JOURNAL OF ANCIENT HISTORY AND ARCHAEOLOGY

Institute of Archeology and Art History of
Romanian Academy Cluj-Napoca
Technical University Of Cluj-Napoca

Journal
of Ancient History and Archaeology

DOI: http://dx.doi.org/10.14795/j.v9i4

ISSN 2360 266x

ISSN–L 2360 266x

No. 9.4 /2022

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Design & layout:
Petru Ureche

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AN ANTHROPOLOGICAL – MULTIDISCIPLINARY ANALYSIS OF THE CINERARY REMAINS DISCOVERED AT OCNIȚA – BURIDAVA
PARS EST IN TOTO ET TOTUM EST IN PARTE

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Abstract: The archaeological research from 2016-2021 allowed us to identify in Buridava some types of archaeological structures that can also be found in other sites belonging to the classic Geto-Dacian era and which largely correspond to the discoveries of Dumitru Berciu from 1961-1992. The discoveries were made on terrace VIII, the last one on the western side of the bushy hills of Cosota. Looking back and benefiting today from multiple sources of analysis (LIDAR, aerial photography, etc.) we are convinced that all eight terraces and the Acropolis served starting from the last quarter of the 1st century BC and throughout the 1st century BC as a necropolis/sacred area. Our study is based on the analysis of the archaeological context; forensic anthropological analysis; serological analysis; X-ray microtomography (μXCT) and 3D reconstruction; SEM and EDS analyses; X-ray analysis, EDXRF spectrometry
The bones analysed are of human nature, a fact that is supported by their morphology, as well as by the serological and physical examinations that were carried out. There are a few exceptions where, due to the extremely small dimensions, further clarifications could not be made. The analyses focused on 1457 cremated fragments and various component parts of the bones of the human skeleton were identified.
Keywords: *Buridava necropolis, human bones, Dacians.*

RESEARCH HISTORY

The ancient site from Ocnița, Vâlcea County came to the researchers' attention ever since the 60's and, thanks to Professor Dumitru Berciu, became the best-known Dacian settlement lying south of the Carpathians.

Whether we are talking about its geographical location, as a direct crossing point coming from the Danube and going to the intra-Carpathian area, or about it as a land of salt, all this allowed it a development that is hard to match compared to other Dacian settlements from the south of the Carpathians.

The archaeological research began with a series of surveys carried out in 1960 and 1961, but the results were not deemed satisfactory. The

DOI: 10.14795/j.v9i4.814
ISSN 2360 – 266X
ISSN–L 2360 – 266X

Fig. 1. Aerial view of the site.

investigations made in 1960 targeted the area of the three heights of the Cosota hills, as well as the civil settlement in Valea Bradului (Fig. 1). The first survey was made right on the Fortress Plateau 1 (as Dumitru Berciu would call it), and it involved mapping out a control ditch, 33 m long and 0.50 m wide, oriented East-West. In his notebook, professor Berciu made some notes that today are well-known for many Dacian sites of the classical period: *it is not a layer of culture, but only pits, quite deep, considered pits for dishes, garbage pits (...)*. The inventory of Pit 1 was recorded as follows: *ceramic fragments, clay bricks (...), ash, charcoal, animal bones (...)*.[1] A year later he made a new attempt in the civil settlement from Valea Bradului, where he found that the level was much too low, and the effort of a systematic research much too great.[2]

The systematic research on this site truly began in 1967 and would end in 1993. The results of those years were exceptional, leading to the publication of an impressive number of studies and articles,[3] as well as to the appearance of a monographic volume.[4]

The identification of the site here with the ancient Buridava, the unique discoveries - the bronze mask, the inscription with Greek letters, the Greco-Roman imports - are the elements that confirmed the local existence of a dynastic centre separate from the one at Sarmizegetusa Regia.

The history of the research carried out at Ocnița/ Cosota is a fascinating one, even if it has been marked by a whole series of inadvertences, some of a chronological nature, others related to the local existence or non-existence of a necropolis belonging to the classic era of the Dacian civilization.[5]

The resumption of systematic research at Ocnița in 2016 primarily sought to clarify the site's chronology issues, as well as the role and relationship of this *power centre* with the Roman world, the necropolis issue being considered a secondary one. The specialized literature from our area is quite clear regarding the issues of funeral rite and ritual.[6]

The discoveries made during these five campaigns brought us in face of the same situation, recorded by Dumitru Berciu ever since 1960: the existence of a very large number of pits dug in the rock, but also the presence of surface structures made of river stone and volcanic tuff[7]

[1] BERCIU 1960, 63-65.
[2] BERCIU 1960-1961, 1967.
[3] BERCIU 1982,147-152; BERCIU 1984, 84-91; BERCIU/IOSIFARU 1980, 183-185; BERCIU 1983, 226-227; BERCIU *et alii* 1983, 109-113; BERCIU *et alii* 1984, 177-186; BERCIU *et alii* 1985, 140-143; BERCIU *et alii* 1986, 139-143; BERCIU *et alii* 1987, 154-161; BERCIU *et alii* 1988, 171-179; BERCIU *et alii* 1989, 205-214; BERCIU/IOSIFARU/PURICE 1990, 135-138; BERCIU *et alii* 1991, 105-115; BERCIU/IOSIFARU/DIACONESCU 1993, 149-156.
[4] BERCIU 1981.
[5] BABEȘ 1982, 255.
[6] SÎRBU 1993, 37.
[7] BĂRBULESCU *et alii* 2022, 278-279.

(rock specific to these hills). The 8th terrace upon which we focused our research throughout these years did not allow the identification of a settlement level or of other elements of daily life.

OCNIȚA – A CONTROVERSIAL SITE

In the *Review* of the *Dacian Buridava* volume, Professor Mircea Babeș managed to clarify a whole series of issues related to the Ocnița research. The chronology proposed by Dumitru Berciu, as well as the stages of development of the settlement, did not correspond to the dating of the artefacts discovered. The material published was in many cases taken out of context or poorly published (without illustrations or with the wrong indications). All this was complemented by the problem of the necropolis, its existence could not be certified, given the lack of anthropological analyses and the chaotic publication of the context.[8]

RITUAL DEPOSITIONS - THE DISAPPEARANCE OF THE DEAD

In Romanian specialized literature, for more than half a century the idea has prevailed that in during 1st century BC - 1st AD period we are to witness a disappearance of necropolises. All this *disappearance of the dead* coming against the clear background of some changes in the practice of the funeral rite and ritual.[9] All the discoveries made in the North Thracian area circumcised these ideas, even if such a phenomenon is observed both in the Celtic area[10] and in the Hispanic one.[11] The only accepted explanations for discoveries like the ones in Hunedoara-Grădina Castelului are that we are dealing with sacred areas and ritual depositions.[12] To the same extent, the funerary phenomenon in the North Thracian spatiality is reduced to the discoveries of the Padea-Panaghiurski Kolonii type, which in the last two decades have been expanding both geographically and chronologically, placing us in a completely different paradigm today.[13]

The perspective according to which the small number of human bones or their total absence presupposes the non-existence of necropolises is rather related to a limitation in our understanding of some changes in funeral rite and ritual, invisible elements of a ritual nature, even from the perspective of archaeology.

The generalization of some archaeological monuments such as pits, the appearance of some pit fields, located on high areas, on terraces or near the Dacian *daves*,[14] coincides with the so-called disappearance of the dead. The deviation from the rule induced the specialists the idea that these pits fields have a ritual character. We partially resume here the hypotheses launched in relation to pits and pit fields: ordinary pits: for extracting clay, storing supplies, storing household waste;[15] cult pits,[16] some with deposits of domestic offerings[17] or with remains of the funeral banquet, possibly dedicated to the cult of the hearth.[18] According to this scenario, the filling of pits goes against the traditional funerary inventory, compiled based on certain rules.[19] The association of this type of *monument* with ritual practices must be resumed. Romanian historiography is cautious or even reserved in associating the pits discovered in the Dacian settlements with the practice of religious or funeral rituals, unlike what happens in Bulgaria, we find a remark in some authors about this.[20]

In a study published relatively recently by us, on pits and pit fields, we tried to resume the theme of the funeral rite and ritual in the Geto-Dacian world, starting from the idea that we need to be a bit more flexible in admitting that not everything that corresponds to our contemporary view of the world also applies to past eras.[21]

Before moving on to the multidisciplinary and anthropological analyses of the cinerary remains from the Ocnița pits, we allow ourselves a last digression based on some older ideas about the role and significance of the pits.[22]

The pit inventory is composed of hearth fragments, pieces of adobe, charcoal, ceramic fragments burnt secondarily or whole vessels (without traces of burning), ash, items of clothing and adornment, household objects, fragments of melted metal, animal bones and cinerary remains, all related to life and death and being part of the *banquet*.[23]

The banquet is part of a ceremonial necessary for the *passage*, the remains of this ritual are the only material evidence of death, they have the role of keeping the idea of *immortality* in collective memory. We do not rule out that this

[8] BABEȘ 1982, 252.
[9] BABEȘ 1988, 18.
[10] PERRIN 2007, 99; BRUNAUX 1998, 257-269.
[11] TORRES - MARTÍNEZ *et alii* 2021, 399-413; TORRES - MARTÍNEZ *et alii* 2017, 105-128.
[12] SÎRBU *et alii* 2007, 191,193.
[13] RUSTOIU/COMȘA 2004, 267-276; RUSTOIU 2002, 12-13; BORANGIC 2017, 255-264; These major changes are also attributed to the entrance into this spatiality of the elements of the so-called Padea-Panaghiurki Kolonii cultural group, in the area of which we find definite funerary complexes, thanks to human cremation remains.
[14] VULPE/TEODOR 2003, 38-40, 380-452; PREDA 1986, 42; MACREA/RUSUS/MITROFAN 1962, 485-504; MATEI/POP 2001, 253-277; SÎRBU 1996, 15, 62-70.
[15] BABEȘ 1988, 17; BABEȘ 1982, 255.
[16] Radu Vulpe is among the first to catalog these pits as being associated with the cult (possibly a cult of the hearth), as S. Sanie also points out, referring to a series of articles by the former, such as: VULPE *et alii* 1950, 50; SANIE 1992, 107-118: VULPE 1957, 231; PĂUNESCU/RĂDULESCU/IONESCU 1962, 134; BABEȘ 2001, 746.
[17] BABEȘ 1988, 17; BABEȘ 1982, 256.
[18] SÎRBU/FLOREA 1997, 45; SÎRBU 2006, 48-49.
[19] BABEȘ 1988, 17; SÎRBU 1994, 44; SÎRBU 2006, 49, 60-61; BABEȘ 2001, 746.
[20] ȘTEFAN *et alii* 2018, 145-146. The study cited here is among the few to reopen this discussion of the functionality of the numerous pits discovered in the settlements from the classic period of the Dacian civilization (but also from the previous period) and makes full use of foreign publications in its argumentation; BERZOVAN 2013, 323-324; ARNĂUT 2014, 246-247.
[21] BĂRBULESCU 2020, 125.
[22] BĂRBULESCU 2020, 128-130.
[23] MĂRGHITU *et alii* 2016, 273-312; We found the authors' remark related to the *daily domestic impregnated with the funerary*. MĂRGHITU *et alii* 2016, 304; extremely interesting, as well as the following quotation: *The daily space of housing is a combination of practices that joins together the image of the "domestic" and the death of it. The death of the houses, workshops, and pits is "braided" in some significant moments with the death of the objects, people, and dogs*. MĂRGHITU *et alii* 2016, 307. *The everyday space of living is a mixture of practices that add to the „domestic" images of its death. The death of houses, workshops and pits is intertwined in certain significant moments with the death of objects, people and dogs.* In this context, we could appreciate that the role of the pits in which we find daily remains is a funerary one and not a domestic one!

banquet also has the role of commemorating the deceased or being a ritual, whose purpose is the revitalization of the community, the renewal of life.[24] The burning of numerous objects, which we find in pits or in surface structures, indicates that they were deposited on the pyre together with the deceased, and the passage through fire also has a symbolic role. Along with the objects that went through the fire and were on the funeral pyre, we find others that were deposited later (without traces of secondary burning), part of the post-cremation ceremony.[25]

The pits and cists discovered contain elements that are necessary and sufficient for them to be considered tombs, preserving or not cinerary remains, in a greater or lesser amount. All these are part of the funerary space – the tomb can be considered a replica of contemporary social structures.[26]

ARCHAEOLOGICAL RESEARCH 2016-2021

The research allowed us to identify in Buridava some types of archaeological structures which can also be found in other sites belonging to the classic Geto-Dacian era and which largely correspond to the discoveries made by Dumitru Berciu in the 1961-1992 period.

The discoveries were made on terrace VIII, the last one on the western side of the bushy hills of Cosota. Looking back and benefiting today from multiple sources of analysis (LIDAR, aerial photography, etc.) we are convinced that all eight terraces and the Acropolis served starting from the last quarter of the 1st century BC and throughout the 1st century BC as a necropolis/sacred area (Fig. 2-3).

The more than 382 *tombs* published by Dumitru Berciu are similar to our discoveries in form, inventory and context. Exceptions are cist-type structures or stone enclosures (which are very reminiscent of some discoveries from Gruiul Dării[27] and which were never recorded by professor Berciu.[28] The carelessness with which, we can state today, the research was carried out in the period 1961-1993, but also the defective publication of the material led us to not having a complex anthropological report for four decades.

Discovery of rock-cut pits and stone ring-like structures and cists,[29] all storing the same type of archaeological material, made us revisit the question of funeral rite and ritual, with the risk of attracting a whole series of criticisms. The strong argument of all those who consider that these types of monuments are not of a funerary nature is related to the lack or impossibility of clearly identifying human cinerary remains, even if we must be cautious in accepting this opinion.

Thus, the study has the role of largely clarifying the nature of the pits dug into the rock (eight in number), but also the *cist/mound* type structures[30] with or without stone enclosure (thirty in number) (Fig. 4; Fig. 5; Fig. 6).

We are dealing with 39 numbered complexes[31] (see *Annex 1* – with the presentation of the summary inventory of the complexes), of which three present an inventory, but without cinerary fragments (M7A/B/2016; M8/2016 and M24/2018), one, M18/2017 (stone cist, ceramic fragments and tuff were outlined in profile) was not surveyed, M14/2017 was completed in 2019 and given a new number, M27/2019 (the two being one structure). Under these conditions, we benefit from the analysis of 1457 cinerary remains from a number of 34 complexes.

Outside of the analysis there remained a series of small cinerary remains discovered scattered, unrelated to a complex or context.[32]

All the monuments investigated have taken a rich inventory, in some exceptional situations as in the case of M6 (rock pit, rectangular shape) where a glass rhyton and fragments of a *lorica* were discovered, M34 (cist-type deposit, with stone and tuff surround) inside a cameo ring and a ceramic bulb-type *unguentarium*.[33]

The main categories of artefacts are represented by: knives, pieces of wear and adornment (*torques*, beads, fibulae, a ring), arrowheads, pieces of military equipment (e.g. chain mail, umbo rivets, etc.) glass, pendants (including bucket type), ceramics (whole or fragmentary vessels), folds. Pieces of hearth, adobe, coal, ash are added to them.

We will return to all these discoveries in a series of articles, but also in the volume currently under work.

The results obtained in these years have been questioned, almost permanently, due to the lack of a comprehensive anthropological study, even though as early as 2017 we published a first analysis of this kind in the excavation report.[34] The research performed then by Claudia Radu[35] proved to be extremely correct considering the new results obtained by the specialists from INML *Mina Minovici* and INFLPR - Turnu Măgurele.

[24] DANA 2008, 34.

[25] The offerings made consisted of both objects and vessels whose contents cannot be precisely determined (drinks, food). There are also cases where we find large animal bones, without traces of burning, which had the same role as a food offering (this is the situation we encountered in the 2022 campaign).

[26] COLLIER 2003,727-749.

[27] SÎRBU/MATEI/DUPOI 2005; SÎRBU *et alii* 2014, 343-371.

[28] There is only the recording of some surface tombs/deposits, which do not allow us a glimpse into the existence of a construction – cist, mound, enclosure.

[29] We mention that during the 2022 campaign, which focused on analysing Terrace V, intensively researched by D. Berciu, we were able to find that we have the same type of archaeological monument here. This year's findings reinforce our ideas and the present study.

[30] The name is taken from Valeriu Sîrbu. SÎRBU/MATEI/DUPOI 2005, 143.

[31] *Translator's note:* all tombs shall be coded by means of the letter M (coming from the Romanian: *tomb*) and the corresponding number of the respective tomb.

[32] BĂRBULESCU *et alii* 2017, 100-102; BĂRBULESCU *et alii* 2019, 363-365.

[33] ANDERSON-STOJANOVIČ 1987, 105-118.

[34] BĂRBULESCU *et alii* 2017, 102: "All bones are cremated. In most cases, the color of the bones is white, which indicates a burning temperature between 645 and 1200 degrees Celsius. In some cases (M1, M5 and M6) we observed a small number of blue/gray colored areas, present on the tooth enamel, respectively on the cancellous part of the bones. The blue/grey color indicates a lower burning temperature, around 500 degrees Celsius. In three cases we can state that they are definitely human individuals: M1, M2 and M4. Of these, in two cases it is about children (M1 and M2), respectively a young individual (M4). In two other cases, M3 and M6, we can only say that at least some of the fragments may be human".

[35] *Anthropologist (Center for Molecular Biology, Institute for Interdisciplinary Research in Bio-Nano Sciences, Babeș-Bolyai University, Cluj-Napoca).*

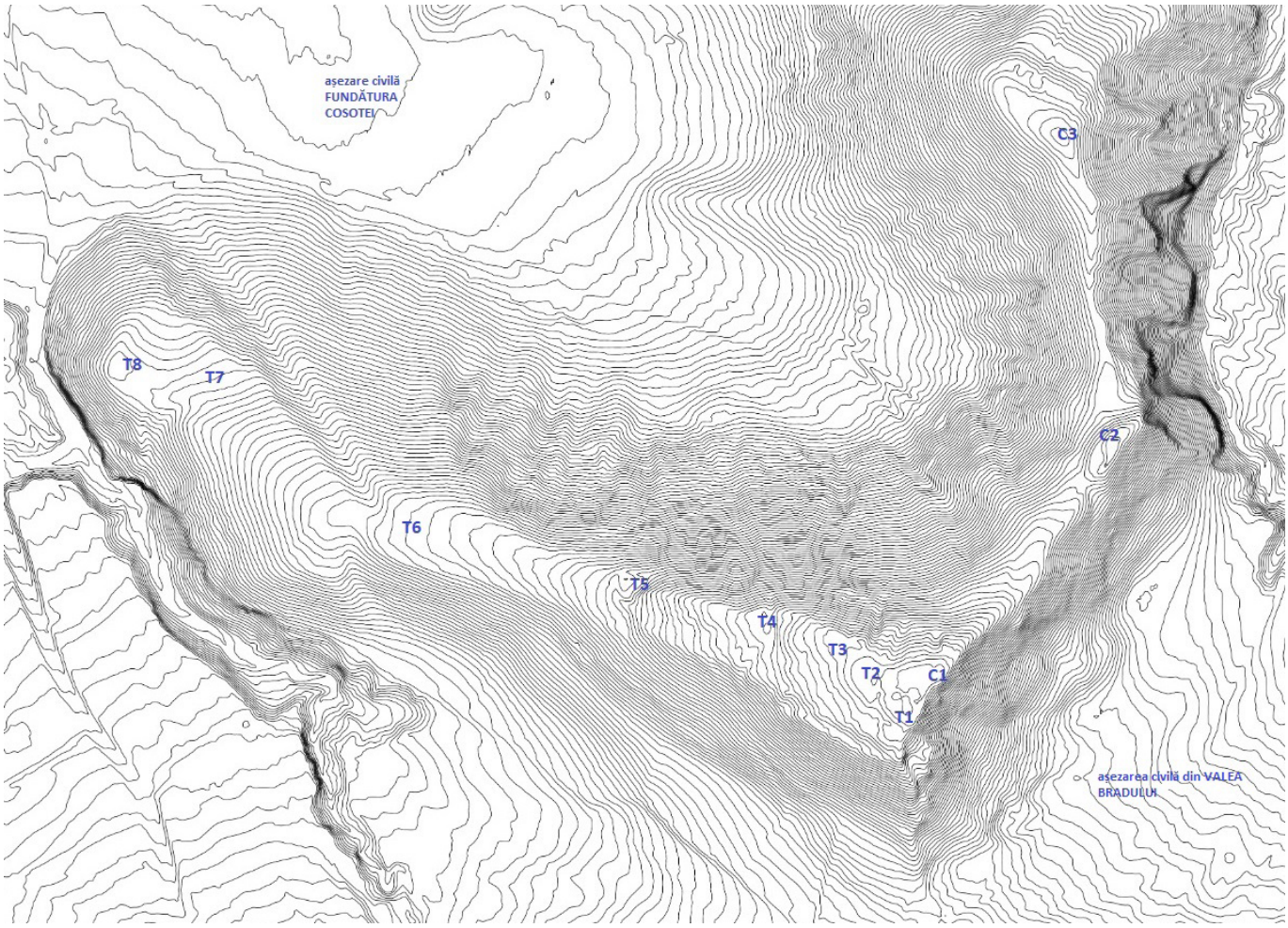

Fig. 2. Topographic elevation and the terraces of the Ocnița-Buridava site.

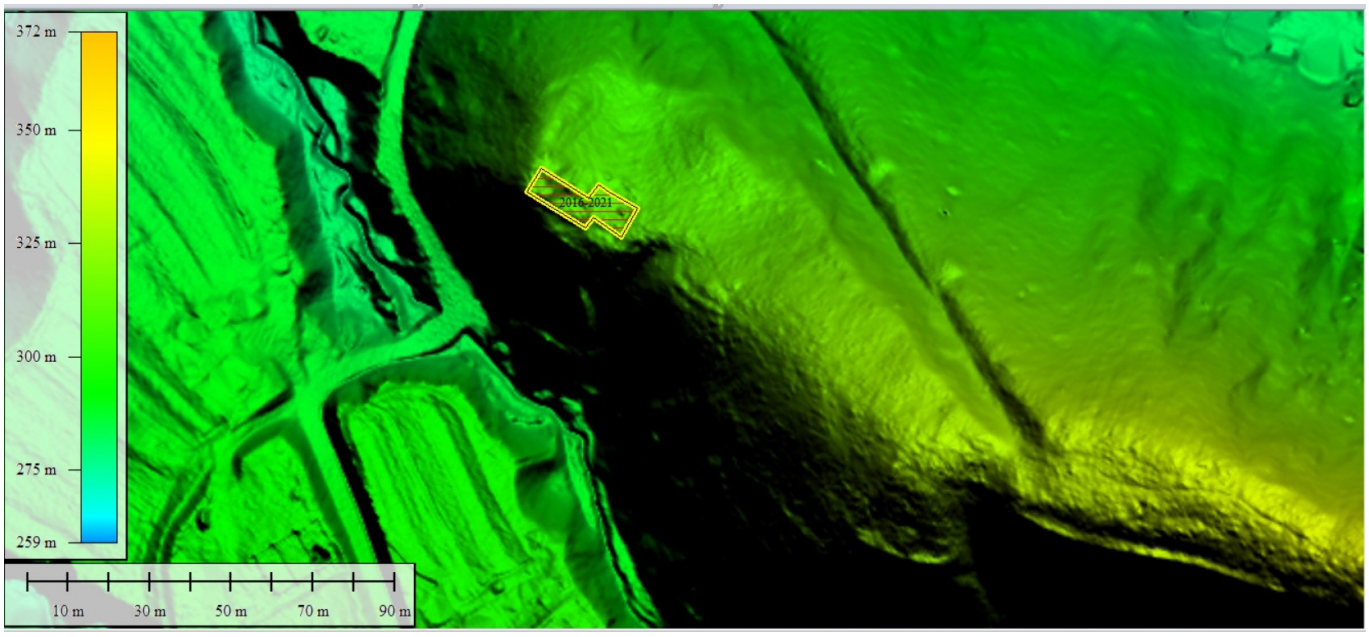

Fig. 3. The surveyed area 2016-2021.

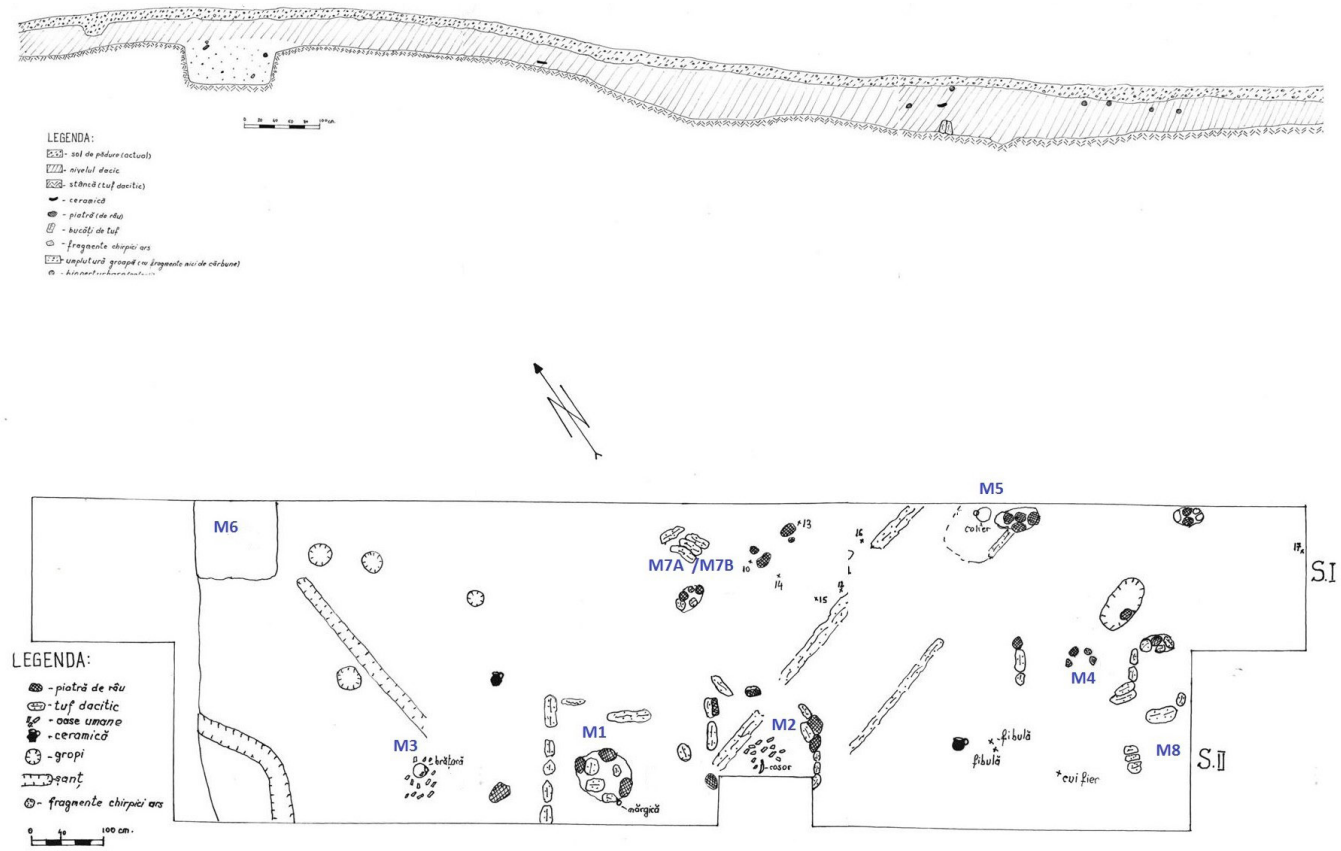

Fig. 4. Plan and profile S1 and S2/ 2016.

Fig. 5. General view during the SVIa/ 2019 research.

Fig. 6. General view during the SVIb/2021 research. Cist and enclosure.

MULTIDISCIPLINARY ANALYSES: ARCHAEOLOGICAL CONTEXT; FORENSIC ANTHROPOLOGICAL ANALYSIS; SEROLOGY; MICRO X-RAY TOMOGRAPHY (µXCT) AND 3D RECONSTRUCTION; SEM AND EDS ANALYSES; X-RAY ANALYSES, EDXRF SPECTROMETRY;

I. PRESENTATION OF THE COMPLEXES RESEARCHED AND THEIR FORENSIC ANTHROPOLOGICAL EXAMINATION:

Archaeological context: M1/2016 (Fig. 7)

M1 is an enclosure made of river stones and tuff, it has a rectangular shape with the sides (210x165 cm), having in the central area a cist with an inner diameter of 35cm, and the outer diameter of 57cm. Once with the removal of the stone *cover*, there could be identified an inventory consisting of cremated bones, a knife, a coloured vitreous bead and two iron necklaces with bronze and copper rings.

Forensic analysis:

- a fragment of a jaw, with 2 molars of a child, having greenish-white enamel, without dental attrition, as well as a fragment of a dental crown;
- 16 fragments of bone cortex, small in size, brown in colour;
- 30 fragments of diaphyseal cortex, 0.2-0.3 cm thick.

Archaeological context: M2/2016

M2 is an oval-shaped tuff and river stone enclosure, with the same type of round-shaped arrangement in the central area, made of river stone, tuff and clay. The inventory consisted of cremated bones, a small knife and an iron brooch.

Forensic analysis:

- a calcined fragment of a skull, reconstructed from 4 pieces, measuring 5/3 cm, 0.2 cm thick, displaying a sutural edge; at the level of the external headboard, a portion of it is detached with the view of the diploë;
- a fragment of diaphyseal cortex, measuring 1/0.7 cm.

Archaeological context: M3/2016

M3 did not take shape as a cist-like agglomeration of stone and tuff, with an archaeological inventory consisting of a twisted bracelet and cremated bone fragments.

Fig. 7. M1/2016 – image during research.

Fig. 8. Cinerary remains from M4/2016.

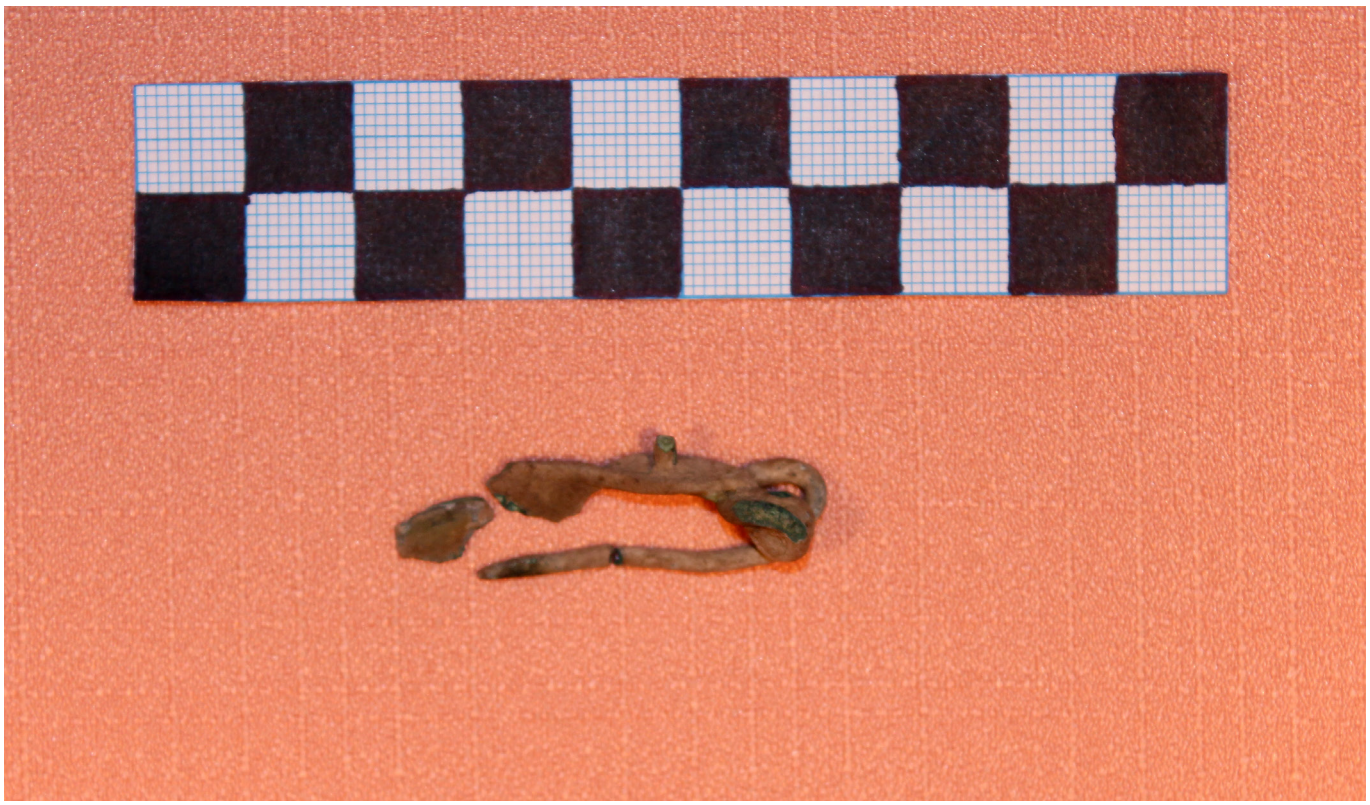

Fig. 9. Bronze fibula, type Feugère 11a, M5/2016.

Analysis of the cinerary remains:

- 48 whitish fragments, belonging to the diaphysis (cortical), one of them measuring 8/1.2 cm, most likely coming from the bones of the forearm, with parallel semi-circular cracks and other cracks with various orientations;

- 3 calcined fragments of diaphyseal origin, one from an ulna, with parallel transverse and semi-circular cracks;

- 5 fragments of a skull, calcined, with cracks on the surface in various directions.

Archaeological context: M4/2016

M4 is a cist made of stone, tuff and ceramic fragments, it was opened at the end of the research, being located in the profile. It is the only one who had no inventory, except for the cremated bones (Fig. 8).

Forensic analysis:

- 46 fragments with dimensions between 4.4/1.6 cm – 0.3/0.2 cm showing parallel longitudinal and semi-circular cracks, of diaphyseal origin; the greatest thickness of the bone cortex = 0.5 cm;

- 4 fragments of a skull cap (one fragment has one side formed by a sutural edge) with dimensions between 2/1.6 cm – 1.1/1 cm, on the surface it shows differently oriented cracks, and in some places detachments of the cortex.

Archaeological context: M5/2016

M5 - we did not identify an external structure as in other cases, but only a few stones and fragments of tuff deposited compactly, below which we can identify a bronze necklace, a vitreous bead, fragments of cremated bones, nearby an arrowhead and a bronze brooch (Fig. 9). The brooch is made of a single piece of metal with an inner string, the spring has four turns, the body widened with a support in the middle, probably to support another element. Rectangular portagraph. Dating from the 1st century B.C., type.[36]

Forensic analysis:

- two calcined bones consisting of two fragments of diaphyseal cortex, displaying differently oriented cracks on the surface.

Archaeological context: M6/2016 (Fig. 10)

M6: pit dug in the rock to a depth of 52 cm compared to the rock level, and compared to the current level 112 cm, rectangular shape, dimensions 117x120 cm. Inventory: glass rhyton imitating a limax (Fig. 11), eastern Mediterranean import (1st century B.C.-beginning of the 2nd century B.C.), fragmentary, but reconstructible upon restoration, a razor with a bone handle and bronze rivets, fragments of a chain mail, cinerary remains (Fig. 12).

Forensic analysis:

- 45 calcined bone fragments with sizes comprised between 1.2/0.9 cm and 0.3/0.3 cm with cracks on the surface; 3 diaphyseal fragments reconstructed as follows: (1) – from 5 fragments that also have small blackish deposits on the surface; (2) – reconstituted from 4 fragments; (3) – from two

[36] FEUGÈRE 1985. (The identification, dating and description of the brooches was done by our colleague Sorin Cociș, to whom we are most grateful).

Fig. 10. M6/2016 – pit dug in the rock, view during the research.

fragments, all displaying differently oriented cracks on the surface; a carbonized, blackish-coloured fragment was also found along with the calcined bones.

- 32 calcined bone fragments, among which 3 belong to a skull cap, showing cracks on the surface; a small fragment most likely coming from a coxal bone of a sub-adult (with a small area from the acetabular part), displaying parallel semi-circular cracks on the surface; 7 diaphyseal fragments, among which one (with dimensions between 6.5/1.2 cm) most likely comes from a splint bone, and the rest are small in size and cannot be assigned to a specific bone.

Archaeological context: M9/2017

M9 took shape on the edge of the Northern profile of S III in the form of a structure made of river stone and tuff. It has a circular shape, with a width of 96 cm, starting from the respective profile, with a cist in the middle. The cist was made of river stone and tuff, with an outer diameter of 38 cm and an inner diameter of 19 cm, with a depth of 20 cm. It is made on a tuff pedestal, placed over the ancient rock. The stone structures appeared in the crack starting from – 22 cm, compared to the current level. As inventory we may mention: a silver brooch and a knife, to which are added ceramic fragments from a fruit bowl and several vessels, along with cinerary remains.

Forensic analysis:

- 12 carbonized fragments of blackish colour, with dimensions between 1.1/0.7 and 0.3/0.2 cm and 3 calcined fragments of white-yellowish colour, with dimensions between 2.5/1.7 – 0.7/0.5 cm, with variously oriented surface cracks.

Archaeological context: M10/2017

M10 was very well defined, with a semi-circular structure of river stone and tuff, located in the vicinity of M9 and M13. With an inner diameter of 135 cm and an outer diameter of 177 cm. Built directly on the landscaped rock, with no cist identified, we do not exclude that it is in the Northern profile. Built at a depth of 23 cm from the current tread level, it reaches up to 47 cm deep. As objects from the inventory we may mention a bronze brooch and ceramic fragments with traces of secondary burning.

Forensic analysis:

- 15 calcined (whitish) fragments of diaphyseal cortex; calcined bones, whitish in colour:

- 6 skull fragments, one showing a jagged sutural edge;

- fragments of a diaphyseal cortex and a small circular diaphyseal fragment with a diameter of 0.3 cm.

Fig. 11. Limax-shaped glass Rhyton, M6/2016.

Fig. 12. Cinerary fragments M6/2016.

Fig. 13. Melt fragments from silver ornaments, discovered in M11/2017.

Archaeological context: M11/2017

M11 was initially identified as a black spot - burn, at a depth of 37 cm compared to the current level. The spot had a circular shape 103x95 cm and was delimited by river boulders, pieces of tuff on the North and West sides. Small fragments of cremated bones and two grains of melted silver were identified and taken (Fig. 13). The black layer was 5-8cm thick. From this burn layer we were able to take an extremely

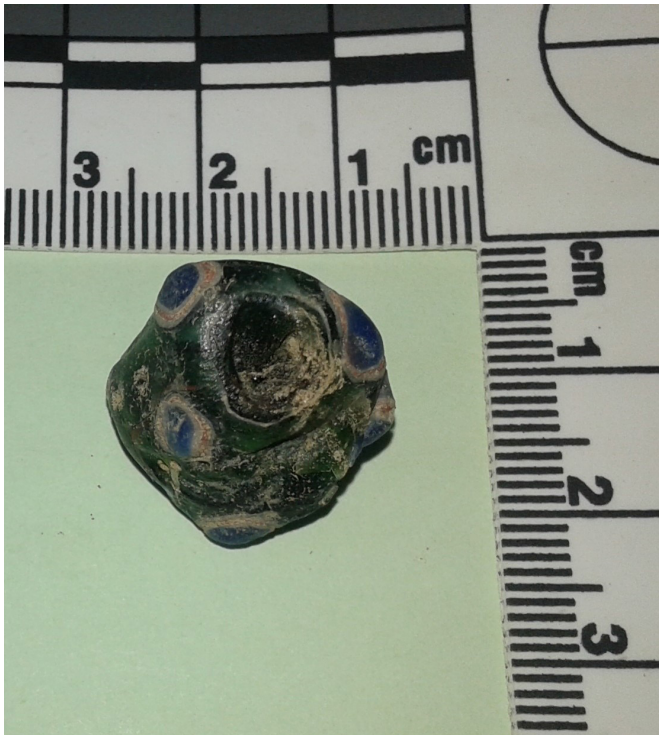

Fig. 14. Peacock-eye bead, deformed because of the burning temperature on the pyre, M11/2017

Fig. 15. M13/2017 – hole dug in the rock. Image from research.

rich inventory, from which we may recall: 3 peacock-eye type beads (Fig. 14), a bronze brooch and two bronze pendants, numerous heavily burned ceramic fragments.

Forensic analysis:

- 6 small fragments of diaphyseal cortex, whitish in colour (calcined), 0.2 cm thick. Variously oriented cracks can be seen on the surface (because of exposure to high temperature);

- 23 carbonized diaphyseal cortical fragments (blackish in colour), small in size;

- 4 charred blackish fragments, cylindrical, without channel, diameter = 0.5 cm., which appear to be made of wood.

Archaeological context: M12/2017

M12 was identified at 1.50 m from the Northern profile and 2.93 m from the Eastern one. It is placed under the roots of a tree. We were not able to identify a clear structure, except for 5-6 pieces of tuff and 3-4 river stones spread or caught in the profile of the case, but we recovered cinerary fragments, ceramics, an arrowhead. The tree roots probably destroyed the possible structure or the latter is partially maintained in the tree protection case.

Forensic analysis:

- 5 calcined fragments (2/1 cm – 0.2/0.2 cm) and a fragment reconstructed from 5 fragments, glued, facing each other, measuring 3.4/1.7 cm.

Archaeological context: M13/2017 (Fig. 15)

M13 is a rock-dug tomb, with a circular shape, 110 cm (N-S) x92 cm (E-W), 18 cm from the North profile of S III. Identified from a depth of 43 cm, compared to the current level, it reaches a depth of 120 cm. It narrows slightly in depth reaching 87x93 cm in diameter on the ancient level. It has chisel marks both on the sides and on the bottom. Next to a jar-type vessel (Fig. 16) located right at the bottom of the pit, in a horizontal position (lying down), there are cinerary remains (ceramics - coming from another smaller jar vessel - Fig. 17 a. and b.) and coal. The pit was practically filled with the remains of the funeral pyre, among which we found a fragmentary bronze brooch, an arrowhead, a sword handle (?), other iron fragments.

Forensic analysis:

- 65 carbonized, blackish fragments, which do not appear to be of human origin (coal?);

- small-sized calcined whitish fragments (1.2/1.1 cm – 0.2/0.1 cm).

Archaeological context: M14/2017 = M27/2019 (Fig. 18)

M14/27 took the shape of a pile of stones (cist), 28 cm deep from the current level. It was not fully researched in 2017, being completed only in the 2019 campaign. We may mention that we managed to delimit it and identify a few fragments from an iron mail, cinerary remains, a bitronconic cup (Fig. 19), a whorl (Fig. 20) and other ceramic fragments.

Forensic analysis:

- 26 calcined fragments with dimensions comprised between 1.2/0.7 – 0.2/0.1 cm.

Fig. 16. Jar vessel, M13.

- 3 calcined fragments with dimensions comprised between 1.1/0.8 and 0.9/0.6 cm;

- 20 calcined fragments with dimensions comprised between 1.5/1 and 0.7/.5 cm;

- approximately 100 calcined fragments with a maximum size of 0.4/0.1 cm;

- 96 carbonized fragments with dimensions comprised between 2.2/1 and 0.5/0.4 cm;

- 3 fragments with sizes comprised between 2.3/0.5 cm and 1/1 cm;

Archaeological context: M15/2017 (Fig. 21)

M15 is a surface tomb – identified in S IV. We could only delimit a cist made of river stone and tuff (whose upper part had been destroyed), being made directly on the rock, having a circular shape, with a diameter of 33 cm. We should mention that S IV was opened on the southern edge of Terrace VIII, on a slightly inclined area with landslides. The inventory of M15 is quite special, the complex consisting of a sword handle, a bronze buckle, a knife, a fragment of a sword(?) and a whetstone - Fig. 22 (preserved in exceptional conditions, with a holding hole, analogy in the Brad

Fig. 17. (a.b.). Fragmentary jar vessel, M13

Fig. 18. M14/27/2017, hole dug in the rock.

Fig. 19. Bitronconic cup from the inventory of M14/27.

Fig. 20. Rifle from the inventory of M14/27.

Fig. 21. M15/2017, cist with inventory.

settlement). All this accompanied by numerous cinerary fragments and a translucent glass bead, slightly deformed (probably due to heavy burning).

Forensic analysis:

- 143 cortical fragments with sizes comprised between 0.7/0.5 – 0.2/0.2 cm;

- 24 calcined fragments, with dimensions comprised between 2/1.2 – 0.7/0.4 cm.

Archaeological context: M16/2017 (Fig. 23)

M16 - was dug into the rock, having the shape of a bell, S III. It has an opening of 56 cm, with a maximum diameter of 134 cm, reaching a depth of 102 cm, compared to the rock level and a diameter of 130 cm on the bottom. Both the walls and the bottom retain chisel marks. A not very rich, but extremely interesting inventory. At the bottom of the pit, an integral ceramic vessel (Fig. 24 a. and b.) (including fragments from a fruit bowl), along with cremated bones and charcoal. Diametrically opposite to the cinerary remains, we identified a rush-light (Dacian *căţuie* - Fig. 25 a. and b.). Two iron brooches (fragmentary) and a knife handle could be recovered fragmentarily.

Forensic analysis:

- carbonized fragments that resemble wood;

- 46 calcined fragments, with sizes comprised between 0.7/0.8 cm and 0.2/0.2 cm;

- 9 calcined fragments of diaphyseal cortex, with dimensions comprised between 1.6/0.8 cm and 0.4/0.3 cm.

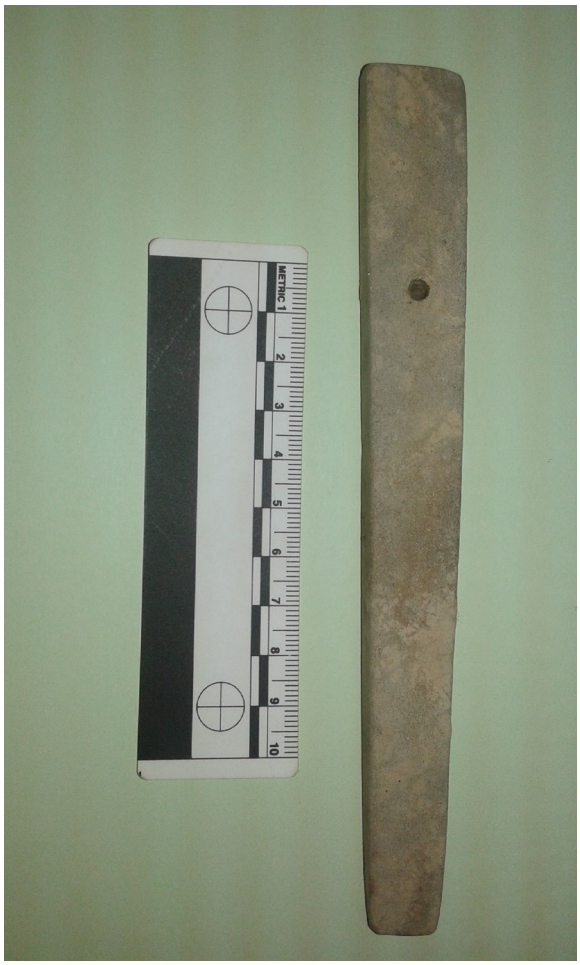

Fig. 22. Whetstone, part of the inventory of M15/2017.

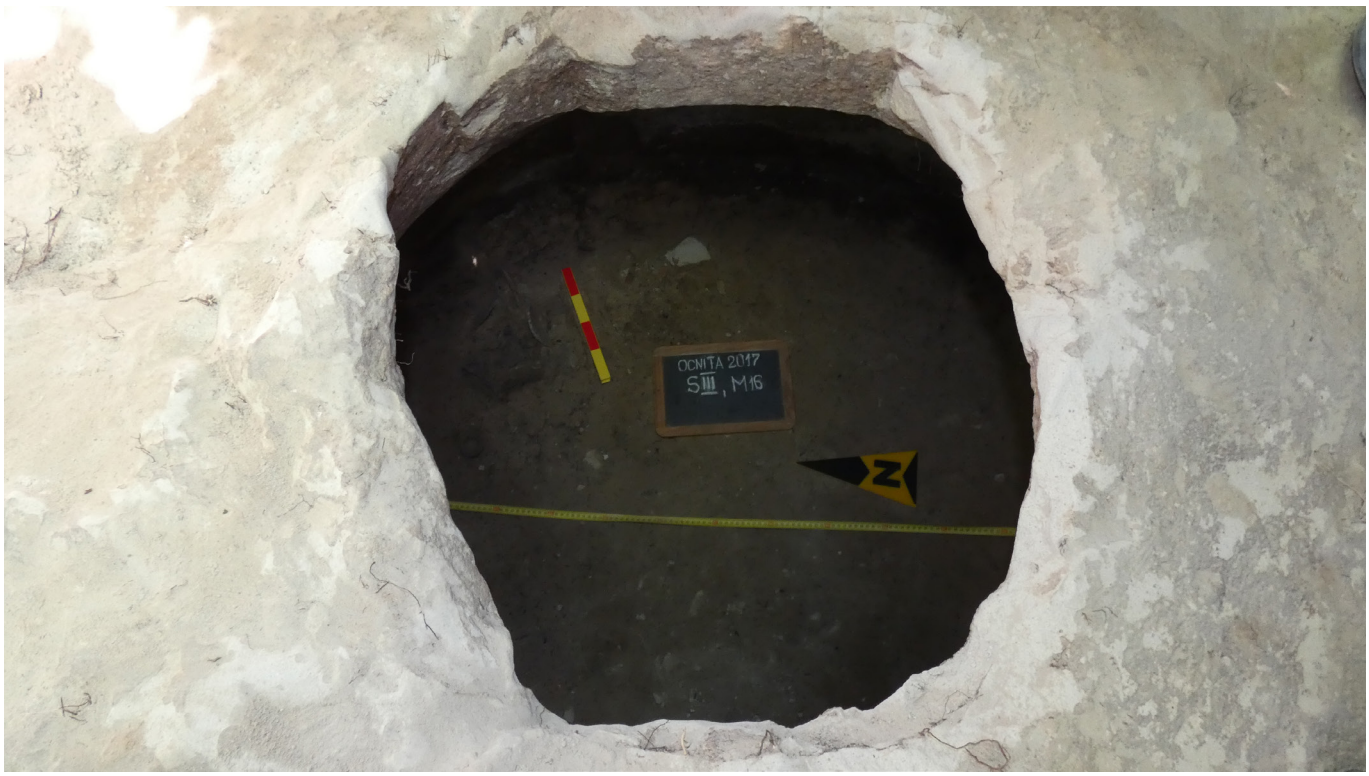

Fig. 23. M16/2017, bell-shaped hole dug into the rock.

Fig. 24. (a.b.). Jar vessel from the inventory of M16/2017.

Archaeological context: M17/2017

M17 took the form of a quadrangular enclosure, which is lost in the southern profile of S IV. The enclosure is made of river stone and tuff. In the excavated soil, we were able to identify a bronze ring, probably coming from a pendant and a fragment of a bronze pendant. The structure was not fully surveyed due to a tree.

Forensic analysis:

- 15 calcined fragments with dimensions between 1.6/1 – 0.2/0.2 cm.

Archaeological context: M19/2018 (Fig. 26)

M19 took the form of a structure made of river stone and tuff, oval in shape, with a diameter of 123 cm, perfectly

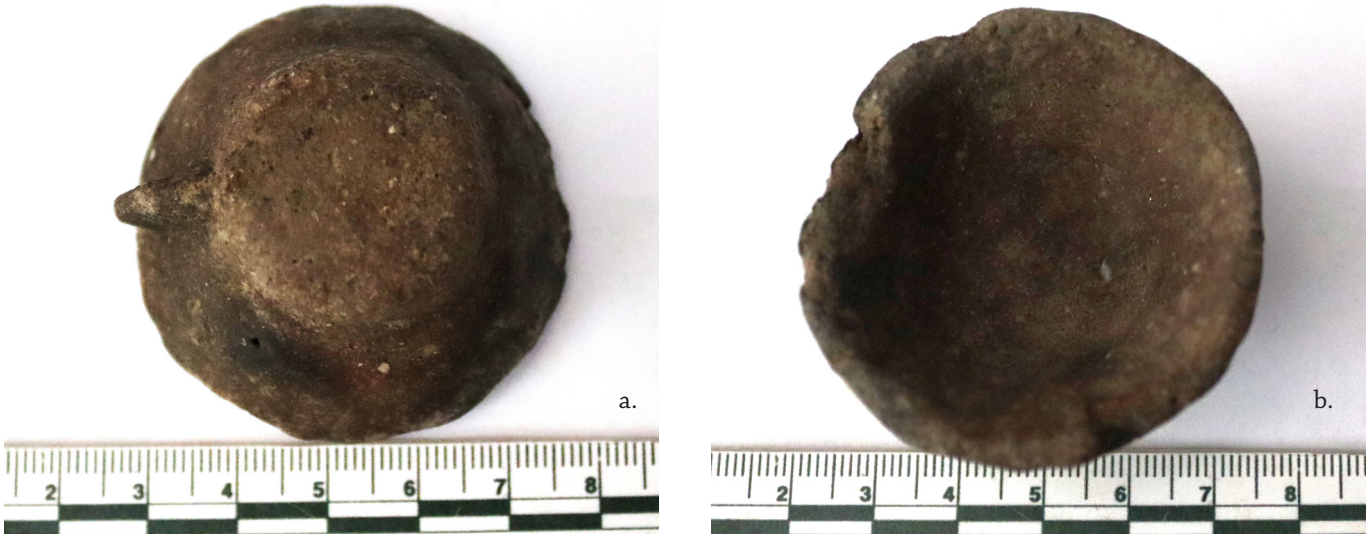

Fig. 25. (a.b.). Dacian bowl/cup from the inventory of M16/2017.

preserved. It is sectioned by the Eastern slope of the section. The inventory is composed of two brooches and a bronze link, along with remains of ashes, ceramics preserved in fragments.

Forensic analysis:

- 67 small calcined fragments (1.3/0.7 - 0.2/0.2 cm).

Archaeological context: M20/2018

M20 is a cist-type structure, made of river stone, tuff and ceramic fragments, with a diameter of 51x33 cm. The cinerary remains are deposited compactly, alongside pieces of charcoal, an integral knife and a bronze link.

Forensic analysis:

- 24 calcined fragments with dimensions between 1.4/1

Fig. 26. M19/2018, circular structure of river stone and tuff.

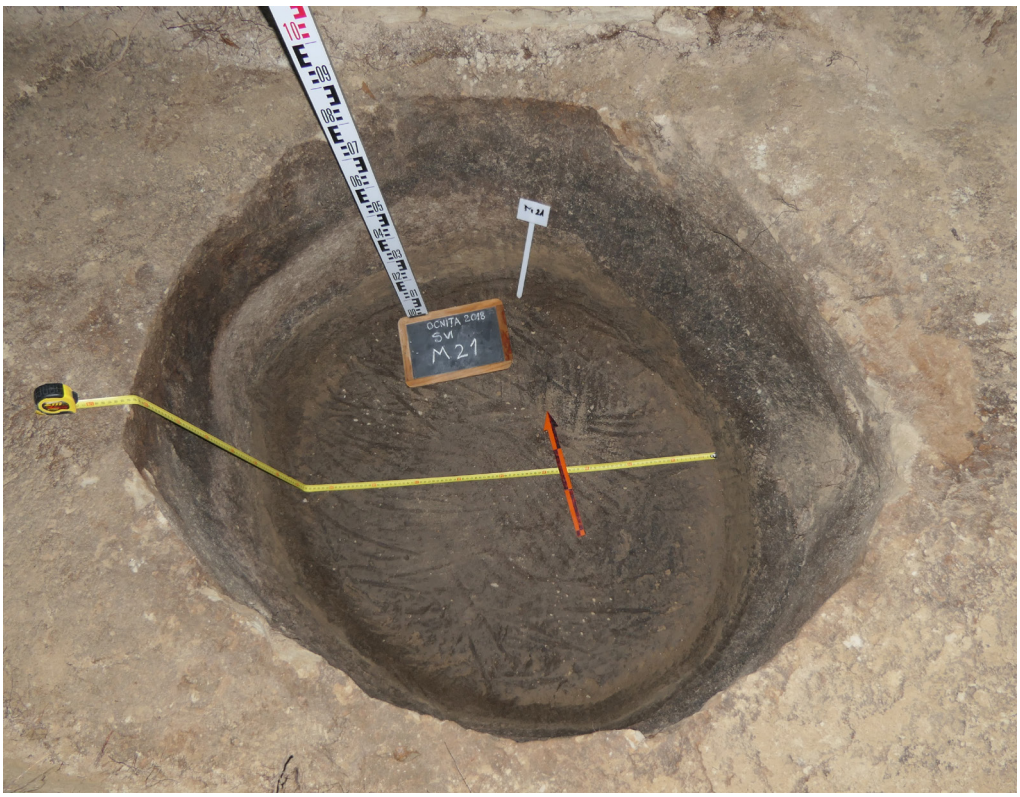

Fig. 27. M21/2018 pit dug in the rock

– 0.2/0.1 cm and 6 carbonized, blackish fragments with dimensions between 1.6/1.2 – 0.3/0.2 cm.

Archaeological context: M21/2018 (Fig. 27)

M21 is an oval-shaped pit, dug into the rock, with a diameter at the mouth of 124x116 cm, and reaching the base with a diameter of 105x91 cm, with a depth of 147 cm compared to the current level, and of 85 cm compared to the ancient level. A single, compact layer of deposition, in which we find cinerary remains, charcoal, a Dacian cup-*cățuie* (Fig. 28 a. and b.) and ceramic fragments, hearth pieces, adobe, a bucket-type pendant, a brooch fragment.

Forensic analysis:

- 34 calcined fragments (one piece measuring 3.6/1.3 cm), the rest of the fragments being small (1.3/0.6 cm – 0.2/0.1 cm).

Archaeological context: M22/2018

M22 is a cist made of river stone, tuff, covered with ceramic fragments, with an outer diameter of 40x50 cm. The cinerary remains are found alongside a bronze link, a razor and a point from a metal (?) object.

Forensic analysis:

- 43 calcined, whitish fragments, with dimensions comprised

Fig. 28. (a. b.). Dacian cățuie/cup from the inventory of M21/2018.

Fig. 29. Shards of smelting, ironwork and heavily burned metal scraps (remnants from the funeral pyre), from the inventory of M23/2018.

between 2.2/0.7 – 0.2/0.2 cm and 5 carbonized, blackish fragments, with dimensions comprised between 0.6/0.5 – 0.2/0 .2 cm.

Archaeological context: M23/2018

M23 was discovered under the form of an agglomeration of ceramic fragments, coal, river stone and tuff. All these are not delimited as in the previous situations, but in the middle of this structure there was a mug with strong traces of secondary burning, deposited in a vertical position, with the mouth down, next to cinerary remains, coal, ash, melt and iron (Fig. 29), ceramic fragments.

Forensic analysis:

- 46 calcined fragments with dimensions comprised between 2.1/1.1 – 0.2/0.2 cm and 6 charred, blackish fragments with dimensions comprised between 1.4/1 – 0.2/0.2 cm.

Archaeological context: M25/2019

M25 took the form of a black spot, with a diameter of 38 cm, from which bones, ashes, coals and fragmentary ceramics were recovered. The potential surrounding structure was not preserved. The inventory included a bronze pendant, a bronze torque and a silver brooch (Fig. 30 a. and b.). The brooch is made from two pieces of metal. The broad head is ornamented with four concentric circles. The body is decorated with five rows of longitudinal profiles and three on the width. The foot is trapezoidal and decorated with point-shaped incisions, in the terminal part a flattened button. Trapezoidal portagraph. Date: second half of the 1st century AD, Riha type variant 5.12.1.[37]

Forensic analysis:

- 45 calcined fragments with dimensions comprised between 1.3/1 – 0.2/0.2 cm.

Archaeological context: M26/2019 – M28/2019 (Fig. 31)

M26 took shape as a pile of river stone, tuff, ceramic fragments and cremated bones, at a depth of 0.21 cm. Later, it turned out to be a hole dug in the rock, identifiable at 0.40 cm from the current treading level. The maximum depth of the pit is 112 cm compared to the current level, the maximum depth compared to the rock level is 0.37 cm. The diameter is 100 cm at rock level and 85 cm at maximum

[37] RIHA 1979, 137-139.

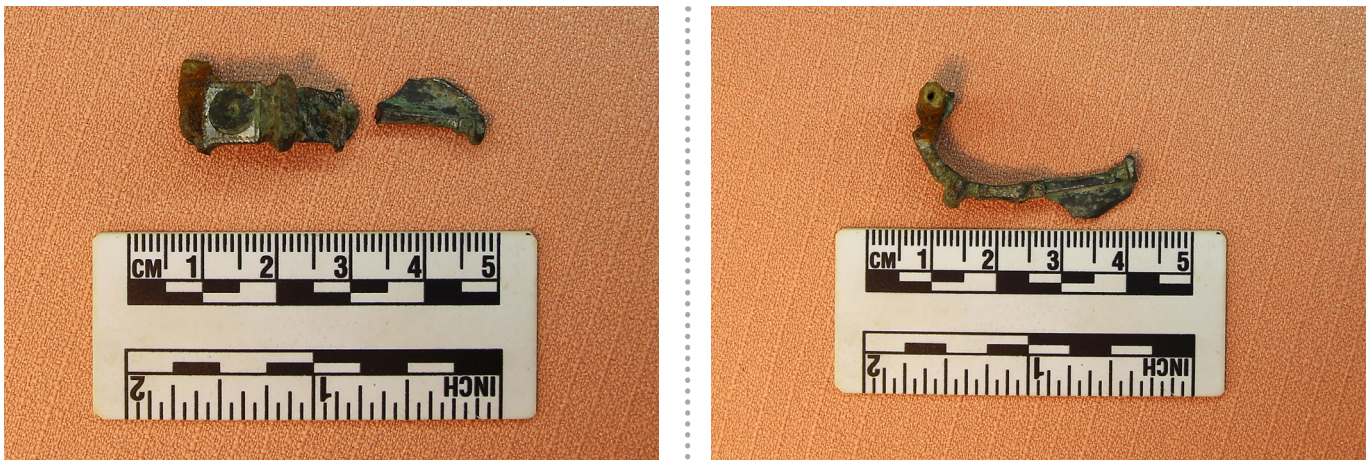

Fig. 30 (a.b.). Riha-type brooch, variant 5.12.1, inventory of M25/2019.

Fig. 31. M26/28/2019 pit dug in the rock, image from research.

depth. The inventory consists of an iron nail, a *sica* scabbard (fragmentary), a pot lid (Fig. 32) with analogue discoveries in Popesti, Poiana, Sighișoara.[38]

Forensic analysis:

In the cist there were identified:

- 18 calcined fragments with sizes comprised between 2/1.7 cm – 0.2/0.2 cm.
- 1 metal fragment of 1.8/0.4 cm;

In the pit filling:

- 44 calcined fragments with dimensions comprised between 1.2/0.7 and 0.2/0.2 cm.

[38] CRIȘAN 1969, 183.

Fig. 32. Bowl lid from the inventory of M26/28/2019.

Archaeological context: M29/2019

M29 was a quadrangular structure of river stone and tuff, with dimensions of 148 cm x 1700 cm, one of the sides is preserved fragmentarily. From the inventory of the deposition, we mention cinerary remains, coals, ashes, ceramic fragments, two brooches, a bucket-type pendant. The first of the brooches (Fig. 33) is made from a single piece of metal, the head is widened in the form of a knot ornamented with incisions, on the body there is also a knot, the foot ends in a button and the portpin is trapezoidal. Date: 1st century BC-1st century AD, highly-profiled Eastern brooch.[39]

Forensic analysis:

- 5 calcined fragments with sizes comprised between 1/0.5 cm and 0.2/0.2 cm.

Fig. 33. Rustoiu-type 20a brooch, strongly profiled of the Eastern type, from the inventory of M29/2019.

[39] RUSTOIU 1997, 53-55.

Archaeological context: M30/2019 (Fig. 34)

M30 was a rectangular tuff structure, very well-preserved on three sides. Dimensions 155 cm x 180 cm. In the middle of it there were discovered cinerary remains, coals, ceramic fragments with traces of secondary burning, a bucket-type pendant, four beads (two of which were strongly deformed because of the temperature on the funeral pyre - Fig. 35), a buckle and a fragment of an iron brooch.

Forensic analysis:

- 21 calcined fragments ranging in size from 0.7/0.4 cm to 0.2/0.1 cm.

Archaeological context: M31/2019

M31 is the same type of large structure, rectangular, with sides of 207 cm x 168 cm, built from pieces of tuff and river stone. On two of the sides, only part of the stones are preserved. The inventory consisted of a bronze pendant with a ring (Fig. 36) and a fragmentarily preserved brooch. In their vicinity, there are cinerary remains and ceramic fragments.

Forensic analysis:

- 12 calcined fragments with dimensions comprised between 1.7/0.9 cm and 0.3/0.4 cm.

- 2 metal fragments with dimensions comprised between 2.5/2 and 2/1.3 cm;

Archaeological context: M32/2021 (Fig. 37)

M32 took the form of a circular structure made of stone and tuff, with a diameter of 84 cm, and the inventory includes a bitronconic cup, secondarily and heavily burnt ceramic fragments, a possible arrowhead (?), a bronze link, cremated bones, ash and coal. The structure was discovered in the NE corner of the S VI B, starting 25 cm deep from the current treading level. We cannot speak of a cist-type structure, but rather of a deposit surrounded by stones and tuff. The bones were scattered all over the surface of the enclosure.

Forensic analysis:

- 19 whitish-coloured calcined fragments, with cracks on the surface in various directions, measuring between 3.2/1.4 cm and 0.7/0.2 cm;

- 2 small carbonized, blackish fragments.

Archaeological context: M33/2021

M33 is a large, oval-shaped structure made of tuff and river stones pieces, with a diameter of 164 cm. The entire structure is sectioned by the South slope, which indicates the existence of a structure patched with river stone and ceramic fragments and filled with cremation debris, charcoal, ceramic fragments, ash. The inventory consists of an iron knife (without tip - Fig. 38) and a fragment of a brooch (also made of iron). The depth from which it was contoured is 14 cm compared to the current treading level.

Forensic analysis:

- 4 blackish carbonized fragments, with dimensions comprised between 1.7/0.4 cm and 0.4/0.3 cm;

Fig. 34. M30/2019 quadrangular stone and tuff structure.

Fig. 35. Heavily deformed bead from exposure to high temperature on the funeral pyre in the inventory of M30/2019.

Fig. 36. Pendant from the inventory of M31/2021.

Fig. 37. M32/2021, surface structure of stone and tuff, image during research.

- 7 calcined fragments, among which 3 are of cortical diaphyseal, showing parallel semi-circular cracks on the surface, and 4 fragments are of small dimensions (2.2/1.4 cm – 0.7/0.5 cm).

Archaeological context: M34/2021 (Fig. 39)

M34 is a structure made exclusively of large pieces of tuff, it has a rectangular shape, it is perfectly preserved on two of its sides, the third is partially destroyed, and the fourth enters the Western profile. The size of the sides is 245 cm x 124 cm. A profile was drawn in the central area, which sectioned the deposition. The inventory was exceptional: ceramic *unguentarium* along with numerous cremation fragments, a cameo ring, an arrowhead, a fragment of a brooch, a republican Roman denarius (82 B.C., this comes from the upper layer), ash, charcoal, secondarily burnt ceramic fragments.

Forensic analysis:

- a diaphyseal fragment, whitish in colour (calcined), measuring 3.6/2 cm, with traces of soil. After its removal, the bone decomposed into 4 fragments that could be laid face to face; on the surface it shows semi-circular cracks (specific to the exposure to high temperatures of bones covered with soft parts).

- a block of earth in which whitish calcined bones are embedded. After cleaning off soil (by immersion in water), the fragments consisted of:

Fig. 38. Knife, inventory of M33/2021.

Fig. 39. M34/2021, river stone and tuff structure, image from survey with part of inventory

- 13 skull fragments with a thickness of 0.2-0.3 cm, showing cracks on the surface, oriented in different directions;

- 18 fragments of cortical diaphyseal with sizes between 4/1.7 cm and 1.6/1.2 cm;

- 15 fragments of calcined diaphyseal cortex, with dimensions between 2.6/1 cm and 1/1.3 cm and one carbonized (blackish in colour). Some show parallel semi-circular cracks;

- 11 fragments of diaphyseal cortex with dimensions between 1.4/0.8 cm and 2.4/0.7 cm, with longitudinal cracks on the surface;

- a diaphyseal fragment measuring 7/2.1 cm, most likely belonging to a humerus, whitish (calcined) with parallel and longitudinal semi-circular cracks;

- a fragment of humeral diaphysis, calcined, measuring 5.1/1.3 cm, with semi-circular and longitudinal cracks;

- a fragment of diaphyseal cortex, measuring 3.4/1.5 cm with cracks on the surface in various orientations;

- a bone fragment measuring 4.7/4.3 cm, very friable, with cracks on the surface, embedded in the ground;

- 2 fragments of a skull cap, whitish in colour, with the dimensions of 2.6/2.4 cm and, respectively, 2.3/1.9 cm;

- a fragment from a diaphyseal cortex with the dimensions of 4/3.8 cm, with cracks on the surface in various orientations;

- 2 small calcined fragments of diaphyseal cortex.

Archaeological context: M35/2021 (Fig. 40)

M35 is in S VI A and is a pit dug into the rock. It was partially overlapped by M22, which is a cist-like structure, surveyed in 2018. The pit has a diameter of 98 x 95 cm, with a depth of 76 cm compared to the level of the rock. The filling consists of ceramic fragments, charcoal, cremated bones, molten silver beads.

Forensic analysis:

- 29 small calcined fragments (2/1.8 – 0.4/0.3 cm), coming from the diaphyseal cortex and a blackish carbonized fragment.

Archaeological context: M36/2021

M36 is a pit dug in the rock, partially overlain by M39 (stone structure). The pit is filled with ash, charcoal, small ceramic fragments that were burnt secondarily. It was found at 102 cm, compared to the current treading level.

Forensic analysis:

- 33 whitish-coloured calcined bone fragments, with areas covered by dry soil, among which one can identify:

Fig. 40. M35/2021, pit dug in the rock.

- a diaphyseal fragment with a length of 4.5 cm that seems to belong to the bone of a forearm (ulna or radius), with parallel semi-circular cracks (specific to exposure to high temperatures of bones covered with soft parts - "curved transverse fractures" or "muscle shrinkage lines"); the diameter of the bone is 1.4 cm;

- a fragment of diaphyseal cortex with the medullary canal highlighted, which seems to come from the distal 1/3 of the radius diaphysis; length = 3 cm, diameter = 2 cm;

- 30 small fragments (between 1.6/0.6 cm – 0.2/0.2 cm) coming from the diaphyseal cortex;

- a fragment of diaphyseal cortex, friable, with areas covered by dry soil;

- a blackish (carbonized) fragment of 3.6/2 cm, which seems to be made of wood.

Archaeological context: M37/2021

M37 was discovered in the SW corner of S VI B, it cannot be considered a compact structure, rather a deposit heavily disturbed by roots (in the corner of the section, just above the largest part of M37 there is a tree). Along with cinerary fragments, ash, charcoal and numerous ceramic fragments, we identified a fragmentary iron brooch and a bronze buckle.

Forensic analysis:

- 58 calcined (whitish) fragments, among which 2 most likely come from the diaphyses of the forearm bones, with dimensions of 2.8/1.7 cm and 2.2/1.4 cm, respectively, with parallel semi-circular cracks; the rest of the fragments are small in size, consisting of cortical fragments.

Archaeological context: M38/2021

M38 is in the immediate vicinity of M32 and is a small tuff and river stone cist. An arrowhead and ceramic fragments were deposited with the cinerary remains.

Forensic analysis:

- calcined bones, with adhering soil on the surface, of small sizes (2.3/1.6 cm – 0.9/0.4 cm), coming from the diaphyseal cortex and skull cap.

Archaeological context: M39/2021

M39 is a large, well-preserved structure made of large pieces of tuff and river stones, it partially overlaps M36 (pit). The inventory consists only of charcoal, ceramic fragments and numerous cinerary remains (Fig. 41). The structure was covered with pieces of tuff.

Fig. 41. Cinerary remains in M39/2021.

Forensic analysis:

- 9 calcined bone fragments, very friable, embedded in dry soil, crossed by threads of plant roots;

- a fragment of diaphyseal cortex, which shows semi-circular, parallel cracks on the surface (specific to exposure to high temperatures of the bones covered with soft parts).

II. LABORATORY SEROLOGICAL EXAMINATIONS

After the medico-legal anthropological identification process of the cinerary fragments, samples were taken for the purposes of carrying out a serological analysis. This is how the Serological Analysis Bulletin no. 794 of 16.06.2022 of the Forensic Serology Laboratory of the "Mina Minovici" INML was drafted, with the following findings:

Identification: bone fragment;

Case history data: the bone fragment comes from the archaeological site at Ocnele Mari/Ocnița, ancient Buridava;

The nature and description of the samples under examination: the bone fragment examined was taken from the plastic container inscribed Ocnele Mari M16/2017, having a greyish white appearance, a parallelogram shape, with dimensions of 2.7/1.5 cm;

Objectives of the examination: determination of human origin;

Examination methods used: after photo-documentation, the bone fragment was triturated to powder form and subsequently subjected to serological examination.

To establish belonging to the human species, specific methods were used: the Uhlenhuth precipitation reaction with anti-human serum and the immune-chromatographic test to identify human haemoglobin (both with positive and negative controls);

Results obtained: the Uhlenhuth test was positive, indicating that the bone fragment under examination is of human origin.

Expert comments and assessments: the biological sample was completely consumed during the serological examination.

The serological analysis was performed on a sample, which was consumed in its entirety, as stated above. The purpose of this examination was to use another method to determine whether the cinerary samples from Buridava belonged to the human species. The result confirms the forensic anthropological examination.

III. VOLUMETRIC MICROSTRUCTURAL EXAMINATIONS BY X-RAY MICRO-TOMOGRAPHY (µXCT)

The third method of investigating the cinerary samples from Buridava involved volume structural examinations by

Fig. 42. Sample M1, Ocnița, tooth. Longitudinal sections. Human origin.

X-ray micro-tomography (μXCT), these being carried out at the National Institute for the Physics of Lasers, Plasma and Radiation - INFLPR, located on the Măgurele campus.

The μXCT instrument used for the analyses requested is equipped with a nano-focusing cone beam X-ray source with W target on diamond window, a flat panel X-ray detector 2K x 2K pixels of 200x200 microns and a set of translational and rotational axes for sample positioning during scanning. The samples were scanned in similar condition with a X-ray beam filter of 0.2 mm Cu at 100 kV and 100 μA (for sample with higher density, the beam current was increased at 150 μA). For each sample were acquired a total of 1800 projections with an integration time per projection of 1s and two images were mediated before data storage. The 3D CT model was reconstructed with VGStudio Max 3.5 software using cone-beam Feldkamp algorithm. The nominal reconstructed voxel was approx.13 μm.

This allows qualitative analysis by visualizing all morphological details, as well as the effects of destruction caused by burning and possible perimortal trauma.

X-ray Micro-Tomography (XCT) is a very recent technique in judicial (forensic) use that allows an ultra-detailed tomography, more detailed than medical tomography, which allows the identification of the structure, as well as some micro inclusions in bones or bone fragments, thus being very useful in the forensic examination of burnt bones.[40]

The bone fragments from the Ocnița-Buridava finds were analysed using the method described above.

[40] PLESSIS *et alii* 2017, 1-11.

Samples from M1, M10, M34 and M36 were chosen for exemplification purposes.

Three samples have been preserved for communication from M1, one sample from a tooth (Fig. 42-47, Fig. 52), as well as a sample of cancellous bone with unbanded osteons. In the sample from M34, the bone fragments have parcelal but also semilunar fractures specific to the burning of bones with soft (wet) parts (Fig. 48). In the sample from M36 Buridava, the bone fragments are preserved in the diaphyseal structure by earth bridges (Fig. 49), and in the sample from M10 Ocnița, the bones have an obvious appearance of a specifically human diaphyseal trabeculae, a spongy bone can also be observed in lateral section with osteons in specific human arrangement (Fig. 66-67, Fig. 69-70).

At the same time, 3D reconstruction with comparative morphological analysis of several samples is also possible (Fig. 42-52).

In conclusion, the bone fragments are of human origin, an aspect that can be supported anthropologically due to the diploë, in which the osteons and the Haversian systems are not structured next to each other, ordered as it happens with animals, and at the same time due to extensive cortical surfaces, an aspect that is specific to human bones.

IV: SEM AND EDS ANALYSES

The penultimate method of investigating cinerary fragments involved physical-chemical examinations, more specifically elemental composition measurements through SEM and EDS analysis. SEM images and EDS analysis were

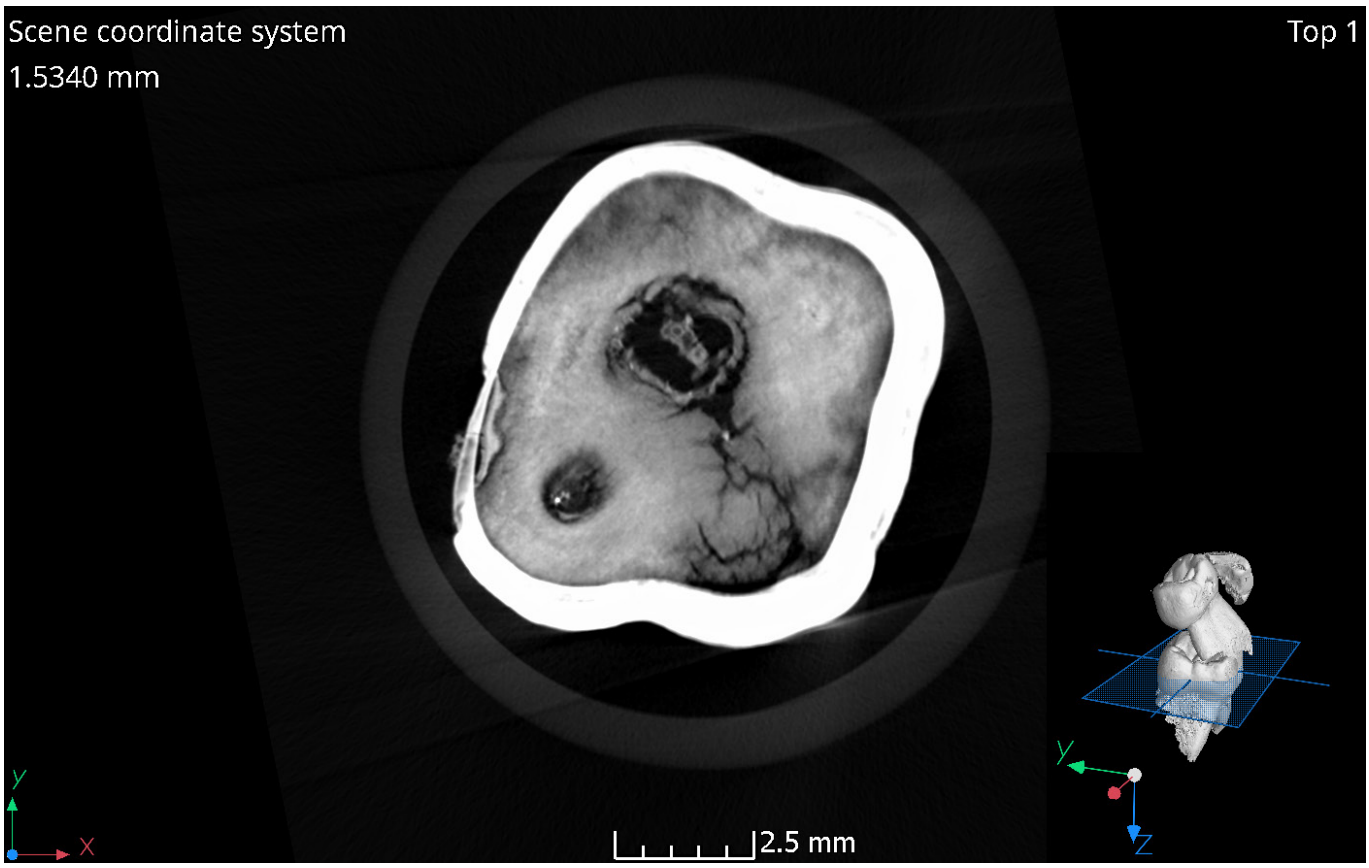

Fig. 43. Sample M1, Ocnița, tooth. Transversal sections. Human origin.

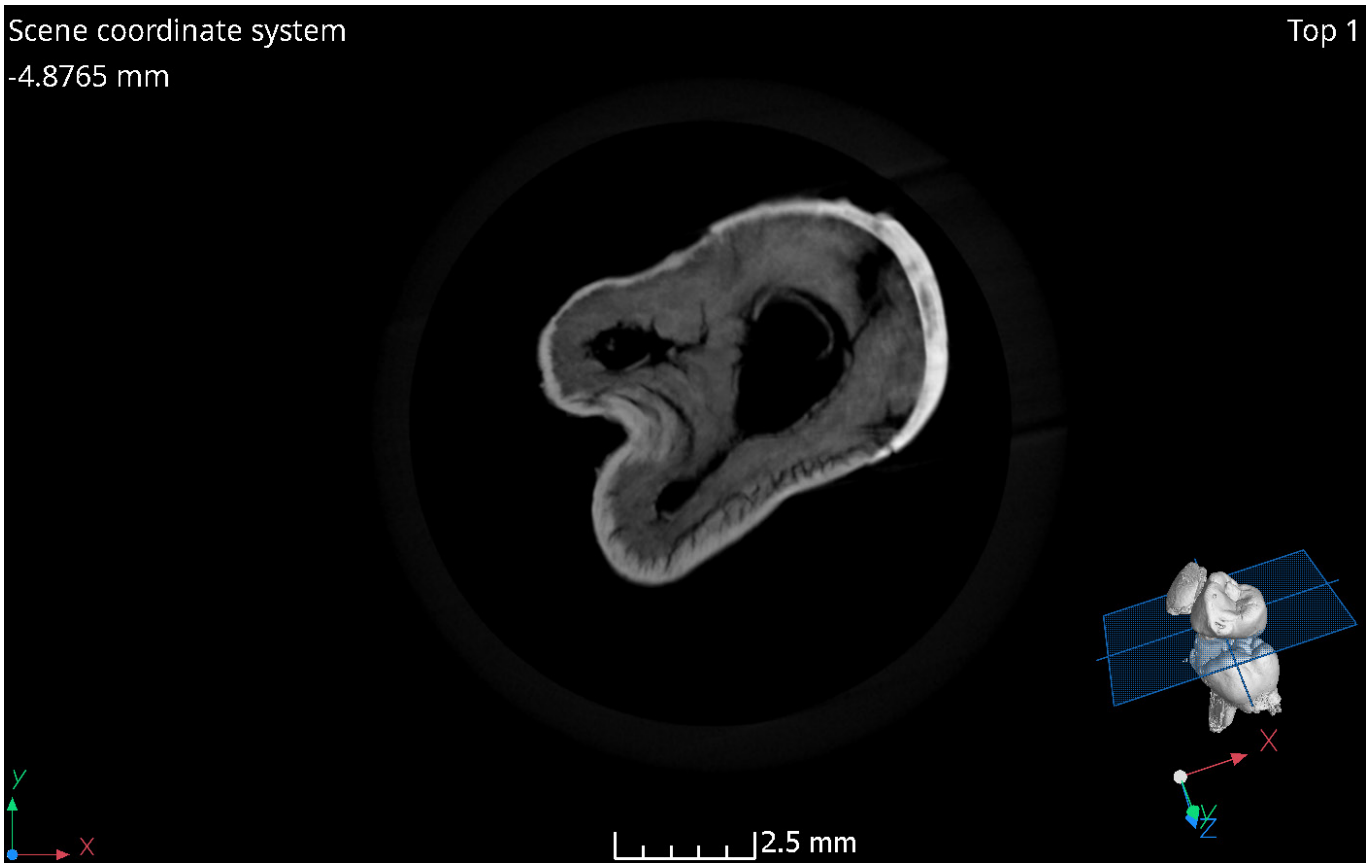

Fig. 44. Sample M1, Ocnița, tooth. Transversal sections. Human origin.

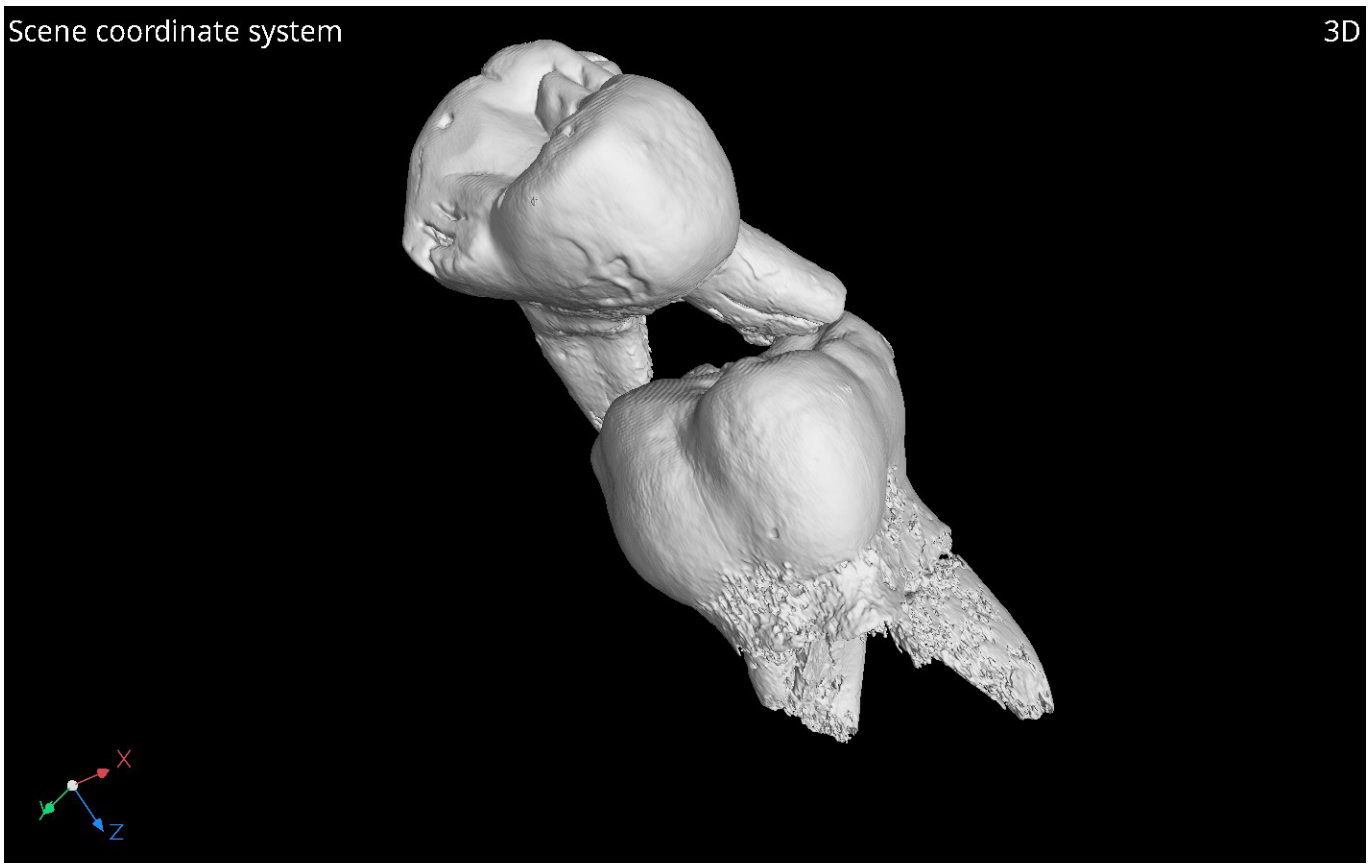

Fig. 45. 3D tooth reconstruction.

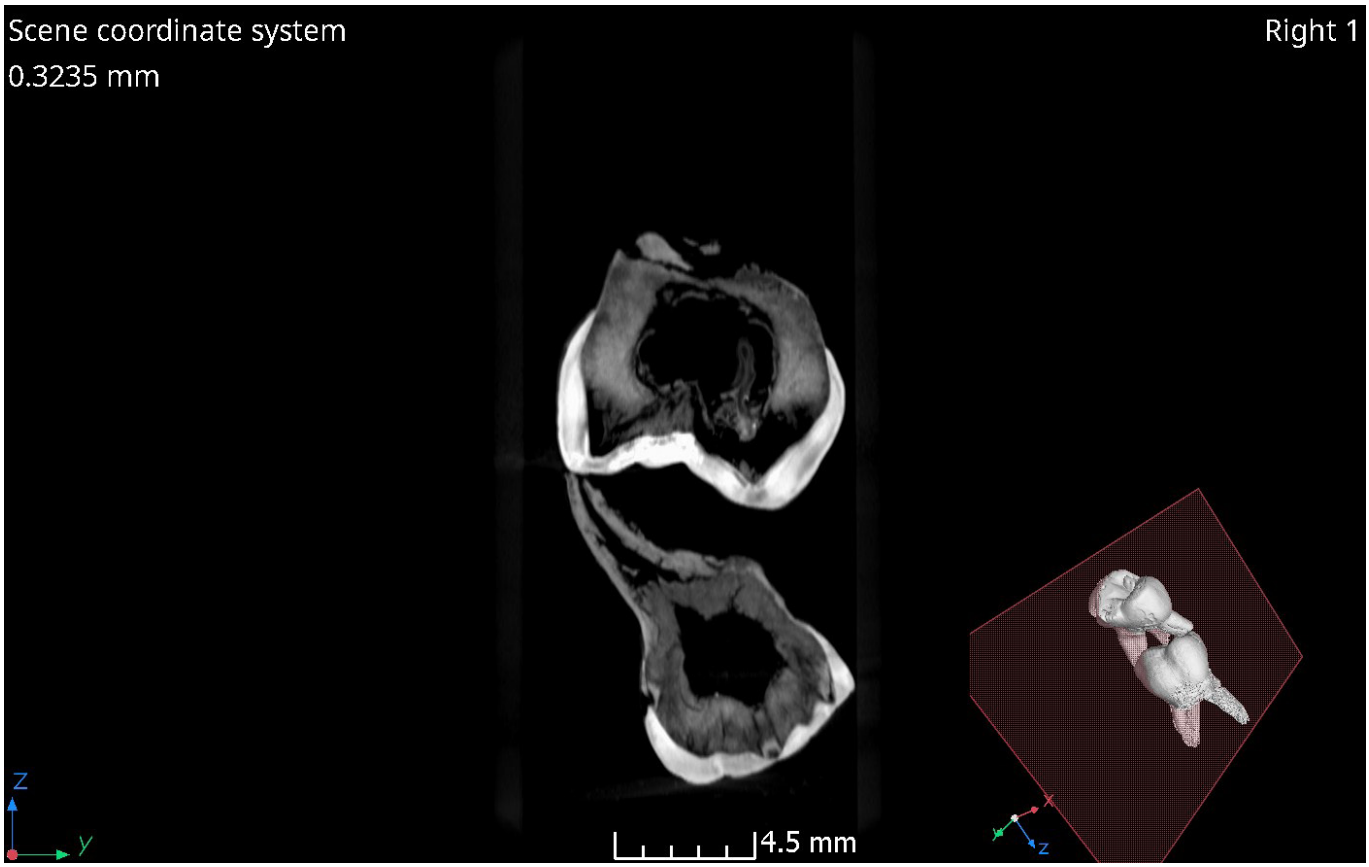

Fig. 46 Sample M1, Ocnița, tooth. Transversal sections. Human origin.

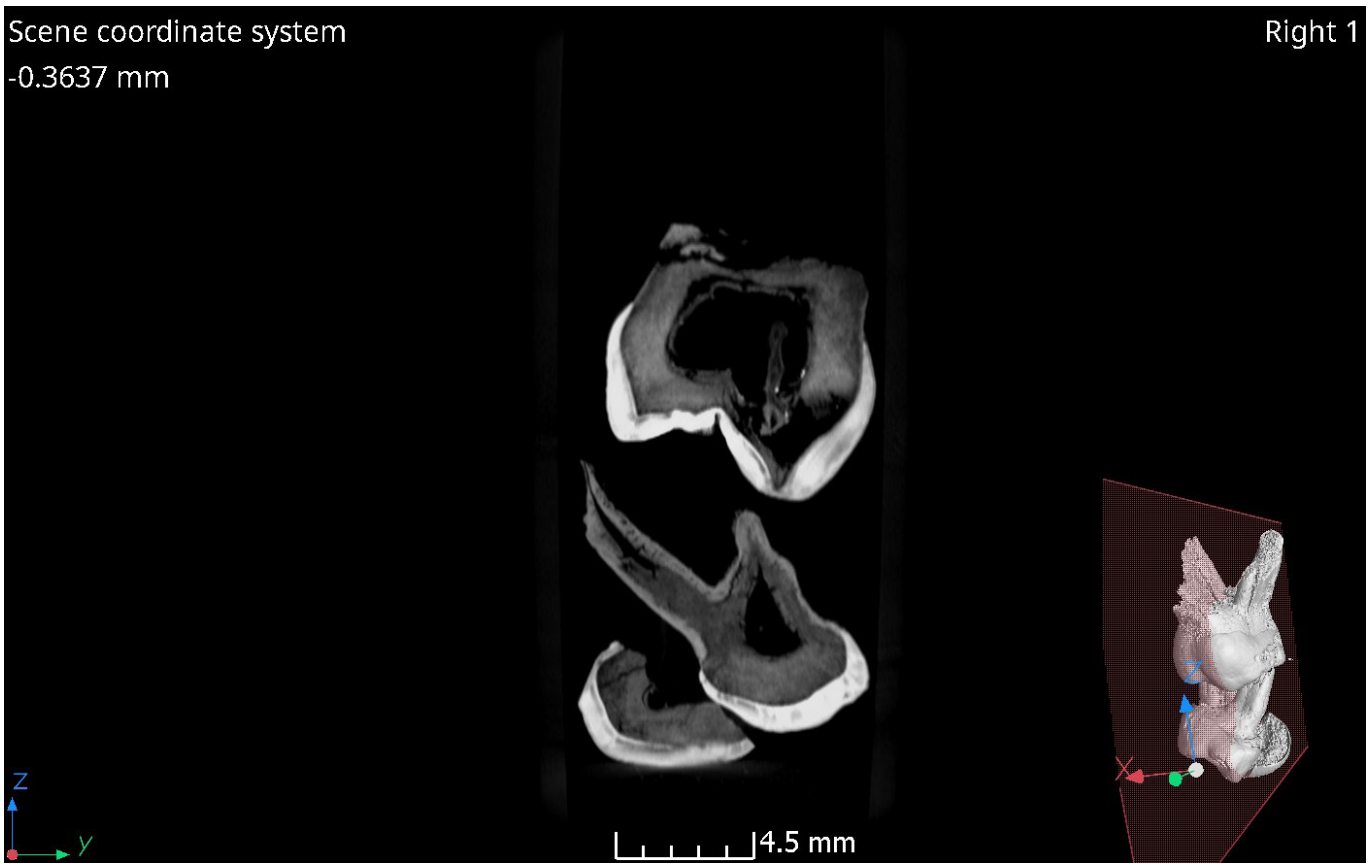

Fig. 47. Sample M1, Ocnița, tooth. Transversal sections. Human origin.

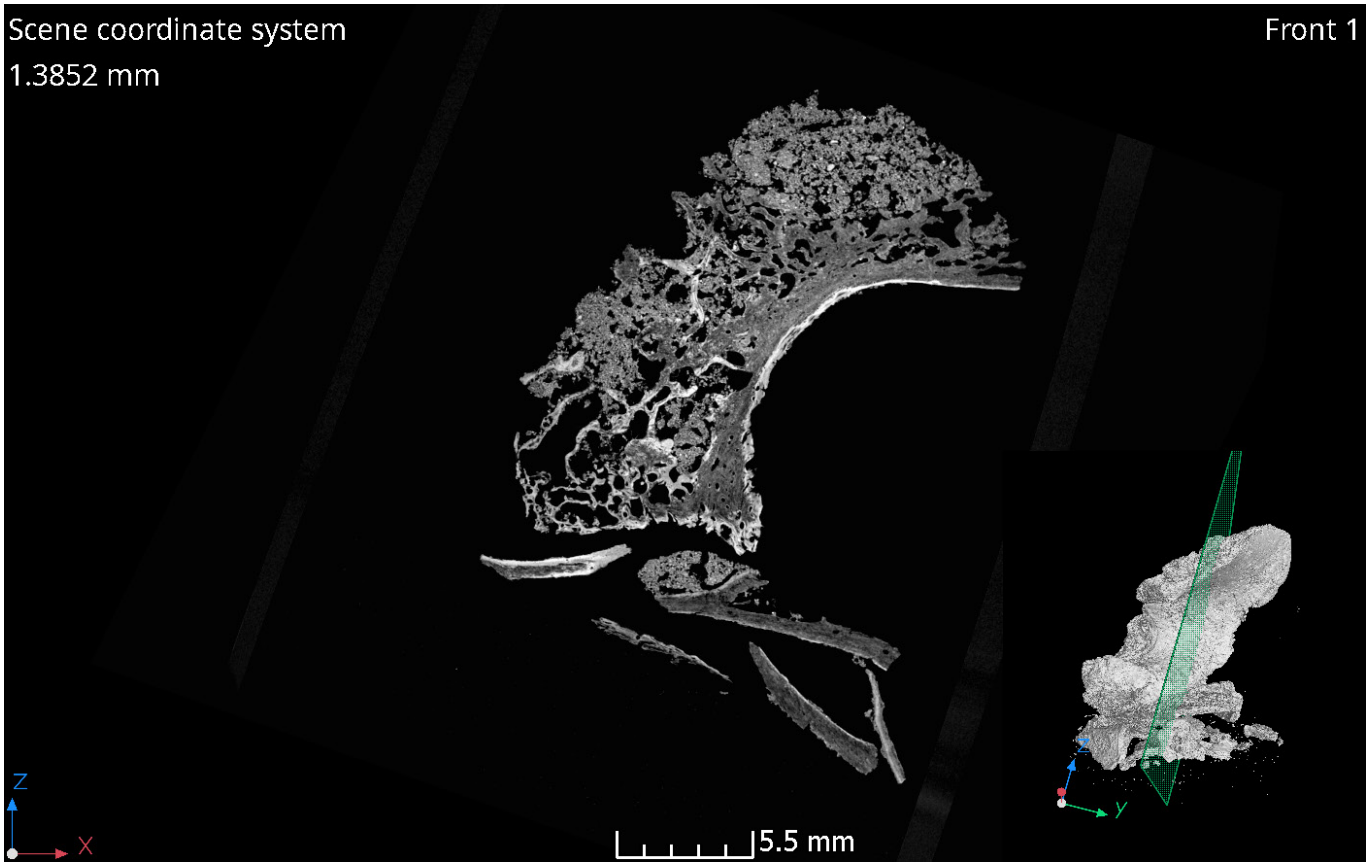

Fig. 48. Sample M1 Ocnița, cancellous bone with unbanded osteons, human aspect.

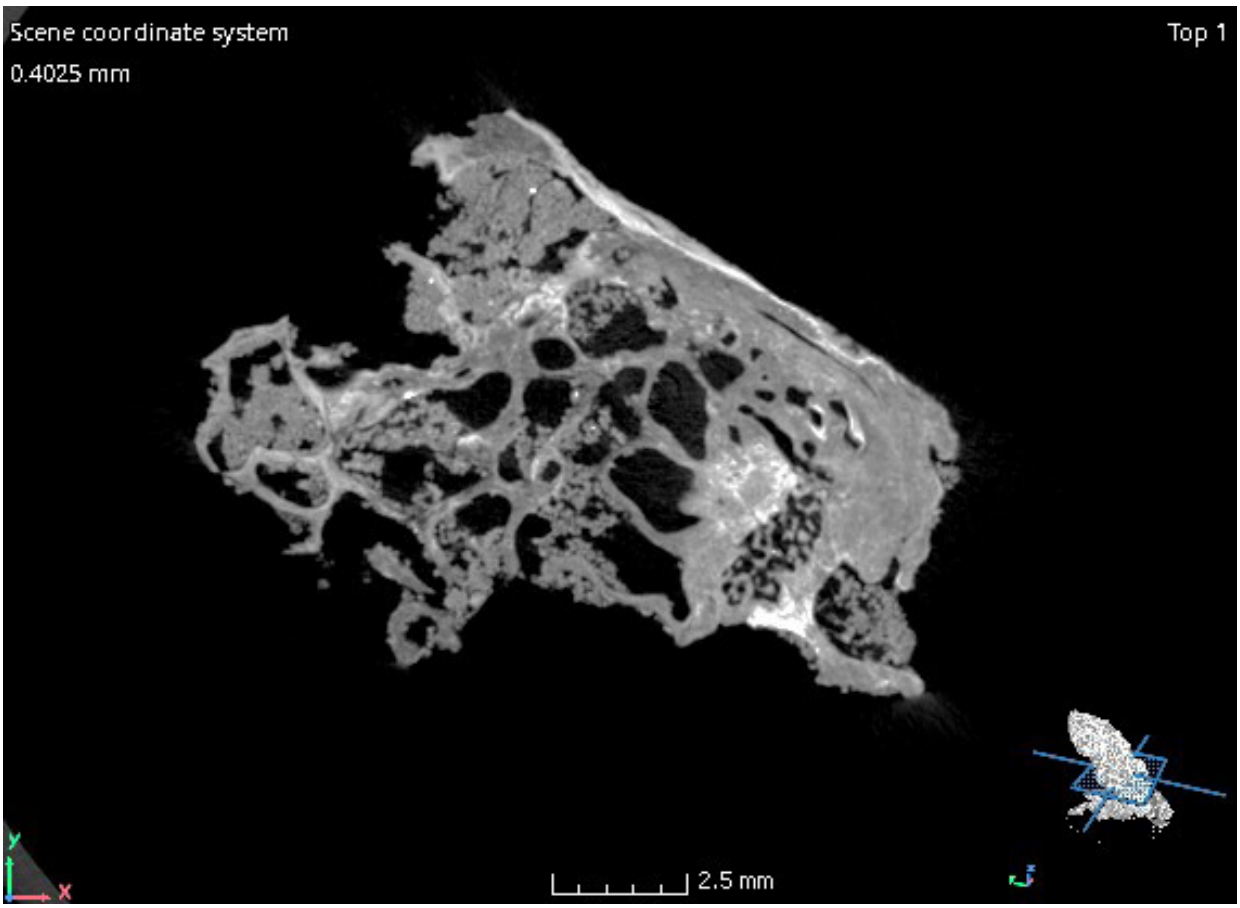

Fig. 49. Sample M1 Ocnița, cancellous bone with human aspect.

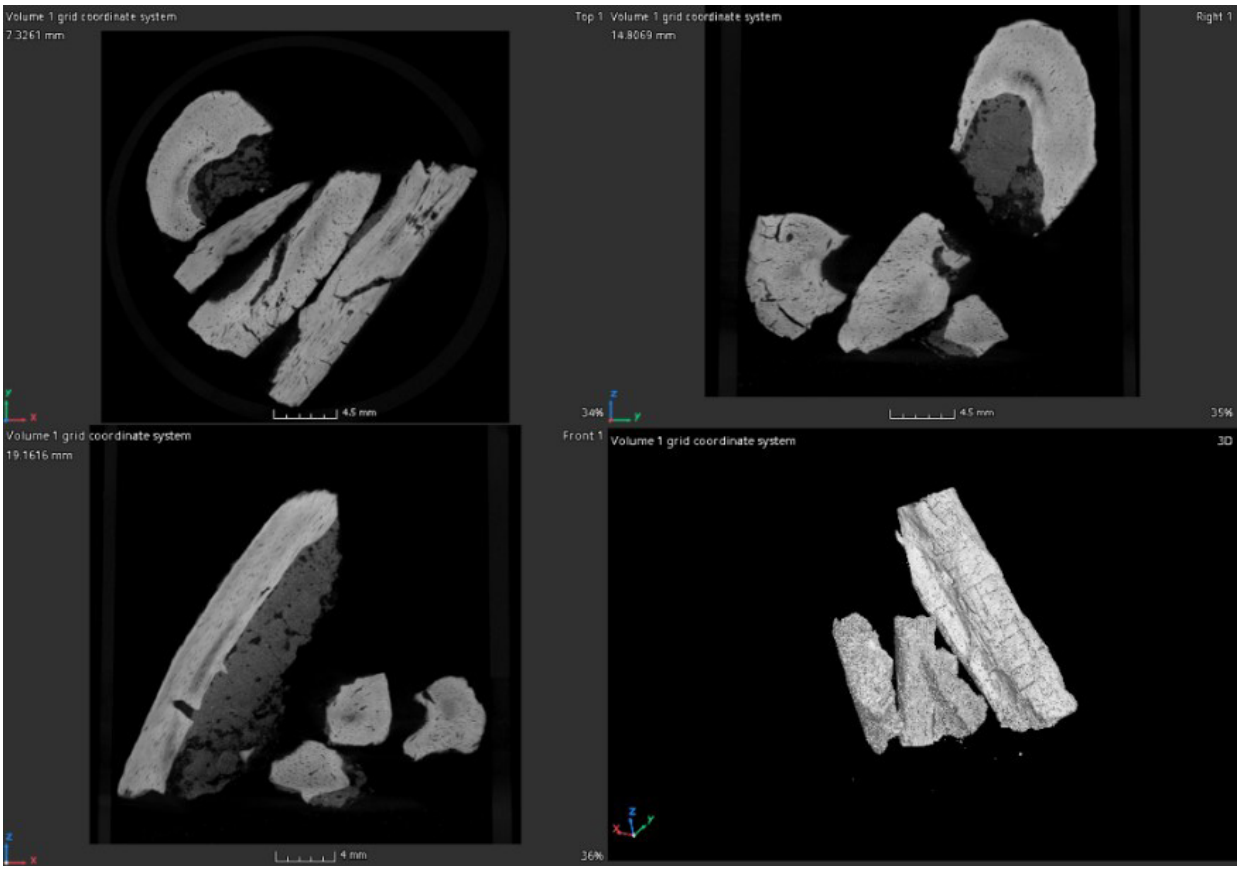

Fig. 50. Sample M34 Buridava, bone fragments with partial but also crescentic fractures specific to burning of bones with soft (wet) parts. 3D reconstruction. Human aspect.

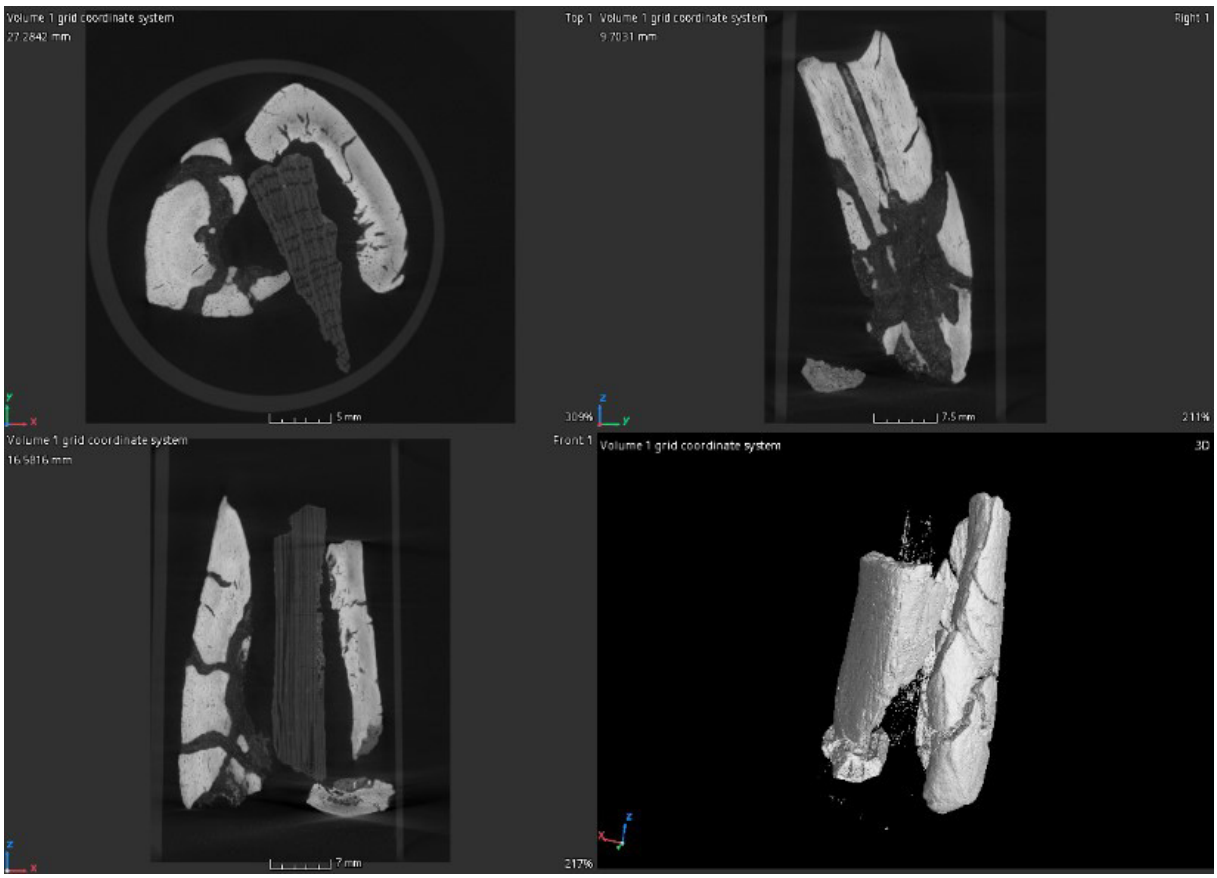

Fig. 51. Sample M36 Buridava, bone fragments that are preserved in the diaphyseal structure by earth bridges. 3D reconstruction. Human aspect.

Fig. 52. Sample bone fragments from sample M1 Ocnița.

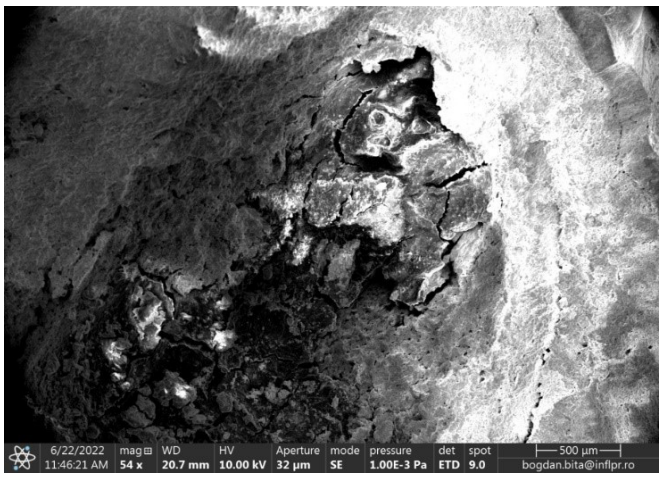

Fig. 53. Ultrastructure of bone fragments during EDS.

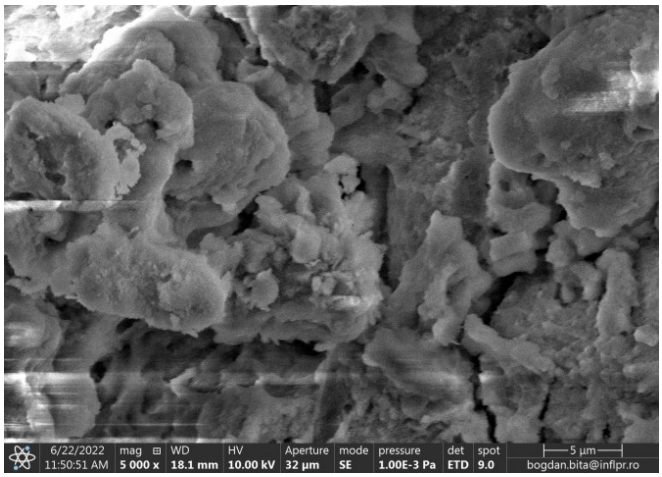

Fig. 54. Ultrastructure of bone fragments during SEM.

obtained with Apreo S, ThermoFisher device at 1.3 e^{-3} Pa and a voltage of 10 kV. EDS is a complementary technique for elemental acquisition using Auger electrons. Counting time for acquisition was 50 s.

EDS measurements allow mapping the composition of substances that were discovered on different object surfaces (in our case bone fragments and skeletal remains) useful for on-site research (mobile equipment) or for identifying possible substances with an accelerating role that are located on or within skeletal fragments or remains and that can be used to initiate or accelerate combustion[41] (Fig. 55-56, 65).

SEM analysis (Scanning Electron Microscopy, which scans the bone surface with an electron beam that can provide information about the bone surface) and EDS (Energy Dispersive X-ray Spectroscopy) is an elemental technique that allows the chemical characterization of elemental substances arranged on various surfaces (in the present case, on bones – Fig. 53-54, 57-64).

THE CONCLUSIONS OF THE ANALYSES PERFORMED:

Human bones differ structurally from non-human bones due to evolutionary changes that increase gracility. The main difference is bone density: non-human bones have higher density relative to size, are less porous and thicker in transversal sections than human bones. In the femur or humerus we are dealing with ¼ of the total diameter, while in non-human bones we are dealing with 1/3.

Trabecular bones or the trabecular areas of the bones (diploë) are quasi-absent within non-human bones, which results in a smooth endo-canalicular medullary face (diaphyseal trabeculae) as compared to human bones. In

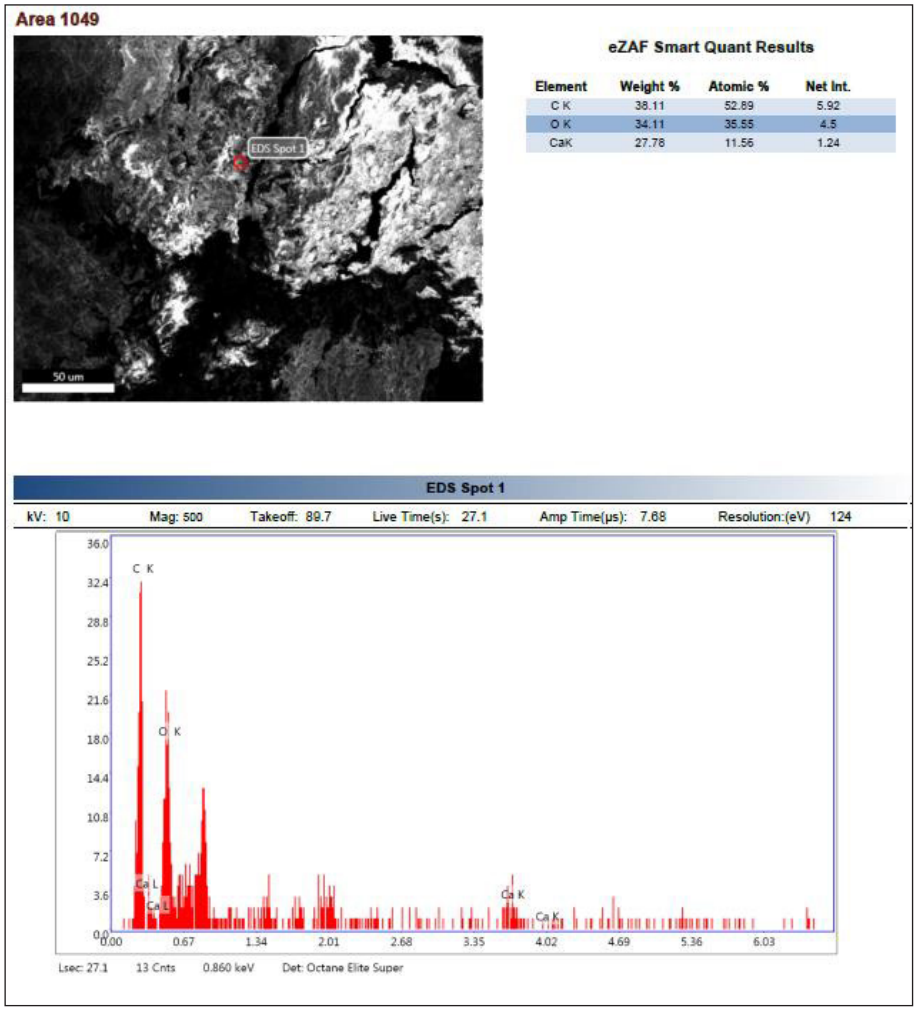

Fig. 55. Peaks of carbon, potassium, calcium. The analysis was performed with EDS.

[41] VOGLIS *et alii* 1993, 229-233; TROMBKA *et alii* 2002, 1-9; ZIEBA-PAULUS/BORUSIEWICZ/KUNICKI 2008, 1-10; BERENDES *et alii* 2006, 1085-1090; ZIEBA-PAULUS/BORUSIEWICZ 2006, 286-292.

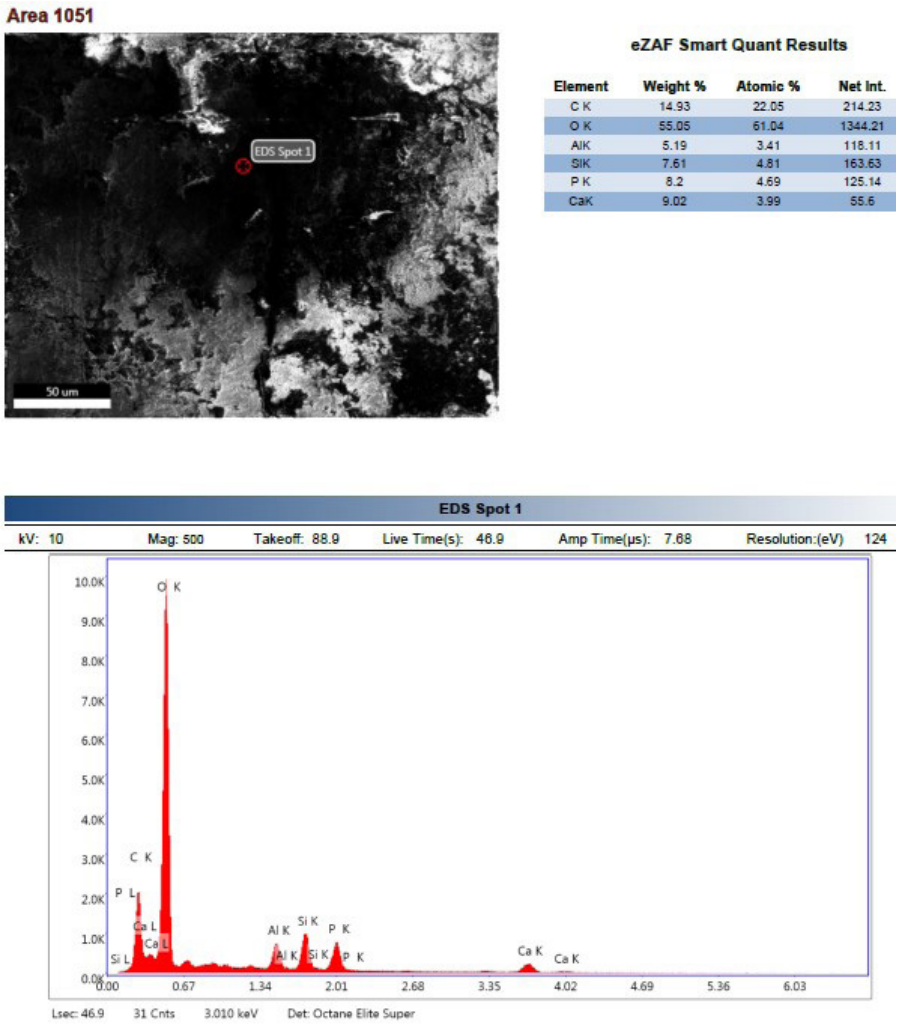

Fig. 56. Peaks of Aluminium, Potassium, Silicon, Phosphorus, Calcium. The analysis was performed with EDS.

human bones, the skull has a well-represented diploë in relation to the cortex (tabular area), as compared to non-human bones. This aspect was also noticed in the samples that were studied (Fig. 66-68).

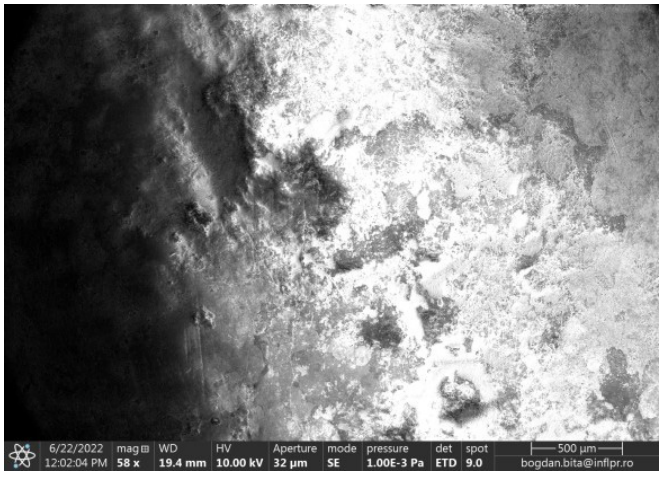

Fig. 57. Ultrastructure of bone fragments during EDS.

Inside the medullary canal one can observe (Fig. 68) the diaphyseal, porous trabecula in which the marrow is positioned in the case of a living person, in an increased amount and well vascularized, which is specific to human bones.[42]

The comparative microstructure of human versus non-human bones (Fig. 69-71) reveals a clear difference between human and non-human cortex. The osteons in the trabecular and cortical bone are spread and spaced, while in non-human bones they line up in rows or lines (osteonic banding) or form rectangular structures (plexiform bone). However, since 1999, Ubelaker has been demanding for caution in assessments.[43]

One can see in (Fig. 71) the distal portion of the long bones of pigs (bottom) compared to those of humans, how the trabecular structure is organized and the arrangement of osteons - banded in pigs and spread in humans.[44]

The next stage of the examinations is the elemental analysis of the substances deposited on the surface of the bone (such as the micro XRF method) and the research of stable isotopes, N, C, P, to know more about the dietary habits of the deceased and their area of origin.

Forensic anthropology implies the study of human remains, wet or dry bones and their taphonomy fate. Forensic Archaeology as a relative new

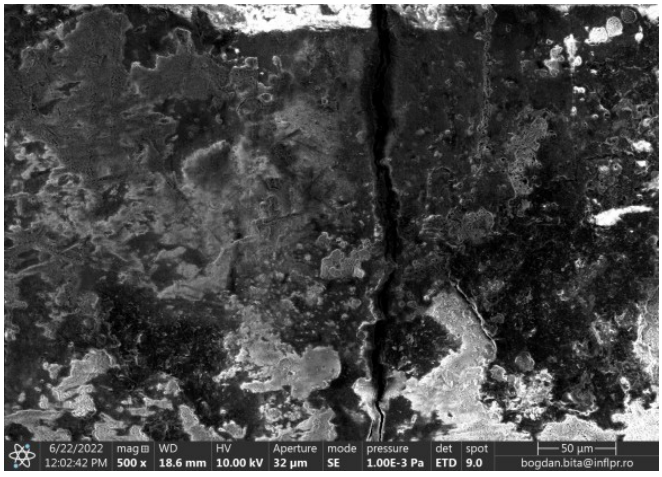

Fig. 58. Ultrastructure of bone fragments during EDS.

[42] WATSON/MCCLELLAND 2018, 8.
[43] UBELAKER 1999.
[44] WATSON/MCCLELLAND 2018, 9.

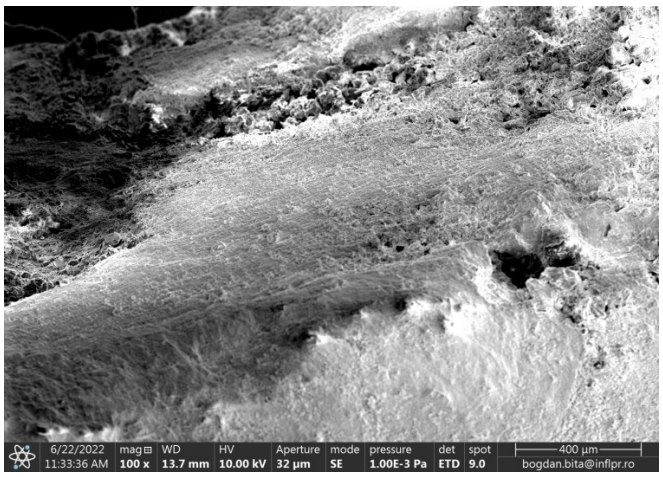

Fig. 59. Ultrastructure of bone fragments during EDS.

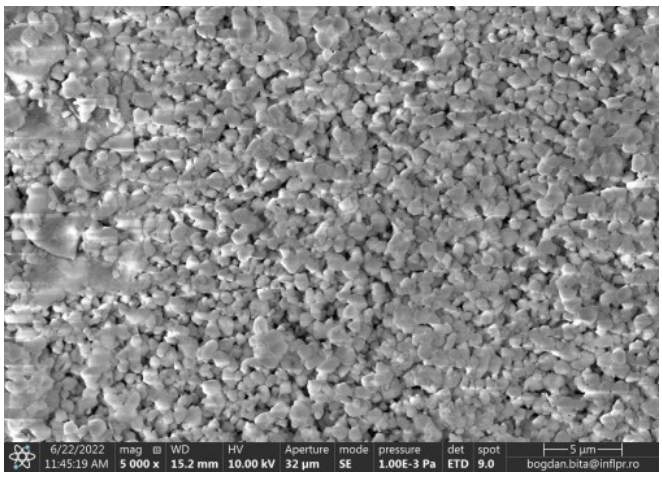

Fig. 60. Ultrastructure of bone fragments during EDS.

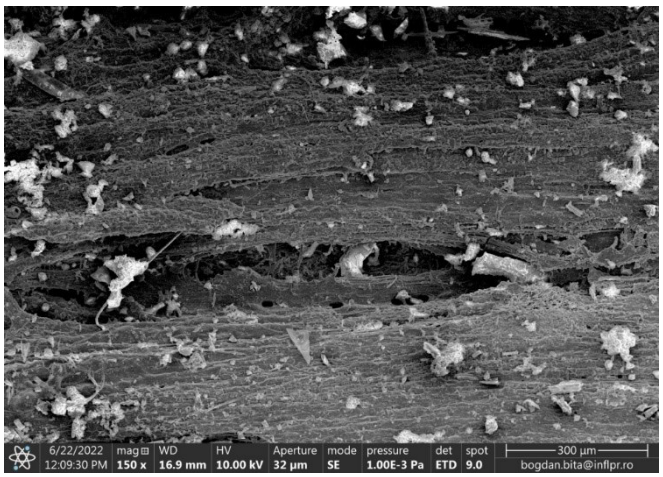

Fig. 61. Sample M11 with carbonized elements. SEM image.

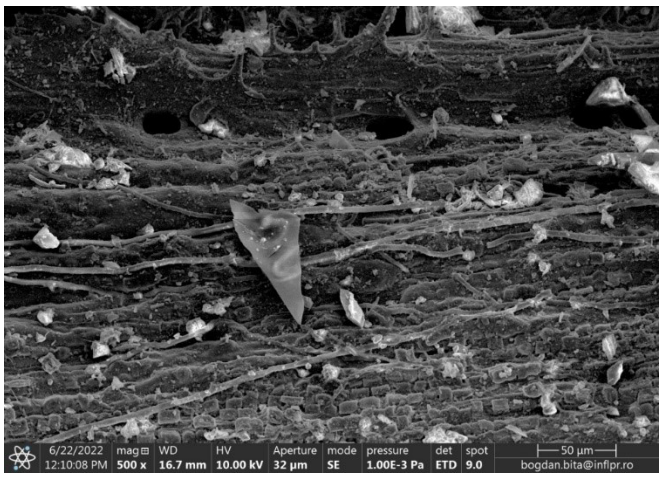

Fig. 62. Sample M11 with carbonized elements. SEM image.etail.

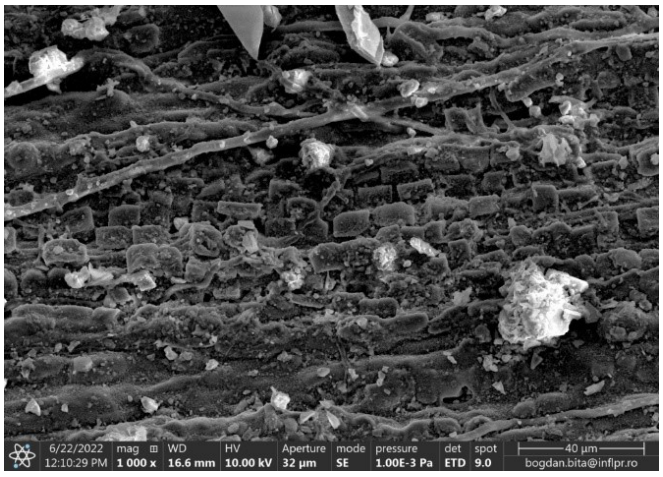

Fig. 63. Sample M11 with carbonized elements. SEM image.

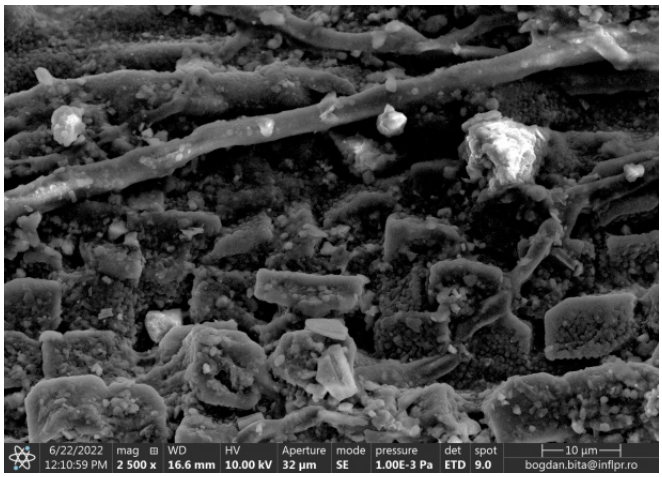

Fig. 64. Sample M11 with carbonized elements. SEM image. Detail.

discipline involve the application of archaeological methods to forensic activity in investigation of a crime scene in order to identify evidence and reconstruct crime scene to solve crimes scene details and combines knowledge of osteology, forensic medicine, forensic anthropology with archaeological techniques, physical and chemical laboratory methods to contribute to a better understanding of archaeology data. It is a team work both in forensic anthropology and in forensic archaeology, bringing together archaeologists, physicists, forensic doctors, anthropologists, biologists, historians, linguists, etc. Recovering buried remains, identification, mass grave or individual bury, primary or secondary burial site, violent or nonviolent death, time since death or post-mortem interval, taphonomy details, etc. are so many

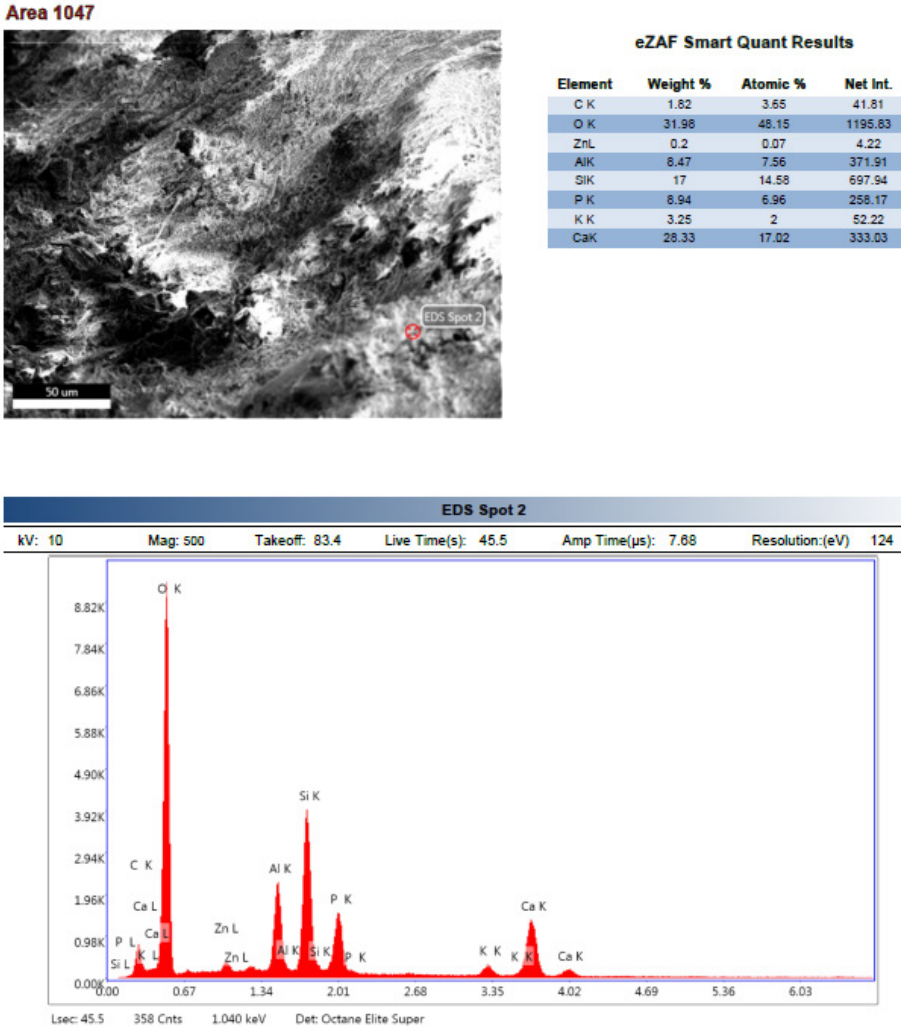

Fig. 65. The elemental structure of two drops on a bone fragment. In drop 2 there are elements of Zinc, Aluminium, Potassium, Calcium. The analysis was performed with EDS.

important clues waiting to discover and to provide solid explanations. In our case, all bones prove to be human and old enough to belong to the Geto-Dacian world. Bone markers and Micro-CT scanning support human origin however on bone specimens studied no traumatic lesions or inflicted trauma was not yet recorded.

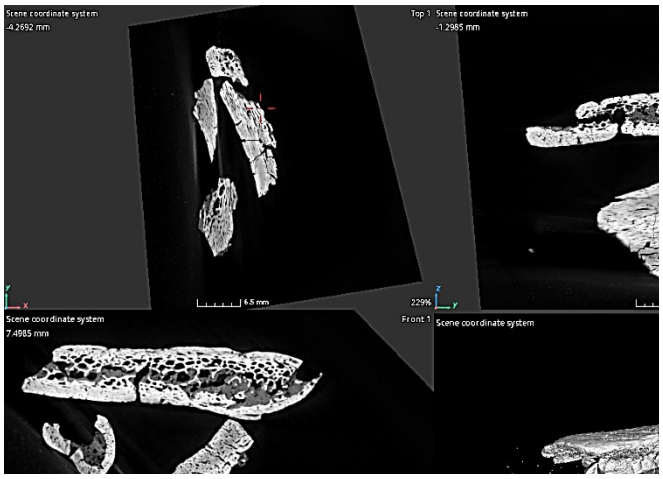

Fig. 66. Sample M10 Ocnița with obvious human-specific diaphyseal trabeculae appearance.

V. X-RAY FLUORESCENCE SPECTROMETRY (EDXRF), METALLOGRAPHIC ANALYSES SPECIFIC TO MATERIALS ENGINEERING

On the occasion of an extensive research on the corrosion of some pieces of military equipment, but also of other objects, made of iron, they were subjected to characterization with the help of X-ray Fluorescence Spectrometry (EDXRF).[45] Their qualitative results revealed the existence of Ca and P alongside other chemical elements.

As an example, we can recall the case of an arrowhead discovered in M12/2017. The qualitative EDXRF analysis performed on the corrosion layer covering the arrowhead revealed the presence of the following elements: Al, Si, P, S, Cl, K, Ca, La, Cr, Mn, Fe and Cu (Fig. 72).

The quantitative EDXRF analysis reveals, as is natural, Fe as the majority element, with a weight of 52.26%, while all the other elements provided in the spectrum in Fig. 72 are minority elements, including Ca, with a weight of < 0.030%. If the other minor elements originate from the soil, in the case of Ca, it was incorporated together with the corrosion products. It most likely comes from the fairly numerous bones in the tomb where the arrowhead was discovered.

Unfortunately, in general, when restoring pieces from cremation tombs, the laboratory removes the layer

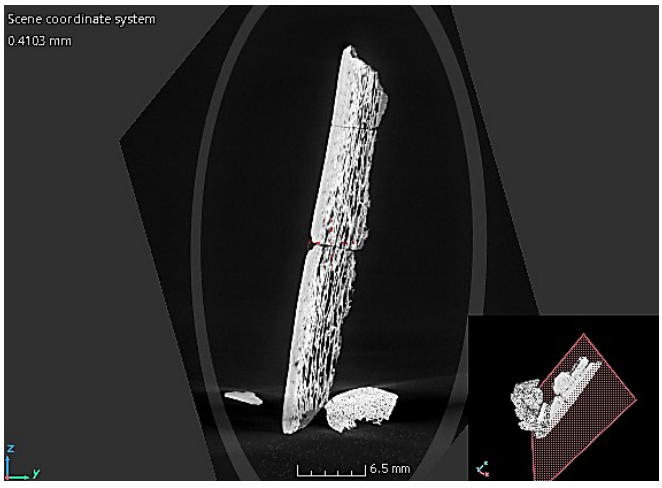

Fig. 67. Sample M10 Ocnița with obvious human-specific diaphyseal trabeculae appearance.

[45] UDRESCU *et. alii* 2021, 1-6.

Fig. 68. Marrow in increased quantity in a human being (according to James T. Watson, John McClelland. Distinguishing Human from Non-Human Animal Bone. The Univ. of Arizona, Arizona State Museum, 2018, https://statemuseum.arizona.edu/sites/default/files/Distinguishing%20Human%20From%20Animal%20Bone%20%28Watson%20and%20McClelland%202018%29.pdf).

of soil, respectively corrosion products, in order to reach the healthy part of the piece, but without paying attention to the material being removed. In the present case, this is a mistake because not only the object subject under restoration, but also the layer removed can provide extremely valuable information. In this case, the thermally cremated bones may no longer be visible, but indications that they existed can be found in the layer of corrosion products, soil and other elements around the metal piece.

Another more eloquent example regarding Ca migration from bones was identified during the EDXRF characterization (Fig. 73) of a sword blade fragment, respectively the handle of the weapon discovered in M15/2017.

Very interesting is the fact that, following the qualitative EDXRF analysis, respectively some detailed research on this weapon,[46] the existence of Ca was observed only in the hilt of the sword, not in the blade. In general, any element in the analysed pieces can come either from the ore or from the technological process from obtaining the iron to the making of the respective object by the forger, or from the soil or the environment in which the piece was deposited or abandoned. Or, in the present case, the fact that only the handle contains Ca removes any presumption that this element comes from the metallurgical or technological process in the workshop. It should be noted that, indeed, at the time of discovery, the handle was surrounded by a considerable number of calcined bones, this being the only plausible hypothesis in the present case regarding the existence of Ca.

As a conclusion, if we were to talk in particular about the iron objects discovered in this context, considering that the principles of research provide that a maximum of information must be obtained, it must be emphasized once again that the analyses must also be carried out on the environment around the inventory object, respectively the corrosion layer, the soil which most often incorporates the object, but also the soil within the respective archaeological complex. As we have shown, in the case of heavy cremation,

[46] UDRESCU *et alii* 2022, 483-496.

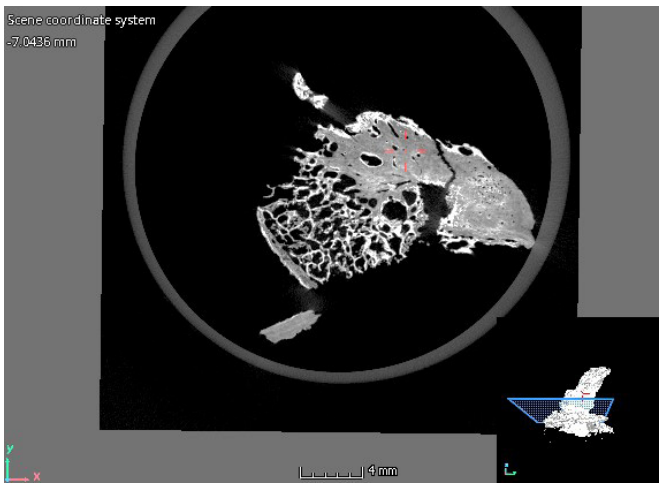

Fig. 69. Sample M10 Ocnița - cancellous bone in lateral section with osteons in specific human arrangement.

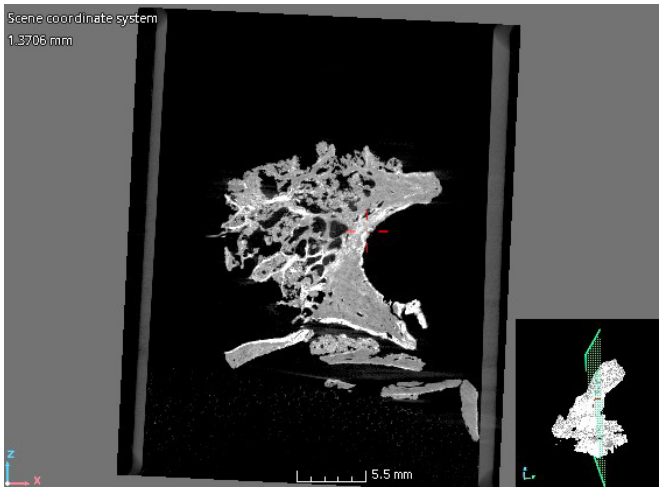

Fig. 70. Sample M10 Ocnița cancellous bone in lateral section with osteons in specific human arrangement.

Fig. 71. The distal portion of a pig's long bones (bottom) compared to human ones; how the trabecular structure and osteon arrangement are organized (according to James T. Watson, John McClelland. Distinguishing Human from Non-Human Animal Bone. The Univ. of Arizona, Arizona State Museum, 2018, https://statemuseum.arizona.edu/sites/default/files/Distinguishing%20Human%20From%20Animal%20Bone%20%28Watson%20and%20McClelland%202018%29.pdf).

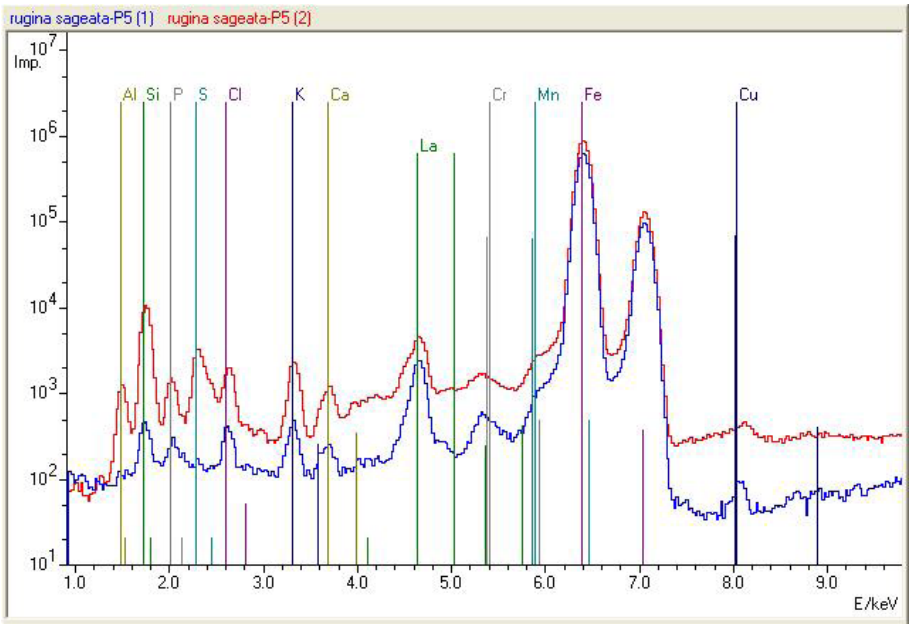

Fig. 72. Overlay of the EDXRF spectra obtained on the corrosion layer covering the arrow (according to Udrescu et alii 2021, 5).

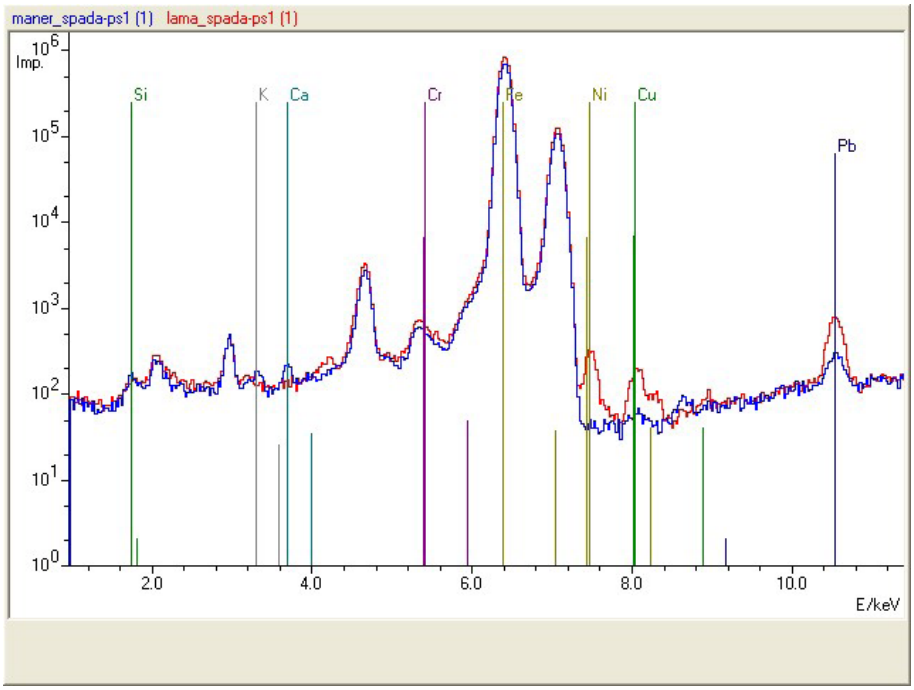

Fig. 73. Overlay of EDXRF spectra taken on the sword blade and hilt (according to Udrescu et alii 2022, 489).

traces of bones, even if they are no longer visible, can be identified by modern methods of investigation.

THE BURIDAVA NECROPOLIS - A NEW PERSPECTIVE ON DEATH AT THE GETO-DACIANS

The bones analysed are of human nature, a fact that is supported by their morphology, as well as by the serological and physical examinations that were carried out. There are a few exceptions where, due to the extremely small dimensions, further clarifications could not be made.

The analyses focused on 1457 cremated fragments, and various component parts of the bones of the human skeleton were identified. A special mention related to the remains identified should be made in connection with the seven tombs where skull fragments were found (M2, M3, M4, M6, M10, M34, M38), as well as with the two where one can state without other types of analysis that we are dealing with a child (M1) and a sub-adult (M6). To these are added bone fragments from the jaw, femur, coxal bone, fibula, humerus, radius, etc. From this perspective we are going to publish separately the context and implications of the inventory for these tombs.

The EXDRF and EDS analyses revealed the existence of some elements, both on the cinerary fragments and on the objects deposited in pits or cists, of Ca, Zn, Al, K, Fe, Cu, Ag (...). These were found on the bones because of the high temperature to which they were subjected during cremation. The cremated bones in contact with the metal released Ca, which is found in the EXDRF-type metallographic analyses.

In the inventory of the tombs we frequently find melted silver (Fig. 13/Fig. 29), coming from various pieces of clothing and jewellery, which accompanied the deceased on the funeral pyre. The melting temperature of silver is between 700°C and 1150°C, as it results from the studies and research carried out.[47]

The high combustion temperature also led to the deformation of some glass beads (Fig. 14/Fig. 35). A physico-chemical analysis carried out on such beads showed that the melting/shaping temperature is between 700°C - 1400°C, but it depends on the physico-chemical characteristics of the glass composition, as well as on the burning mode.[48]

Without performing now an analysis of the cremation temperature reached in the case of the cinerary remains analysed, we can note that a corroboration of the above

[47] CRADDOCK 2014, 1085-1092. FELL 1990, 37, 44. Typically, a temperature in the interval of 600-700°C for several minutes is required to anneal bronze.
[48] AGUA *et alii* 2017, 119-130.

data indicates values between 500°C and 1400°C, the result being similar to Claudia Radu's 2016 analysis which sustains a temperature comprised between 500 and 1200 degrees Celsius.[49]

We will return to the issues raised by the combustion temperature, the method of cremation, the objects placed on the pyre, the physico-chemical analysis of the earth, coal, ceramic fragments, adobe and hearth pieces in a separate study.

The archaeological and historical research of different eras allows us today to admit that the funerary phenomenon cannot be framed within the limits known to contemporary societies. The conceptualization of death depends on the daily life of man, on the conceptions of the society in which he was formed and lived, this is difficult *to read* and *interpret* even when there are written sources. The major advantage of contemporary research is offered by multidisciplinarity, which is what we tried to do in this study.

It is certain that the lack of human remains or their deposition in a reduced quantity does not imply the non-existence of the tombs, but rather, as H. Fokkens[50] and Jesús F. Torres-Martínez[51] remarked, a broader understanding of the funerary phenomenon in the Second Iron Age.

The tombs of this stage can be considered genuine ancestral monuments, *places of remembrance*, where it is not necessary to bury the whole body.[52]

There is already a similar perspective related to *invisible tombs* and the acceptance of the idea that it is not mandatory to have osteological remains (cinerary or not) in order to have tombs and necropolises in certain historical eras.[53] The presence of pits and pit fields also in the south-Danube area, corresponding to the south-Thracian area, is known,[54] and from a chronological perspective they are related to what we also have in the North-Danubian space.

In the rest of European spatiality we also find similar situations, the San Valero discoveries[55] are strikingly similar to those from Ocnița and from the Thraco-Dacian spatiality.[56]

Returning to the premises of the first part of our study, we believe that we are dealing with a funerary behaviour that was specific to the era, which is only in dissonance with our contemporary imaginary.

In other words, *pit fields and cists*[57] must be interpreted in a purely funerary context, at least as far as the Ocnița case is concerned.

The funerary manifestations assumed, as stated before, the existence of banquets, the remains of which were deposited alongside the offerings in such contexts. The pits and pit fields in this European area and beyond have a funerary role, ritual deposition being part of the phenomenon.[58] The persistence of several methods related to the deposition or not of cinerary remains is absolutely normal.

Pits and cists/mounds or depositions, considered to be ritual, reflect a different way of perceiving death within Second Iron Age societies, with clear reminiscences of earlier ages. The cremation of the deceased, the carrying out of the rites of passage and the deposition of a material part of this ritual (pars pro toto), with or without the presence of human remains, ensure for the society of the living the existence of the grave as well.[59]

This type of interpretation largely corresponds to the more recent opinions expressed by J. Torres-Martínez[60] (Isabelle Le Goff, Cadavre et cremation, Techniques & Culture Revue semestrielle d'anthropologie des techniques, 2013, p. 92-109). Tombs and necropolises don't disappear, we just have to redefine the way in which they are perceived: Estas necrópolis funcionan como "espacios rituales de memoria a los difuntos con ausencia de restos humanos".[61]

The Buridava necropolis is the first example, from the North Thracian area, where pits, cists (mounds) with or without stone structures are found, containing deposits that indicate a complex approach to the funerary phenomenon. The invisibility of graves considered a broad and normal phenomenon due to the lack of human remains, at this chronological stage, is only a matter of understanding and interpretation – *Por lo tanto, no podemos hablar de "invisibilización" ya que la memoria del difunto se "visibiliza" a través del acto de cremación y de la necrópolis misma, de sus estructuras y rituales funerarios, lo que incluye las evidencias de culto post mortem a los antepasados*.[62]

The Ocnița necropolis is located in a dominant area, right near the salt mines and probably the main access roads. In addition, the richness of the discoveries, their uniqueness proves to us that the depositions are related to both prestige and the connection of the deceased with the object in question. In the same way, the persistence of a common inventory: coal and ashes, pieces of hearth, adobe or ceramic vessels implicitly belongs to the cult of divinities of the household, hearth, fire, etc.

[49] BĂRBULESCU *et alii* 2017, 101-102.
[50] FOKKENS 2012, 553-572. Some genuine cenotaphs, graves without human remains, were also identified in the Celtic area, in Belgrade-Karaburma according to BABEȘ 1998, 10.
[51] TORRES – MARTÍNEZ *et alii* 2021, 411.
[52] TORRES – MARTÍNEZ *et alii* 2021, 411; ARNOLD 2010, 147-173; please see a similar approach in RUSTOIU 2021, 69-83.
[53] TORRES – MARTÍNEZ *et alii* 2021, 399–413; TORRES – MARTÍNEZ *et alii* 2017, 105-128.
[54] TONKOVA 1997, 592-610.
[55] TORRES – MARTÍNEZ *et alii* 2021, 400: *At a depth of 1.5 m, he uncovered what he described as "six or eight" small- to medium-sized tumuli, several of them already disturbed by Moro's previous digging. The "tumuli" described by San Valero were simple stone mounds that formed a tumular-shaped structure. One of them was found intact, and San Valero described it as composed of several stones laid roughly around the burial pit and covered in its entirety by a larger stone slab. San Valero emphasized that the intact structure contained "no significant finds" and that he only found metal grave goods in two of the other tumuli. In both cases, the graves contained a Monte Bernorio-type dagger, spearheads, and sword belts. No ceramic remains and only a few splinters of cremated bone were recorded. However, a large number of highly fragmented pieces of burnt metal were found around the funerary structures.*
[56] Those from Pietroasele Gruiu Dării are strikingly similar to those from Monte Bernorio, TORRES – MARTÍNEZ *et alii* 2021, 402.
[57] Which we find not only at Ocnița, but also at Gruiul Dării.
[58] ROTROFF 1997, 212-213.
[59] BĂRBULESCU 2020, 128.
[60] TORRES – MARTÍNEZ *et alii* 2021, 88.
[61] TORRES – MARTÍNEZ *et alii* 2021, 88.
[62] TORRES – MARTÍNEZ *et alii* 2021, 87.

Starting from the analyses that were presented, we can state that the Buridava site allows us, today, to identify a necropolis belonging to the classical era of the Dacian civilization, and future serological, tomographic and forensic analyses with stable isotopes will reveal to us a completely different reality of that era for other sites as well. Based on the inventory discovered, we can state that the necropolis belongs to the 1st century BC, but we do not exclude a broader dating between the last quarter of the 1st century BC and beginning of the 2nd century BC.

The Geto-Dacian world as a whole is really considered *transient*, and the mapping of the ethnic structures that coexist in this geographical space, as well as the influence of the Greco-Roman civilization, is confirmed by the Buridava discoveries.

GRADITUDE

Our thanks go to the entire team who participated in the 2016-2021 archaeological research (Sorin Cociș. Alexandru Nălbitoru, Laurențiu Mecu, Andrei Robert, Ioan Andi Pițigoi, Corneliu Beldiman, Ion Tuțulescu, Aurora Pețan and to all students and volunteers).

For the translation of the materials, we would like to thank Assoc. Prof. Valentina Stinga, PhD.

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