

A salt production site at Gherla–Valea Sărată (Transylvania). Preliminary report

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Abstract. *The article presents the preliminary results of the archaeological and ethnographic explorations of the site with remains of salt exploitation from Gherla–Valea Sărată. The site is located at ca. 1800 m south-west of the city of Gherla, Romania, and covers the valley of a salt creek measuring ca. 3000 m (N-S) × 550 m (E-W). In the northern sector of the site, around a salt water basin that was recently developed, on a surface measuring ca. 70 m (N-S) × 60 m (E-W), there were identified and studied various archaeological remains: traces from structures of wooden poles and wattle, ceramic fragments and a stone axe. They date from the Neolithic or the Eneolithic, the early and middle Bronze Age, and the modern period. The discovered remains are, by most probabilities, related to the exploitation of the salt water. In the northern and central part of the site there are numerous cavities and earth mounds, as well as other soil irregularities of anthropic origin, for which it was not possible to advance a dating. The northern part of the site yielded several structures from the recent period: two roofed salt water wells with timber shafts, both recently re-developed using fresh and reclaimed timber. Across the entire site there are several salt springs with basic furnishings. In the northern and central part of the site there are several “scalde” — pools with basic furnishings used for treatments with salt water and mud, without any supervision from healthcare personnel. Near the largest of these “scalde”, there have been discovered fragments a wayside crucifix, specific to the area. It was most likely dedicated to the curative properties of the “salt place”. According to the interviewed denizens, the saline manifestations from Valea Sărată are exploited to a large extent in the traditional economy: for cooking and preserving human food and animal fodder, and in folk medicine. Also relevant is that Valea Sărată is one of the preferred grazing locations for sheep according to the local shepherds, who mentioned that animals particularly like the grass growing in saline soils. The brine from Valea Sărată is considered by the locals and inhabitants of the surrounding villages as “the best of the area”, so that people from multiple settlements around a 10 km radius come regularly to Valea Sărată for collecting brine and for bathing. The site has a high potential for more in-depth interdisciplinary research.*

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Rezumat. *Articolul prezintă rezultatele preliminare ale explorărilor arheologice și etnografice ale sitului cu urme de exploatare a sării de la Gherla-Valea Sărată. Situl se află la cca. 1800 m sud de marginea de sud-vest a orașului Gherla și cuprinde valea unui pârâu sărat care măsoară cca. 3000 m (N-S) × 550 m (E-V). În sectorul nordic al sitului, în jurul unui bazin de apă sărată amenajat recent, pe o suprafața de ca. 70 m (N-S) × 60 m (E-V), au fost identificate și studiate variate vestigii arheologice: urme ale unor structuri din pari de lemn și nuiile împletite, fragmente ceramice și un topor de piatră. Acestea datează din neolitic sau eneolitic, perioadele timpurie și mijlocie ale epocii bronzului, precum și din perioada modernă. Vestigiile descoperite, după toate probabilitățile, sunt în mod nemijlocit legate de exploatarea apei sărate. În partea nordică și centrală a sitului se observă numeroase cavități și movile de pământ, precum și alte denivelări de pământ de origine antropică. Acestea încă nu au putut fi date. În partea nordică a sitului se află câteva structuri din perioada recentă: două fântâni de apă sărată cu puțurile căpușite de lemn și acoperite, ambele fiind re-amenajate recent din material lemnos nou și cel preluat de la structuri mai vechi. Pe întreaga întindere a sitului au fost observate mai multe izvoare de slatină amenajate sumar. În partea nordică și centrală a sitului au fost realizate câteva „scalde” – bazine cu apă sărată amenajate sumar și folosite pentru tratamente cu apă sărată și nămol, nesupravegheate de cadre medicale. În apropierea celei mai mari dintre astfel de „scalde” au fost descoperite fragmente de la o troiță (răstignire) specifică zonei. Aceasta, după toate probabilitățile, a fost dedicată proprietăților curative ale „sărăturii”. Conform interviurilor realizate cu localnicii, manifestările saline din Valea Sărată sunt pe larg exploatare în cadrul economiei tradiționale: în gătitul și conservarea produselor alimentare, aditivarea hranei animalelor și medicina populară. Nu este lipsit de interes și faptul că Valea Sărată este unul dintre locurile preferate pentru pășunatul oilor, păstorii spunând că oilor le place în mod deosebit iarba care crește în soluri sărate. Apa sărată de aici este considerată de localnicii și locuitorii satelor din jur „cea mai bună din zonă”, astfel încât oamenii din mai multe localități de pe o rază de cca. 10 km, vin periodic aici după slatină și la băi. Situl prezintă un potențial ridicat pentru cercetări interdisciplinare mai aprofundate.*

Keywords: Gherla-Valea Sărata, salt spring, salt mud, ethnomedicine.

1. Introduction

Up to the end of the 20th century, the knowledge on ancient, recent and present-day non-industrial salt exploitation in Transylvania⁵ was based just on a few random archaeological and epigraphical finds⁶, some written records, and a couple of sporadic notes on “folk” salt production and usage. Systematic archaeological and ethnographic field explorations focused on salt exploitation in Transylvania have started just at the very beginning of the 2000s⁷. Until 2016, the explorations were carried out just in the East-Transylvanian Subcarpathians

⁵ We use the term of Transylvania to cover just the territory of the Transylvanian Basin, without Maramureș, Crișana and Banat.

⁶ RUSSU 1966; MAXIM 1971; WOLLMANN, CIUGUDEAN 2005; PISO 2007; MIHAILESCU-BÎRLIBA 2018.

⁷ HARDING & KAVRUK 2013; CHIRICESCU 2013; CAVRUC *et al.*, 2014; 2015.

and in the Someșul Mare river Basin. In contrast, the western part of Transylvania, despite the abundance of easily accessible salt deposits in the area, remained much less studied until the most recent years. The archaeological and ethnographic field explorations on salt exploitation started in this part of Transylvania just in 2016. The research witnessed significant progress from a specialised project on the ethnoarchaeology of salt⁸. Since then, a number of salt production sites have been explored in the Someșul Mic river Basin and in the Turda–Alba Iulia Corridor. The most consistent evidence of ancient, recent and nowadays non-industrial salt exploitation have been explored at Ocnișoara (Lopadea Nouă, Alba County), Pata, Dezmir, Sic, Cojocna, Gădălin, Corpadea, Sânmarghita, Gherla–Valea Sărata, and Bunești (Cluj County).

This article aims to present the preliminary report of the archaeological and ethnographic explorations carried out in 2019 at the Gherla–Valea Sărata site. Pursuant to the methodology first introduced in a pioneering article⁹, the site was first investigated on the ground by M. Alexianu, who discovered ceramic remains around the present-day pond, and then by V. Kavruk, who collected archaeological materials (ceramic fragments) and revisited the site for supplemental documentation.

2. The geographical position, geology and topography of the site

The site is located on the western part of the Transylvanian Plateau, in the Someșul Mic river basin, in a hilly area, to the south of Gherla, in the area rich in brine, salt soil and halophytes (Figure 1). It covers the Valea Sărata (Salt Valley) around the brine stream flowing northwards into the *Valea Lungu* (Long Valley) valley. The *Valea Lungu* is fed also by *Lacul Știucii* (Lake of the pike). Further on, this stream flows into the Fizeș River and, from there on, into the Someșul Mic River. All the area occupied by Valea Sărata belongs to the territory of the municipality of Fizeșul Gherlii, being positioned at equal distance between the villages of Bonț (to the east) and Hășdate (to the west).

The geological evolution of the area is governed by the sedimentation processes known for most of the Depression of Transylvania¹⁰, having their beginning as early as the Mesozoic Era (approx. 200 million years ago). These first deposits were in the meantime eroded along with the lifting movements of the basin bottom so that the oldest deposits identified in the Transylvanian Depression belong to the Upper Cretaceous sedimentation cycle (approx. 100 million years ago).

⁸ KAVRUK & CURCĂ 2018.

⁹ ALEXIANU *et al.*, 1992.

¹⁰ KRÉZSEK & BALLY 2006; CIUPAGEA *et al.* 1970; VANCEA 1960.

In the more recent sedimentation sequences, during the Middle Miocene¹¹, the salt and evaporite deposits were laid over and partially intertwined in the previous layer, of eruptive origin, known as Dej Tuffs (approx. 15 million years ago¹²). Salt deposits are, in turn, covered by more recent sedimentary formations, formed, lithologically, from rhythmic alternations and stratigraphic successions of sandstone, marlin, clay and sands. Finally, Quaternary deposits placed on older strata built the basis for the recent geomorphological sculptures.

The thick layer of salt occurs at the surface in many parts of the Transylvanian Depression in the form of salt domes. This is also the case in the study area where such a salt dome, known as “the Hășdate salt massif”, intrudes vertically into surrounding sedimentary rock strata (Figure 2)¹³. The presence near the surface of the salt massive led to the appearance of several salt springs along the valley. The site is located on an S–N axis of tectonic origin¹⁴.

The topography of the site, beyond the available cartographic materials, was established through a low altitude aerial survey session. Given the linear nature of the site, a corridor type approach was used, based on a set of mosaics of aerial perpendicular and oblique images taken from low and medium altitude¹⁵. All of these images were taken by a 20 Mp photo camera carried by a DJI Phantom 4+ V.2.0. For the general area survey, an aerial mission was programmed in a zig-zag pattern with overlapping flight tracks at 110 m altitude. After the photogrammetric processing of more of 800 perpendicular and oblique aerial images extremely highly detailed orthophotos (Figure 4/a.) and Digital Terrain Models have been calculated (Figure 4/b.). The surveyed area cover an area of 2.5 km (o the N–S axis) by 0.55 Km (on the E–W axis).

For some spot areas, bearing traces of past human activities, mosaics of low altitude (5 + 15 m) perpendicular and oblique images has been recorded using free style aerial missions in order to calculate even more detailed orthophotos (better than 0.1 mm / pixel) and digital models. Using all the acquired aerial data but also the surface archaeological survey, an updated Topographic plan of the site was generated (Figure 5).

The segment on which saline manifestations occur in *Valea Sărata* has a length of approx. 3 km while the width of the bottom of valley varies between 70 and 200 m. In this segment the valley path is linear and oriented approximately S–N (10 degrees oblique to the East). The water flowing to the north is supplied not only by salt springs (mainly from the eastern slope), but also by freshwater springs. Such a freshwater spring that comes from the west,

¹¹ MĂRUNȚEANU *et al.*, 1999.

¹² More detailed analyses on the age of Dej Tuffs and salt sedimentation sequences see SZAKÁCS *et al.*, 2012.

¹³ BOMBIȚĂ *et al.*, 1967.

¹⁴ Corpadea, Jucu, Gădălin, Sic and Bunești are other salt exploitation sites aligned on this axis (see Figure 1 – right).

¹⁵ ȘTEFAN & ȘTEFAN 2016.

beneath *Dealul Comorii* (the Treasure Hill), is captured in a concrete well in the immediate vicinity of the brine well (Figure 5/3).

3. The physical-chemical characteristics of the salt water from well no. 1

The saline water sample from the captured spring from Gherla-Valea Sărată was analysed in order to establish the density, salt concentration and elemental composition. The density, established by applying the pycnometer method, was 1.1469 g/cm³. The salt concentration, established by evaporating a volume of brine in a porcelain crucible, through the gravimetric method, was 19.1340%. The elemental composition was determined using a scanning electron microscope (SEM) model Vega II LSH, coupled to an EDX detector type Quantax QX2. It was obtained on a salt microstructure from the SEM image (Figure 6), on the basis of the EDX spectrum (Figure 7), as listed in Table 1. The elements identified in the salt were Na and Cl in high concentration, and Ca and S under 2% concentration.

4. The previously known data

The site has been known for a long time. In the First Military Survey of the Austrian Empire¹⁶, the area was labelled as *Valje Sarate*, while the brine extraction source was labelled as *Saltz Brun* (Figure 3). In the archaeological literature it has been noticed as early as at the beginning of 20th century¹⁷. Under its various names (*Gherla-Sărătura*, *Gherla-Valea Sărata*, *Gherla-Fântâna Sărată*) it has been mentioned in some recently published archaeological works¹⁸. All of them notice the Coțofeni culture pottery in the site. In addition, the National Archaeological Repertoire (RAN) mentions “the Neolithic settlement of the Iclod culture”¹⁹. Unfortunately, the papers lack the description and pictures of the uncovered evidence. As we can know, this site has never been mentioned in the papers dealing with prehistoric salt production.

5. The recent explorations in the site

In Mai, June, and July of 2019, the authors have paid several visits to the site and explored some of its aspects. The exploration focused on some environmental (Dan Ștefan and Valerii Kavruk), archaeological (Valerii Kavruk and Dan Ștefan) and ethnographic (Marius Alexianu

¹⁶ Josephinische Landesaufnahme, 1764–1768.

¹⁷ OROSZ 1901.

¹⁸ REPERTORIU CLUJ, 215 (9); CIUGUDEAN 2000; LISTA CLUJ (Cod LMI: CJ-I-s-B-07061; GPS coordinates: 47°00'19"N 23°54'20"E); RAN).

¹⁹ RAN.

and Valerii Kavruk) features of the site, as well as on the oral witnesses of locals regarding recent and nowadays salt exploitation in the area (Marius Alexianu).

6. The material evidence of human activity in the site

The site contains various material evidence of human activity, from prehistory to the most recent period. The earliest of it dates to the Neolithic or Eneolithic period, to the Early and Middle Bronze Ages, as well as to the modern period (18th–19th centuries AD), and is visible only in the northern part of the site, more precisely around the brine pool, recently rebuilt. In addition, the recent and some undated evidence of human activity are visible throughout the entire valley.

6.1. Neo-Eneolithic (?) evidence uncovered in the site

The prehistoric evidence was uncovered in the northern part of the site, on both sides of the brine stream, around the recently built brine pool, close to salt springs and wells. The most archaic looking evidence includes a fragment of a polished stone plate axe with a hafting hole (Figure 6/1), some potsherds with crushed pottery and chaff or dung in the fabric (Figure 6/3–4). The number of these finds is too little to suggest their more or less precise dating and cultural attribution. The axe shows similarities with many axes found in Eneolithic contexts in Transylvania. Thus, for instance, some more or less similar axes are known in the Ariuşd cultural group, for example at Comolău²⁰ and in Covasna County²¹. The pottery shows some general elements specific to Neolithic and Eneolithic periods (for example, the presence of chaff in the fabric), but it does not show any features specific to a certain Neolithic or Eneolithic culture. In the present stage of research, it is impossible to say whether are these the remains of salt production activity, or of a votive deposition of goods related to salt springs. By the bye, the Neolithic or Eneolithic stone axes have been found close to brine spring at Mărtiniş in the Homorod Depression²².

6.2. The Early Bronze Age (EBA) evidence

The Early Bronze Age (EBA) evidence includes some potsherds (Figure 7) that show the characteristics common to most of the EBA cultural groups, without any specific culturally diagnostic features: just fragments of coarse fabric pots, sometimes with brushed surface. Taking into account the geographic area and the aspect of this pottery, some similarities with

²⁰ SZTÁNC SUJ 2015, 376, fig. pl. XIX: 10.

²¹ SZTÁNC SUJ 2015, 378, pl. XXI: 2.

²² CAVRUC & CHIRICHESCU 2006, 40.

the Coțofeni²³ (Later Eneolithic / EBA I), Copăceni²⁴ (EBA II) and Iernut pottery²⁵ (EBA III) should be considered in view of its further cultural attribution. For more precise attribution further investigations are needed. So far, in Transylvania, the EBA evidence for salt production was found just at Băile Figa (the Iernut stile pottery²⁶ and some timber fragments dated to ca. 3300–2800 cal BC²⁷) and at Pata (a worked log dated to ca. 2600–2500 cal BC²⁸).

6.3. *The Middle Bronze Age (MBA) evidence*

The MBA evidence includes the pottery specific to the Wietenberg culture²⁹. This pottery mainly comes from bowls and pots (Figure 8) with wide openings. This suggests the use of the vessels for brine evaporation. No any fragment of Wietenberg fine decorated pottery was found in the site, which does not allow the attribution of the pottery to a certain period of the culture. For now, the lot of the Wietenberg pottery from Gherla–Valea Sărata is the largest one found till now in salt production contexts. Transylvania, except Gherla–Valea Sărata, some single Wietenberg potsherds have been found just at Comănești³⁰ and Băile Figa³¹.

6.4. *The material evidence of modern, recent and present-day period*

6.4.1. *The material evidence of the modern period*

The modern period evidence (18th–19th centuries AD) in the Gherla–Valea Sărata site includes a number of potsherds (Figure 9) found around the brine pool in the northern part of the site. The presence of the modern period pottery is omnipresent in nearly every salt production site in Transylvania we have explored so far. It is a common pottery which does not suggest any clues of how it could be used in salt production.

6.4.2. *The material evidence of recent and present-day period*

The material evidence of recent and present-day period is rich, and it is visible in most of the site's surface. It includes, among many others, the following features:

²³ CIUGUDEAN 2000.

²⁴ ROTEA 2003.

²⁵ CIUGUDEAN 1993.

²⁶ HARDING & KAVRUK 2013.

²⁷ HARDING & KAVRUK 2013.

²⁸ TODA *et al.*, 2019.

²⁹ BOROFFKA 1993.

³⁰ CAVRUC & ȘTEFAN 2014.

³¹ HARDING & KAVRUK 2013.

- Two brine wells built from recent and earlier used timbers, located near the recently rebuilt brine pool (Figure 10).
- A concrete well in the northern part of the site that collects fresh water coming from the neighbouring western hill.
- Several summarily arranged brine springs (Figure 11).
- Three summarily arranged brine pools used for halotherapy (Figure 12).
- Some earth work traces, of which the earth mounds and roundish cavities are most visible (Figure 13).
- The 20th century crucifix specific to the area found in the northern part of the site, in front to the largest brine pool (Figure 14). This probably marked the importance of this salt-rich area for the local community.

6.5. Undated material evidence

Some features, among which the remains of structures made of wooden sticks and wattle (Figure 15) are visible in the northern part of the site, close to the eastern side of the recently rebuilt brine pool, more precisely in the brine stream-bed and on its banks. In the same spot the modern period and prehistoric pottery was found. We took some samples from these structures in view of their radiocarbon dating. So far, no reliable indications regarding their age are available.

7. The oral witnesses for the present-day salt exploitation

According to the methodology employed in the EthnosolRo project, an interview was carried out, concerning this salt resource. We had the chance to identify an elder, whose life had constantly interacted with this resource, on May 9th, 2019. The interviewee was Constantin Cherecheș, 83 y.o., from Gherla, 76 Călărași Str. The main information provided by him is as follows:

- *La sărătură* is the toponym marking the existence of a salt resource. The present-day facilities were made in 2018.
- The inhabitants that collected brine from here came from the towns and villages: Gherla, Nicula, Hășdate, Fizeș, Bonțu, and Săcăleia.
- In order to collect brine, the denizens of Gherla walked carrying 5-6-litres buckets or with a *canta* (a ceramic pot with a capacity of ca. 5 l, with strap handles, which allowed pouring or drinking the liquid inside).
- Transport was ensured by a cart drawn by a horse or a cow, loaded with 1-3 barrels (80-100 l). Each cart was accompanied by 2-3 persons (members of the family or neighbours). The cart could have also been loaded with wooden recipients with a capacity of 30-50 l, without a lid

(Rmn. *ciubăr*, pl. *ciubere*). To prevent the brine from spilling during transportation, these recipients were covered with pieces of cloth.

– Currently, part of the denizens of Gherla bring to the Sărătura a hand cart with a canister of 5, 10 or 15 l. Some reach the site with a taxicab, carrying plastic recipients of various capacities. Travelling from the city itself to the salt place takes, in this way, around 5 minutes.

– Main uses: preserving pork fatback and meat on December 20th (*Ignat* in Romanian, the day when the pig was sacrificed according to the Christian Orthodox tradition); preserving various vegetables (pickles; Rmn. *murături*); sprinkling brine on the corn husks and cobs (and generally all fodder), as to soften them and appeal more to the cattle.

– Observation: rough horsetail grew around the salted pond, which was both savoury and sweet, and much enjoyed by cattle.

– The salt place was an attractor for roe deer, wild boar and rabbits.

– Periods with increased human activity at the salt place are autumn (for preserving vegetables) and winter (for preserving pork fatback and meat).

– Remarks: he remembers that when he was a child, alongside other children of 8, 9, 10 y.o., they went alone to the salt place and brought back brine in *canta* (“Where are you going? I’m going for brine.”). When gathering wild strawberries, they sojourned at the salt pond and bathed for 5–10 minutes, then drying in the sun until evaporation, to repel the flies. Of archaeological interest is the informer’s statement that some of the *canta* pots sometimes broke when they hit the ground while being hauled by the children.

– The Gherla–Valea Sărata site is one of the favourite places for sheep grazing (Figures 16–23). The shepherds say that sheep particularly enjoy grass that grows in salty soils.

8. Some conclusions

The Gherla–Valea Sărata site is a hybrid one. It is rich in environmental, archaeological, ethnographic, and immaterial heritage. The prehistoric evidence uncovered in the site to some extent is unique in Transylvania, since it shows for the first time in Transylvania the Neolithic and/or Eneolithic evidence associated with salt production context. The site provides important potential for further more in-depth interdisciplinary research.

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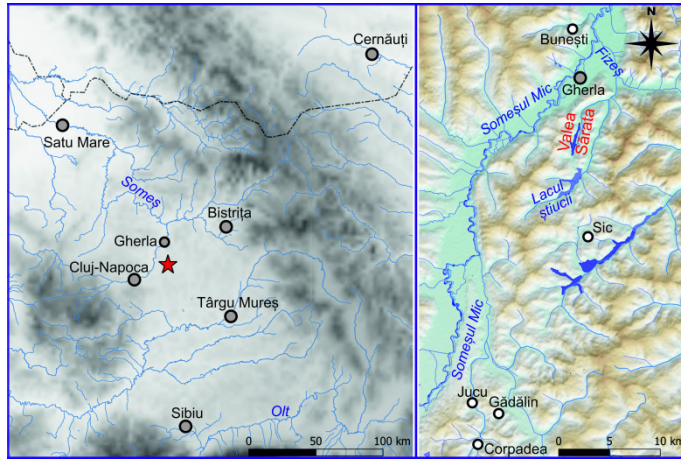


Figure 1. Location maps of Valea Sărata

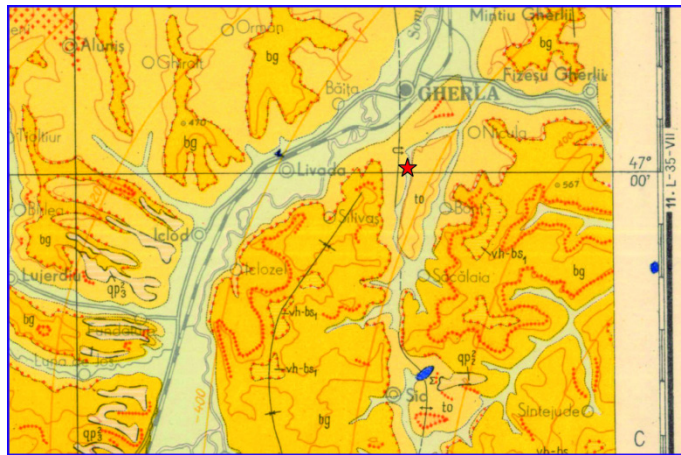


Figure 2. Selection from Geological Map, 1:200 000, on the study area

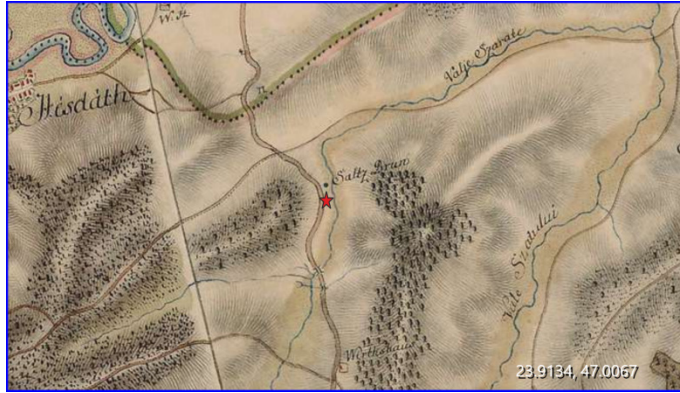


Figure 3. Selection from the First Military survey of the Austrian Empire, on the study area

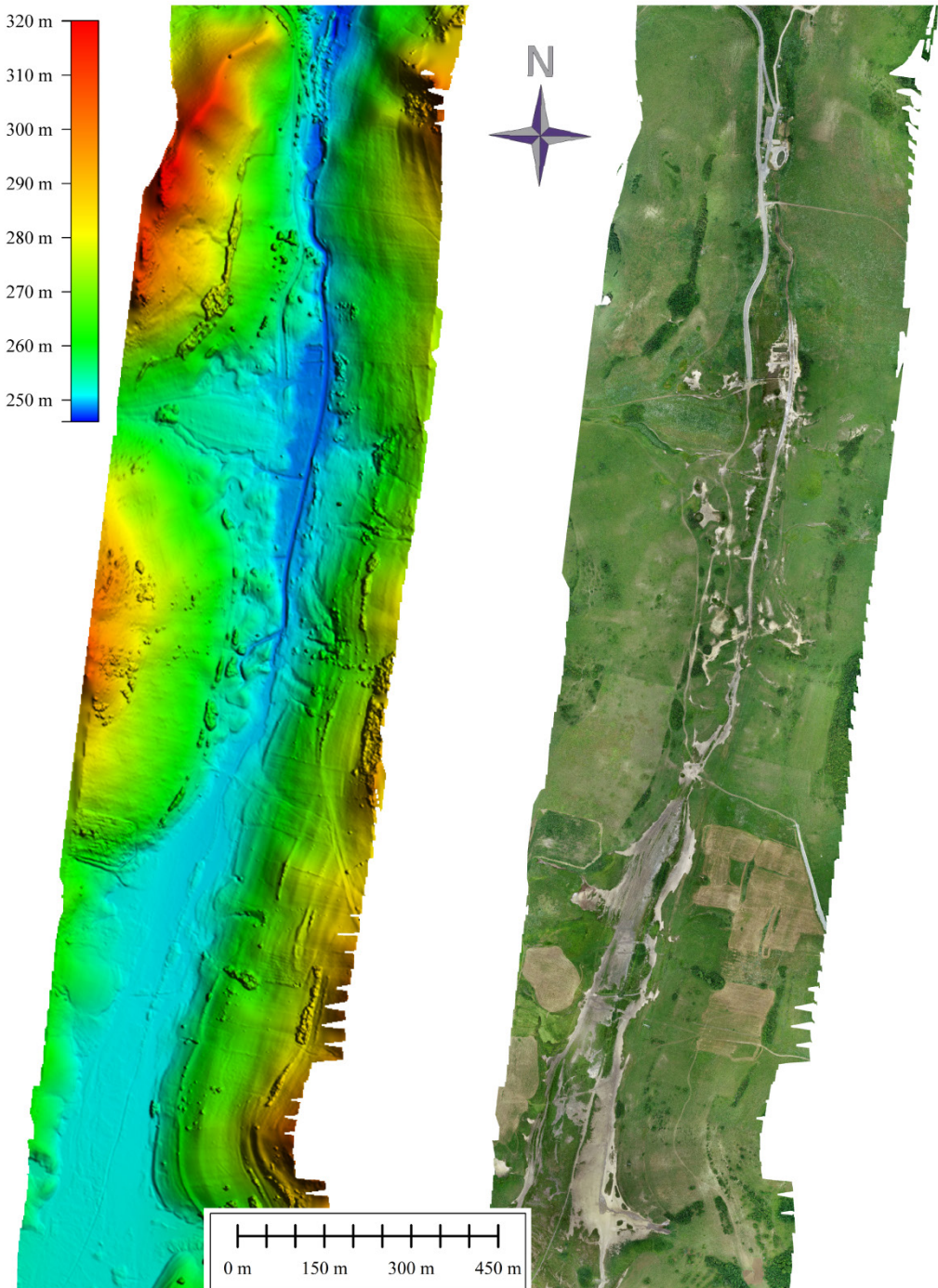


Figure 4. Valea Sărata ortophoto (a) and Digital Elevation Model (b)

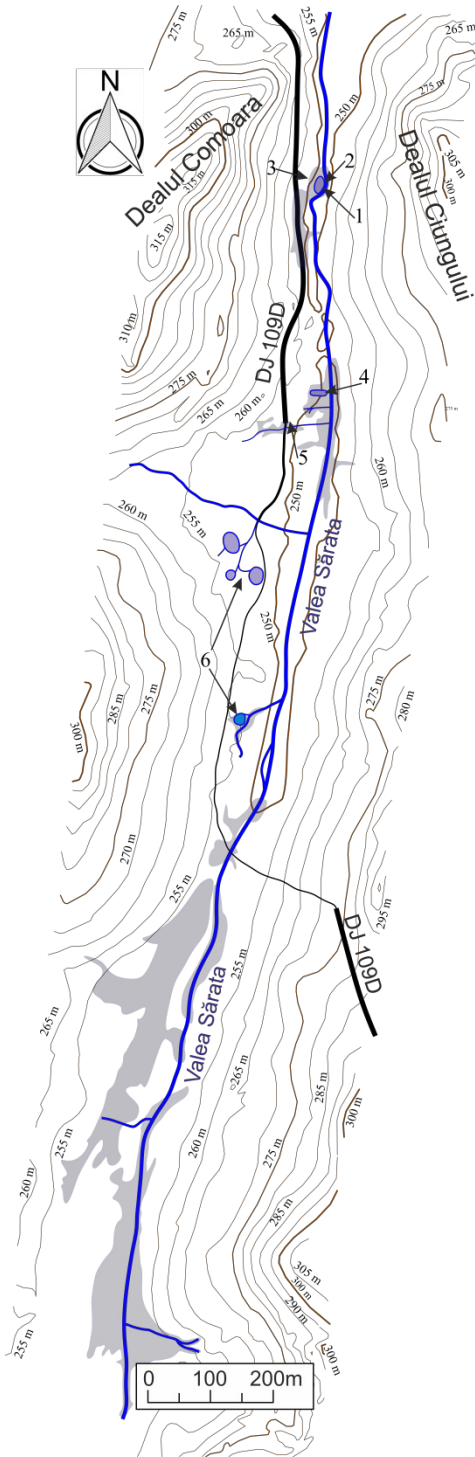


Figure 5. Valea Sărata, topography of the site; 1, 4 – pool; 2, 3 – brine well; 5 – wayside cross; 6 – pits

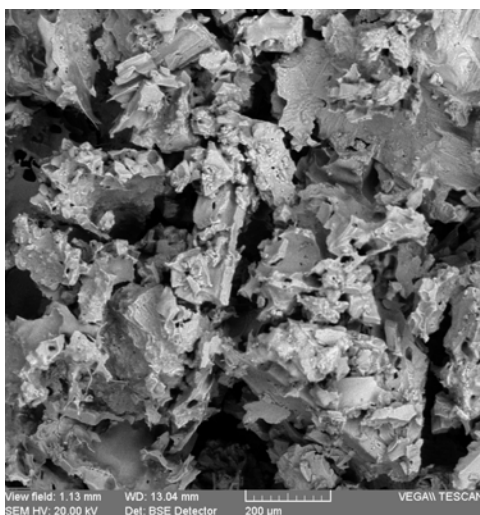


Figure 6. The SEM image of the salt microstructure under analysis (magnification of 200×)

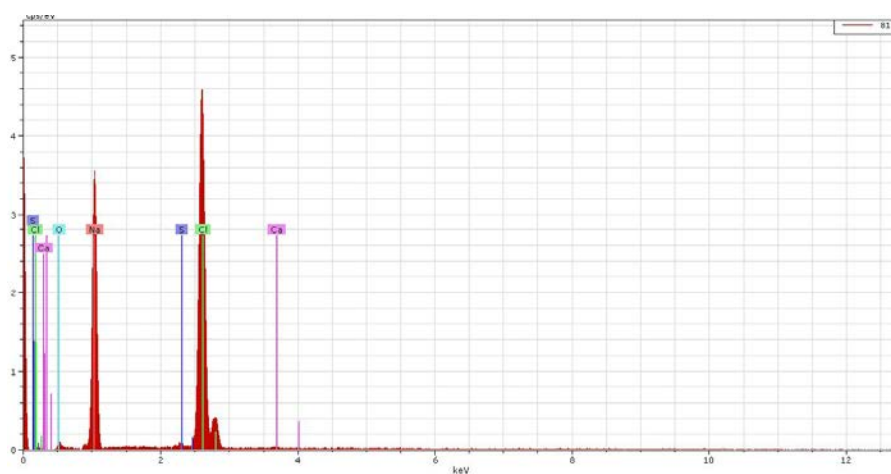


Figure 7. The EDX spectrum corresponding to the microphotograph in Figure 1, on the basis of which the chemical composition found in Table 1 was obtained

Table 1. The chemical composition of recrystallized salt

Element	series	[wt.-%]	[norm. wt.-%]	[norm. at.-%]	Error in %
Sodium	K-series	47,2796	35,70548	44,27939	3,099371
Chlorine	K-series	76,64235	57,88018	46,54595	2,618937
Sulphur	K-series	2,494471	1,88382	1,674928	0,137501
Calcium	K-series	0,709289	0,535654	0,381048	0,06768
Oxygen	K-series	5,28982	3,994863	7,118682	1,283132
	Sum:	132,4155	100	100	



Figure 8. Valea Sărata, views from above: top – northern sector; bottom – northern-central sector



Figure 9. Valea Sărata, views from above: top – central-southern sector; bottom – southern sector



Figure 10. Valea Sărata, views from above:
central-northern sector – earth barrows and cavities of anthropic origin



Figure 11. Valea Sărata, northern sector: top – brine pool built in 2018; bottom – brine spring with plastic tube outlet, located close to the pool



Figure 12. Valea Sărata, northern sector: top – brine pool in 2011; bottom – brine pool in 2019



Figure 13. Valea Sărata, northern sector: top – brine stream; bottom – brine well no. 1



Figure 14. Valea Sărata, northern sector: brine well no. 2



Figure 15. Valea Sărata, central sector: brine springs



Figure 16. Valea Sărata, northern sector: brine pool with basic furnishings



Figure 17. Valea Sărata, northern sector: prehistoric potsherds visible on the surface, close to the well no.2



Figure 18. Valea Sărata, northern sector: timbers and wattle *in situ* visible on the right bank of the brine stream, close to the brine spring with plastic tube outlet

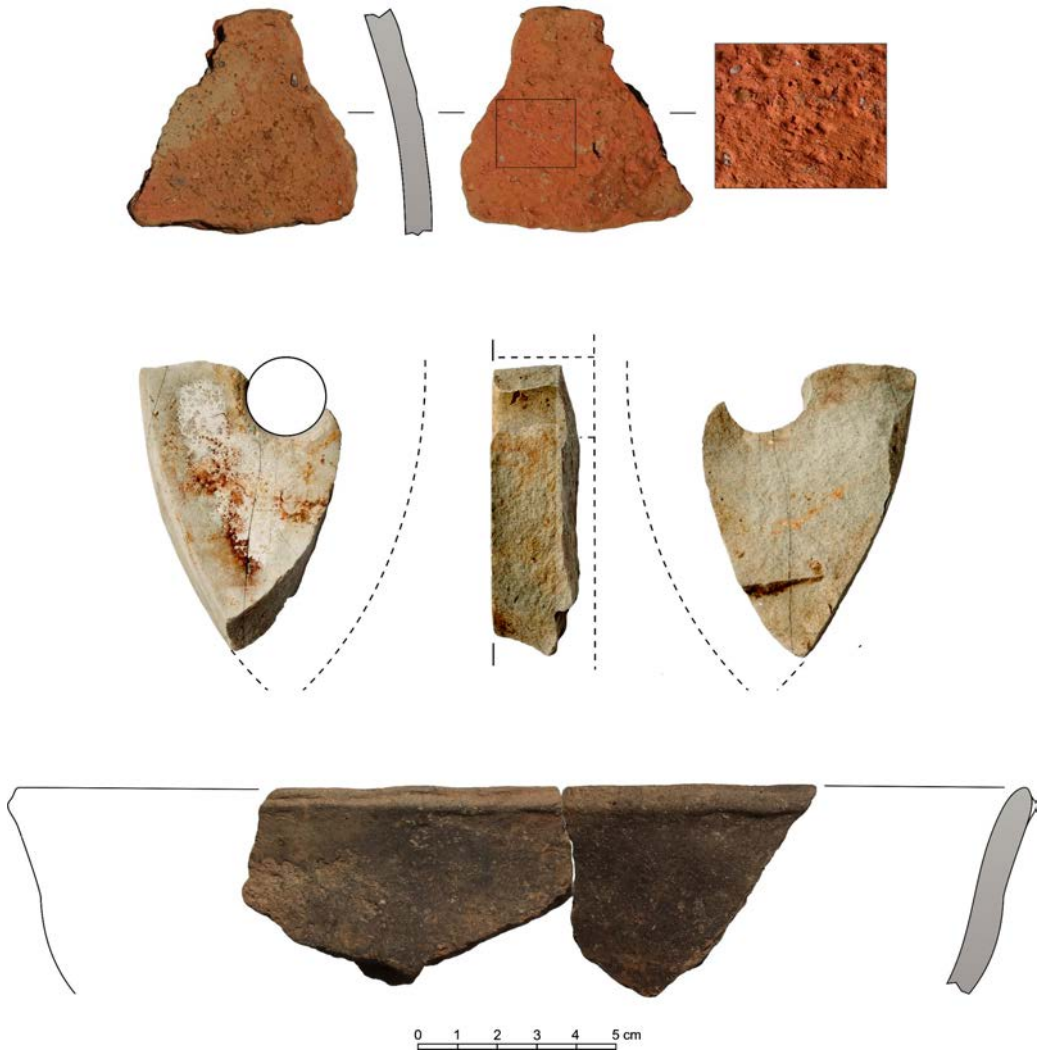


Figure 19. Valea Sărata, northern sector: prehistoric pottery (top and bottom) and a stone axe (middle)

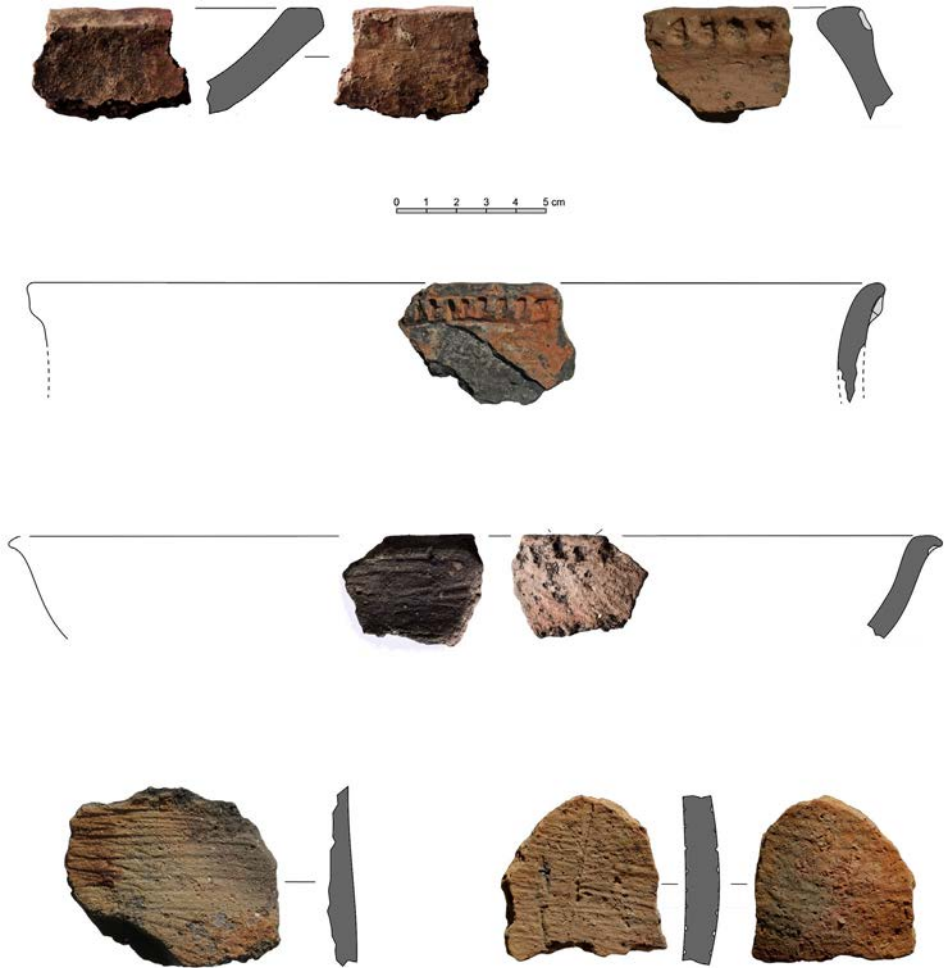


Figure 20. Valea Sărata, northern sector: EBA pottery

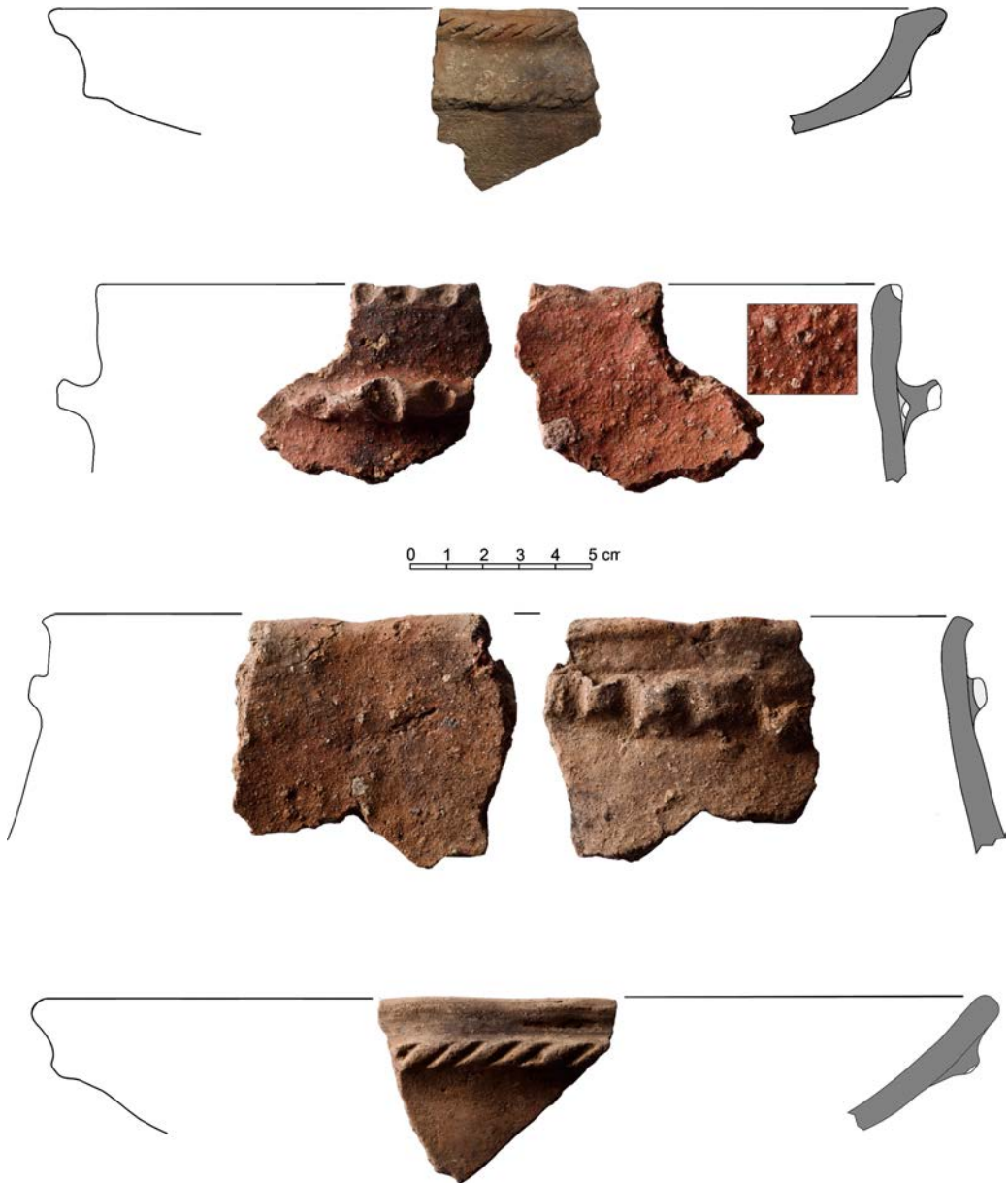


Figure 21. Valea Sărata, northern sector: MBA (Wietenberg) pottery

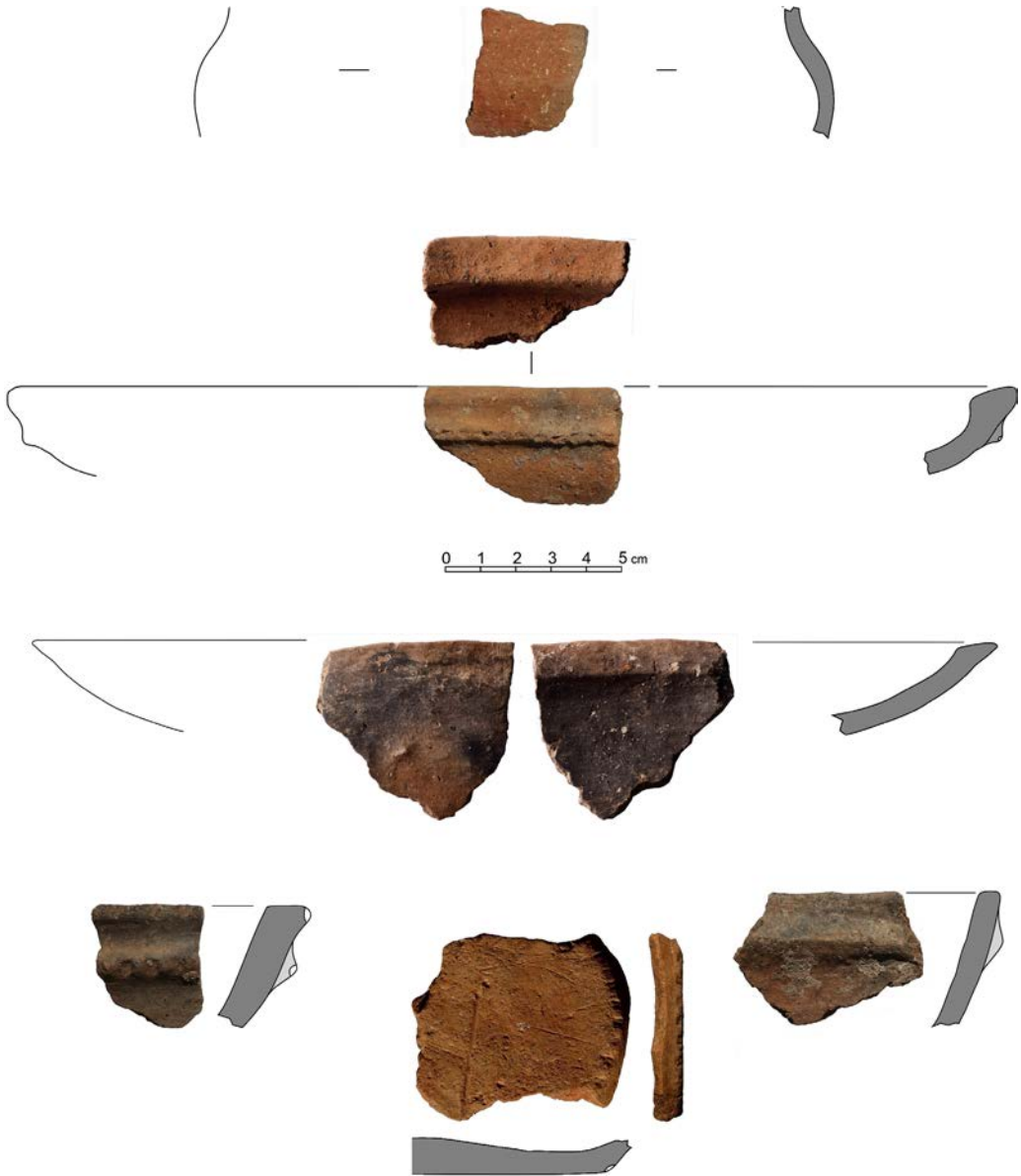


Figure 22. Valea Sărata, northern sector: MBA (Wietenberg) pottery



Figure 23. Valea Sărata, northern-central sector: clockwise from top-left: fragments of a wayside cross found on the site; bottom-left - wayside cross in the Săcăleia village (4 km from the site)

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