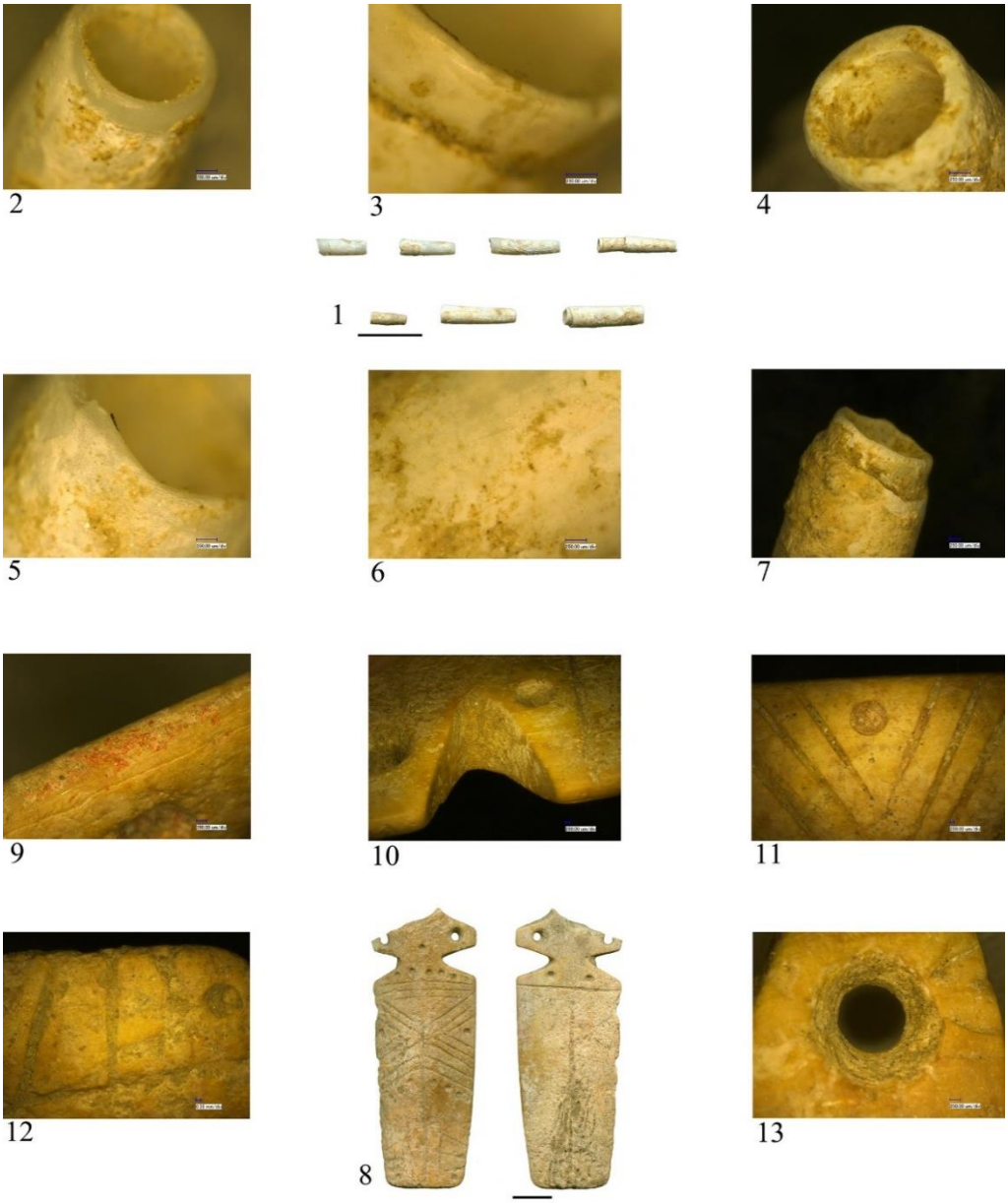

Fig. 42. 1. Antalis *shell beads (scale=1 cm); 2, 4, 9. abrasion marks; 3, 10. sawing marks; 5. concavity at the periphery of perforation; 6. flattened facet; 7. shells caught in each other; 8. bone figurine (scale=1 cm); 11-12. decor details; 13. perforation detail.*

A female figurine (Fig. 42.8) with a head fracture was deposited in the same grave. The blank is flat, obtained from the bone diaphysis of a large mammal. The longitudinal debitage procedures could not be determined because the inferior side and the debitage edges (Fig. 42.9) were rigorously abraded. The outlining of the arms from the body was done by sawing (Fig. 42.10). The delineation of the legs is represented by a longitudinal line carried out by grooving. On either side of this groove, a similar geometric decoration was created of lines cut by sawing. The sequence of the decoration, starting from the body down, is the following:

1. A series of three transversal incisions, with seven points at the top;

2. A series of three incisions that create a triangular pattern (with a point inside) (Fig. 42.11)/developed on either side of main groove. At this level, traces of red pigment are visible both inside the point and in the incisions.

3. Series of two oblique incisions, on either side of the groove, delimited at the bottom by eight points.

4. The feet are represented by a trapezoidal motif (Fig. 42.12) and one point.

The arms are marked by two perforations, made by bifacial rotation (Fig. 42.13) and a central point. On the interior side, the legs are delimited by a vertical line through grooving, and the delineation of the body was made by a horizontal line and two points. The current length of the figurine is 70.90 mm, the maximum width is 27.03 mm and the thickness is 5.26 mm.

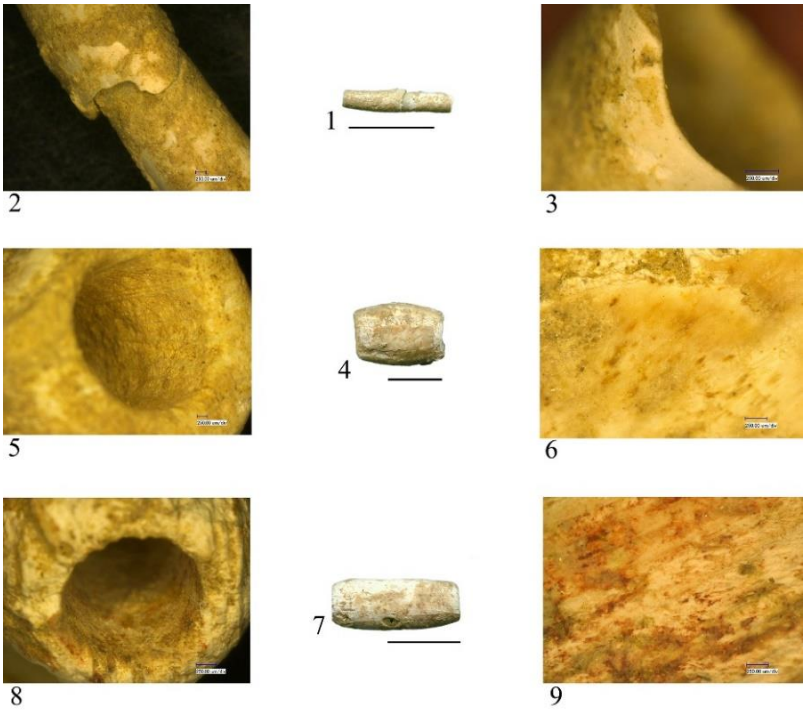

Fig. 43. 1. Antalis *shell bead (scale=1 cm); 2. shells caught in each other; 3. concavity at the periphery of perforation; 4, 7.* Spondylus *valve beads (scale=1 cm); 5, 8. perforation details; 6. flattened facet; 9. red pigment spots.*

Grave M14

From this grave came two biconvex beads made of *Spondylus* valves (Fig. 43.4, 7) and a tubular bead made of the *Antalis* shell. At the first *Spondylus* specimen, the perforation was performed by bilateral rotation (Fig. 43.5, 8). The rotation striations are almost absent due to suspension and wear. The first specimen, although with a degraded surface, has a strongly flattened wear facet (Fig. 43.6). At the second specimen the facet is not so visible, but it shows spots of red pigment on its surface (Fig. 43.9). The lengths of the pieces are 15.26 mm, respectively 15.98 mm; diameter of 10.37 mm and 6.49 mm, respectively, and the perforation diameter of 4.50 mm and 3.28 mm. The *Antalis* bead has the same technological metrics as described above. Its length is 2.8 mm, the maximum diameter of 2 mm and the perforation maximum diameter of 1.2 mm.

X. Clay artefacts

During the excavations from 2018 and 2019 at Gumelnița, five clay representations were identified (the head of an anthropomorphic figurine, the head of a zoomorphic figurine, one zoomorphic figurine, a fragmented miniature table and a spool-shaped clay artefact).

Three of them (the head of an anthropomorphic figurine, the head of a zoomorphic figurine and the miniature table) were identified as *passims* in the terrace area (Zone 3), Son 11, in the proximity of C5 – C6 features.

One zoomorphic figurine was discovered in a fragmentary state, only the head of the figurine being preserved (length – 4.6 cm, height– 3.6 cm, weight – 24.4 g) (Fig. 44.1a-c). The facial features (eyes, nose, mouth, and ears) are schematically represented. The eyes and ears were made by impressions. The superior surface of the figurine was decorated with 16 round impressions and sets of lines, filled with white paste. Traces of red paste are also visible. The figurine was fragmented from ancient times.

Another artefact identified represents the head of an anthropomorphic figurine with six lateral perforations (height – 4.7 cm, length – 4.6 cm, weight – 31.8 g) (Fig. 45.1a-b). The face was schematically modelled by finger-pinching; the nose is represented by a vertical ridge. In the area of C5 – C6 features a miniature table was identified, preserved in a fragmentary state of conservation (height – 3.8 cm; length – 4 cm, weight – 44.6 g) (Fig. 45.3a-c).

In 2018, in Zone 1, S1, sector II, grid square B8, stratigraphic unit 1011 (colluvium) a spool-shaped clay artefact was identified (height – 4.3 cm; thickness – 2.2 cm, weight – 13.8 g) (Fig. 45.2a-b). The clay object has a small impressed dot on the front part.

During the excavations in 2019, in Zone 1, a zoomorphic figurine was identified in S 1, sector I, grid square A1, stratigraphic unit 1036, 20.903 m altimetry. The figurine represents a quadruped mammal (length – 6.6 cm, height – 2.3 cm, weight – 28.9 g) (Fig. 44.2a-d). The anatomical features of the zoomorphic figurine (horns, tail, and legs) were schematically modelled, but only one horn and the superior left leg are preserved; also, a fragmented bump is present on the back of the figurine.

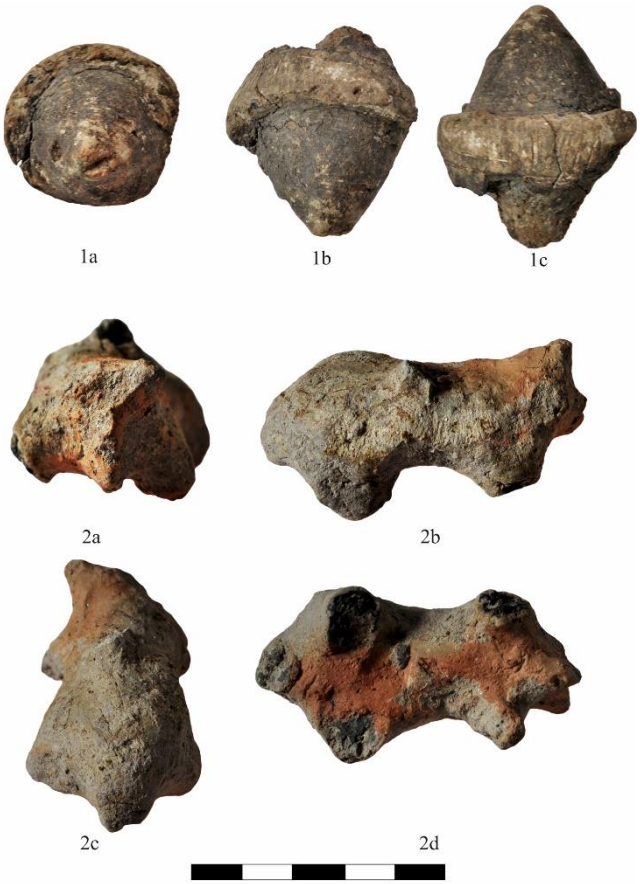

Fig. 44. 1 a-c. Head of a zoomorphic figurine found in Zone 3, C5-C6 features area; 2a-d. Zoomorphic figurine found in Zone 1

The clay artefacts were made of semi-fine clay and tempered with grog. The presence of vegetal matter as temper is visible at the head of the anthropomorphic figurine and the inferior part of the zoomorphic figurine. The surface treatment was done by smoothing and polishing (the fragmented zoomorphic figurine). Except the head of the zoomorphic figurine, which was fired in a reducing environment, the other oxidized clay representations were incompletely fired. For the incomplete oxidized clay objects, natural inclusions such as mica are visible.

The head of the anthropomorphic figurine, modelled by lateral impressions, resembles the figurines found at Căscioarele; Ciolănești din Deal; Măriuța[92]; Pietrele-*Măgura Gorgana*[93]. The zoomorphic figurine of the quadruped mammal has similarities

[92] Andreescu 2002, pl. 7(2, 4), pl. 8(5); pl. 4(7).
[93] Hansen 2011, fig. 14.

with items from the old excavations from Gumelnița[94], Vidra[95], or the new excavations from Sultana-*Malu Roșu.* The miniature table and the spool-shaped clay artefact are similar to those identified at Vidra[96] or Pietrele[97].

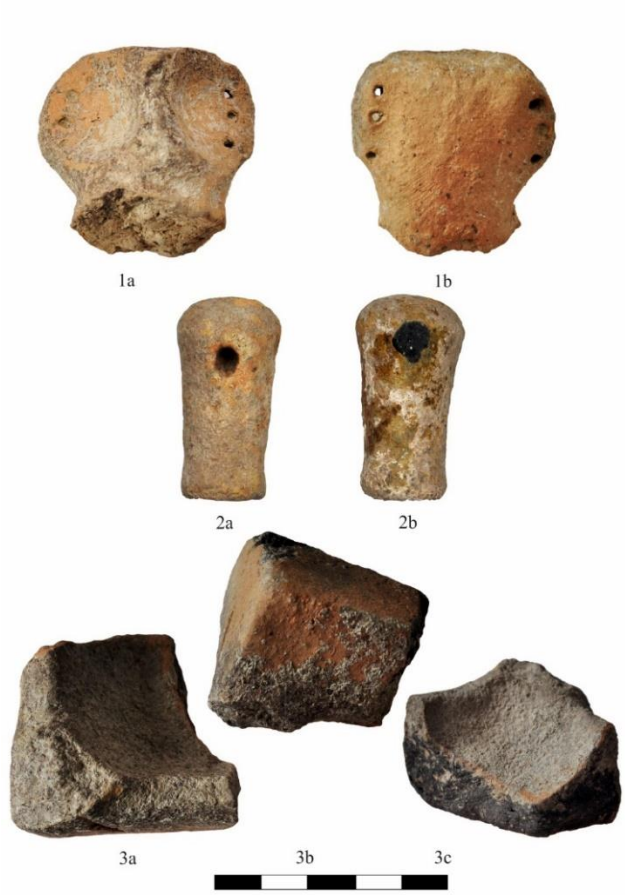

Fig. 45. 1a-b. Head of an anthropomorphic figurine found in the C5-C6 area, Zone 3; 2a-b. Spool-shaped artefact found in Zone 1. 3a-c. miniature table fragment found in the C5-C6 area, Zone 3.

XI. Metal items

The analysed material consists of three small copper pieces found in Zone 1. Two of them were found in S1, sector II, grid square A7, stratigraphic unit 1044 (ID 1851/2018 (Fig. 46.1): length - 1 cm; thickness - 0.2 cm; ID 1413/2019 (Fig. 46.2): length – 1.2 cm; thickness - 0.7 cm. The other piece was identified in 2019, S1, Sector III, grid square C2, stratigraphic unit 1011 (colluvium) (ID 424/2019: length –

[94] Marinescu-Bîlcu, Ionescu 1967, pl. XII, 13.
[95] Andreescu, Vintilă 2017, pl. V, 2, 3.
[96] Vintilă, Neagu 2016, fig. 2/2, 2/4.
[97] Toderaș *et alii* 2009, pl. XX, 2, 4.

2.5 cm; thickness - 0.9 cm) (Fig. 46.3). The ED-XRF analyses performed with a handheld Skyray Instruments Genius spectrometer indicate a high percentage of copper (93-95%) suggesting it derived from native copper ores.

Fig. 46. 1-3. Copper pieces found during the excavations from 2018-2019 in Zone 1.

XII. Radiocarbon data

During the archaeological 2017-2019 fieldwork seasons that represented the reappraisal of the archaeological research at the Gumelnița complex sites, a number of 23 samples were collected and radiocarbon dated, yielding a total of 27 dates overall (Tab. 25), so far[98]. The radiocarbon dates here have been recovered from two occupation areas at Gumelnița, namely Zone 1 (*tell* settlement) and Zone 3 (terrace area) corresponding to several kind of discoveries (cemetery, pits, etc.) The dating of the ^{14}C samples was performed at the RoAMS laboratory, in Bucharest, Romania http://dfna.nipne.ro /radiocarbon/[99]. The resulting dates were calibrated (95.4% confidence) with the rcarbon package within R statistical environment that uses the intcal20 calibration curve and a similar calibration protocol with OxCal[100].

An almost equal number of samples from both areas (n = 13, from Zone 3 and n = 14, from Zone 1) was dated so far, allowing for a comparison in terms of occupation duration between the two areas, although preliminary. The 13 dates from Zone 3 indicate a timespan between about 5035-4169 cal BC (95.4% probability), which may place the occupation of that area during both the Gumelnița and (partly) the Boian cultures. This fact is confirmed by the pottery style classification also (see VII. Pottery).

The situation is slightly different in what the *tell* settlement is concerned. Here, the 14 dates available so far, span the entire Gumelnița complex chronological sequence, ranging from approximately 4800 through 4040 cal BC (see Fig. 47 and Tab. 25). Although one cannot consider a fully continuous occupation at the site, it might be that various Gumelnița communities were using the *tell* all along the fifth millennium cal BC. We expect that future dates from the site to increase the number of dates belonging to the early occupational phases of the tell. However, one must not forget the probability that the freshwater reservoir effect (that we are going to investigate for this complex of sites) could have made some dates to look older than they are (from several decades to potentially several hundred years). As this is an ongoing analysis, we can only say for now that it is not impossible that the *tell* site at Gumelnița to be amongst the oldest known for the Gumelnița cultural complex. As mentioned above, it may be that the cemetery may have an earlier starting point as well, something that further dating effort would elucidated in the future.

[98] Bem 2000, p. 85, nr. 52, 53; Lazăr *et alii* 2017, p. 154-159, 166-167.
[99] Sava *et alii* 2019.
[100] Bevan *et alii* 2020; Bronk-Ramsey 2009; R Core Team 2020; Reimer *et alii* 2020.

No	Lab. ID	Zone	Feature	Discovery year	Material	Date BP	SD	BC 2σ
1	Poz-52503	Zone 3	M3	1962	Human bone	5625	35	4535-4513 (7%) 4507-4432 (49%) 4429-4361 (39%)
2	RoAMS-1321.110	Zone 3	M2-I1	2018	Human bone	5437	37	4350-4238 (93%) 4185-4175 (2%)
3	RoAMS-1322.110	Zone 3	M2-I2	2018	Human bone	5455	36	4355-4245 (95%)
4	RoAMS-1325.110	Zone 3	M3-I2	2018	Human bone	5456	38	4359-4241 (94.8%) 4181-4179 (0.3%)
5	RoAMS-1326.110	Zone3	M4	2018	Human bone	5429	39	4351-4231 (90.5%) 4192-4169 (4.6%)
6	RoAMS-1327.110	Zone 3	M5	2018	Human bone	5545	37	4448-4338 (95.1%)
7	RoAMS-1328.110	Zone 3	M6	2018	Human bone	5485	38	4441-4419 (7.1%) 4400-4380 (3.2%) 4372-4313 (55.3%) 4299-4251 (29.3%)
8	RoAMS-1330.110	Zone 3	M8	2018	Human bone	5497	38	4443-4415 (13%) 4404-4320 (64.1%) 4293-4257 (17.9%)
9	RoAMS-1332.110	Zone 3	M10	2018	Human bone	5646	36	4545-4437 (74.9%) 4427-4363 (20.1%)
10	Poz-52502	Zone 1	M1	1960 (?)	Human bone	5495	35	4442-4418 (10.8%) 4401-4376 (5.5%) 4374-4320 (60.4%) 4292-4257 (18.2%)
11	RoAMS-655.4	Zone 3	M1	2017	Human bone	5527	43	4450-4327 (92%) 4284-4268 (3.2%)
12	RoAMS-656.4	Zone 1	L2, s.u. 1032	2017	Herbivor	5560	39	4483-4479 (1%) 4454-4339 (94.2%)
13	RoAMS-657.4	Zone 1	C6, s.u. 1031	2017	Herbivor	5556	41	4484-4479 (1%) 4455-4337 (94%)
14	RoAMS-658.4	Zone 1	C2, s.u. 1013	2017	Herbivor	5582	36	4489-4473 (4.5%) 4458-4348 (90.5%)
15	RoAMS-659.4	Zone 1	C5, s.u. 1030	2017	Herbivor	5538	37	4448-4335 (95.4%)
16	GrN-3025	Zone 1	GUMT	1960 (?)	Charcoal	5700	70	4704-4440 (87.5%) 4421-4367 (7.5%)
17	GrN-3028	Zone 1	GUMT	1960 (?)	Grains	5400	90	4439-4422 (1.5%) 4366-4040 (91%) 4017-4000 (1.5%)
18	RoAMS-1334.110	Zone 3	C6, s.u. T1032	2018	Animal Bone (ovi-caprin)	5635	35	4540-4437 (66.5%) 4426-4363 (28.6%)
19	RoAMS-1335.110	Zone 3	C7, s.u. T1039	2018	Animal Bone (bos tarus)	6040	36	5035-4838 (95%)
20	RoAMS-1336.110	Zone 1	C9, s.u. 1041	2018	Animal Bone (bos tarus)	5379	29	4331-4224 (65.6%) 4197-4164 (17.3 %) 4126-4111 (3%) 4098-4060 (9.4%)
21	RoAMS-1337.110	Zone 1	C12, s.u. 1048	2018	Animal Bone (bos tarus)	5472	29	4359-4315 (56.1%) 4297-4252 (39.1%)
22	RoAMS-1616.122	Zone 1	C6, s.u. 1031	2017	Seeds	5809	43	4782-4744 (7.4 %) 4729-4545 (87.7%)
23	RoAMS-1617.122	Zone 1	C4, s.u. 1027	2017	Seeds	5660	57	4653-4637 (2%) 4613-4357 (93.3%)
24	RoAMS-1619.122	Zone 1	L1, s.u. 1026	2017	Seeds	5552	49	4492-4468 (4%) 4461-4329 (91%)
25	RoAMS-1622.122	Zone 1	L1, s.u. 1026	2017	Seeds	5482	32	4439-4422 (4.1%) 4366-4314 (60.6%) 4298-4252 (30.3%)
26	RoAMS-1624.122	Zone 3	C7, s.u. T1039	2018	Seeds	5954	37	4934-4913 (5.1%) 4909-4767 (79.3%) 4763-4725 (10.6%)
27	RoAMS-1625.122	Zone 1	C6, s.u. 1031	2017	Seeds	5464	38	4435-4427 (1.2%) 4361-4244 (94%)

Tab. 25. Radiocarbon dates from the Gumelnița tell (Zone 1) and the cemetery area (Zone 3).

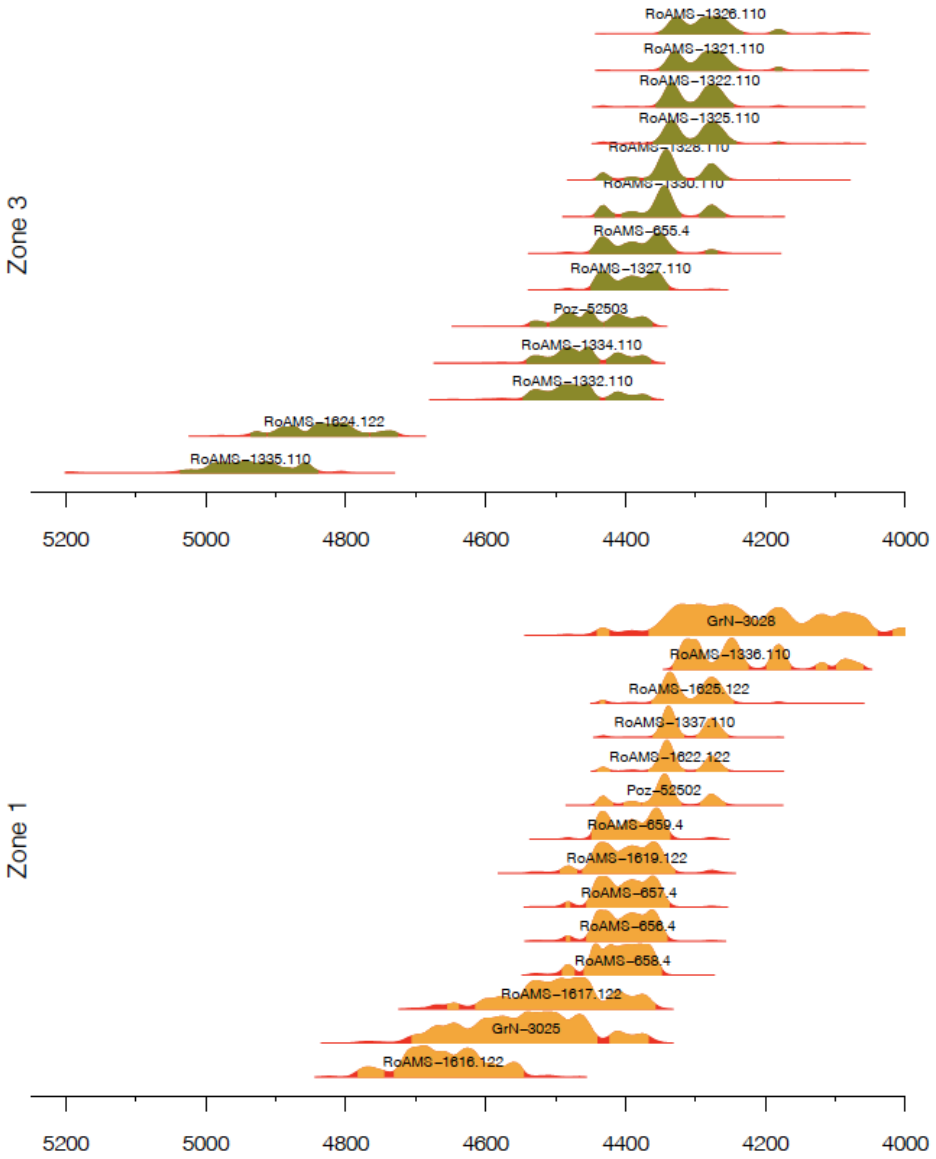

Fig. 47. Results of radiocarbon analysis from the Zone 3 (top) and Zone 1 (bottom) at Gumelnița. Shown are dates distributions (green and orange) and highest potential density intervals (red).

XIII. Conclusions

These are the results obtained by our team during the 2018 and 2019 seasons. The data are preliminary, and the following research will complement this information. However, the interdisciplinary archaeological data achieved until now indomitable provide new important information about past human communities who lived at Gumelnița 6000 years ago. This new research also set the Gumelnița site within the broad context of other contemporary settlements from the Balkans in the fifth millennium BC.

As previously mentioned, the potential of Gumelnița site is obvious, and our interdisciplinary project will continue on a vast scale in the coming years.

Funding

The zooarchaeological, carpological, and anthropological works, along with the radiocarbon dating and the field trip of the University of Bucharest team were supported by a grant from the Romanian Ministry of Research and Innovation, CCCDI - UEFISCDI, project number PN - III - P1-1.2 - PCCDI - 2017-0686, within PNCDI III.

Acknowledgments

We express our gratitude to Cătălin Nicolae ("Vasile Pârvan" Institute of Archaeology, Bucharest) for his help in taking the photographs for the anthropological analysis.

Also, we would like to thank Dragoș Alexandru Mirea (Bucharest Municipality Museum) for all the help in the analyses of the copper artefacts.

Bibliography / Bibliografie

Acsádi, Nemeskéri 1970: Gy. Acsádi, J. Nemeskéri, *History of human life span and mortality*, Académiai Kiadó, Budapest, 1970.

Amu 2015: P. Amu, *Monografia Orașului Oltenița și Orașul Turtucaia în timpul cedării Cadrilatetului 1940*. vol. V. Oltenița: Tridona, 2015.

Andreescu 2002: R.R. Andreescu, *Plastica antropomorfă gumelnițeană. Analiză primară*, Editura Muzeul Național de Istorie a României, Monografii III, 2002.

Andreescu *et alii* 2001: Andreescu, R., Haită, C., Mirea, C., Zaharia, P., *Vitănești, com. Purani, jud. Teleorman. Punct Măgurice* in Angelescu M.V., Borș, C., Oberländer – Târnoveanu (eds.), CCA Campania 2000, Suceava 2001, p. 271– 272, București: cIMeC.

Andreescu, Vintilă 2017: R.R. Andreescu, C. M. Vintilă, *Gumelnița zoomorphic figurines from the collections of the Bucharest Municipality Museum,* RCAN 3, 2017, p. 104-126.

Andrefsky 2005: W. Andrefsky Jr, *Lithics: macroscopic approaches to analysis*. Cambridge: Cambridge University Press, 2005.

Auerbach, Ruff 2004: B.M. Auerbach, C.B. Ruff, *Human body mass estimation: a comparison of "morphometric" and "mechanical" methods*, American Journal of Physical Anthropology, 125, 4, 2004, p. 331-342.
Auerbach, Ruff 2006: B.M. Auerbach, C.B. Ruff, *Limb bone bilateral asymmetry: variability and commonality among modern humans*, Journal of Human Evolution, 50, 2, 2006, p. 203-218.
Aufderheide, Rodriguez-Martin 1998: A. C. Aufderheide, C. Rodriguez-Martin, *The Cambridge encyclopedia of human paleopathology*, Cambridge, 1998.
Bălășescu 2014: A. Bălăşescu, *Arheozoologia neo-eneoliticului de pe Valea Teleormanului*, Muzeul Național de Istorie a României, Colecția Muzeului Național, Seria Cercetări Puridisciplinare, XIV, Editura Mega, Cluj Napoca, 2014.
Bălășescu, Radu 2011: A. Bălășescu, Radu V., *Paléo-économie animalière et reconstitution de l'environnement*, in L. Carozza, C. Bem and C. Micu, eds., Société et environnement dans la zone du Bas Danube durant le 5ème millénaire avant notre ère, IaşI, Editura Universității „Al. I. Cuza", 2011, p. 385–407.
Bălășescu *et alii* 2005: A. Bălăşescu, V. Radu, D. Moise, *Omul şi mediul animal între mileniile VII-IV î.e.n. la Dunărea de Jos*, in Muzeul Naţional de Istorie a României, Seria Cercetări Pluridisciplinare XI, Editura Cetatea de Scaun, Târgovişte.
Bem 2000: C. Bem, *Noi propuneri pentru o schiţă cronologică a eneoliticului românesc*. Pontica, 33–34, p. 25–121.
Bevan *et alii* 2020: Bevan, A., Crema, E., Bocinsky, R.K., Hinz, M., Riris, P., Silva, F., rcarbon: Calibration and Analysis of Radiocarbon Dates.
Bogaard 2001: A. Bogaard, *Charred plant remains from flotation in 2000*, in D.W. Baley, R. Andreescu, S. Mills, S. Trick (eds.), *Southern Romanian Archaeological Project. Second Preliminary Report.* Cardiff University. Cardiff: School of History and Archaeology, 2001, p. 113–127.
Bojňanský, Fargšová 2007: Bojňanský V., Fargšová A., *Atlas of Seeds and Fruits of Central and East-European Flora*, Springer Science & Businnes Media, 2007.
Bonsall *et alii* 2010: Bonsall, C., Gurova, M., Hayward, C., Nachev, C., & Pearce, N. J., Characterization of 'Balkan flint' artefacts from Bulgaria and the Iron Gates using LA-ICP-MS and EPMA. *Интердисциплинарни изследвания*, *22*, 2010, p. 9–18.
Bräuer 1988: G. Bräuer, *Osteometrie*, în: R. Knußmann, I. Schwidetzky, H.W. Jürgens, G. Ziegelmayer (eds.), *Anthropologie, Handbuch der vergleichenden Biologie des Menschen*, zugleich 4, Auflage der Lehrbuchs der Anthropologie, begründet von Rudolf Martin, Sonderdruck, Band I/1: Wesen und Methoden der Anthropologie, Stuttgart, 1988, p. 160-232.
Bréhard, Bălășescu 2012: S. Bréhard, A. Bălăşescu. *What's behind the tell phenomenon? An archaeozoological approach to eneolithic sites in Romania*, Journal of Archaeological Science, 39, 2012, p. 3167–3183.
Brickley, McKinley 2004: M. Brickley, J.I. McKinley (eds.), *Guidelines to the standards for recording human remains*, IFA Paper, No. 7, British Association for Biological Anthropology and Osteoarchaeology, Southampton, Hampshire, 2004.
Bronk-Ramsey 2009: C. Bronk-Ramsey, *Bayesian analysis of radiocarbon dates*. Radiocarbon 51, 2009, p. 337–360.

Brooks, Suchey 1990: S. Brooks, J.M. Suchey, *Skeletal age determination based on the os pubis: a comparison of the Acsádi-Nemeskéri and Suchey-Brooks methods*, Human Evolution, 5, 3, 1990, p. 227-238.
Buikstra, Ubelaker 1994: J.E. Buikstra, D.H. Ubelaker (eds.), *Standards for data collection from human skeletal remains*, Arkansas Archaeological Survey Research, Series No. 44, Fayetteville, Arkansas, 1994.
Cabi.org 2019: *Polygonum lapathifolium (pale persicaria).* [online] Available at: https://cabi.org/isc/datasheet/42689 [Accessed 23 October 2019].
Campana 2009: S. Campana, *Archaeological Site Detection and Mapping: Some Thoughts on Differing Scales of Detail and Archaeological "Non-Visibility"*, in *Seeing the Unseen: Geophysics and Landscape Archaeology*. A Balkema Book. Boca Raton, Fla.: CRC Press, 2009, p. 5-26.
Cârciumaru 1996: M. Cârciumaru, *Paleoetnobotanica*, editura Glasul Bucovinei, Helios, Iași, p. 201.
Comșa 1974: E. Comşa, *Istoria comunităţilor culturii Boian*, Bucureşti: Ed. Academiei Republicii Socialiste România.
Dumitrescu 1924: V. Dumitrescu, *Découvertes de Gumelnița*, Dacia, I, 1924, p. 325–342.
Dumitrescu 1925: V. Dumitrescu, *Fouilles de Gumelnița*, Dacia, II (2), 1925, p. 29–103.
Dumitrescu 1963: V. Dumitrescu, *O statuetă neolitică de marmură descoperită la Gumelnița*, SCIVA 14, 1963, p.139–143.
Dumitrescu 1966: V. Dumitrescu, *Gumelnița - sondajul stratigrafic din 1960*, SCIVA, 17(1), 1966, p. 51–60.
Dumitrescu, Marinescu-Bîlcu 2001: V. Dumitrescu, S. Marinescu-Bîlcu, *Noi descoperiri de la Gumelnița*, CCDJ, 16–17, 2001, p. 114–144.
Eisenbeiss, Sauerbier 2011: H. Eisenbeiss, M. Sauerbier, *Investigation of Uav Systems and Flight Modes for Photogrammetric Applications: Investigation of UAV Systems and Flight Modes*, The Photogrammetric Record 26 (136), 2011, p. 400–421.
Ferembach *et alii* 1980: D. Ferembach, I. Schwidetsky, M. Stloukal, *Recommendations for age and sex diagnoses of skeletons*, Workshop of European Anthropologists, Journal of Human Evolution 9, 7, 1980, p. 517-549.
Finnegan 1978: M. Finnegan, *Non-metric variation of the infracranial skeleton*, Journal of Anatomy 125, 1, 1978, p. 23-37.
Golea *et alii* 2014: M. Golea, C. Lazăr, M. Stavrescu-Bedivan, *Macroresturi vegetale descoperite în situl arheologic Sultana – Malu Roșu, județul Călărași: studiu preliminar*, SP, 11, 2014, p. 163 – 172.
Gurova 2012: M. Gurova, *'Balkan Flint'–fiction and/or trajectory to Neolithization: Evidence from Bulgaria*, *Българско е-Списание за Археология*, *2*(1), 2012, p. 15–49.
Hansen 2011: S. Hansen, *Figurines in Pietrele: Copper Age ideology*, Documenta Praehistorica 37, 2011, p. 117-129.
Hauser, De Stefano 1989: G. Hauser, G. F. De Stefano, *Epigenetic variants of the human skull*, E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, 1989, p. 301.
Herrerin Lopez 2001: J. Herrerin Lopez, *La necropolis de la catedral de El Burgo de Osma (Soria): bioantropologia de una poblacion medieval y moderna*, teză de doctorat, 2001, Universidad Complutense de Madrid.

Hiscock 2002: P. Hiscock, *Quantifying the Size of Artefact Assemblages*, Journal of Archaeological Science, 29(3), 2002, p. 251–258.
https://doi.org/10.1006/jasc.2001.0705
Işcan *et alii* 1984: M.Y. Işcan, S.R. Loth, R.K. Wright, *Age estimation from the rib by phase analysis: white males*, Journal of Forensic Sciences, 29, 4, 1984, p. 1094-1104.
Jacomet 2006: S. Jacomet, *Identification of chaff remains from archaological sites'* 2nd edn. IPNA. Basel, 2006.
Kreuz *et alii* 2005: A. Kreuz, E. Marinova, E. Shäfr, J. Wiethold, *A comparison of early Neolithic crop and weed assemblages from the Linearbandkeramik and the Bulgarian Neolithic cultures: differences and similarities*, Vegetation History and Archaeobotany 14, 2005, p. 237 – 258.
Kučera *et alii* 2019: L. Kučera, P. Jaroslav, P. Fojtík, P. Barták, P. Kučerová, P. Jaroslav, V. Komárková, J. Beneš, L. Polcerová, M. Králik, P. Bednář, *First evidence of broomcorn millet (*Panicum miliaceum*) in Central Europe*, Archaeological and Anthropological Sciences, 11, 2019, p. 4221.
Lansdown 2013: R. Lansdown, *Persicaria lapathifolia. The IUCN Re List of Threatened Species* 2013: e.T164411A1048733.
Lazăr 2001: C. Lazăr, *Date noi privind unele morminte gumelnițene*, CCDJ, 14–15, 2001, p. 173–183.
Lazăr *et alii* 2016: C. Lazăr, M. Mărgărit, A. Bălăşescu, *Dogs, jaws and other stories: two symbolic objects made of dog mandibles from Sultana- Malu Roșu tell settlement (Southeastern Europe)*, Journal of Field Archaeology, 41, 1, 2016, p. 101- 117.
Lazăr *et alii* 2017: C. Lazăr, A. Bălăşescu, I. Crăciunescu, C. Covătaru, M. Danu, A. Darie, M. Dimache, O. Frujină, M. Golea, C. Haită, T. Ignat, B. Manea, M. Mărgărit, V. Opriş, V. Radu, T. Sava, G. Sava, D. Ștefan, G. Vasile, *Gumelnița: then and now. The research results of the 2017 fieldwork*, SP, 14, 2017, p. 119-174.
Lazăr *et alii* 2019: C. Lazăr, M. Dimache, S. Cristache, T. Zavalaș, D. Pîrvulescu, V. Opriş, T. Ignat, A. Darie, B. Șandric, M. Streinu, O. Borlean, M. Buruiană, A. Ciobotaru, A. Bălăşescu, M. Golea, G. Vasile, M. Florea, V. Radu, C. Haită, M. Mărgărit, C. Căpiță, C. Covătaru, M. Danu, O. Frujină, B. Manea, A. Șerbănescu 2019, *Gumelnița, mun. Oltenița, jud. Călăraşi. Punct: Măgura Gumelniţa (Măgura Calomfirescu)*, CCA Campania 2018. Volum editat de către Institutul Național al Patrimoniului în parteneriat cu Muzeul Național Brukenthal, Sibiu. București, Ministerul Culturii și Identității Naționale, 2019, p. 65-69.
Lazăr *et alii* 2020: C. Lazăr, M. Dimache, S. Cristache, T. Zavalaș, D. Pîrvulescu, V. Opriş, T. Ignat, A. Darie, B. Șandric, M. Streinu, O. Borlean, M. Buruiană, A. Iancu, M. Tufaru, A. Bălăşescu, M. Golea, G. Vasile, M. Florea, V. Radu, C. Haită, M. Mărgărit, C. Căpiță, C. Covătaru, M. Danu, O. Frujină, B. Manea, A. Șerbănescu, A. Vespremeanu-Stroe 2020, *Gumelnița, mun. Oltenița, jud. Călăraşi. Punct: Măgura Gumelniţa (Măgura Calomfirescu)*, CCA Campania 2019. Volum editat de către Institutul Național al Patrimoniului în parteneriat cu Muzeul Județean Buzău. București, Ministerul Culturii, 2020, p. 151-153.
Lovejoy *et alii* 1985: C.O. Lovejoy, R.S. Meindl, T.R. Pryzbeck, R.P. Mensforth, *Chronological metamorphosis of the auricular surface of the ilium: a new method for*

the determination of adult skeletal age at death, American Journal of Physical Anthropology, 68, 1, 1985, p. 15-28.
Luontoportti.com 2019: *False Cleavers, Galium spurium – Flowers – NatureGate.* [online] Available at: http://www.luonportti.com/suomi/en/kukkakasvit/ false–cleavers [Accessed 23 Oct. 2019].
Mann, Hunt 2005: R.W. Mann, D R. Hunt, *Photographic regional atlas of bone disease. A guide to pathologic and normal variation in the human skeleton*, Springfield, Illinois, 2005.
Mann *et alii* 2016: R.W. Mann, D.R. Hunt, S. Lozanoff, *Photographic regional atlas of non-metric traits and anatomical variants in the human skeleton*, Springfield, Illionois, 2016.
Marinescu-Bîlcu 1962: S. Marinescu-Bîlcu, *Carnet de Șantier Gumelnița 1962.* Manuscript. Personal archive.
Marinescu-Bîlcu, Ionescu 1967: S. Marinescu-Bîlcu, B. Ionescu, *Catalogul sculpturilor eneolitice din muzeul raional Oltenița*, Sibiu, 1967, 43 p.
Martin 1928: R. Martin, *Lehrbuch der Anthropologie in systematischer darstellung mit besonderer berücksichtigung der anthropologischen methoden; für studierende, ärzte und forschungsreisende*, Zweite vermehrte auflage, Zweite band: Kraniologie, osteologie, Jena, 1928.
Meindl, Lovejoy 1985: R.S. Meindl, C.O. Lovejoy, *Ectocranial suture closure: a revised method for the determination of skeletal age at death based on the lateral-anterior sutures*, American Journal of Physical Anthropology 68, 1, 1985, p. 57-66.
Monah 1999: F. Monah, *Analiza arheobotanică a unui complex menajer gumelnițean din Tell–ul de la Hârșova*, ArhMols 22, 1999, p. 273– 281.
Monah, Monah 1995: F. Monah, D. Monah, *Macroresturi vegetale descoperite în nivelurile Cucuteni A2 și B1 de la Poduri – Dealul Ghindaru*, ArhMold, 17, 1995, p. 311 – 319.
Motuzaite – Matuzeviciute *et alii* 2013: G. Motuzaite – Matuzeviciute, R.A. Staff, H.V. Hunt, X. Liu, M.K. Jones, *The early chronology of broomcom millet (*Panicum miliaceum*) in Europe*, Antiquity 87, 2013, p. 1073–1085.
Myszka, Piontek 2012: A. Myszka, J. Piontek, *Variation of musculoskeletal stress markers in the medieval population from Cedynia (Poland) – proposal of standardized scoring method application*, Collegium Antropologicum 36, 3, 2012, p. 1009-1017.
Necrasov, Haimovici 1966: O. Necrasov, S. Haimovici, *Studiul resturilor de faună neolitică, descoperite în stațiunea Gumelnița*, SCIV, 17, t. 1, 1966, p.101-108.
Opriș 2017: V. Opriș, *Ceramica eneoliticiă Boian-Gumelnița. O perspectivă tehnologică și funcțională*, unpublished Phd thesis, Institutul de Arheologie Vasile Pârvan, Academia Română, București, 2017.
Ortner 2003: D.J. Ortner, *Identification of pathological conditions in human skeletal remains*, 2nd edition, San Diego, California, 2003.
Panțu 1906: Z.C. Panțu, *Plante cunoscute poporului român,* Institutul de Arte Grafice și Editura „Minerva”, București, p. 398.
Popescu 2009: G. Popescu, *Estimating the size of lithic artifact assemblages. A view from the Southern Carpathians Middle Paleolithic*, SP, 5, 2009, p. 37–49.

Popovici *et alii* 2014a: D. Popovici, B. Randoin, I. Cernău, C. Cernea, A. Ilie, C. Haită, A. Bălăşescu, V. Radu, M. Mărgărit, L. Niţu, R. Hovsepyan, *Programul de colaborare Româno–Francez de la Hârşova tell, jud. Constanţa. Campania 2013*, CA, 21, 2014, p.25–54.
Popovici *et alii* 2014b: D. Popovici, C. Cernea, I. Cernău, V. Parnic, M. Dimache, R. Hovsepyyan, A. Bălăşescu, V. Radu, C. Haită, M. Mărgărit, L. Niţă, L., *Şantierul arheologic Borduşani – Popină, jud. Ialomiţa (2012 – 2014),* CA, 21, 2014, p. 55–118.
R Core Team 2020: *R: A language and environment for statistical computing. R Foundation for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria.
Radu 2011: V. Radu, *Le Néolithique de la Roumanie Méridionale: Exploitation des ressources aquatiques dans les cultures Boian et Gumelniţa*, Sarrebruck, Editions Universitaires Européennes, 2011.
Radu *et alii* 2016: V. Radu, D. N. Popovici, C. Cernea, I. Cernău, A. Bălăşescu, *Harvesting molluscs in the Eneolithic: a study of freshwater bivalve accumulations from the tell settlements of Borduşani-Popină and Hârşova (Romania, 5th millennium BC)*, Environment archaeology 21 (4), 2016, p. 334-350.
Reimer *et alii* 2020: P.J. Reimer, W.E. Austin, E. Bard, A. Bayliss, P.G. Blackwell, C.B. Ramsey, M. Butzin, H. Cheng, R.L. Edwards, M. Friedrich, *The IntCal20 Northern Hemisphere radiocarbon age calibration curve (0–55 cal kBP)*. Radiocarbon, 2020, p. 1–33.
Sava *et alii* 2019: T. Sava, C. Simion, O. Gâza, I. Stanciu, D. Păceşilă, G. Sava, L. Wacker, B. Ştefan, V. Moşu, D. Ghiţă, A. Vasiliu, *Status report on the sample preparation laboratory for radiocarbon dating at the New Bucharest RoAMS Center*, Radiocarbon 61 (2), p. 649–658.
Săvulescu 1972: T. Săvulescu, *Flora Republicii Socialiste Române,* editura Academiei Republicii Socialiste România, volume XII, Bucureşti, 1972.
Schaefer *et alii* 2009: M. Schaefer, S. Black, L. Scheuer, A. Christie, *Juvenile osteology: a laboratory and field manual*, Elsevier Academic Press, Burlington, Massachusetts, 2009.
Schiffer 1996: M. B. Schiffer, *Formation processes of the archaeological record*, University of Utah Press, Salt Lake City, 1996.
Schoch *et alii* 1988: W.H. Schoch, B. Pawlik, F.H. Schweingruber, *Botanical Macro-remains: an altlas for the determination of frequently encountered and ecologically important plant remains*, Paul Haupt Bern uns Stuttgard, Stuttgard, 1988.
Sitka, Heiss 2013: H.P. Sitka, A.G. Heiss, *Plant cultivation in the Bronze Age* in Fokkens, H., Harding, A. (eds.), The Oxford Handbook of the European Bronze Age, Oxford University Press, 2013, p. 348 – 369.
Şerbănescu 1985: D. Şerbănescu, *Vestigii neolitice descoperite la Ulmeni*, CCDJ I, 1985, p. 25–34.
Şerbănescu 2009: D. Şerbănescu *Momente Din Istoria Olteniţei*. Călăraşi: Agora, 2009.
Toderaş *et alii* 2009: M. Toderaş, S. Hansen, A. Reingruber, Jürgen Wunderlich, *Pietrele-Măgura Gorgana: O aşezare eneolitică la Dunărea de Jos între 4500 şi 4250 î.e.n*, MCA (serie nouă) V, 2009, p. 39–90.
Turner II *et alii* 1991: G.C. Turner II, C.R. Nichol, G.R. Scott, *Scoring procedures for key morphological traits of the permanent dentition: the Arizona State University dental*

anthropology system, in M.A. Kelley, C.S. Larsen (eds.) Advances in dental anthropology, Wiley-Liss, New York, 1991.
Vasile 2019: G. Vasile, *Analiza antropologică a scheletelor eneolitice din necropola aşezării eponime de la Gumelniţa (jud. Călăraşi, România)*, Revista de Arheologie, Antropologie și Studii Interdisciplinare, 1, Chișinău, 2019, p. 43-57.
Vermeulen, Verhoeven 2006: F. Vermeulen, G. Verhoeven, *An Integrated Survey of Roman Urbanization at Potentia, Central Italy*, Journal of Field Archaeology 31 (4), 2006, p. 395-410.
Vintilă, Neagu 2016: C.M. Vintilă, M. Neagu, *Aspects de la plastique de la culture Gumelniţa: pièces de mobilier et d'autres éléments de ritual Gumelniţa: pièces de mobilier et d'autres éléments de ritual,* Moesica et Cristiana. Studies in honour of Prof. Alexandru Barnea on his 70th anniversary, 2016, p. 465-471.
Voinea 2005: V. Voinea, *Ceramica complexului cultural Gumelniţa - Karanovo VI. Fazele A1 şi A2*, Ex Ponto, Constanţa, 2005.
Walker, Bogaard 2011: A. Walker, A. Bogaard, *Preliminary archaeobotanical results from Teleor 003/ Măgura „Buduiasca"*, in Steve Mills and Pavel Mirea (eds.), The Lower Danube in Prehistory: Landscape Changes and Human Environment Interactions – Proceeding of the International Confrence, Alexandria 3–5 Noiembrie 2010, 2011, p. 151–159.
Wasylikowa *et alii* 1991: K. Wasylikova, M. Crâciumaru, E. Hajnalová, B.P. Haryányi, G.A. Pashkevich, Z.V. Yanushevich, *East Central Europe*, in Van Zeis, W., Wasylikova, K. și Karl – Ernst (eds.) Progress in the Old World palaeoethnobotany. A retrospective view on the occasion of 20 years of the International Work Group for Paleoethnobotany*:* p. 207 – 239, 1991, Rotterdam: A.A. Balkema.
White, Folkens 2005: T.D. White, P.A. Folkens, *The human bone manual*, Burlington, Massachusetts, 2005.

List of figures and tables / Lista figurilor și a tabelelor

Figura 6. Suprafețele în care au fost desfășurate săpături de salvare în 2018 la Gumelnița (arealul gropii de gunoi din Zona 3).
Figure 7. Stratigraphic matrix for surveys 11-12 (the landfill area from the Zone 3.
Figura 7. Matricea stratigrafică pentru sondajele 11-12 (arealul gropii de gunoi din Zona 3).
Figure 8. Stratigraphic matrix for surveys 9-10 and 13-14 from the Zone 3.
Figura 8. Matricea stratigrafică pentru sondajele 9-10 și 13-14 din Zona 3.
Figure 9. New plan of the *tell* settlement and terrace at Gumelnița site.
Figura 9. Noul plan al așezării de tip *tell* și a terasei de la Gumelnița.
Figure 10. CORONA image satellite (1964).
Figura 10. Imagine satelitară CORONA (1964).
Figure 11. Possible locations of the old excavations on the terrace (after Topographic Map of Romania 1:25.000, second edition, 1975-1987).
Figura 11. Posibilele locații ale săpăturilor vechi de pe terasă (Harta topografică a României 1:25.000, a doua ediție, 1975-1987).
Figure 12. M11. Traces of ochre on the frontal bone (skull, anterior view).
Figura 12. M11. Urme de ocru pe osul frontal (craniu, vedere anterioară).
Figure 13. M11. Cranial trauma in the stage of bone consolidation and remodelling (exocranial).
Figura 13. M11. Traumă craniană realizată în stadiul de consolidare și remodelare a osului (exocranial).
Figure 14. M11. Cranial trauma with formation of bone callus (endocranial).
Figura 14. M11. Traumă craniană cu formarea de calus osos (endocranial).
Figure 15. M11. Osteoarthritis on the acromial facet (left scapula).
Fiura 15. M11. Osteoartrită pe fața acromială (scapula stângă).
Figure 16. M13. Consistent calcareous deposition in the skull (endocranial).
Figura 16. M13. Depozitare consistentă de calcar în craniu (endocranială).
Figure 17. M14. Lambdoid ossicles, right (skull, posterior view).
Figura 17. M14. Osicule lambdoide, dreapta (craniu, vedere posterioară).
Figure 18. M14. Ossicles inside the parietal groove (right temporal).
Figura 18. M14. Osicule în interiorul canelurii parietale (temporală dreaptă).
Figure 19. Distribution of faunal remains from the 2018 and 2019 seasons in Gumelnița.
Figura 19. Distribuția resturilor faunistice din campaniile 2018 și 2019 de la Gumelnița.
Figure 20. The variation of the shell height of the genus Unio (*Ut-Unio tumidus; Up-Unio pictorum; Uc-Unio crassus*) from the areas of Zone 1 (Gumelnița level, n = 92) and Zone 3 (Boian, n = 15).
Figura 20. Variația înălțimii cochiliei la genul Unio (*Ut-Unio tumidus; Up-Unio pictorum; Uc-Unio crassus*) din secțiunile din Zona 1 (Gumelnița, n = 92) și Zona 3 (Boian, n = 15).
Figure 21.1**.** Shells from *Anodonta* sp., *Unio crassus*, *Unio tumidus*; 2. Carp operculum (*Cyprinus carpio*), precaudal catfish vertebra (*Silurus glanis*); 3. Bone plates of turtle shell (*Emys orbicularis*).
Figura 21.1**.** Cochilii de *Anodonta* sp., *Unio crassus*, *Unio tumidus*; 2. Opercul de crap (*Cyprinus carpio*), vertebra precodală de somn (*Silurus glanis*); 3. Placă osoasă de la o carapace de broască țestoasă (*Emys orbicularis*).

Figure 22. Mammalian faunal remains discovered in the Gumelnița level. 22.1. Right pig (*Sus domesticus*) radius; 22.2. Aurochs (*Bos primigenius*) fused right distal metacarpus; 22.3. Wild horse (*Equus ferus*) lateral metapodial with cutmarks; 22.4. Hare (*Lepus europaeus*) left proximal fused femur.
Figura 22. Resturi faunistice de mamifere descoperite în nivelul Gumelnița. 22.1. Radius drept de porc (*Sus domesticus*); 22.2. Metacarp distal drept (*Bos primigenius*); 22.3. Metapod lateral de cal sălbatic (*Equus ferus*) cu urme de tăiere; 22.4. Femur stâng proximal de iepure (*Lepus europaeus*).
Figure 23. Percentage distribution of mammalian remains (NR and W) in the Gumelnița level, phase A2.
Figura 23. Distribuția procentuală a resturilor de mamifere (NR și G) din nivelul Gumelnița, faza A2.
Figure 24. Right dog mandible with cutmarks (detail on the right).
Figura 24. Mandibulă dreaptă de câine cu urme de tăiere (detalii pe imaginea din dreapta).
Figure 25. Distribution of the minimum number of individuals (MNI) by studied sectors (Gumelnița culture, phase A2).
Figura 25. Distribuția numărului minim de indivizi (NMI) raportat la sectoarele studiate (cultura Gumelnița, faza A2).
Figure 26. Percentage distribution of the minimum number of individuals (MNI) by studied sectors (Gumelnița culture, phase A2).
Figura 26. Distribuția procentuală a numărului minim de indivizi (NMI) raportat la sectoarele studiate (cultura Gumelnița, faza A2).
Figure 27. Plant categories identified at Gumelnița archaeological site, 2018 campaign.
Figura 27. Categorii de plante identificate pe situl arheologic Gumelnița, campania 2018.
Figure 28. Plant categories identified at Gumelnița archaeological site, 2019 campaign.
Figura 28. Categorii de plante identificate pe situl arheologic Gumelnița, campania 2019.
Figure 29. Botanical macroremains discovered at Gumelnița, 2018 campaign: A.: broomcorn millet (*Panicum miliaceum*), B.: hulled barley, ventral side (*Hordeum vulgare vulgare*), C.: hulled barley, dorsal side, D.: bitter vetch (*Vicia ervilia*); 2019 campaign: E.: einkorn caryopse (*Triticum monococcum*), ventral side (left), lateral side (centre) and dorsal side (right) and F.: einkorn spikelet base (*Triticum cf. monococcum*), adaxial view (left), abaxial view (right).
Figura 29. Macroresturi vegetale descoperite pe situl arheologic Gumelnița, campania 2018: A.: mei (*Panicum miliaceum*), B.: orz îmbrăcat, partea ventrală (*Hordeum vulgare vulgare*), C.: orz îmbrăcat, partea dorsală, D.: măzăriche (*Vicia ervilia*); campania 2019: E.: cariopsă de alac (*Triticum monococcum*), partea ventrală (stânga), partea laterală (centru) și partea dorsală (dreapta) și F.: bază spiculeț de alac (*Triticum cf. monococcum*), partea adaxială (stânga) și partea abaxială (dreapta).
Figure 30. Contextual distribution of the mean values of sherds weight (n=2012).
Figura 30. Distribuția contextuală a valorilor medii a greutății fragmentelor (n=2012).
Figure 31. The percentage distribution of primary forming methods regarding the pottery tradition and the research areas at Gumelnița in 2018 and 2019.
Figura 31. Distribuția procentuală a metodelor de formare primară în raport cu tradiția ceramică și zonele de cercetare de la Gumelnița în 2018 și 2019.
Figure 32. Comparison of external finishing methods (%).

Figura 32. Comparație între metodele de finisare a suprafețelor exterioare (%).
Figure 33. Comparison of internal finishing methods (%).
Figura 33. Comparație între metodele de finisare a suprafețelor interioare (%).
Figure 34. Comparison of firing types (%).
Figura 34. Comparație între tipurile de ardere (%).
Figure 35. 1, 4, 9. bevelled tools (scale=1 cm); 2, 6, 7, 10. abrasion marks; 3, 8, 11. active extremity details; 5. scraping marks.
Figura 35. 1, 4, 9. Dăltițe (scara=1cm); 2, 6, 7, 10. stigmate de abraziune; 3, 8, 11. detalii ale frontului activ; 5. stigmate de raclage.
Figure 36. 1, 4. pointed tools (scale=1 cm); 2. scraping marks; 3, 6. active extremity details; 7. haft (scale=1 cm); 5, 9, 12, 13. abrasion marks; 8. sawing marks; 10. bone figurine (scale=1 cm); 11. proximal extremity detail; 14. perforation detail.
Figura 36. 1, 4. vârfuri (scara=1cm); 2. stigmate de raclage; 3, 6. detalii ale extremităților active; 7. mâner (scara=1cm); 5, 9, 12, 13. stigmate de abraziune; 8. stigmate de sciage; 10. figurină din os (scara=1 cm); 11. detaliu al extremității proximale; 14. detaliu perforație.
Figure 37. 1. modified astragalus (scale=1 cm); 2-3, 9. abrasion marks; 4, 7. preforms (scale=1 cm); 5. debitage edge; 6. perforation detail; 8. undetermined bone object (scale=1 cm); 10. sawing marks; 11. undetermined object.
Figura 37. 1. astragal prelucrat (scara=1 cm); 2-3, 9. stigmate de abraziune; 4, 7. preforme (scara=1cm); 5. laturi de debitaj; 6. detaliu perforație; 8. obiect indeterminat din os (scara=1cm); 10. stigmate de sciage; 11. obiect indeterminat din corn.
Figure 38. 1. adornment made from marble (scale=1 cm); 2, 5-7. abrasion marks; 3. detail of the groove; 4. adornments made from stone (scale=1 cm); 8. perforation detail; 9-10. depression at the periphery of perforation.
Figura 38. 1. podoabă confecționată din marmură (scara=1cm); 2, 5-7. stigmate de abraziune; 3. detaliu al șanțului; 4. podoabe confecționate din piatră (scara=1cm); 8. detaliu perforație; 9-10. depresiune la periferia perforației.
Figure 39. 1. *Unio* sp. beads (scale=1 cm); 2-3. abrasion of the edges; 4-5. abrasion of the surface; 6-7. perforation details; 8. perforated *Unio* valves (scale=1 cm); 9-13. perforation details; 14. red pigment spots.
Figura 39. 1. mărgele din valvă de *Unio* sp. (scara=1cm); 2-3. abraziunea conturului; 4-5. abraziunea suprafeței; 6-7. detalii ale perforației; 8. valve de *Unio* perforate (scara=1 cm); 9-13. detalii ale perforației; 14. pete de pigment roșu.
Figure 40. 1. *Spondylus* valve beads (scale=1 cm); 2-3. beads details; 4. bone disc (scale=1 cm); 5. perforation detail; 6. *Cervus elaphus* tooth (scale=1 cm); 7. sawing marks; 8. clay bead (scale=1 cm); 9-10. bead details.
Figura 40. 1. mărgele din valvă de *Spondylus* (scara=1 cm); 2-3. detalii mărgele; 4. disc din os (scara=1 cm); 5. detaliu perforație; 6. dinte de *Cervus elaphus* (scara=1 cm); 7. stigmate de sciage; 8. mărgea din lut (scara=1 cm); 9-10. detalii mărgea.
Figure 41. 1, 5. *Spondylu*s valve beads (scale=1 cm); 2, 6-8. perforation details; 3, 9-10. use-wear depressions at the periphery of the perforation; 11. flattened facet.
Figura 41. 1, 5. mărgele din valvă de *Spondylus* (scara=1 cm); 2, 6-8. detalii perforație; 3, 9-10. depresiune de uzură la periferia perforației; 11. fațetă aplatizată.

Figure 42. 1. *Antalis* shell beads (scale=1 cm); 2, 4, 9. abrasion marks; 3, 10. sawing marks; 5. concavity at the periphery of perforation; 6. flattened facet; 7. shells caught in one another; 8. bone figurine (scale=1 cm); 11-12. decor details; 13. perforation detail.
Figura 42. 1. mărgele din cochilie de *Antalis* (scara=1 cm); 2, 4, 9. stigmate de abraziune; 3, 10. stigmate de sciage; 5. concavitate la periferia perforației; 6. fațetă aplatizată; 7. cochilii sudate; 8. figurină din os (scara=1 cm); 11-12. detalii decor; 13. detaliu perforație.
Figure 43. 1. *Antalis* shell bead (scale=1 cm); 2. shells caught in one another; 3. concavity at the periphery of perforation; 4, 7. *Spondylus* valve beads (scale=1 cm); 5, 8. perforation details; 6. flattened facet; 9. red pigment spots.
Figura 43. 1. podoabă din cochilie de *Antalis* (scara=1 cm); 2. cochilii sudate; 3. concavitate la periferia perforației; 4, 7. mărgele din valvă de *Spondylus* (scara=1 cm); 5, 8. detalii perforație; 6. fațetă aplatizată; 9. pete de pigment roșu.
Figure 44. 1a-c. Head of a zoomorphic figurine found in Zone 3, C5-C6 features proximity; 2a-d. Zoomorphic figurine found in Zone 1.
Figura 44. 1a-c. Capul unei figurine zoomorfe găsit în Zona 3, în proximitatea complexelor C5-C6; 2a-d. Figurină zoomorfă descoperită în Zona 1.
Figure 45. 1a-b. Head of an anthropomorphic figurine found in the C5-C6 proximity, Zone 3; 2a-b. Spool-shaped artefact found in Zone 1; 3a-c. Clay miniature table fragment found in the C5-C6 proximity, Zone 3.
Figura 45. 1a-b. Capul unei figurine antropomorfe descoperit în proximitatea complexelor C5-C6, Zona 3; 2a-b. Artefact în formă de bobină descoperit în Zona 1; 3a-c. Un fragment de masa miniaturală din lut descoperit în proximitatea complexelor C5-C6, Zona 3.
Figure 46. 1-3. Copper pieces found during the excavations from 2018-2019 in Zone 1.
Figura 46. 1-3. Bucăți de cupru găsite în timpul săpăturilor din 2018-2019 în Zona 1.
Figure 47. The results of radiocarbon analysis from Zone 3 (top) and Zone 1 (bottom) at Gumelnita. Shown are dates distributions (green and orange) and highest potential density intervals (red).
Figura 47. Rezultatele analizei radiocarbon din Zona 3 (sus) și Zona 1 (jos) de la Gumelnița. Sunt indicate distribuția datelor (verde și portocaliu) și intervalele cu potențialul de densitate cel mai ridicat (roșu).

Table 1. Synoptic table with the main anthropological characteristics highlighted in Eneolithic individuals from Gumelniţa.
Tabel 1. Tabel sinoptic cu principalele caracteristici antropologice evidențiate la indivizii eneolitici de la Gumelnița.
Table 2. Distribution of faunal remains (molluscs, fish, reptiles and birds) discovered at Gumelnița (2018 and 2019)
Tabel 2. Distribuția resturilor faunistice (moluște, pești, reptile și păsări) descoperite la Gumelnița (2018 și 2019).
Table 3. Distribution of mammal remains from the Boian feature discovered at Gumelnița (2018).
Tabel 3. Distribuția resturilor de mamifere din complexul Boian descoperit la Gumelnița (2018).

Table 4. Distribution of mammal remains from the Gumelnița levels discovered at Gumelnița (2018 and 2019).
Tabel 4. Distribuția resturilor de mamifere din nivelurile Gumelnița descoperite la Gumelnița (2018 și 2019).
Table 5. Macrobotanical remains identified at Gumelnița during the 2018 season.
Tabel 5. Macroresturile vegetale identificate la Gumelnița în campania 2018.
Table 6. Macrobotanical remains identified at Gumelnița during the 2019 season.
Tabel 6. Macroresturile vegetale identificate la Gumelnița în campania 2019.
Table 7. Contextual distribution of the pottery by sherd size and total weight.
Tabel 7. Distribuția contextuală a ceramicii raportat la dimensiunea fragmentelor și a greutății totale.
Table 8. Zone 3. Boian-Vidra pottery (feature C7). The distribution of identified inclusions within the main categories of paste.
Tabel 8. Zona 3. Ceramică Boian-Vidra (complexul C7). Distribuția incluziunilor identificate în prinicipalele categorii de pastă.
Table 9. Zone 3. Gumelnița A2 pottery (feature C6). The distribution of identified inclusions within the main categories of paste.
Tabel 9. Zona 3. Ceramica Gumelnița A2 (complexul C6). Distribuția incluziunilor identificate în prinicipalele categorii de pastă.
Table 10. Zone 1. Gumelnița A2 pottery. The distribution of identified inclusions within the main categories of paste.
Tabel 10. Zona 1. Ceramica Gumelnița A2. Distribuția incluziunilor identificate în prinicipalele categorii de pastă.
Table 11. Distribution of the constructed shapes.
Tabel 11. Distribuția formelor construite.
Table 12. Distribution of the decorative methods.
Tabel 12. Distribuția metodelor decorative.
Table 13. Lithic assemblage by site sector.
Tabel 13. Utilajul litic pe sectoarele sitului.
Table 14. Lithic assemblage by complex.
Tabel 14. Utilajul litic pe complexe.
Table 15. Blanks completeness by categories.
Tabel 15. Gradul de fragmentare al suporturilor pe categorii.
Table 16. Lithic assemblage dimensions by blank categories.
Tabel 16. Dimensiunile utilajului litic pe categorii de suport.
Table 17. Platform type by blank type.
Tabel 17. Tipuri de platforme raportat la tipuri de suport.
Table 18. Raw material categories by lithic categories.
Tabel 18. Categorie de materii prime raportat la categoriile litice.
Table 19. Retouched pieces categories by blank types.
Tabel 19. Categorii de piese retușate funcție de tipul de suport.
Table 20. Distribution of osseous tools discovered in the site of Gumelnița (archaeological excavations from 2018-2019).
Tabel 20. Distribuția pieselor din materii osoase descoperite în situl de la Gumelnița (campanii arheologice 2018-2019).

Table 21. Distribution of personal adornments discovered at the site of Gumelnița (archaeological excavations from 2017-2018).
Tabel 21. Distribuția podoabelor descoperite în situl de la Gumelnița (campaniile arheologice din 2017-2018).
Table 22. Dimensions of the beads made of stone, discovered at the site of Gumelnița.
Tabel 22. Dimensiunile mărgelelor din piatră, descoperite în situl de la Gumelnița.
Table 23. Dimensions of the beads from grave M8.
Tabel 23. Dimensiunile mărgelelor descoperite în mormântul M8.
Tabel 24. Dimensions of the beads from grave M13.
Tabel 24. Dimensiunile mărgelelor descoperite în mormântul M13.
Table 25. The radiocarbon dates from Gumelnița *tell* (Zone 1) and cemetery area (Zone 3).
Tabel 25. Datele radiocarbon din zona *tell*-ului (Zona 1) și a cimitirului (Zona 3) de la Gumelnița.