# The exploitation of animal resources in Şoimuş-La Avicola (*Ferma 2*) settlement (Romania)

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ABSTRACT – *The aim of this paper is to present an interesting archaeological assemblage discovered during archaeological research at the settlement of Şoimuş-La Avicola (*Ferma 2*) (Romania). So far, this is the only example of a Turdaş culture osseous assemblage published. It is numerically representative, with 901 pieces, of which 796 are bone, 94 antler, 8 tooth and 3 valve. Among the bone pieces, a high standardisation in the selection of blanks is noticeable, with* Bos taurus *ribs being prevalent. At the same time, the techniques and procedures vary only a little within the groups, which allows for the identification of typological series. The recovery of all the products and sub-products resulting from the operational sequences of raw material transformation and the analysis of the wear and technological traces led us to try to reconstruct a behavioural model of the ways raw material was acquired, processing techniques and activities developed with them, or in other words to outline the economic and cultural features of the Şoimuş-La Avicola (*Ferma 2*) community.*

IZVLEČEK – *Namen članka je predstaviti zanimiv arheološki zbir, ki smo ga odkrili pri arheološkem raziskovanju naselbine Şoimuş-La Avicola (Ferma 2) v Romuniji. To je edini primer objavljenega kostnega zbira kulture Turdaş. Zbir sestavlja 901 kosov, od tega 796 kosti, 94 ostankov rogovja, 8 zob in 3 lupine školjk. Pri izbiri kosti prepoznamo visoko stopnjo standardizacije, prevladujejo pa rebra vrsta* Bos taurus*. Poleg tega je le malo variacij znotraj skupin pri izbiri tehnike in postopkih izdelave orodij, kar omogoča prepoznavanje tipoloških serij. S pomočjo analize vseh izdelkov in pod-izdelkov iz analize operacijske sekvence spremembe naravnih surovin in analize uporabe ter tehnoloških sledov lahko poskušamo rekonstruirati načine, kako so v preteklosti pridobivali surovine, kakšne so bile tehnike izdelave in druge aktivnosti povezane z obdelavo kosti; z drugimi besedami, lažje zaobjamemo gospodarske in kulturne značilnosti skupnosti na najdišču Şoimuş-La Avicola (*Ferma 2*).*

KEY WORDS – *Turdaş culture; raw materials; operational schemes; wear traces*

## Archaeological background

Turdaş culture evolved along the middle and lower stretches of the Mureş River, and included approx. 60 settlements (*Suciu 2009.Fig. 259*). Among the best researched are those at Turdaş-*Luncă*, Orăştie-*Dealul Pemilor* (punct x2), Deva-*Tăualaş*, Mintia, Zlaşti-*Gruiul lui Moş*, Peştera Cauce, and Nandru Vale (*Lazarovici, Lazarovici 2006*). Several radiocarbon dates place this important manifestation of the Transylvanian Neolithic in the first half of the 5$^{th}$ millennium BC (*Draşovean 2013a; 2013b*).

Settlements have extensive surfaces, generally between 7 and 10ha, but there are also cases when they reach 55ha (Nandru Vale) or even 75ha (Turdaş-*Luncă*). Surface dwellings and numerous pits are attested as inhabited structures, and enclosure ditches or defensive structures, like trenches and palisades are also mentioned (Turdaş, Orăştie, Şoimuş). Along with the settlements, several seasonally inhabited caves were also excavated, probably connected with sheep herding, like at Cauce Cave (*Lazarovici,*

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*Lazarovici 2006; Luca 2012*). As ceramic forms specific to Turdaş culture, we may mention goblets with high feet, rectangular vessels, cups, bitronconical pots, amphorae, and bowls. The main types of ornament are incised lines with arrays of dotted lines in the interior, or incisions cut in the vessel wall before firing, while parallel incised lines are rarely painted. Numerous anthropomorphic and zoomorphic figurines have also been found, as well as anthropomorphic representations on vessels, anthropomorphic vessels, and miniature altars (*Roska 1941; Luca 1997; 2001*). The connections of Turdaş culture with the great Vinča area are obvious through the forms and decoration of pottery, figurines, architectural or cult objects. Moreover, in most of the archaeological literature, Turdaş culture is considered a distinct group, with strong affinities in the Vinča area, which appeared as a consequence of a migration at the Vinča C level in south-western Transylvania (*e.g., Berciu 1966; Lazarovici 1981; Chapman 1981.Fig. 13*).

Because of the construction of the Deva-Orăştie segment of the A1 Motorway, the 'Vasile Pârvan' Institute of Archaeology, Bucharest, the Deva Museum of Dacian and Roman Civilization, and the National Museum of Romanian History undertook rescue excavations in the settlement of Şoimuş-La Avicola (*Ferma 2*) (Hunedoara County). This is within the area of Şoimuş village, between the eponymous settlement and Bălata village, on the first terrace of Mureş (Fig. 1).

Given the size and archaeological complexity of the work, the site was divided into two sections: area A, the Neolithic nucleus, and area B, the Bronze Age settlement. According to the preliminary field observations, a Neolithic settlement with two main habitation phases was located here. From the stratigraphic perspective, the first phase corresponds to a settlement comprised of houses, followed by a field levelling, with brown-grey sediment discovered in the filling's upper side of many stratigraphic features at the site. The second phase of habitation is indicated by surface dwellings, where a consistent level of destruction was identified in the form of pieces of house daub scattered throughout the surface, fireplaces, fragments of clay floors with a substructure of river gravel, post holes and a very rich archaeological assemblage (ceramics, bones, lithic material). Most of the Neolithic complexes consist of pits with different functions: for storage or for clay extraction, later on transformed into domestic waste pits.

A first conclusion we may draw after researching area A of the site at Şoimuş is that the site on this terrace of Mureş was intensively occupied during the Neolithic period by people of the Turdaş culture, a fact demonstrated by the impressive amount of archaeological material, which includes coarse and fine ceramics (166 complete pots and numerous other ceramic fragments), anthropomorphic and zoomorphic figurines (over 200 clay weights, complete or fragmentary), lithic items (flint and obsidian blades, grinders, 150 axes of polished stone), processed and unprocessed bones, miniature altars *etc*. (*Petcu* et al. *2012; Ştefan* et al. *2013; 2015; Ştefan 2014; Niţă* et al. *2015; Ştefan, Petcu 2015*).

## Methodology

The methodology used in this study relied on both macroscopic and microscopic analysis of the technological and wear traces present on the finds, aided by published technological data from other archaeological assemblages from the same area and neighbouring regions. In the first stage of analysis, a chart was drawn for each artefact, with observations on raw material, the type of find (waste, blank, preform, finished piece) or morphology; then followed processing techniques (two main operations: debitage and shaping) and, finally, hypothetical function resulting from identified use wear was proposed. In the next stage, in order to correlate the data offered by each artefact, the analysis was largely dependent on specific raw materials (such as bone, antler, valve, tooth), because, as we will observe in this study, the different mechanical characteristics of raw materials required the use of different techniques adapted to their characteristics. Within the main large categories of raw materials, the finds were subdivided in terms of how finished they were, thus resulting in four categories; the presence of all the constitutive elements of an operational sequence offered clues regarding the *in situ* processing of the necessary toolkit for this community.

When the degree of preservation allowed, pieces were examined with a Keyence VHX-600 digital microscope at 30x to 150x magnification; images were focused with the aid of a camera incorporated into the microscope. Analytical criteria for the technological and functional interpretation of micro-stigmata were established based on comparisons with other publications on osseous industries in prehistory (*e.g., Maigrot 2003; Sidéra, Legrand 2006; van Gijn 2007; Legrand 2007; Legrand, Sidéra 2007; Gates St-Pierre 2010; Buc 2011*).

## Raw materials exploitation

The osseous industry at Şoimuş took raw materials from both domestic and wild animal species, as well as from trade networks (Tab. 1; Fig. 2). We identified continuity in the selection of species and the skeleton elements, with few variations. Cattle (*Bos taurus*) predominates (accounting for approx. 72% of all processed bones) with a predisposition for ribs. They provided a matrix for various types of object: pointed tools, spatulas, spoon-spatulas and pendants. Moreover, there is a noticeable standardised processing of blanks and of preforms, processed finished objects which could be transformed, for instance, into both pointed tools, and into spatulas on a rib split lengthwise. The difference between them lies only in the extremity at which wear is present. Next in quantity, sheep/goat (*Ovis aries/Capra hircus*) bones (13% of osseous blanks) were made into pointed tools only. Other species were used sporadically, probably opportunistically, by recovering blanks morphologically adapted to different uses from culinary waste.

The deer (*Cervidae*) antler was not very intensively exploited (11.43% of the archaeological assemblage). It is difficult to establish how many of the items derive from shed antlers and how many from hunted animals, given the preeminence of the tines and the quasi-absence of the antler's basal area. Nevertheless, the basal area of a red deer (*Cervus elaphus*) antler was identified, considered debitage waste, and two finished items from roe deer (*Capreolus capreolus*) antlers, which demonstrate the obvious exploitation of a shed antler. The presence of a shed antler implies that expeditions with the aim of gathering the antlers were organised a short time after the red deer lost its antlers. Antlers grow from April until July (when they reach maximum calcification) and fall at the end of the winter (in March for adult specimens) (*Provenzano 2001*). They are attacked by rodents, carnivores, even red deer, then by invertebrates, shortly afterward (*Averbouh 2000; 2005; van Gijn 2007*); however, prehistoric communities needed them in good condition. This is why we assume the organisation of expeditions shortly after the red deer lost its antlers.

A third type of raw material is the boar (*Sus scrofa*) canine. Being a wild species, the acquisition of this raw material was exclusively the result of hunting.

Finally, the items made from *Spondylus* and *Glycymeris* valves derive from exchanges with other communities. A number of prehistoric communities are known to have used fossil species, but a series of studies, like those of Shakelton and Elderfield (*1990*), or, more recently, of Bernadett Bajnóczi *et alii* (*2013*), seem to confirm the use of fresh valves, at least of *Spondylus*. Exchanges could have entailed the direct import of raw material or of finished pieces via direct exchange or group to group (*kula*-like exchanges, such as those in Polynesia; *Malinowski 1989*). The socio-economic importance of these shells, probably along with difficulties in acquiring them, compelled the community at Şoimuş to manage items carefully, reflected by long usage (advanced wear) and by repairing or recycling fractured items (see the *Spondylus* valve bracelet).

## Management of technology

The assemblage of hard animal material at the Şoimuş settlement totals 901 objects, which can be assigned to four product and sub-product categories as mentioned above (Fig. 3). Their distribution is uneven, favouring finished products, which total 769 (85.4% of all products), whereas 20 objects were being processed (2.2%) and blanks and wastes amount to 14 items (1.6%). We have also added the important category of 'undetermined', which includes 98 artefacts (10.8%).


***Fig. 1. Location of the Şoimuş-La Avicola (*Farm 2*) settlement.***

## Bone

**Pointed tools** (458 items) comprise the most numerous typological category within the assemblage from Şoimuş. We observed a couple of typological sub-groups, which are defined first by the manner in which the blank was obtained. Most of the items (246 samples) were made of cattle rib by splitting the bone lengthwise. In samples in which the shaping stage was not clear, it is evident that semi-ribs were detached by direct diffuse percussion, with the procedure being finished by indirect percussion. The manner of treating the cancellous tissue is not quite the same: in some items, it was not removed, while in others it was removed completely. The inferior side was afterwards smoothed by abrasion (Fig. 4.1,2). A convex or rectilinear form was impressed at the proximal extremity by abrasion (Fig. 4.3). The debitage edges were generally also shaped by abrasion (Fig. 4.4), after which, at the distal end, bilateral scraping was applied (Fig. 4.5) in order to shape the point. The active surface morphology of the pieces with wear traces is generally rounded, with fine longitudinal scratches (Fig. 4.6). Twenty-two other items were included in this typological subgroup, also obtained by a method of splitting by percussion. Anatomically, the blanks are various. The technological data on the shaping operation are identical with those on the pointed tools made of ribs.

A second type of processing (92 items) used sheep/goat bones (metapodials, 55 items; metatarsus, 17 items; metacarpus, 12 items) and secondarily roe deer (metatarsus, 4 items, metapode, 4 items). The two points which seem to derive from the same bone and which illustrate perfectly the debitage method (Fig. 5.1) are very interesting. The method was to split the bone, generally preserving the epiphysis (Fig. 5.2). At the proximal end, both sides were flattened by abrasion (Fig. 5.3,7). On most pieces, abrasion does not seem to have been used exclusively until the two blanks were detached. It was applied until the medullary canal was reached, over a small surface, with the splitting of the two halves by indirect percussion. Nevertheless, in a couple of samples, it is obvious that bifacial abrasion was the only method used (Fig. 5.6). The blank was shaped by longitudinal scraping applied around the entire circumference at the mesial-distal end (Fig. 5.4). The points are rounded, with marked wear polish (Fig. 5.5,8).

The third subgroup comprises 94 items made on flat blanks obtained by dividing the bone into four by percussion (Fig. 6.1,2). In most cases, the shaping stage took the form of abrasion of the debitage edges (Fig. 6.3), superposed at the distal end with bilateral scraping (Fig. 6.4) in order to develop the point (Fig. 6.5). In items that were preserved, the proximal extremity was shaped by abrasion. Some samples were shaped only by abrasion or scraping applied to various areas.

Seven pieces were made on blanks in the assemblage. Atypical raw materials were used that do not appear in other categories, *e.g.*, boar ulna and fibula or two horse metatarsus (*Equus caballus*). In one sample, at the epiphysis end, bifacial abrasion was applied to make the surfaces regular. In others (Fig. 7.1), the only technological intervention was the procedure for finishing the point by scraping around

| SKELETON ELEMENTS | *Bos taurus* | *Ovis aries/ Capra hircus* | *Equus caballus* | *Sus scrofa* | *Sus domesticus* | *Cervus elaphus* | *Capreolus capreolus* | *Aves* sp. | Indeterminate sp. | *Spondylus* sp. | *Glycymeris* sp. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve | | | | | | | | | | 2 | 1 |
| Antler | | | | | | 88 | 6 | | | | |
| Incisor | 1 | | | | | | | | | | |
| Canine | | | | 7 | | | | | | | |
| Rib | 549 | | | | | | | | | | |
| Coxae | 2 | | | | | | | | | | |
| Humerus | 1 | | | | | | | | | | |
| Scapula | 5 | | | | | | | | | | |
| Radius | 6 | | | | | | | | | | |
| Ulna | | 1 | | | | | | | | | |
| Metacarpus | 1 | 14 | | | | | 1 | | | | |
| Femur | 1 | | | | | | | | | | |
| Tibia | 1 | 3 | | | 1 | 1 | | | | | |
| Metatarsus | 4 | 19 | 2 | | | 1 | 5 | | | | |
| Metapodial | 1 | 69 | | | | 4 | 4 | | 1 | | |
| Long bone diaphysis | | 1 | | | | | | 2 | 96 | | |
| **TOTAL** | **572** | **107** | **2** | **7** | **1** | **94** | **16** | **2** | **97** | **2** | **1** |

***Tab. 1. Numerical distribution of the differents types of raw material and their selection by species and skeletal elements.***

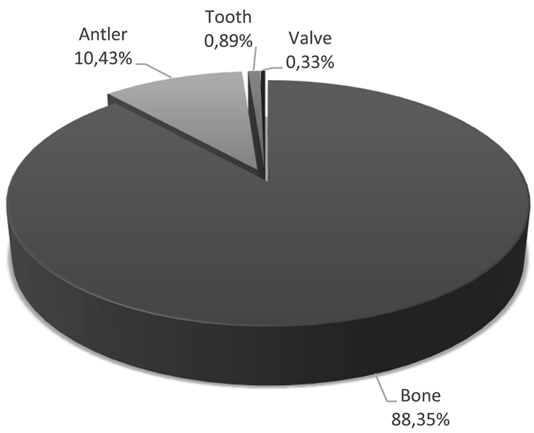


***Fig. 2. Percentages of raw materials used for tools.***

the entire circumference (Fig. 7.2). When preserved, points are very rounded, showing no signs of being worked on (Fig. 7.3). A second method (Fig. 7.4) of processing points on blanks consisted of eliminating the epiphysis by percussion, without regularising the debitage plan. In order to form the active front (*i.e.*, anatomically preserved surface), the object was struck obliquely. The point was developed by bilateral shaping (Fig. 7.5). Still, we are no longer able to identify any technological traces, because the piece is very worn, with a high surface macroscopic polish. The point is blunt and rounded. Moreover, 7mm of the point developed a depression around the entire circumference, which might have resulted from the use of the piece to make perforations by rotation, the depression being the piece's penetration limit (Fig. 7.6).

**Spatulas** (118 items). A first variant of processing consists of using the rib's natural blank (16 pieces) (Fig. 8.1,4). The development of the active front started with a segmentation procedure using percussion, according to all the data we have. Unifacial abrasion was then applied (Fig. 8.2,5) to the active front. The wear is characterised by a macroscopic polish, with longitudinal scratches (Fig. 8.3,6), demonstrating use in a lengthwise movement in contact with a soft material.

A second technological variant consists of applying a method of splitting ribs (99 pieces), seemingly accomplished by diffuse percussion (Fig. 8.7,9). The form was created by scraping the fracture sides (Fig. 8.10). The inferior side was not cleaned thoroughly in all the samples, with the complete elimination of the cancellous tissue. The proximal part was developed by abrasion. The active front was also made by bifacial abrasion, applied only at the extremity. The active surface presents macroscopic polish and oblique scratches (Fig. 8.8,11). On the superior side, a strong macroscopic polish developed at the medial side, probably because of handling.

In the spatula category we also included pieces deriving from the diaphysis wall, entirely shaped and having two spatula extremities, with macroscopic polish (3 pieces) (Fig. 8.12,13). We do not know the debitage procedures, due to the very smooth shaping by abrasion applied on the entire surface. The two extremities, also shaped by abrasion, developed functional longitudinal scratches.

**Spoons** (96 items). In this category, we integrated different pieces whose common element is the presence of a concavity which transforms them into receptor elements. Some pieces (72 pieces) were made on longitudinally split cattle rib split lengthwise (Fig. 9.1). The debitage edges and the convex distal extremity were made by abrasion. The technological data which led us to define the group as spoons rather than spatulas relate to both with the concavity created by profound deep longitudinal scraping (Fig. 9.5), and the finishing of a narrower proximal area by bilateral scraping (Fig. 9.4). In some samples, the handle presents an example made by alternative cutting (Fig. 9.3). The cutting was applied subsequently when the sides were shaped because specific traces are still visible (Figs. 9.6,7). Perforations were also made in the proximal extremity (Fig. 9.2).

Spoons with a different morphology were obtained from the diaphysis of some cattle and red deer long bones (24 pieces) (Fig. 10.1). The pieces consist of three distinct parts: receptor element, the rod and the specific proximal extremity. Generally, we identified fractured proximal parts and meso-distal parts that lack a specific proximal extremity. We believe that the pieces fractured quite often at the proximal end and were fixed by the abrasion of the frac-

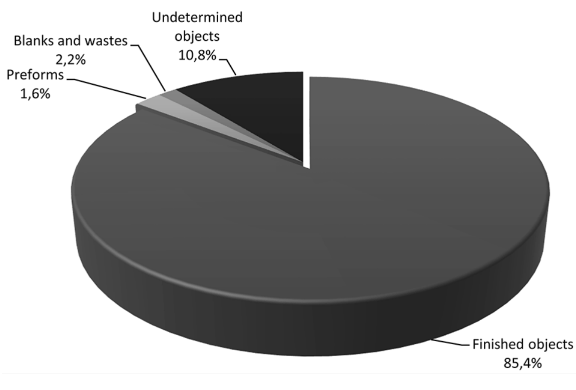


***Fig. 3. Percentages of tools and semi-finished products of the operational sequence.***

ture plan. Unfortunately, we have not identified pieces in intermediary processing stages, which raises the problem of reconstructing the operational transformation scheme, given the complexity of the procedures. The experimental study published by Isabelle Sidéra (*2011*) allowed us to reconstruct the succession of the technological process. Thus, in the first stage, a method of splitting the bone was applied, thus obtaining two similar blanks. The debitage edges were regularised by abrasion, including the distal extremity, with a convex morphology (Fig. 10.4). In order to make the concavity specific to spoons, the medullary canal was used, deepened either directly by longitudinal scraping (Fig. 10.7) or by a delineation procedure in the form of a perforation made by rotation (Fig. 10.3), starting from which longitudinal scraping was applied (Fig. 10.2).

In most pieces, the handle is cylindrical (Fig. 10.6), probably shaped by scraping (Fig. 10.10), over which an abrasion meant to create a specific morphology was superposed. At this end, the wear on the is great, with macroscopic polish and the disappearance of technological traces (Fig. 10.5,8). The proximal extremities (Fig. 10.9) are actually the extremities of the epiphysis, illustrating a procedure of bifacial abrasion applied until the two perfectly plain sides appeared (Fig. 10.11).

**Bevelled objects** (9 items). A first processing variant started from dividing the bone into four pieces by percussion (2 items) (Fig. 11.1). The active front was achieved by bifacial abrasion applied only at the distal end (Fig. 11.2). The wear consists of longitudinal scratches, with a very high polish, from which we concluded that the pieces were used in a linear movement (Fig. 11.3). The other six items were made by splitting the bone longitudinally; with one exception, percussion was used. The exception (Fig. 11.4) consists of splitting by grooving (Fig. 11.5) one of the edges, the detachment continuing by indirect percussion. The active front was developed by bifacial abrasion applied at the distal end. In most pieces, the active front exhibits important fractures (Fig. 11.4), illustrating their use as intermediary tools in indirect percussion actions. In one item (Fig. 11.6), the surface presents wear in the form of fine scratches that are slightly oblique, superposed by abrasion incisions, which demonstrate several stages of resharping the piece (Fig. 11.7,8). One last item is a fragment detached by percussion from a cattle scapula. Abrasion for regularisation on the debitage edges and at both extremities was applied on irregular surfaces. The wear of the active front is not great.

**Fish hooks** (5 items) (Fig. 12.1). The presence of the constitutive elements of the technological scheme (see preforms section) helped us to reconstruct the stages of blank extraction for future hooks. The surface was smoothed by longitudinal scraping (Fig. 12.2) applied on variable surfaces according to the piece. The specific point of the hook was sharpened by scraping (Fig. 11.5). Abrasion was the final processing stage for 3 items (Fig. 12. 3). The pieces have one (1 piece) or two perforations (4 pieces) at the distal end, accomplished by bifacial rotation (Fig. 12.4).

**Adornments** (14 items). A bracelet was made from a rib (Fig. 13.1). The item was fractured; the two fragments could not be fastened, but they seem to belong to a single unique piece. The blank is flat, obtained by longitudinal splitting; the procedure could not be reconstructed, due to subsequent interventions. The lower side was thoroughly shaped lengthwise (Fig. 13.3), eliminating the cancellous tissue. The same technique was applied to the debitage edges (Fig. 13.2). The extremities were made regular. It is worth noting that the blank underwent a treatment that allowed it to flex, so that it took the form of a bracelet. This was clasped by means of two perforations made by bifacial rotation (Fig. 13.5) at the extremities. They are noticeably worn; the rotation scratches can no longer be seen. Moreover, one of the extremities bears the remains of a fractured perforation (Fig. 13.4). The item was repaired with a new perforation. Another fragment also seems to derive from a bracelet. In this case also the bone was split, but we do not know the procedure, because the debitage edges were thoroughly abraded. Deep scraping, still visible, was applied to the inferior side. One extremity still retains part of a perforation made by unifacial rotation.

Twelve items, similar in raw material and technology, have raised framing issues. They could have been transformed either into points or into spatulas, but the extremities do not have traces of wear (Fig. 13.6). On the contrary, a perforation was made by bifacial rotation at the pointed extremity (Fig. 13.9). All the pieces are made on flat blanks obtained by splitting the rib lengthwise, with the edges achieved by lengthwise scraping (Fig. 13.8) in order to achieve the desired form of the piece. The cancellous tissue was removed from all the pieces. The lower side and both extremities were made regular by abrasion (Figs. 13.7,10) on variable surfaces, according to the item.

**Needles** (2 items). The first item (Fig. 14.1) is made on a flat blank obtained by splitting the bone into four pieces by percussion. The debitage edges were entirely shaped by lengthwise scraping. The active front was developed by scraping around the entire circumference at the distal end (Fig. 14.2). Proximally, a perforation was made by unifacial rotation from the lower side. The point is blunt, with marked polish and functional scratches in parallel with the item's axis (Fig. 14.3). The second needle is a mesoproximal fragment on a flat blank obtained by splitting the bone into four pieces. We do not know the debitage procedure, because the entire surface of the item was made regular by lengthwise scraping. Abrasion was used only at the proximal extremity. Its function as a needle is suggested by a bifacial rotation perforation.

**Ring** (1 item). The item was obtained through a segmentation procedure by sawing. The segmentation plan was shaped by abrasion. At the same time, the diaphysis' medullary canal was enlarged by scraping.

**Knife** (1 item). Although the item is fractured (Fig. 14.4), we may assert that the blank was obtained through lengthwise percussion. Only the edge used as the active front was processed. It was bilaterally shaped with lengthwise scraping (Fig. 14.5). A convex and very sharp bevel resulted. Presently, it is highly polished on both sides (Fig. 14.6) and the traces of scraping have begun to disappear. We do not know if it was used for cutting or scraping. Whatever the case, this type of active front is useful for both types of action.

**Belt element** (1 item). One item (Fig. 14.7), interesting because of its morphology and technological scheme, was placed in this typological category based on comparisons with similar items from the literature (*Ramseyer 2001*). It was made on a flat blank derived from a long bone. Due to subsequent work on the item, we were not able to identify the debitage procedures. The form was created by sawing, after which the debitage edges were shaped. The perforation was accomplished by bifacial rotation, with still visible grooves (Fig. 14.9). We also identified areas of wear, with the disappearance of technological traces. The lower side was regularised by abrasion (Fig. 14.8). The entire surface of the item presents a strong macroscopic polish, probably caused by prolonged use. Unfortunately, it is fractured and we do not know its intact morphology.

**Handle** (1 item). The item (Fig. 15.1) was made by eliminating the epiphysis by sawing (Fig. 15.2), after which the segmentation plan was thoroughly polished (Fig. 15.3). The natural medullar canal was used for gloving.

**Indeterminates** (87 items). This category mainly includes items made on ribs split lengthwise – most probably pointed tools, spatulas or spoons-spatulas; their high degree of fragmentation prevents identification of the exact morphology/function (70 items). Several items (17) made on other types of blanks, alas also fractured, proved interesting due to their technological traces. For the first item (Fig. 15.4), a flat blank was used, the debitage edges being regularised by abrasion (Fig. 15.5). Three bifacial rotation perforations were made centrally (Fig. 15.6) and a fourth was initiated from the inferior side, by rotation. Another item (Fig. 15.7) is a mesoproximal fragment. First, the model was cut (Fig. 15.9), after which the item's entire surface was regularised by lengthwise scraping (Fig. 15.8), which covered all the traces appearing during the debitage operation. The extremity was made regular by abrasion. One of four pieces is technologically worth noting: they seem to have been made on flat bones, preserving the matrix's anatomic volume. We do not know the procedure for obtaining the blank, because the form was achieved by scraping the side lengthwise (Fig. 15.11) and by surface abrasion (Fig. 15.13), which destroyed some of the previous traces. In one of the pieces (Fig. 15.10), the preserved extremity seems to have been segmented by sawing; it also exhibits two perforations made by alternative bifacial rotation (Fig. 15.14). A third perforation was initiated from the inferior side, which is very important because it demonstrates that the perforation was not performed with a perçoir-type lithic tool, but with a circular item, hollow on the inside (small central waste) (Fig. 15.12). Another piece presents a small perforation at its base accomplished by bifacial rotation, above which a perforation with a greater diameter was made. The fact that the latter has a morphological deformation, probably following the pressure of a thread, seems quite interesting. The wear covers the entire surface of the item.

**Preforms** (3 items). Two preforms identified in the Şoimuş settlement were destined to be transformed into fish hooks. These are flat blanks (Fig. 16.1) obtained by splitting the bone, seemingly by percussion, after which the debitage edges were completely abraded. The segmentation was done by sawing. One of the samples was shaped by lengthwise scraping, while the upper side was regularised by abrasion in order to reduce the bone's convexity. The extremities were also regularised by abrasion. In order to make the future hook, perforations were made with bifacial (1 item) or unifacial (1 item) rotation (Fig. 16.2). Afterwards, grooving traced the form of the future hook (Fig. 16.3).

Another type of item which was still being processed (Fig. 16.4) consisted in obtaining a splinter by successive partitions. A proximal peduncle-shaped gloving system was set up by progressive cutting, followed by shaping applied meso-proximally by abrasion to the upper side. The item remained at this stage of processing.

**Antler**

**Punches** (17 items). The items were made on red deer antler tines (Fig. 16.5), except for a single piece, an antler branch of roe deer. Usually, the antler's natural form was used with minimal technological interventions. Segmentation was probably made by percussion applied to various surfaces, the procedure being finished by bending or, in rare cases, again by percussion (Fig. 16.6). The active front was fixed at the point of the tine by small chiseling, thus creating a flattened surface. Another manner of achieving a point consisted in thinning by scraping around the entire circumference. The pressed aspect of the active front, with fine irregular scratches (Fig. 16.7), might be due to its use for crushing different materials. For instance, one of the items shows spots of black pigment on the active front (Fig. 16.8).

Six of these pieces seem also to have been used as pressure flakers (Fig. 16.9). One piece presents a small area with oblique, sub-parallel scratches on the point (Fig. 16.10), perpendicular to the item's axis (Fig. 16.11). The point's anatomic form was modified by some degree of chiseling around the entire circumference, like the other pieces in this typological category.

The roe deer antler is a shed one, upon which the tines were eliminated by percussion on half of the diameter, followed by bending. A tine was preserved. Its surface is covered by macroscopic polish and transversal scratches, probably due to contact with a lithic tool.

**Fish hooks** (13 items). The blank was obtained from the compact tissue of the antler, by lengthwise percussion. Segmentation was made transversally by percussion. The form was achieved meso-distally by bilateral lengthwise scraping (Fig. 12.7). Abrasion was the final process for 11 items (Fig. 12.8). The distal extremity was shaped by abrasion, acquiring a rectilinear morphology. At the distal end, the items have one (4 pieces) or two perforations (8 pieces), accomplished by bifacial rotation. One item (Fig. 12.6) presents a different clasping system, namely a perforation made by rotation (Fig. 12.10), associated with a groove cut at 19mm from it, by sawing applied around the entire circumference (Fig. 12.9).

**Bevelled objects** (12 items). The common element of these pieces is that the blanks in the assemblage were made only from red deer antler tines (Fig. 17. 1,4). Segmentation was by percussion around the entire circumference (Fig. 17.5) in 4 items, while the procedure was undetermined in the others (8 items). The oblique distal end was finished by percussion (Fig. 17.2) or scraping (Fig. 17.6); in 3 of the items, the debitage plan of the active front was regularised by abrasion (Fig. 17.7) or scraping. The manner in which the fractures evolved both distally and proximally alongside the macroscopic polish with longitudinal scratches (Fig. 17.3,8) clearly illustrate these items' function as intermediary tools.

**Composed tools** (4 items). All the items were made from the superior area of a branch. At the segmentation level, the preserved volume was thinned by abrasion, thus creating an area with biconvex section and convex-concave sides (Fig. 18.6). The rest of the surface was regularised by lengthwise scraping (Fig. 18.2). Towards this end, a perforation was made by rotation (Fig. 18.4,7). Moreover, one item (Fig. 18.5) was fractured and repaired, as demonstrated by the presence of median technological traces which attest the existence of previous perforations. Another item (Fig. 18.1) presents two perforations performed by bifacial rotation. Two grooves developed towards the point, which seem to have resulted from tying a thread (Fig. 18.3). Finally, a third item (Fig. 18.8) has an ornament accomplished by rotation quite randomly distributed over the entire surface.

**Handles** (2 items). The pieces attributed to this category differ, so they will be described separately. The first (Fig. 19.1) is a segment on a tine detached by percussion at both extremities (Fig. 19.2). Technological traces of this segmentation procedure can hardly be identified because the pearling was eliminated by chiseling over the entire surface of the piece, on which a procedure of shaping by scraping was superimposed (Fig. 19.4). Both segmentation plans were regularised by abrasion (Fig. 19.5). At the narrower extremity, the cancellous tissue was excavated, thus developing a hole (Fig. 19.3) with a depth of 11 mm and a diameter of 9 mm. The item is highly worn, with lengthwise cracks as a consequence of the pressure exerted by the gloved piece, and presents strong macro-wear.

The second item is a percussion segmented beam. A procedure of surface modification by percussion was employed, eliminating the pearling. A median rectangular perforation by bifacial cutting was made, as well as a small perforation by rotation, probably for blocking the gloved piece.

**Receptacle** (1 item). An antler tine (Fig. 19.6) from the basal area was processed by segmentation and lengthwise splitting; the procedures could not be identified because the debitage edges were regularised by abrasion. The cancellous tissue was entirely removed, deep lengthwise scraping being visible on the inside. Lengthwise scraping was also applied to the upper side to eliminate the pearling and clean the surface. A concavity is visible on the lower side, which led us to identify the item as a receptacle.

**Bracelet** (1 item). The piece (Fig. 19.7) was made on flat blank, which was probably processed in order to be curved and achieve the bracelet form. The lower side was thoroughly abraded. Small cuts were applied by sawing (Fig. 19.8), at a distance of approx. 3mm, while the depth of the grooves is approx. 1.87mm. Three perforations were made by unifacial rotation (Fig. 19.9) from the upper side, and were intended to clasp the item.

**Comb** (1 item) (Fig. 20.1). In order to obtain the blank, an extraction method by sawing was used (specific technological traces may still be identified on the item's long side) (Fig. 20.2). Afterwards, the debitage edges were thoroughly shaped (Fig. 20.3). On the lower side, the blank was shaped by a lengthwise scraping. Two perforations were made at the extremities by unifacial rotation from the lower side (Fig. 20.4). The perforations were subsequent to the scraping made on the superior side, because they superpose it. They were probably intended for clasping. The ornament consists only of incisions (Fig. 20.7). Initially, there were 13 teeth, obtained by the intersection of two grooves (Fig. 20.5). The procedure was applied until the cutting of a small fragment, with triangular morphology. The teeth present macroscopic polish and are well rounded (Fig. 20.6).

**Ring** (1 item). The item (Fig. 20.8) was obtained through a segmentation procedure, probably by sawing. The traces are no longer visible, because the segmentation plan was regularised by abrasion (Fig. 20.9). Grooves were made on its surface (Fig. 20.10), traced around the entire circumference, probably to suggest an ornament. The ring's interior was enlarged by means of lengthwise scraping.

**Undetermined** (11 items). In this category, we included pieces whose function could not be determined, generally because of breakage. The first piece (Fig. 21.1) is a beam fragment for which the segmentation was made by percussion. The segmentation plan was subsequently shaped. The pearling was completely eliminated by percussion (Fig. 21.2). The item shows one broken perforation. Nevertheless, a new median perforation was made by bifacial cutting (Fig. 21.3). We may be dealing with the recycling of an item by transforming it into a handle. Another piece (Fig. 21.4), also made from a beam, is longitudinally fractured, so that we were not able to entirely reconstruct its morphology. The segmentation plan was thoroughly abraded proximally. At the opposed extremity, it seems that the segmentation was made by percussion. The item's entire surface was shaped by lengthwise scraping (Fig. 21.6). A perforation was made 75 mm from the proximal extremity by bifacial cutting. The item is decorated (Fig. 21.5): longitudinal proximal rows of 8–9 perforations and a long row of 13 meso-distal perforations (the row was probably longer).

The basal area (Fig. 21.7), with the first tine of a shed antler, was detached by percussion applied to half of the diameter, followed by bending. A portion of the outer burr was eliminated by percussion. Circular incisions appeared in this area (Fig. 21.8), surely resulting from the pressure of threads, either wool or plant fiber. The preserved tine shows no sign of wear.

**Preforms** (17 items). Seventeen items are in an intermediate processing stage. They were processed on red deer (15 pieces) and roe deer (2 pieces) antler tine. Blanks prevail in the assemblage, but flat ones are also present. Where identifiable, segmentation was made by percussion on variable surfaces, followed by bending (6 pieces) or by percussion around the entire circumference (6 pieces). Among these preforms, we identified items which were about to be turned into punching tools by applying lengthwise scraping (5 pieces) or small chiseling (2 pieces) around the circumference. Visible traces appear on a roe deer tine (Fig. 22.2) detached by percussion applied on one third of the diameter and bending. A chiseling procedure was distally applied around the entire circumference to prepare a punch-type item. Another type of fixing consists in the initiation of a bevelled-type active front (2 items – Fig. 22.1) by percussion.

The first flat blank is from a roe deer tine. It is proximally fractured, so we do not know the segmentation procedure. The lengthwise splitting was done by percussion. On the upper side, a chiseling procedure was applied in *taille au canif*. The second flat blank derives from a red deer tine split by percussion. Shaping by chiseling was initiated on the debitage edges. Transversally, a bending technique seems to have been used. The making of three fish hooks was also initiated on flat blanks. They were detached from the raw material, but had not reached the final processing stage. After extraction, the shape was created by scraping. All the items have a perforation accomplished by bifacial rotation at the distal end.

**Blanks** (11 items). Nine tines and two beams were attributed to the blanks category. They lack any specific trace of shaping operations and, because of their size, they became finished items. All the blanks preserve the antler's anatomic volume. Segmentation was achieved by percussion, applied either on approx. half of the matrix diameter (6 items), followed by bending, or by percussion applied around the entire circumference (5 items).

**Wastes** (3 items). In this category, we included artefacts unfit to be transformed into finished items. We refer here to two roe deer antler tines, segmented by percussion and detached by bending, and to the basal area of a shed red deer antler, from which the basal tines were detached by bending and the beam by percussion around the entire circumference.

## Teeth

Teeth objects form two typological categories: scrapers (6 items) and adornments (2 items). All the scrapers (Fig. 22.3,7) were made on flat blanks obtained by percussion (5 items) or grooving (Fig. 22.4), combined with indirect percussion (1 item). The proximal extremity preserved in two samples was regularised by abrasion (Fig. 22.8). The lower side was shaped by abrasion (4 pieces) (Fig. 22.5) or lengthwise scraping (1 piece). The active front was achieved by scraping applied on the debitage edges (Fig. 22.6,9). The items seem to have gone through successive stages of reshaping the active front by scraping applied only on the concave side. All the samples are of boar canines.

The first adornment is a cattle incisor (Fig. 23.1), simply perforated by bifacial rotation (Fig. 23.2). The wear is not too advanced, the rotation scratches still being visible. The second is more elaborately processed, starting from a boar canine (Fig. 23.3). The flat blank was obtained by percussion. The sharp form was achieved by lengthwise scraping (Fig. 23.4). The perforation was made by unifacial rotation (Fig. 23.5) from the lower side. Towards the end point, it presents a slight deformation of the wall, probably the clasping area.

## Bivalve

*Spondylus* valves were turned into two types of adornment. The first, extremely interesting because of the traces of wear, is a perforated plaque (Fig. 23.6). An extraction method by sawing was used to process the blank. All traces of the debitage operation were removed by the shaping operation, which was accomplished by abrasion of the entire item (Fig. 23.7). Laterally, two perforations were made by bifacial rotation. The rotation scratches are quite blurred. Small fractures of the wall appeared at the extremity, superimposed by wear polish (Fig. 23.8). Moreover, on one of the item's superior side a small depression developed, the result of friction with a thread for a long period. We suppose that each perforation was intended for an individual clasp. The second item is a fragment from a bracelet (Fig. 23.9) which was previously fixed. A fragmented perforation has survived at one end, apparently made by bifacial rotation. The bracelet had probably fractured and a perforation was made for a clasp. The general wear on the item is very advanced.

A bracelet made from a *Glycymeris* valve (Fig. 23.10) was discovered in fragmented form. The finished item was obtained by bifacial abrasion (Fig. 23.11), acquiring a rectangular section. Towards the end point, a unifacial perforation was made (Fig. 23.12) by rotation, with still visible technological traces.

## Discussion

The exploitation of animal resources to produce tools, weapons, or ornaments is subject to a succession of technological stages, beginning with the acquisition of raw material and continuing with transformation and consumption, which does not always end the operational chain, because recycling may sometimes also intervene. Through traces, these artefacts recorded all the actions which led to their production, so we may assert that they offer an insight into the life and occupations of prehistoric communtities. Moreover, anthropologists and archaeologists, following their observations on pre-industrial populations, underlined that objects and, implicitly, technology are subordinate to the social realm (*Malinowski 1939; Pétrequin, Pétrequin 2006; Choyke 2008 etc.*) or, as splendidly summarised by Pfaffenberger (*1988.249*): "*To construct a technology is not merely to deploy materials and techniques; it is also to construct social and economic alliances, to invent new legal principles for social relations, and to provide powerful new vehicles for culturally-provided myth.*"

The study of the above-mentioned categories (see Tab. 2) led to the identification of the following detachment procedures: transversal debitage, to which a transformation scheme by segmentation corresponds, and longitudinal debitage, to which transformation schemes by splitting into two, successive splitting and extraction are subordinate. As for the techniques used during the debitage stage, we produced some figures on raw material types, as we could clearly highlight different treatment for bones, antlers, and teeth. For bone, the debitage resulted in two blank types: with the original volume or flat. Considering the percentage, we may state that flattened blanks were preferred. Transversal debitage was performed by direct percussion and sawing (*e.g.*, ring, handle). To split items lengthwise, percussion and abrasion were mainly applied; a groove and splinter combination was used less (1 item), while for successive splitting, only percussion was used. For the extraction procedure, groove and splinter (*e.g.*, fish hooks) or sawing techniques (*e.g.*, comb) were used. Among the surface modification procedures, we identified a variety of combinations of techniques. Abrasion was used primarily for points, superposed by scraping; also, abrasion was used to create flat surfaces; to make spoons concave, abrasion was used either in a combination of perforation by rotation and scraping, or merely scraping. Grooving was used to make surface ornamentation (comb and ring). The techniques used for volume modification procedures were perforation, having only one variant, namely ro-

| Raw materials | Species | Typological category | No. pieces |
|---|---|---|---|
| Bone | Mammals | Pointed tool | 458 |
| | | Spatulas | 118 |
| | | Spoon | 96 |
| | | Fishing hook | 5 |
| | | Bevelled object | 9 |
| | | Adornment | 12 |
| | | Bracelet | 2 |
| | | Needle | 2 |
| | | Ring | 1 |
| | | Belt | 1 |
| | | Handle | 1 |
| | | Knife | 1 |
| | | Indeterminate | 87 |
| | | Preform | 3 |
| Antler | *Cervus elaphus* | Fishing hook | 13 |
| | | Punching tool | 11 |
| | | Punching and retouching tool | 6 |
| | | Bevelled object | 12 |
| | | Composite tool | 4 |
| | | Handle | 2 |
| | | Receptacle | 1 |
| | | Bracelet | 1 |
| | | Comb | 1 |
| | | Ring | 1 |
| | | Indeterminate | 9 |
| | | Preform | 15 |
| | | Blank | 11 |
| | | Waste | 1 |
| | *Capreolus capreolus* | Punching tool | 1 |
| | | Indeterminate | 1 |
| | | Preform | 2 |
| | | Waste | 2 |
| Tooth | *Sus scrofa* | Adornment | 1 |
| | | Scraper | 6 |
| | *Bos taurus* | Adornment | 1 |
| Shell | *Spondylus* | Adornment | 2 |
| | *Glycymeris* | Adornment | 1 |

***Tab. 2. Types of tools and semi-finished products of the transforming technique.***

tation. Sawing, used for decorated handles and grooving, was also used to detach the comb's teeth.

For antlers, the situation is completely different, given the predominance of volume blanks. For transversal debitage, percussion combined with bending, or only percussion, were used. The few flat blanks were obtained by splitting the antler lengthwise by percussion. Direct percussion, scraping, abrasion and perforation by rotation were used for surface modification. Anatomically preserved volume was modified particularly by perforation or cutting. Sawing was also used to modify, being used for the decoration of the bracelet.

Finally, in the case of teeth, we do not know how the blank's transversal segmentation was made. Lengthwise splitting was achieved by debitage, which involved percussion or, in one item, a groove and splinter combination. The procedures for surface modification were abrasion and scraping, while perforation by rotation was used for volume modification.

The general picture shows that techniques and procedures varied. Still, they are quite standardised within the groups, which allows the identification of typological series; some are numerically significant (see the case of the pointed tools). They are well adapted to different raw material types, illustrating a good knowledge of the field. This assertion is also sustained by the presence of a highly complex transformational technological scheme. We do not know if they were created by specialists, but the repeated elements of the operational sequence found within the assemblage are evidence of skill or knowledge that is transmitted from one generation to the next.

Among these items, the biggest typological category is that of pointed tools, including needles, probably having been related to domestic activities such as hide perforation or knitting of textile fibres (*Campana 1989; LeMoine 1991*). Projectile points, which could certainly be included here, are not present. We think that the varying hardness of the processed materials is also reflected in the different appearances of the active extremity wear. The fact that soft materials were processed is proved by the prevalence of rounded points (Figs. 4.6; 5.5,8; 7.3,6), highly worn, with lengthwise traces of wear.

By their extended and fine use polish (Fig. 8.6,8), spatulas seem to correspond to a functionality characterised by prolonged movement on soft materials, such as hides (*Averbouh, Buisson 2003; Raskova Zelinkova 2010*). However, other studies suggest the use of these objects in clay pot making (*Struckmeyer 2011*). Our own experiments on ceramics illustrated, especially for spatulas with convex extremities, that they are very useful for smoothing surfaces and removing excess clay (*Mărgărit 2015*).

The items categorised as spoons are very interesting. As far as wear is concerned, the area with the most significant polish is the handle. The receptor element presents intense wear in a few of the items. Selena Vitezović (*2014*) considers that they were used for preparing and applying pigments. Even if the hypothesis cannot be rejected, our microscopic analysis did not identify pigments on these items.

The bevelled objects may have been intermediate tools, according to the fracture type, such as wedges for splitting wood or removing tree bark. In most objects, made both of bone and antler, the active front has an intense macroscopic polish, with fine perpendicular marks on the extremity being increasingly more extended on one face. As a result, we may consider that they belong to the transformation tool category, used for processing soft materials (*Maigrot 2000*).

The fish hooks exhibit different degrees of finish, which suggests the importance of this activity to the community's economy. A stock was made, which allowed the quick replacement of broken or lost pieces. Moreover, whenever possible, fractured pieces were repaired. The presence of fish hooks and the total absence of classic harpoons suggest only one type of fishing was practised. The dimensions of the items (in the intact items, the length is generally standardised between 6–7cm) suggest that they were used to catch large fish. Still, the composed tools (Fig. 18) made of antler tine might also have a connection with fishing, resembling some toggle harpoons. The points are not sharpened to be stuck into prey, which urges caution about the proposed hypothesis.

The processed antler objects with a circular active extremity and the development of functional scratches seem to correspond to an action involving breaking and friction for an abrasive material. The wear area is quite well defined, being concave in some cases. At the same time, we have seen that some of these items were used for retouching lithic tools.

The tools made of boar teeth seem to have been used, according to the experimental data, in scraping, and for wood and bark processing (*Maigrot 1999*). Moreover, they were sharpened periodically, indicating prolonged use.

The assemblage demonstrates that these tools were used especially in activities of a domestic nature, like processing leather, vegetal fibre, wood or stone, along with fishing and, to a lesser extent, hunting. All types of artefacts were randomly disposed in the settlement's ensemble, as shown in the previous diagram (Fig. 24). There are no differences even between dwellings and the housekeeping area because, very curiously, finished tools also appear in the pits area, which, in our opinion, was still functional. This might be proof of a multitude of activities developed at domestic level, and the lack of specialisation inside the community in favour of tool management and, implicitly, of activities involving the entire group.

The studies published by Selena Vitezović on a series of Vinča settlements are very useful in this context. We may thus see how the Şoimuş assemblage fits into the larger phenomena of Vinča culture. One example is the site at Divostin; the raw materials that were used indicate a major difference between the two sites. At Divostin, antler (49%) was followed by long bones (36%) and, finally, ribs (9%) (*Vitezović 2013a.Graph 1*). Also, blanks deriving from bones of sheep/goats predominate at Divostin, while at Şoimuş the bones of cattle dominate selection. Typologically, the archaeological assemblages have common features: the most numerous are the pointed tools, followed by chisel-type forms, spatulas, and punching tools. Composite tools such as the toggle harpoon type are attested at Divostin, but also at Drenovac (*Vitezović 2011*). At other three Vinča sites – Vitkovo (*Vitezović, Bulatović 2013*), Drenovac (*Vitezović 2011*) and Grivac (*Vitezović 2013b*) – the selection of raw materials illustrates the prevalence of long bones and ribs of medium-sized ungulates, mainly sheep/goat, while large mammal bones were used to a lesser extent. Typologically, these are roughly the same types of item: pointed tools predominate, followed by chisels and spatulas, and scrapers made of wild boar tooth. At Opovo, fishing tools like those from Şoimuş are mentioned (*Vitezović 2012*). Bracelets made of *Spondylus* and *Glycymeris* valves also appear at other Vinča sites, at Vitkovo, Divostin, Drenovac (*Vitezović 2013c*) or Belo Brdo (*Dimitrijević, Tripković 2006*).

In conclusion, we observe that at the Şoimuş-La Avicola settlement the selection of raw materials is not identical to that of other Vinča sites, for, as Selena Vitezović and Jelena Bulatović (*2013*) stressed, irrespective of the faunal assemblage, sheep/goat bones predominate among tools made of hard animal materials, which demonstrates a deliberate choice. At Şoimuş, we have seen that cattle ribs predominate. Different ratios of antler exploitation have been registered at Vinča settlements. Typologically, at all the sites, pointed tools are the most numerous, but for the remaining typological categories, the proportions are different. The types identified at Şoimuş are also to be found at other Vinča sites, but the picture is never the same. This is why, at least at this stage of the research, the site seems to be exceptional compared to the Vinča sites. Another interesting fact is the preservation of some typological elements which are specific to the previous period – the Starčevo-Criş culture (pointed tools processed by splitting and abrasion, spoons, rings, belt elements) – and more or less absent from Vinča culture sites. Our paper, even if it is a case study, brings useful

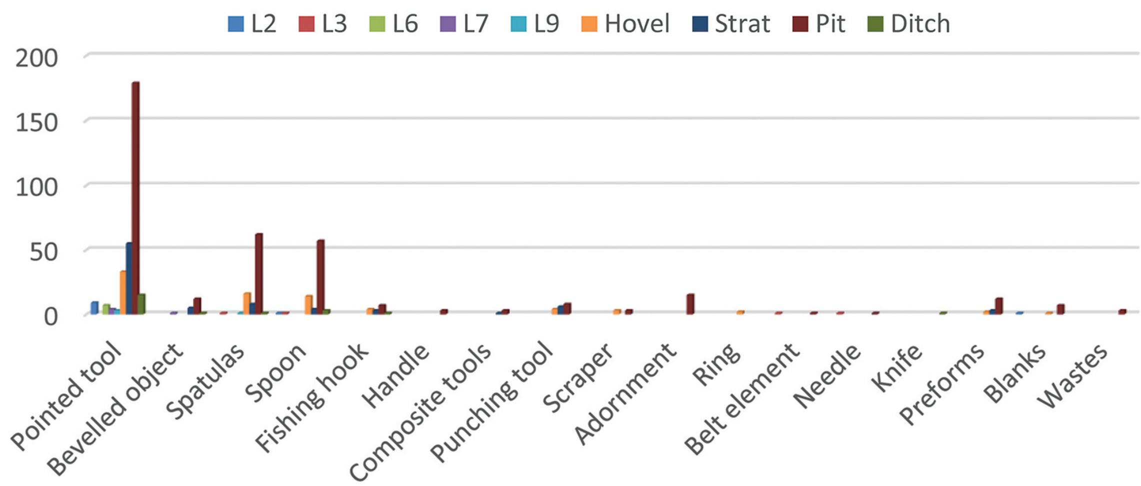


***Fig. 24. Archaeological context for the artefacts at the Şoimuş settlement.***

information about the hard animal material industry specific to the Turdaş culture. Comparative studies connecting these finds to other contemporary or successive sets found in Romania would be needed in order to identify the cultural innovation and continuity processes in time and space.

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## References

Averbouh A. 2000. *Technologie de la matière osseuse travaillée et implication palethnologique; l'exemple des chaînes d'exploitation du bois de cervidé chez les magdaléniens des Pyrénées*. Unpublished PhD thesis. Université de Paris I Panthéon-Sorbonne. Paris.

2005. Collecte du bois de renne et territoire d'exploitation chez les groupes madgaléniens des Pyrénées ariégeoises. In D. Vialou, J. Renault-Miskovsky and M. Patou-Mathis (eds.), *Comportements des hommes du Paléolithique Moyen et Supérieur en Europe: territoires et milieux*. Actes du colloque du G. D. R. 1945 du CNRS, Paris, 8–10 janvier 2003. Eraul 111. Liège: 59–70.

Averbouh A., Buisson D. 2003. Les lissoires. In J. Clottes, H. Delporte (eds.), *La Grotte de la Vache Ariège. I – Les occupations du Magdalénien*. Documents préhistoriques 16. Éditions de la réunion des musées nationaux. Paris: 309–324.

Bajnóczi B., Schöll-Barna G., Kalicz N., Siklósi Z., Hourmouziadis G. H., Ifantidis F., Kyparissi-Apostolika A., Pappa M., Veropoulidou R. and Ziota Ch. 2013. Tracing the source of Late Neolithic Spondylus shell ornaments by stable isotope geochemistry and cathodoluminescence microscopy. *Journal of Archaeological Science 40: 874–882*.

Berciu D. 1966. *Zorile istoriei în Carpaţi şi la Dunăre*. Pagini din istoria patriei. Editura Ştiinţifica. Bucuresti.

Buc N. 2011. Experimental series and use-wear in bone tools. *Journal of Archaeological Science 38(3): 546–557*.

Campana D. 1989. *Natufian and Protoneolithic Bone Tools. The Manufacture and Use of Bone Implements in the Zagros and the Levant*. British Archaeological Reports IS 494. Archaeopress. Oxford.

Chapman J. 1981. *The Vinča culture of South-East Europe: studies in chronology, economy and society*. British Archaeological Reports IS 117. Archaeopress. Oxford.

Choyke A. 2008. Shifting meaning and value through imitation in the European Late Neolithic. In P. F. Biehl, Y. Y. Rassamakin (eds.), *Import and Imitation in Archaeology*. Schriften des Zentrums für Archäologie und Kulturgeschichte des Schwarzmeerraumes 11. Langenweißbach. Beirer, Beran: 5–22.

Dimitrijević V., Tripković B. 2006. *Spondylus* and *Glycymeris* bracelets: trade reflections at Neolithic Vinča-Belo Brdo. *Documenta Praehistorica 33: 237–252*.

Draşovean F. 2013a. In regards to certain Late Neolithic – Early Eneolithic synchronism from Banat and Transylvania. A Bayesian approach to published absolute dates. *Studii de Preistorie 10: 13–48*.

2013b. Despre unele sincronisme de la sfârsitul neoliticului târziu si începutul eneoliticului timpuriu din Banat si Transilvania. O abordare Bayesiană a unor date absolute publicate de curând si republicate recent. *Analele Banatului S.N. XXI: 11–34*.

Gates St Pierre Ch. 2010. Iroquoian Bone Artifacts: Characteristics and Problems. In A. Legrand-Pineau, I. Sidéra, N. Buc, E. David and V. Scheinsohn (eds.), *Ancient and Modern Bone Artefacts from America to Russia. Cultural, Technological and Functional Signature*. British Archaeological Reports IS 2136. Archaeopress. Oxford: 71–85.

van Gijn A. L. 2007. The use of Bone and Antler Tools: Two Examples from the Late Mesolithic in the Dutch Coastal Zone. In St.-P. C. Gates, R. Walker (eds.), *Bones as tools: Current Methods and Interpretations in Worked Bone Studies*. British Archaeological Reports IS 1622. Archaeopress. Oxford: 81–92.

Lazarovici Gh. 1981. Die Periodisierung der Vinča-Kultur in Rumänien. *Prähistorische Zeitschrift 56(2): 169–196*.

Lazarovici C.-M., Lazarovici Gh. 2006. *Arhitectura Neoliticului şi Epocii Cuprului din România, I. Neoliticul*. Trinitas. Bibliotheca Archaeologica Moldaviae. Iasi.

Legrand A. 2007. *Fabrication et utilisation de l'outillage en matières osseuses du Néolithique de Chypre: Khirokitia et Cap Andreas-Kastros*. British Archaeological Reports IS 1678. Archaeopress. Oxford.

Legrand A., Sidéra I. 2007. Methods, Means, and Results When Studying European Bone Industry. In St.-P. C. Gates, R. Walker (eds.), *Bones as tools: Current Methods and Interpretations in Worked Bone Studies*. British Archaeological Reports IS 1622. Archaeopress. Oxford: 291–304.

LeMoine G. 1991. *Experimental Analysis of the Manufacture and Use of Bone and Antler Tools among the Mackenzie Inuit*. Unpublished PhD thesis. University of Calgary. Calgary.

Luca S. A. 1997. *Aşezări neolitice pe Valea Mureşului (I). Habitatul turdăşean de la Orăştie-Dealul Pemilor (punct X2)*. Bibliotheca Musei Apulensis IV. Alba Iulia.

2001. *Aşezări neolitice pe Valea Mureşului (II). Noi cercetări arheologice la Turdaş-Luncă I. Campaniile anilor 1992–1995*. Bibliotheca Musei Apulensis XVII. Alba Iulia.

2012. *Cercetările arheologice preventive de la Turdaş-Luncă (jud. Hunedoara). Campania 2011*. Bibliotheca Brukenthal LIX. Sibiu.

Maigrot Y. 1999. Technical and functional study of ethnographic (Irian Jaya, Indonesia) and archaeological (Chalain and Clairvaux, Jura, France, 30th century BC) tools made from boars's tusks. In P. Pétrequin, S. Beyries (eds.), *Ethno-archaeology and its transfers*. British Archaeological Reports S983. Archaeopress. Bournemouth: 67–79.

2000. Les outils en matières dures animales utilisés pour le travail du bois à Chalain station 4 (Neolithique final, Jura). In P. Bodu, Cl. Constantin (eds.), *Approches fonctionnelles en Préhistoire. XXV-ème Congrès Préhistorique de France*. Nanterre. Société préhistorique française. Paris: 67–82.

2003. *Etude technologique et fonctionnelle de l'outillage en matières dures animales: La station 4 de Chalain (Néolithique final, Jura, France)*. Unpublished PhD thesis. Université de Paris I Panthéon-Sorbonne. Paris.

Malinowski B. 1939. The group and the individual in functional analysis. *American Journal of Sociology 44: 938–964*.

1989. *Les argonautes du Pacifique Occidental*. Gallimard. Paris.

Mărgărit M. 2015. Spatulas and abraded astragalus: Two types of tools used to process ceramics? Examples from the Romanian prehistory. *Quaternary International:* http://dx.doi.org/10.1016/j.quaint.2015.07.057.

Niţă L., Ştefan C. E., Dimache M., Hila T. and Petcu R. 2015. Consideratii privind industria litică de la Şoimuş-La Avicola (*Ferma 2*), jud. Hunedoara. Buletinul Muzeului Judetean Teleorman. *Seria Arheologie 7: 97–116*.

Petcu R., Petcu Răz. and Heroiu A. 2012. Şoimuş 1 (*La Avicola*), km. 29+750–30+300. In *Cronica Cercetărilor Arheologice. Campania 2011*. cIMeC – Institutul De Memorie Culturală. Bucureşti: 291–292.

Pétrequin M., Pétrequin P. 2006. *Objets de pouvoir en Nouvelle – Guinee*. Le Petit Journal des grandes expositions 394. Musée d'Archéologie nationale. Saint-Germain-en-Laye.

Pfaffenberger B. 1988. Fetishised Objects and Humanised Nature: Towards an Anthropology of Technology. *Man. New Series 23(2): 236–252*.

Provenzano N. 2001. *Les industries en bois de Cervidés des Terramares émiliennes*. Unpublished PhD thesis. Université Aix-Marseille II. Marseille.

Ramseyer D. 2001 (ed.). *Objets méconnus. Fiches typologiques de l'industrie osseuse préhistorique*. Cahier IX. Éditions Société préhistorique française. Paris.

Raskova Zelinkova M. 2010. Reconstructing the "Chaîne operatoire" of skin processing in Pavlovian bone artifacts. In A. Legrand-Pineau, I. Sidéra, N. Buc, E. David and V. Scheinsohn (eds.), *Ancient and Modern Bone Artefacts from America to Russia. Cultural, Technological and Functional Signature*. British Archaeological Reports IS 2136. Archaeopress. Oxford: 191–200.

Roska M. 1941. *Die Sammlung Zsófia von Torma in der numismatischarchaeologische Abteilung des Siebenbürgischen National museums*. Cluj.

Shakelton J., Elderfield H. 1990. Strontium isotope dating of the source of neolithic european Spondylus shell artefacts. *Antiquity 64: 312–331*.

Sidéra I. 2011. Fabriquer des cuillers en os: L'exemple de Kovacevo. *Studia Praehistorica 14: 55–62*.

Sidéra I., Legrand A. 2006. Tracéologie fonctionnelle des matières osseuses: une méthode. *Bulletin de la société préhistorique française 103(2): 291–304*.

Struckmeyer K. 2011. The bone tools from the dwelling mound Feddersen Wierde, Germany, and their functions. In J. Baron, B. Kufel-Diakowska (eds.), *Written in Bones. Studies on technological and social contexts of past faunal skeletal remains*. Uniwersytet Wrocławski. Instytut Archeologii. Wrocław: 187–195.

Suciu C. 2009. *Cultura Vinča în Transilvania*. Altip. Alba Iulia.

Ştefan C. E. 2014. Some special clay artifacts from Şoimuş-*La Avicola* (*Ferma 2*), Hunedoara County, Romania. *The Old Potter's Almanack 19(2): 14–22*.

Ştefan C. E., Petcu R. 2015. Notă asupra unor capace de lut cu trăsături umane de la Şoimuş-*La Avicola* (*Ferma 2*), jud. Hunedoara. *Studii de Preistorie 12: 117–126*.

Ştefan C. E., Petcu R. and Petcu Răz. 2013. Reprezentări antropomorfe din aşezarea neolitică de la Şoimuş-La Avicola (*Ferma 2*), jud. Hunedoara. *Studii de Preistorie 10: 49–66*.

2015. Vase cu picioare de la Şoimuş-*La Avicola* (*Ferma 2*), jud. Hunedoara. *Studii Şi Cercetări De Istorie Veche Şi Arheologie 66(3–4): 183–209*.

Vitezović S. 2011. The Neolithic Bone industry from Drenovac, Serbia. In J. Baron, B. Kufel-Diakowska (eds.), *Written in Bones. Studies on technological and social contexts of past faunal skeletal remains*. Uniwersytet Wrocławski. Instytut Archeologii. Wrocław: 117–135.

2012. Neolithic bone industry in Banat. In I. Pantović (ed.), *Proceedings of the Regional Conference "Research, Preservation and Presentation of Banat Heritage: Current State and Long Term Strategy"*. City Museum of Vršac. Regional Center for Cultural Heritage of Banat Concordia. Vršac: 25–29.

2013a. The Vinča culture bone industry from Divostin. *Zbornik Narodnog muzeja 21(1): 109–127*.

2013b. The prehistoric bone tool assemblage from Grivac (central Serbia). *Glasnik Srpskog arheološkog društva 29: 209–231*.

2013c. Personal ornaments in the Vinča culture: the case study of Vitkovo and Stragari. In I. V. Ferencz, N. C. Rişcuţa and O. Tutilă Bărbat (eds.), *Archaeological small finds and their significance*. Mega. Deva-Cluj-Napoca: 9–20.

2014. Manufacturing techniques in the Early Neolithic: Manufacturing bone and antler at Starčevo-Grad (northern Serbia). *Poster presented at 10th Meeting of the Worked Bone Research Group of the International Council for Archaeozoology*. Institute of Archaeology. Beograd.

Vitezović S., Bulatović J. 2013. Managing raw materials in Vinča culture: a case study of osseous raw materials from Vitkovo. *Documenta Praehistorica 40: 279–289*.

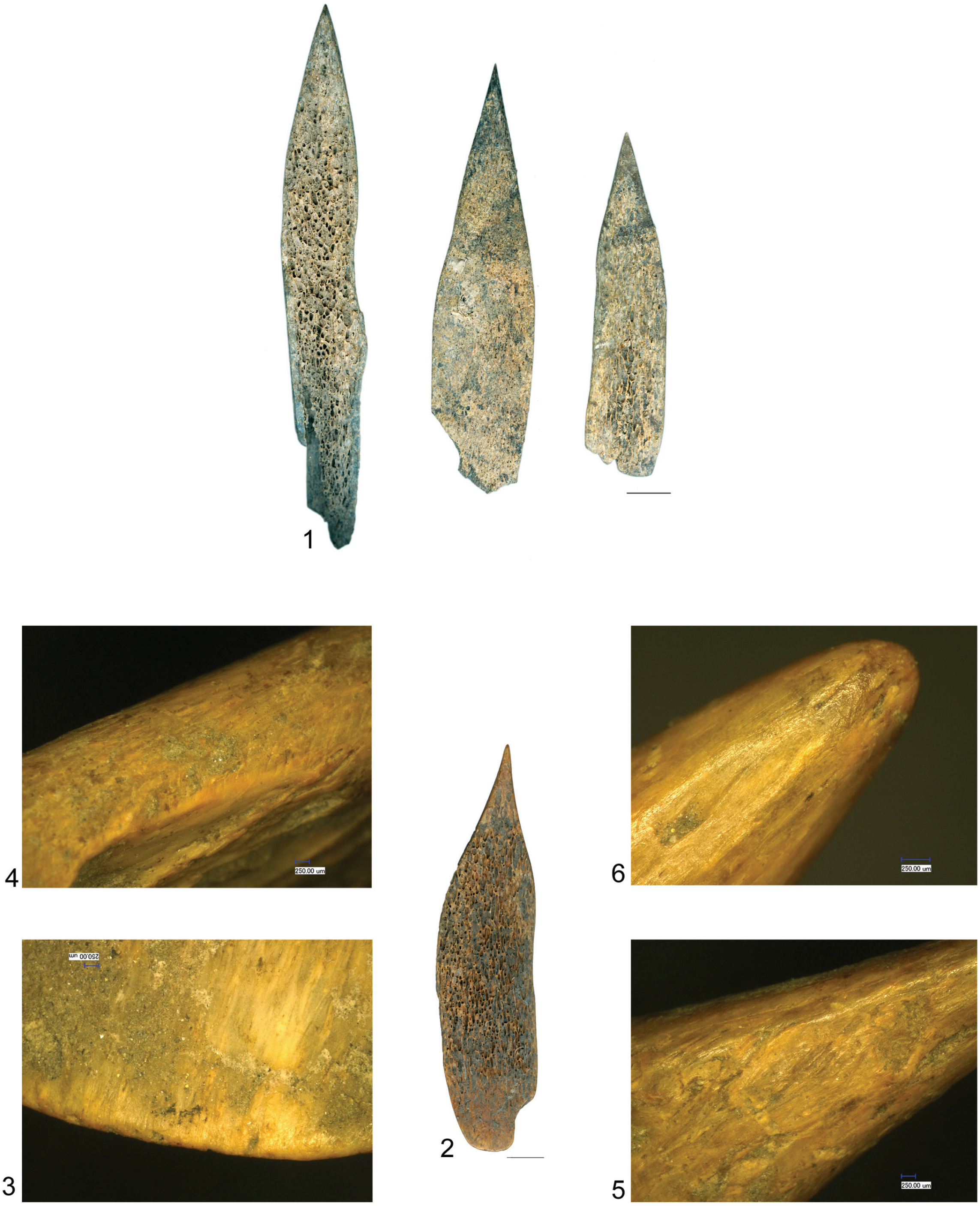


***Fig. 4.*** 1, 2 ***pointed tools made on cattle (*****Bos taurus*****) rib;*** 3 ***proximal end developed by abrasion;*** 4 ***shaping of debitage edges by abrasion;*** 5 ***point developing by scraping;*** 6 ***point with extended wear.***

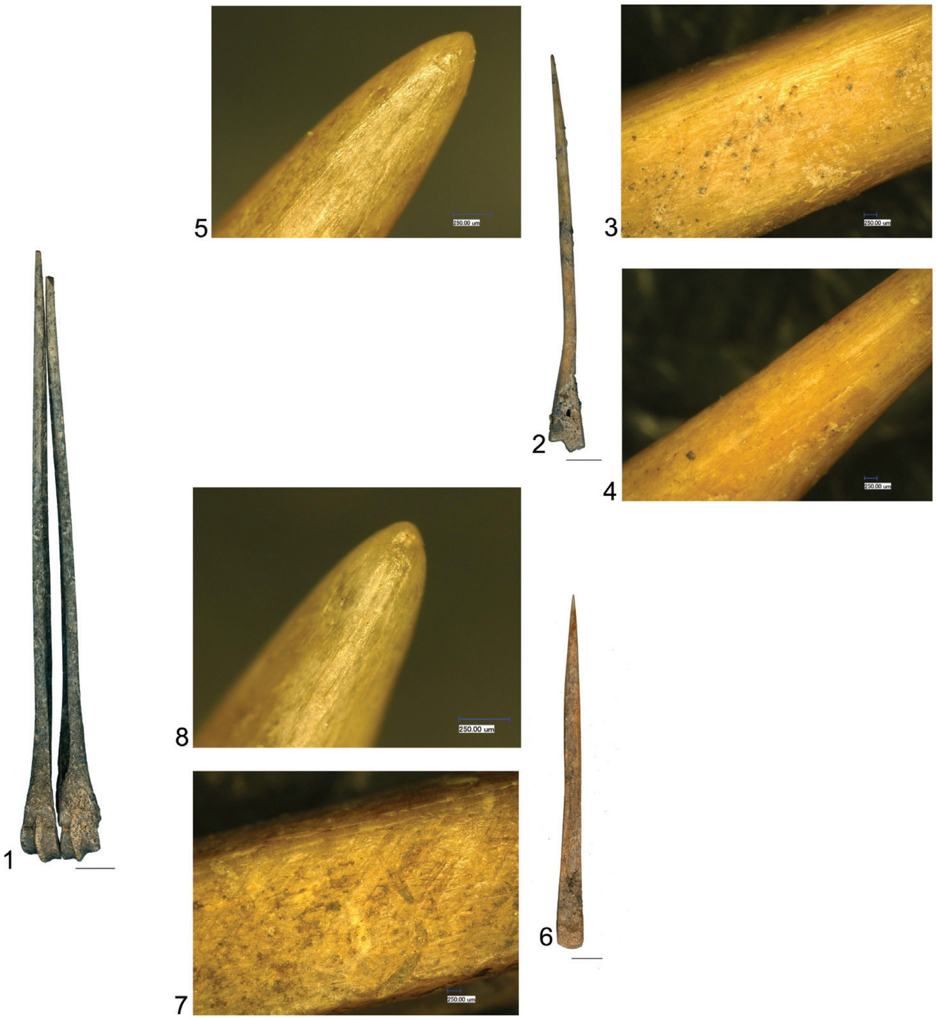

***Fig. 5.*** 1, 2, 6 ***pointed tools obtained by a bipartition debitage method;*** 3, 7 ***debitage by bifacial abrasion;*** 4 ***point developed by scraping;*** 5, 8 ***points with functional wear.***

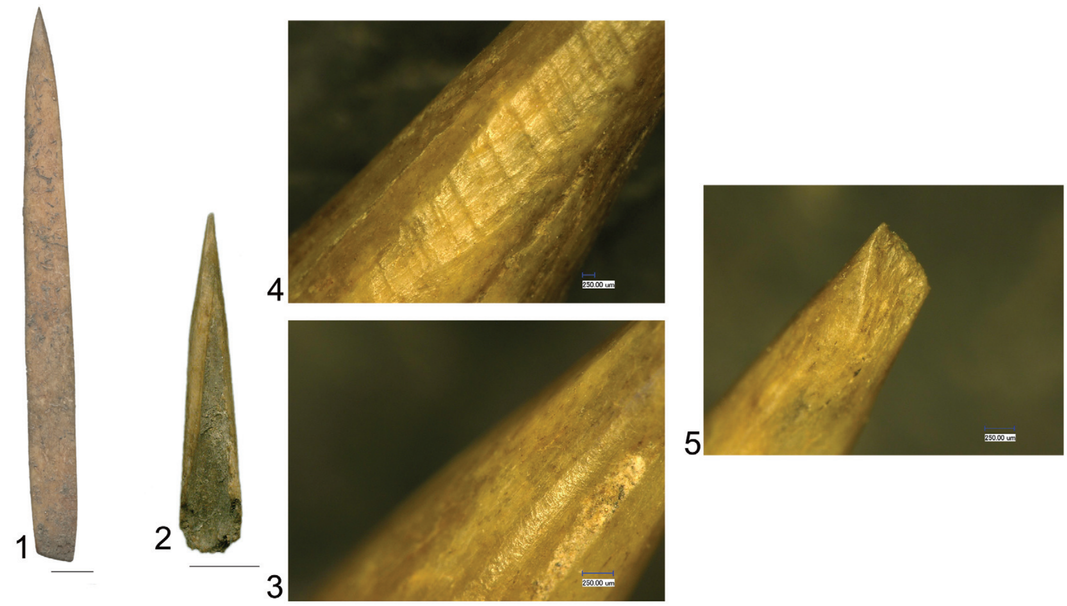

***Fig. 6.*** 1, 2 ***pointed tools obtained through splitting the bone into four;*** 3 ***abrasion of debitage edges;*** 4 ***point developing by scraping;*** 5 ***fractured point.***

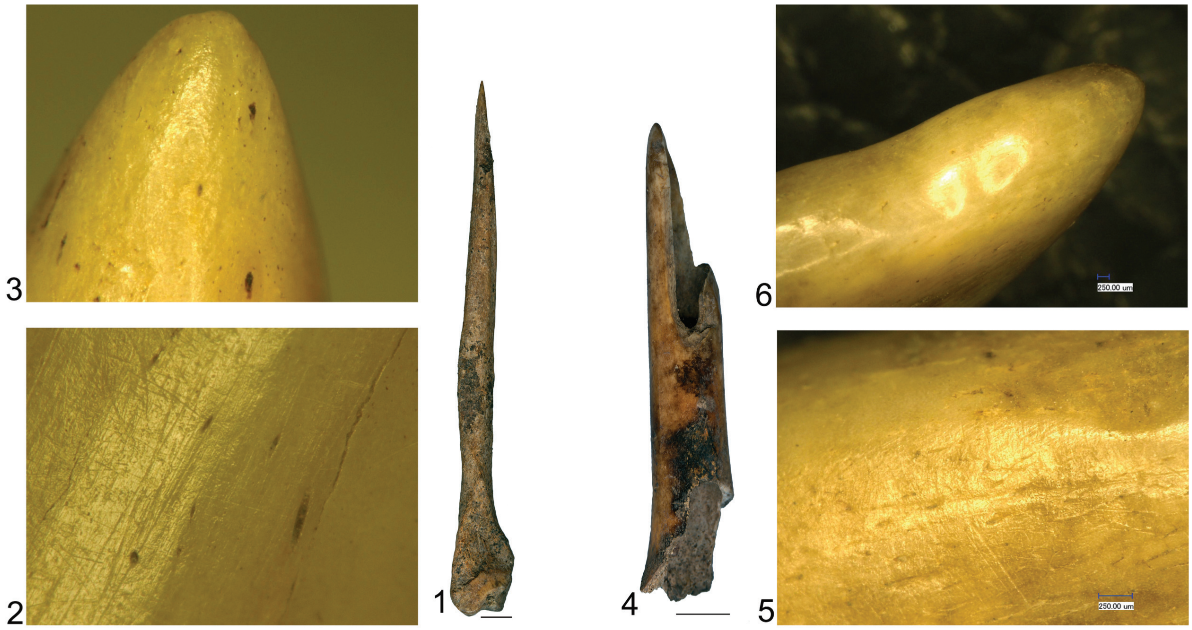


***Fig. 7.*** 1, 4 ***pointed tools made on blanks on preserved volume;*** 2 ***point achieved by scraping;*** 5 ***wear on surface;*** 3, 6 ***active front highly worn.***

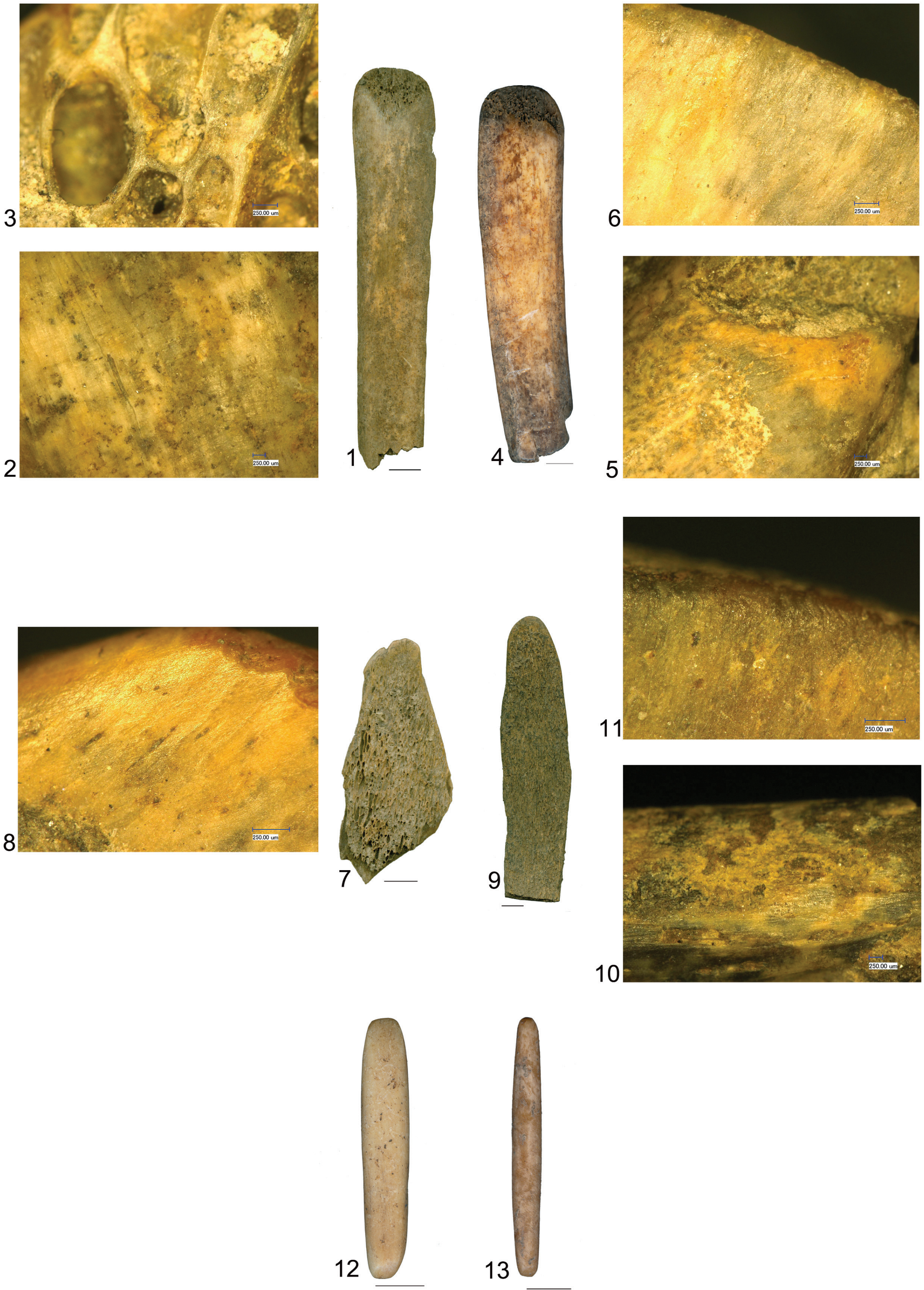


***Fig. 8.*** **1, 4, 7, 9, 12, 13 *different types of spatula;* 2, 5 *active front made by abrasion;* 10 *debitage edges shaped by scraping;* 3, 6, 8, 11 *active surface with wear traces.***

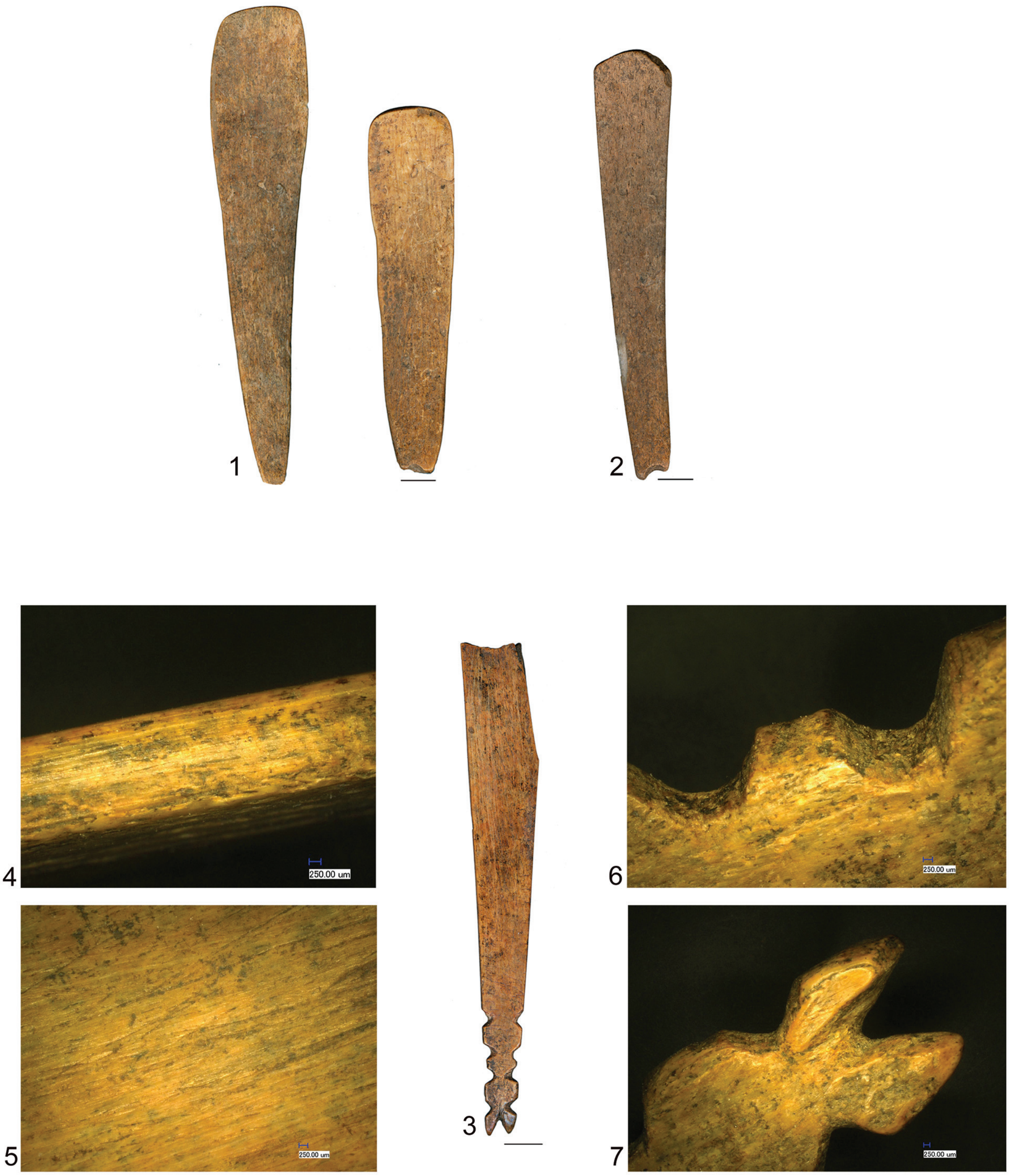


***Fig. 9.*** **1, 2, 3 *spoons made on rib split lengthwise;* 4 *debitage edges shaped by scraping;* 5 *concavity achieved by lengthwise scraping;* 6, 7 *proximal extremity cut by sawing.***

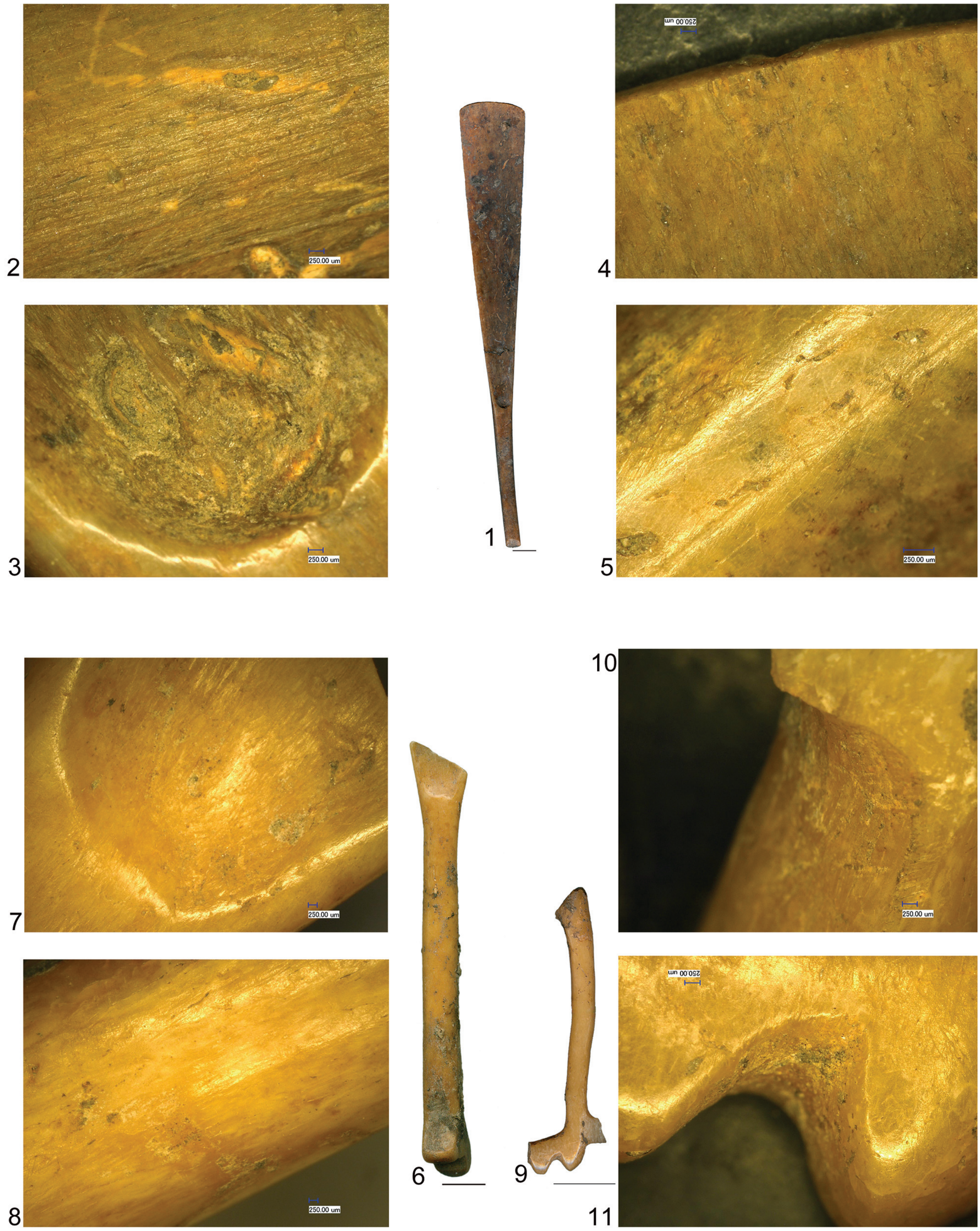

***Fig. 10.*** **1** ***spoon made on long bone diaphysis;*** **2, 7** ***concavity developed by scraping;*** **3** ***procedure of delineation by perforation;*** **4** ***distal extremity shaped by abrasion;*** **5, 8** ***wearing present on the handle;*** **6, 9** ***meso-proximal fragments deriving from spoons;*** **10** ***handler developed by scraping;*** **11** ***detail of proximal extremity.***

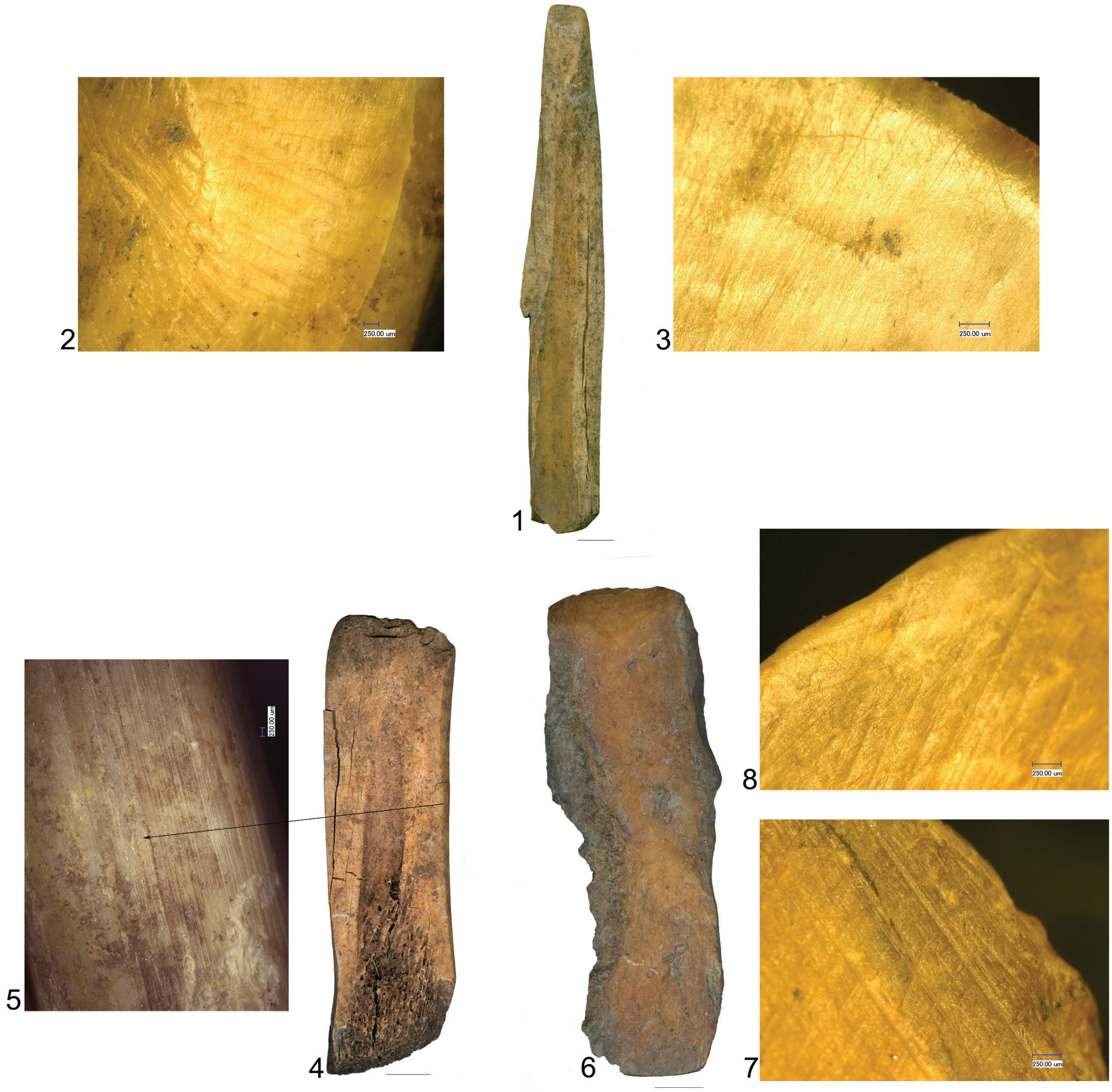

***Fig. 11.*** 1, 4, 6 ***bevelled objects;*** 2 ***active surface processing by abrasion;*** 3 ***active surface wearing;*** 5 ***splitting method involving grooving;*** 7, 8 ***re-sharpening active surface.***

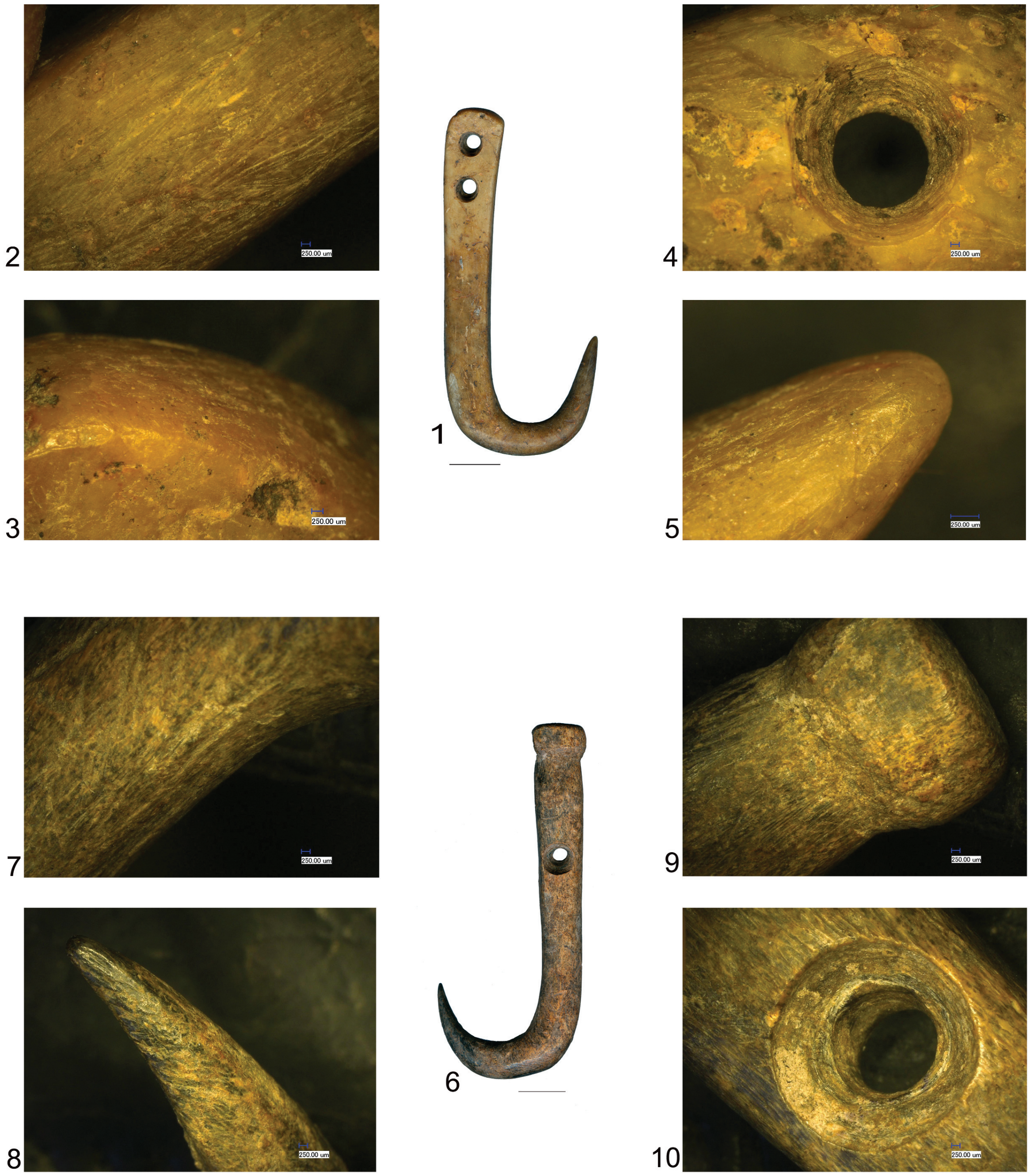


***Fig. 12. Fish hooks made of bone** 1 **and antler** 6**;** 2, 7 **preform processing by scraping;** 5, 8 **point sharpened by scraping;** 3 **distal extremity achieved by abrasion;** 4, 10 **perforation made by rotation;** 9 **clasping system made by sawing.***

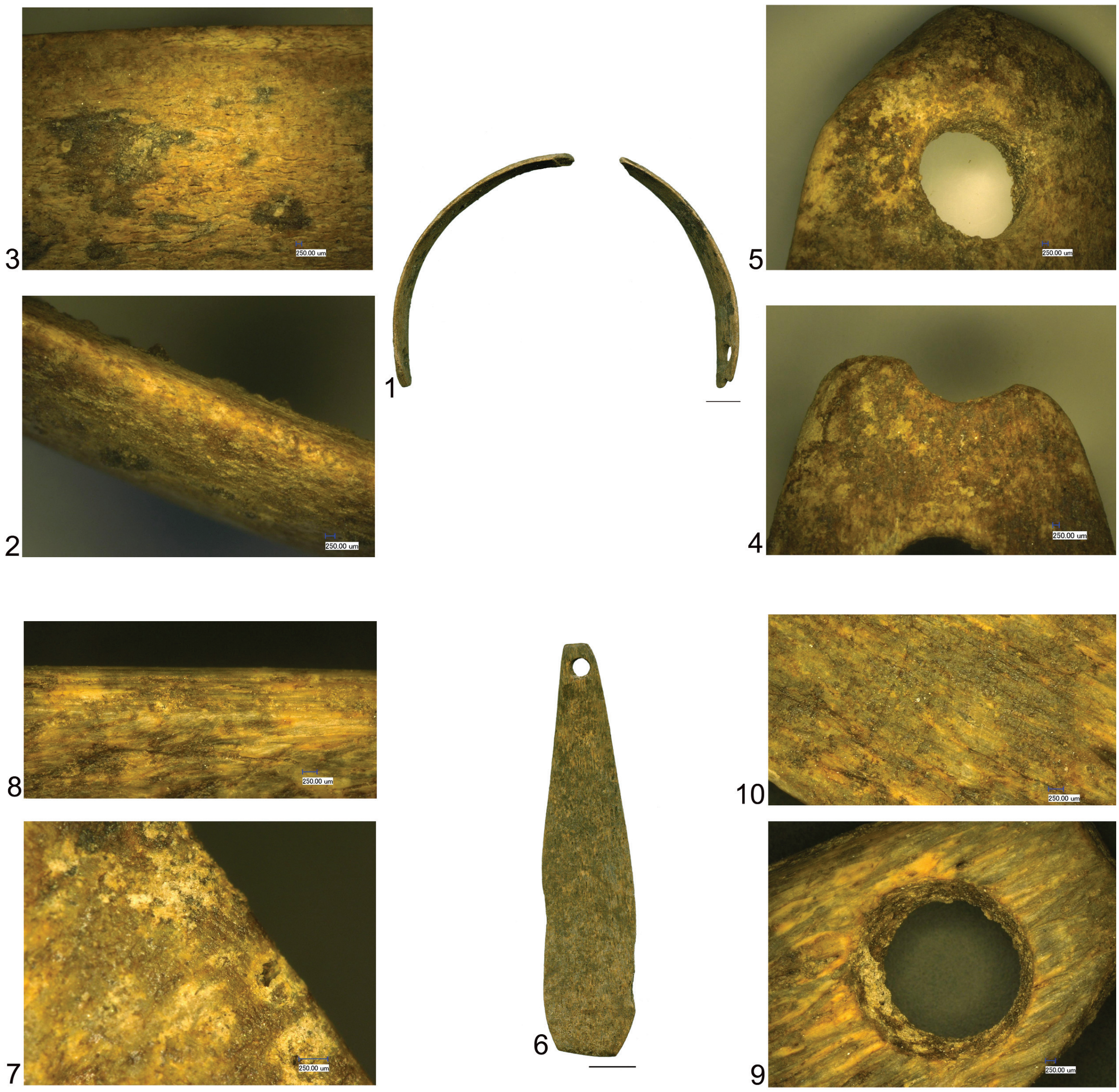


***Fig. 13.*** 1 ***bracelet made on rib;*** 2, 3, 8 ***scraping of debitage edges and inferior side;*** 4 ***fracture at the perforation;*** 5, 9 ***perforation made by bifacial rotation;*** 6 ***pendant made on rib;*** 7, 10 ***inferior side and extremities abrasion.***

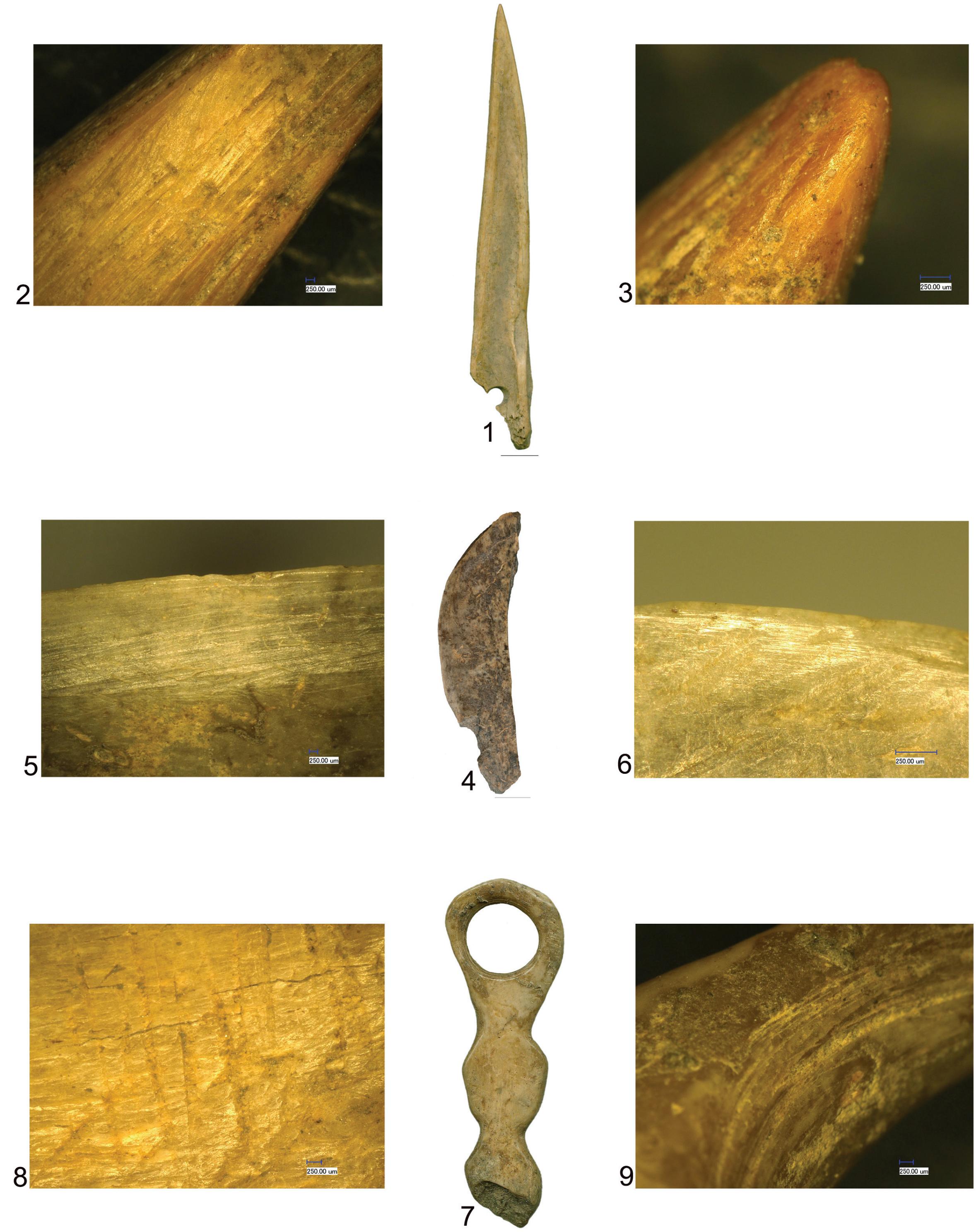


***Fig. 14.*** ***1 bone needle; 2 point developing by scraping; 3 point with functional wear; 4 knife; 5 active surface achieved by scraping; 6 active surface wear; 7 belt element; 8 surface shaping; 9 detail perforation.***

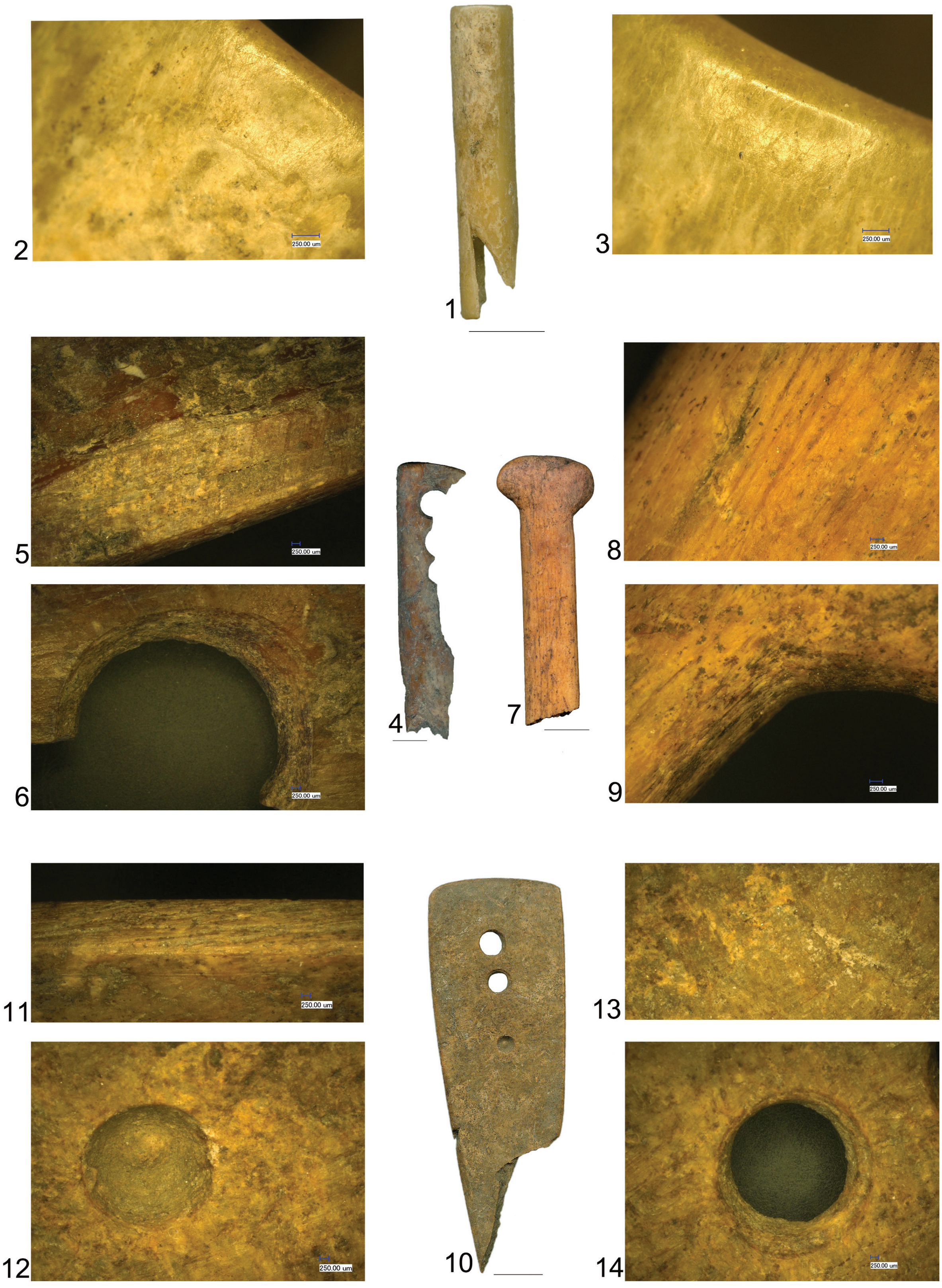


***Fig. 15.*** ***1 bone handle; 2 traces of segmentation; 3 abrasion of the segmentation plan; 4, 7, 10 items of undetermined function; 5 abrasion of the debitage plan; 6, 12, 14 perforations details; 8 surface scraping; 9 traces of sawing; 11 scraping of debitage edge; 13 abrasion area.***


***Fig. 16.*** **1 *preform for a fish hook;* 2 *perforation detail;* 3 *traces of grooving;* 4 *preform;* 5, 9 *punches;* 6 *segmentation by percussion;* 7, 8 *active surface detail;* 10 *procedure of surface modification;* 11 *area with functional traces.***

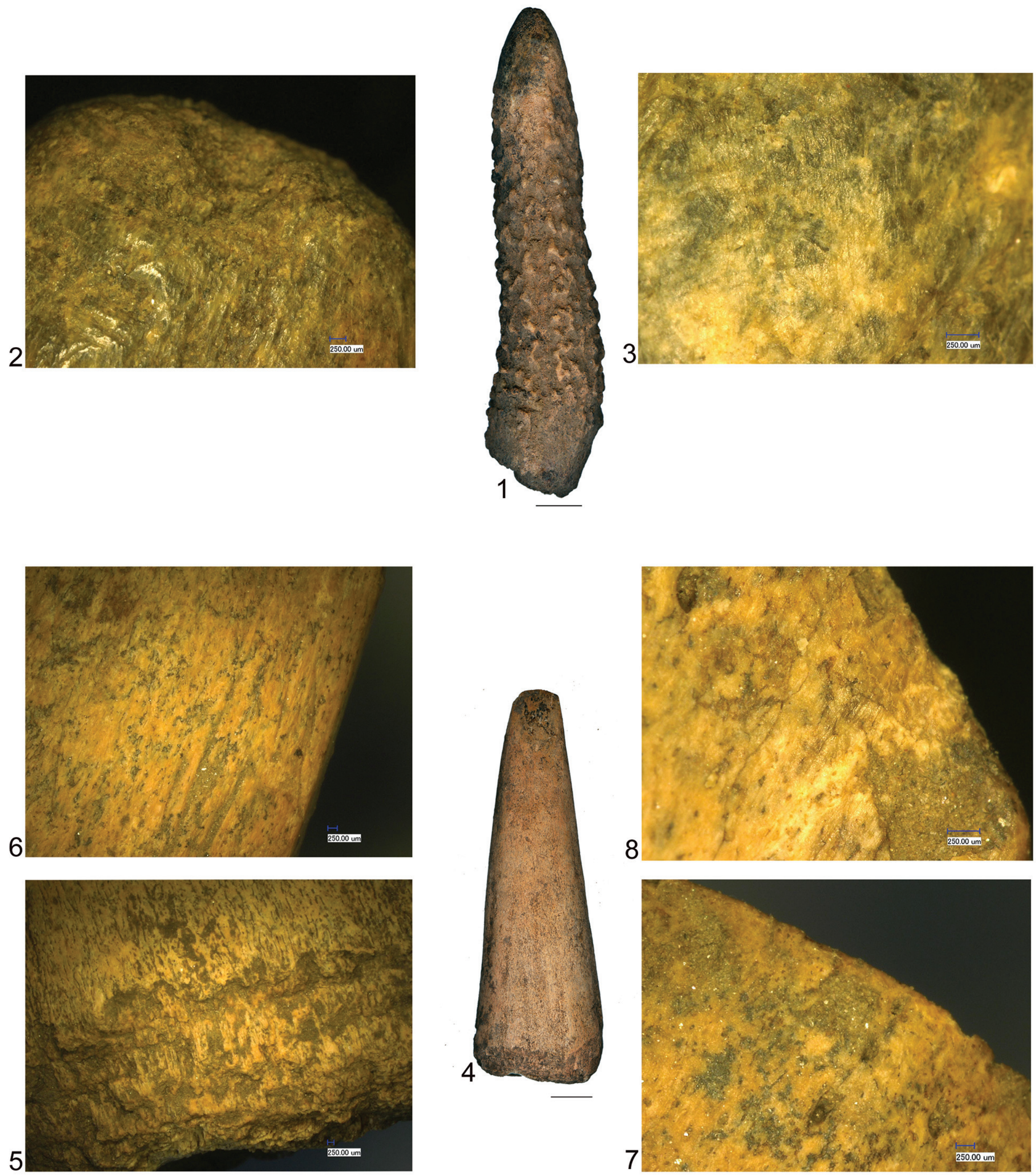

*Fig. 17.* 1, 4 ***bevelled objects; 2 active surface developed by percussion; 3, 8 active surface detail; 5 segmentation by percussion; 6 active surface processed by scraping; 7 shaping of active surface.***


***Fig. 18.*** **1, 5, 8** ***composite tools made of red deer (*****Cervus elaphus*****) antler;*** **2** ***scraping;*** **4, 7** ***perforation detail;*** **3** ***groove detail;*** **6** ***shaped proximal extremity.***

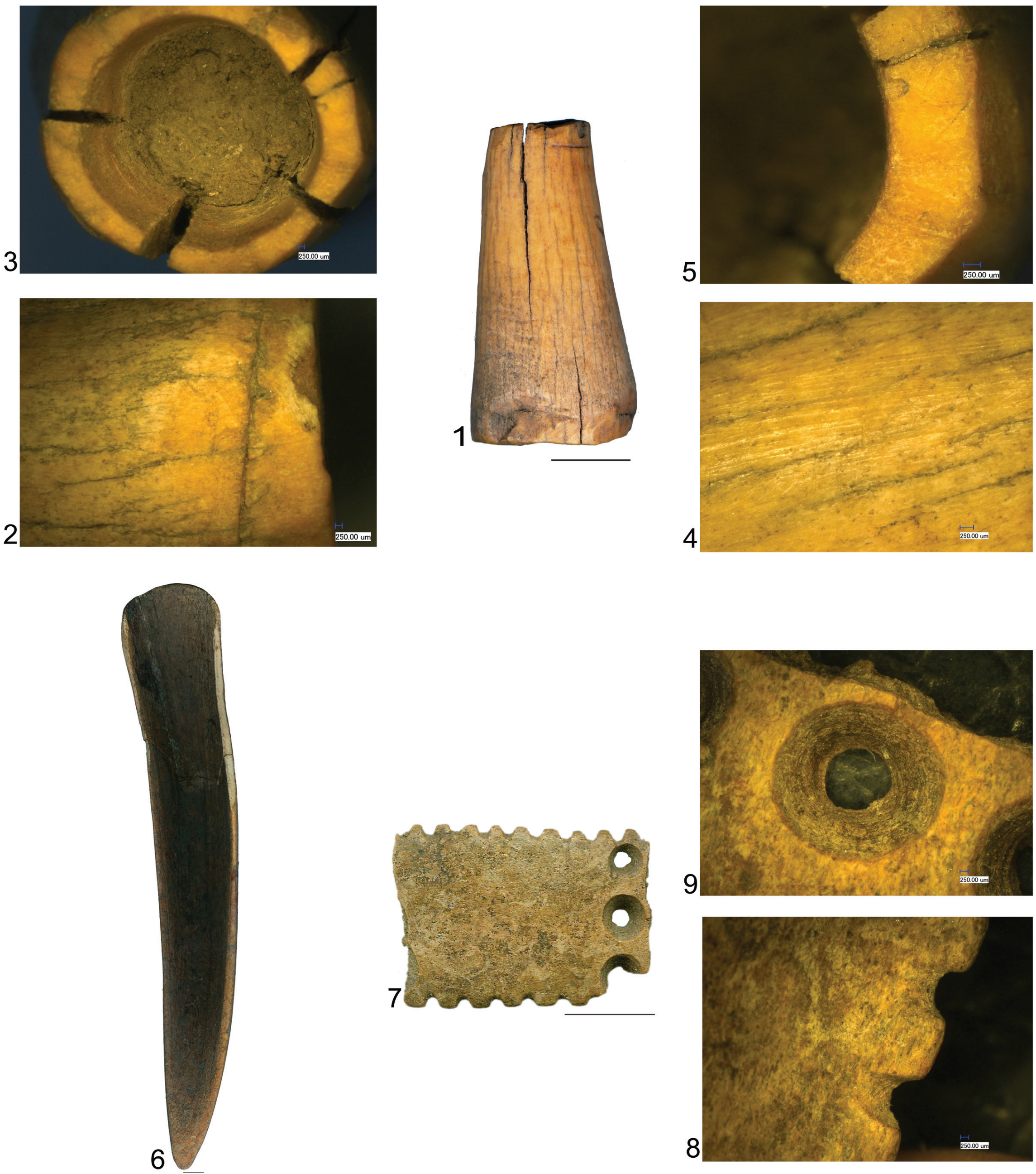

***Fig. 19.*** **1 *antler handle;* 2 *segmentation by percussion;* 3 *hole for gloving;* 4 *scraping;* 5 *abrasion of segmentation plan;* 6 *receptacle;* 7 *bracelet;* 8 *detail of ornament;* 9 *perforation detail.***

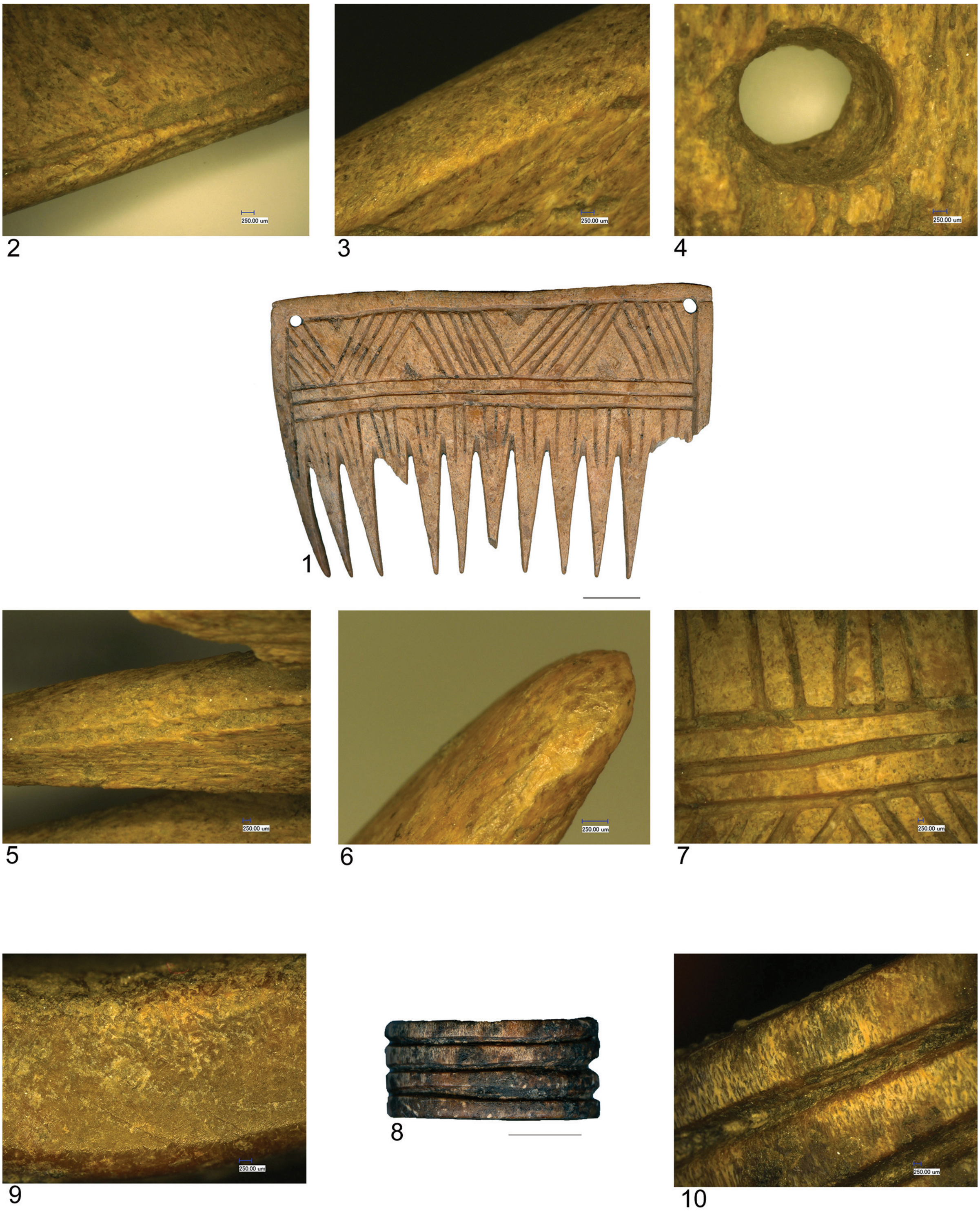


***Fig. 20.*** 1 *comb;* 2 *method of extraction by sawing;* 3 *abrasion of the debitage edges;* 4 *perforation detail;* 5 *teeth detached by grooving;* 6 *tooth with wearing;* 7 *ornament detail;* 8 *ring;* 9 *abrasion of segmentation plan;* 10 *ornament made by grooving.*

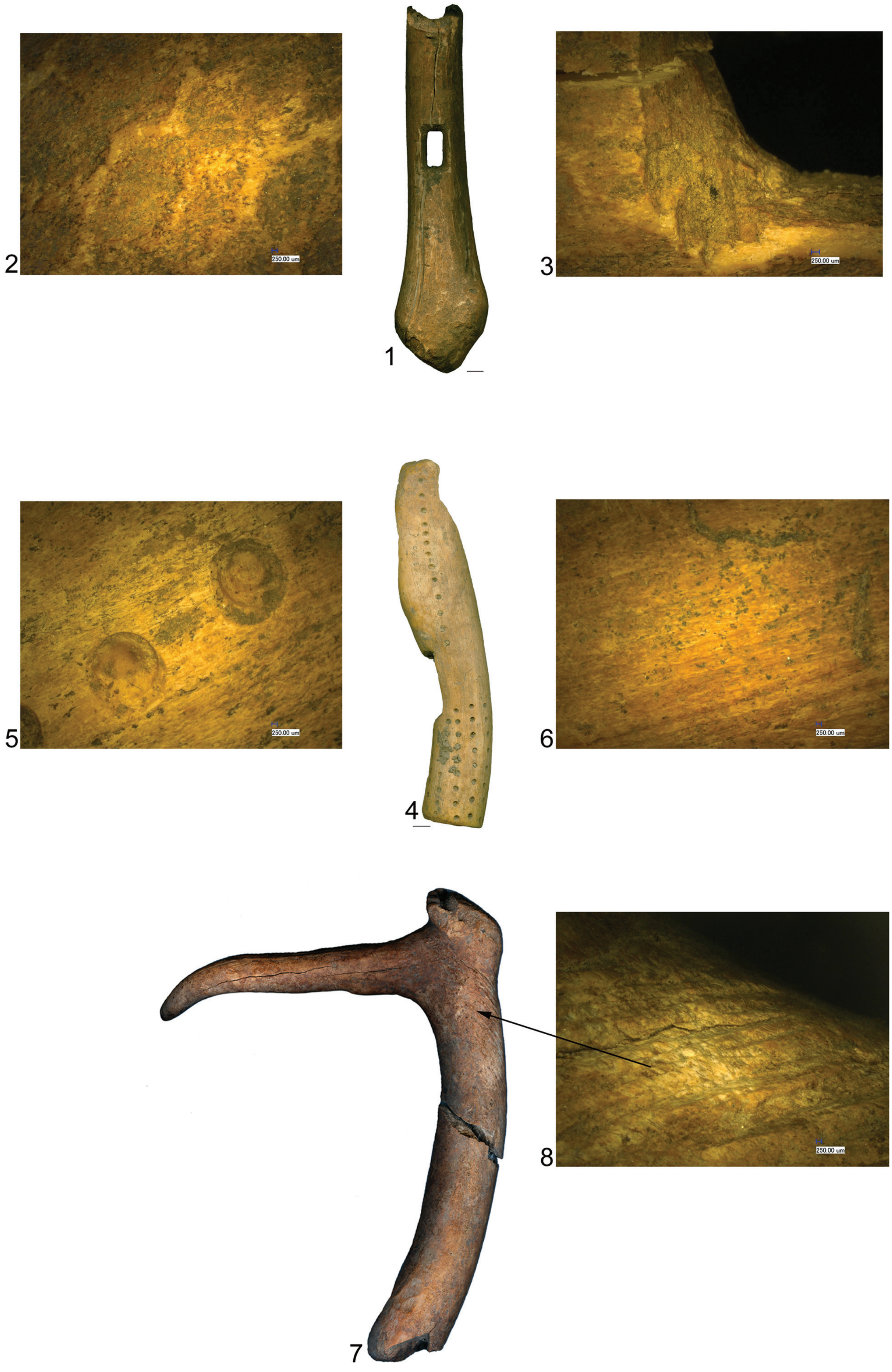


***Fig. 21.*** 1, 4, 7 ***items of indeterminate function made of antler;*** 2 ***pearling elimination by percussion;*** 3 ***perforation made by cutting;*** 5 ***decoration made by rotation;*** 6 ***surface shaping by scraping;*** 8 ***incisions on the item's surface.***


***Fig. 22. Preforms made of red deer (*****Cervus elaphus*****) 1 and roe deer (*****Capreolus capreolus*****) 2 antler; 3, 7 scrapers made of boar (*****Sus scrofa*****) tooth; 4 splitting by grooving; 5 abrasion of the inferior side; 6, 9 active surface achieved by scraping; 8 abrasion of proximal extremity.***

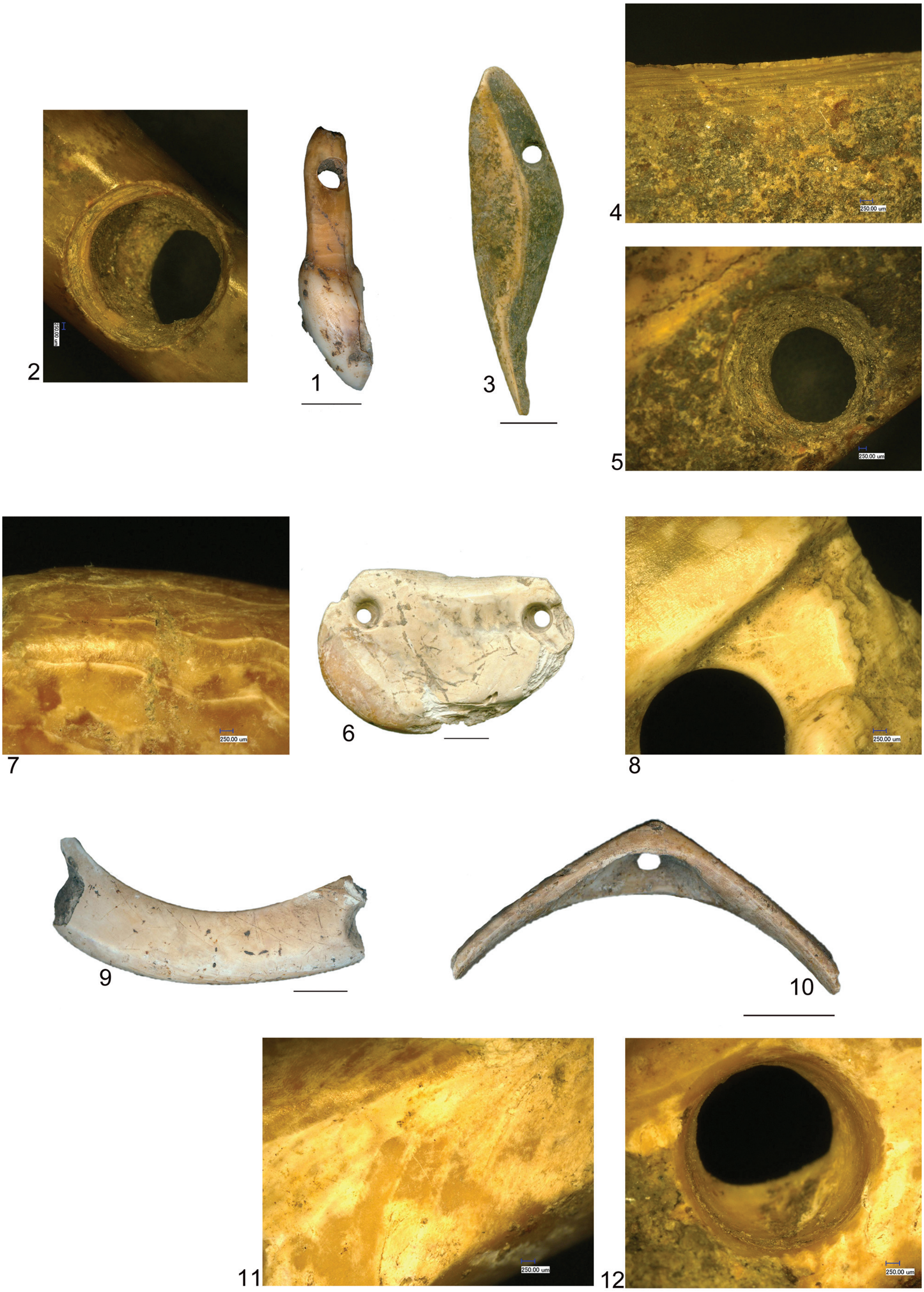


***Fig. 23.*** 1 ***perforated cattle (*****Bos taurus*****) tooth;*** 2 ***perforation detail;*** 3 ***pendant made of boar (*****Sus scrofa*****) canine;*** 4 ***scraping of debitage edges;*** 5, 8, 12 ***perforation detail;*** 6 ***perforated plaque of*** **Spondylus** ***valve;*** 7 ***surface abrasion;*** 8 ***deformation of the perforation;*** 9 ***bracelet of*** **Spondylus** ***valve;*** 10 ***bracelet of*** **Glycymeris** ***valve,*** 11 ***surface modification by abrasion.***