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Bone manufacturing in the Late Neolithic of the Thrace region

La fabrication d'outils en os dans le Néolithique récent dans la région de Thrace

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Abstract: Production of bone tools is an important part of the craft production among the Neolithic and Eneolithic communities; analyses of manufacturing procedures may provide information regarding the technological know-how, knowledge transmission and overall organisation of production. In this paper, manufacturing procedures among the Neolithic communities in the eastern Balkan area will be analysed, using as a case study the assemblage from the site of Hadzhidimitrovo, with the focus on production from long bones. Long bones were used for the most frequent artefact types—different pointed and bevelled tools, as well as some ornamental and other items. Four main methods were identified: 1) almost entire bones were used, with limited modification and with a more or less preserved original shape of the bone; 2) blanks were obtained by longitudinal division; 3) and by transversal division; and 4) simple irregular fragments were used, produces by direct or indirect percussion. For the majority of tools, it is possible to note the strict choices of skeletal elements and manufacturing procedures, suggesting that bone production was an important, planned activity, revealing also a high level of standardisation.
Keywords: Neolithic, Balkans, technology, bone tool production.

Résumé : La fabrication d'objets en matières dures animales constituait une partie importante de la production artisanale au sein des communautés néolithiques ; l'analyse des procédures de fabrication permet d'apporter des informations précieuses sur les savoir-faire de ces communautés, sur la transmission des connaissances, sur l'organisation de la production artisanale et sur les relations sociales qui les sous-tendent. Nous présentons ici l'analyse des modes de fabrication des objets sur os longs du site du Hadzhidimitrovo, situé près de la ville de Yambol (Bulgarie), et dont les fouilles menées en 2010 ont mis au jour un assemblage constitué de plus de 700 objets. Les os longs sont le plus fréquemment utilisés pour la fabrication d'objets pointus ou biseautés et pour celle d'ornements. Il s'agit de métapodes, d'ulnas ou de tibias de chèvre et/ou de mouton, de vache, de chevreuil et de cerf.
On peut identifier quatre méthodes de production des supports : 1) par façonnage direct d'os presque entiers, avec de peu modifications. L'objet fini garde ainsi une forme proche de la forme anatomique ; 2) par partition longitudinale des métapodes, ce qui produit des supports bipartites ou, plus rarement, quadripartites ; 3) par segmentation transversale d'os longs pour produire des tronçons ; 4) par fracturation pour produire des fragments ou des éclats.
Les objets sur support anatomique sont des outils appointés sur ulna et des outils biseautés sur tibia. Les outils sur ulna ont souvent l'épiphyse proximale préservée, tandis que l'extrémité distale est appointée par abrasion ; parfois une partie du corps de l'ulna est supprimée avant l'appointage. Une seule fibula a été utilisée et mise en forme de la même manière afin de produire un poinçon. Un constat analogue a été fait pour un outil biseauté fabriqué à partir d'une ulna. Les outils biseautés sont aménagés sur des tibias de chèvre et/ou de mouton, rarement de chevreuil ; l'épiphyse distale est conservée, ainsi que la majeure partie de la diaphyse. Une fois l'épiphyse proximale supprimée par sciage, la diaphyse est régularisée par abrasion de manière à aménager un biseau à front tranchant.
La partition longitudinale est utilisée pour obtenir des supports pour tous les types d'outils pointus, que la pointe soit fine, moyenne ou massive. Les métapodes ont été utilisés le plus souvent. Plusieurs méthodes ont été mises en œuvre pour produire les supports : abrasion seule ; abrasion suivie d'un sciage ou, inversement, sciage suivi d'une abrasion ; parfois le produit obtenu est à nouveau partitionné par rainurage pour obtenir un support correspondant à un quart du volume original de la diaphyse. La méthode la plus fréquemment

utilisée combine plusieurs techniques – une rainure est installée le long du sulcus pour produire un support sur hémi-métapode, celui-ci est ensuite divisé en deux transversalement par sciage ou par percussion indirecte, et la forme finale est obtenue par abrasion. Ainsi, le type le plus fréquent est celui des poinçons sur métapodes de chèvre et/ou de mouton, conservant la moitié de l'épiphyse distale comme base. Ces poinçons sont caractérisés par une section semi-circulaire et une extrémité distale appointée.
La segmentation est utilisée pour fabriquer des objets sur tronçons de section anatomique circulaire. Une ligne de faiblesse est installée avec un outil en pierre, celle-ci est approfondie et achevée par un sciage à la ficelle avec une fibre abrasive humide. Les segments obtenus sont de dimensions variables, ils peuvent être étroits, similaires à des anneaux, et utilisés comme des sortes de bagues ou des ornements vestimentaires ; les segments plus longs sont utilisés comme des manches et comme des ornements. Les traces d'usure sont différentes. Les manches sont polis avec des surfaces usées et, sur l'extrémité d'insertion de l'outil ou dans le canal de l'os, des stries ou des sillons sont parfois visibles.
Les ornements sont fabriqués très finement, puis soigneusement polis ; les stigmates de débitage sont ainsi fréquemment effacés. Certains ornements sont perforés ou décorés de lignes gravées et de points, dont certains sont comme des perforations inachevées. Enfin, quelques fragments irréguliers ont été utilisés. Ils ont été obtenus par percussion directe ou indirecte, et peuvent découler d'une récupération parmi des déchets de cuisine, des déchets de production d'autres objets ou encore parmi des objets cassés. Souvent, seules leurs parties distales sont aménagées en pointe, en biseau ou en brunissoir.
En définitive, la production des objets sur os longs sur le site d'Hadzhidimitrovo montre que la sélection des matières premières et les procédures de fabrication étaient rigoureusement organisées et planifiées, même si l'utilisation occasionnelle de supports moins réguliers est également attestée.
Mots-clés : Néolithique, les Balkans, technologie, production des outils en os.

INTRODUCTION

Neolithic and Eneolithic communities widely exploited osseous raw materials for a variety of objects. While it is possible to note similarities between different bone industries across Europe in technological and morphological traits, there are also considerable chronological and regional varieties. Bone industries, same as other prehistoric technologies, are social phenomena; and the selection of manufacturing techniques and processes is determined by the availability of raw materials, their physical constraints, available tools for production, ergonomics and efficiency demands, but, at the same time, the choices among possible technical solutions are heavily influenced by tradition and cultural preferences (see Lemonnier, 1992; Horsfall, 1997). Analyses of manufacturing procedures may provide information on the organisation of production, technological know-how, as well as on social relations involved in bone tool production and use, regional identities, and cultural and local preferences (e.g. Sidéra, 2013; Vitezović, 2016; Mărgărit et al., 2018; Mărgărit et al., 2023).

In this paper, we will analyse bone tool production in the Late Neolithic period in the eastern Balkan area, focusing on one of the aspects—modification of mammal long bones.

1. THE ARCHAEOLOGICAL BACKGROUND

The site of Hadzhidimitrovo is situated in present-day eastern Bulgaria. It is located in the Upper Thracian Plain, approximately 13 km to the north-west from the town of Yambol (fig. 1). The site was discovered during the systematic survey in the 1990s, and large-scale rescue excavations were carried out in 2008-2010, caused by the construction of the highway Trakiya ("Thrace"). Numerous features were discovered, 252 in total—pits, pit complexes and post holes, and, with the exception of one Late Iron Age pit, all these features were dated to the Late Neolithic Karanovo IV culture (5200–5000 cal BC). These features also yielded very rich and diverse portable finds: ceramic vessels, small clay objects such as figurines, weights, spindle whorls, chipped and ground stone tools, faunal remains, and osseous items (Petrova et al., 2024).

2. MATERIALS AND METHODS

During the excavations at Hadzhidimitrovo, faunal remains were mainly hand collected, rather carefully, and were subsequently analysed. Some of the bone artefacts were recognised and singled out during excavations, while the remaining were identified during the post-excavation analyses (see Vitezović et al., in press for details). The entire assemblage of osseous artefacts (complete and fragmented items and manufacture debris) comprises over 700 objects (see Petrova et al., 2024). Their preservation ranges from very poor to relatively well-preserved objects; damages to the surfaces were caused mainly by plant roots and by carbonate crusts. All the artefacts were studied with a hand lens with a magnification of up to 10×, and selected objects were further examined with Keyence VHX-100 digital microscope (up to 50×). The analysis followed the protocols widely accepted in the literature (see Pascual Benito, 1998, pp. 19–38), and manufacturing and use-wear traces were identified and interpreted following a set of published results (Newcomer, 1974; Semenov, 1976; Campana, 1989; Christidou, 1999 and 2005; Christidou and

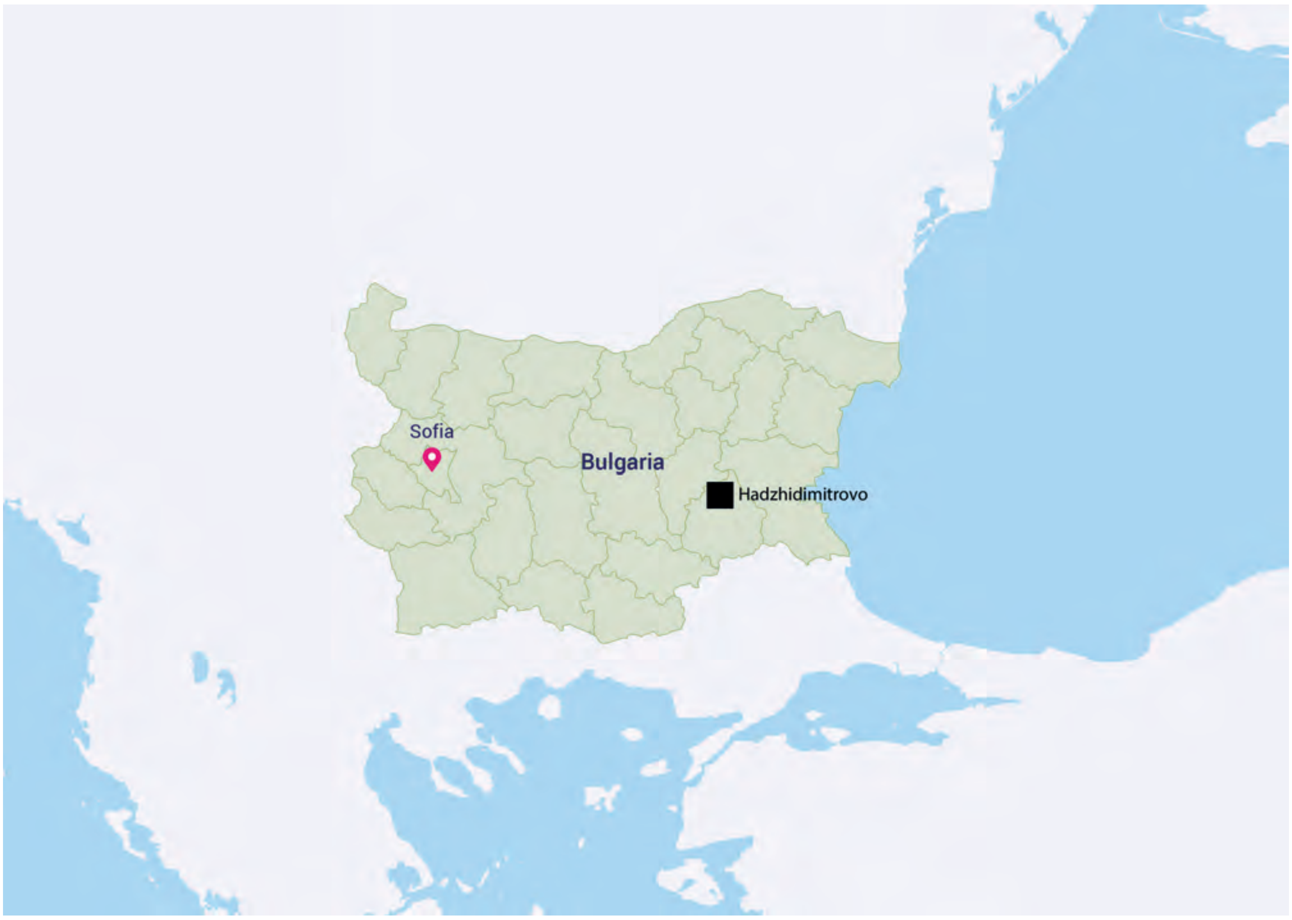

Fig. 1 – Map showing the position of the site of Hadzhidimitrovo (after https://freevectormaps.com/bulgaria/BG-EPS-02-0002?ref=atr).
Fig. 1 – *Carte montrant la position du site de Hadzhidimitrovo (d'après https://freevectormaps.com/bulgaria/BG-EPS-02-0002?ref=atr).*

Legrand, 2005; Legrand, 2008; Maigrot, 2003 and 2005; Ramseyer, 2004; Mărgărit et al., 2014; Bradfield, 2015; Orłowska et al., 2022; Mărgărit et al., 2023).

This assemblage also contained a significant amount of manufacture debris—segments abandoned during different stages of the production process. These pieces provided valuable insight into manufacturing techniques, along with the preserved traces of modification on finished and used items.

3. MANUFACTURING METHODS FOR LONG BONES

The skeletal elements used by the Neolithic communities at the site of Hadzhidimitrovo were mainly various bones from different mammal species—long, flat and short bones (metapodial bones, tibiae, femuri, ribs, scapulae, astragali, etc.). Antlers, teeth, mollusc shells and bird bones were used to a lesser extent. Long bones were the most frequent—approximately 380 artefacts were produced from long bones, or over 50% of the total assemblage. Among them, metapodial bones were the most common (ca. 90 artefacts), followed by tibiae (ca. 40 artefacts), and also femuri, humeri and ulnae were found. They were almost exclusively from ruminants—sheep (*Ovis aries*), goat (*Capra hircus*), roe deer (*Capreolus capreolus*), cattle (*Bos taurus*) and red deer (*Cervus elaphus*). The only exceptions are one long bone from *Canis* or *Vulpes*, one bone most likely from *Lepus*, two tibiae and one fibula from dog (*Canis familiaris)*, three bird (*Aves* sp.) bones, and one human bone.[1]

Long bones were transformed into artefacts by four main methods: 1) Almost entire bones were used, with limited modification and with a more or less preserved original shape of the bone; 2) blanks were obtained by longitudinal division; 3) and by transversal division; and 4) simple irregular fragments were used, produces by direct or indirect percussion.

3.1, Artefacts produced from almost complete bones

The first method was used mainly for the production of pointed tools from ulnae and fibulae (heavy, medium-sized and fine points), and for the production of tools with a small working edge from tibiae or metapodial bones (burnishing or cutting tools, sometimes simply labelled as bevelled tools).

Ulnae and fibulae were used rarely; only 17 artefacts from ulnae were identified, and just one fibula. Ulnae were transformed into tools by modifications at the distal portions of the bone. Some of the tools from ulnae are fragmented, but those that are better preserved have the proximal epiphysis retained as the basal part, while the diaphysis was cut off at a certain point of its length, and the distal end was modified into a sharp point by scraping and burnishing (fig. 2/1). Only one artefact had a small working edge instead of a point.

Particularly interesting is one perforated needle; it was produced from ulna of some small- or medium-sized mammal. Its basal part is more or less triangular in shape, cut below the epiphysis, and a small perforation was made here; the mesial part is slender, with a circular cross-section, while the distal end was not preserved. This needle was carefully burnished, and also it is possible to note polish from use at the mesial part and on the perforation.

Another characteristic techno-type were tools made predominantly from tibiae of sheep/goat (rarely roe deer or other ruminants, and rarely from metapodials; fig. 2/2). Twenty-five such tools were found, but probably some of the fragmented tools may also be classified into this type. The distal epiphysis and a large part of the diaphysis were retained, while the proximal epiphysis was removed by oblique cutting and abrasion. Thus, a working edge was obtained, and usually the entire distal portion was burnished. The final shape were elongated tools, with a complete cylinder of the diaphysis in the basal and the mesial part, and with a small working edge (usually 12–18 mm wide) that may have served for burnishing, but also for scraping or cutting, with sharpness between chisels and spatulae. There are some variations in the distal ends; the oblique cutting may be shorter, and producing a more acute angle of the working edge, or may comprise up to one-third of the object's length. Also, working edges may be straight, rounded, or more or less diagonal, and these differences in shape were the result of different modes of use (different raw materials, in different condition, possible repairs, etc.). The proximal epiphysis is preserved as a handle, sometimes additionally smoothed or abraded.

3.2, Artefacts produced from segments obtained by longitudinal extraction

Elongated segments of long bones were the most common blanks for the predominant artefact types—diverse pointed tools (fine points or needles, medium points or awls and heavy pointes). The most frequent skeletal element was ruminant metapodial bones. The total number of pointed tools (fine, medium and heavy points) from metapodial bones is 88; however, this number is probably larger since the identification is not always possible due to fragmentation. Artiodactyl metapodial bones (metacarpus and metatarsus) are very long, straight bones, with specific anatomy: they develop through a fusion of two initially independent bones (os metacarpale III and os metacarpale IV in the metacarpus, and os metatarsale III and os metatarsale IV in the metatarsus) during foetal stage to early infancy. A line or a channel (*sulcus*) can

Fig. 2 – 1) Pointed tool made from an ulna; 2) Bevelled tool made from a tibia; 3) Pointed tool from a metapodial bone produced by longitudinal division: a) anterior view; b) posterior view, c-d) traces of manufacture.

Fig. 2 *– 1) Outil pointu fabriqué à partir d'une ulna ; 2) outil tranchant fabriqué à partir d'un tibia ; 3) outil pointu fabriqué par division longitudinale, à partir d'un métapode : a) vue antérieure ; b) vue postérieure ; c-d) détails des traces de production.*

be seen on the place of fusion, and it is much easier to separate the bone along the sulcus (see Páral et al., 2004; Schibler, 2013, p. 341).

Several methods for extraction of longitudinal segments from metapodial bones were noted on the Neolithic and Eneolithic sites in Europe (e.g. Sénépart et al., 2004; Sidéra, 2004 and 2005; Legrand, 2005; Mărgărit et al. 2023; Vitezović, 2021 and 2023). I. Sidéra singled out three methods for the production of metapodial awls: 1) manufacture using abrasion only; 2) manufacture by first sawing the metapodia in half and then abrading them; 3) manufacture by first abrading and then by sawing (Sidéra, 2005). A fourth method may be added, partly a variant of the second method – quartering, or *débitage by successive partition* (Le Dosseur, 2014). After longitudinal division by grooving, another longitudinal groove was made on thus obtained half of the metapodial bone and then it was further divided into quarters (Choyke and Tóth, 2013; Vornicu, 2014).

The execution of these manufacturing procedures may not be always strict; for example, the third method described by I. Sidéra (abrading-first; Sidéra, 2005) may be also abrasion-sawing-abrasion (see Vitezović, 2021). Some of these methods were used concurrently by Neolithic communities, with one being predominant; and the presence/absence of some of them may be considered as a technological trait for specific communities. For example, abrasion-only method was practised by Early Neolithic Starčevo communities (Vitezović, 2011 and 2016), but it was very rare and almost completely abandoned by the Late Neolithic Vinča culture (see Vitezović, 2021 and 2023). Quartering was rather common among Late Neolithic and Eneolithic communities in present-day Hungary and Romania (e.g. Choyke and Tóth, 2013; Vornicu, 2014; Mărgărit et al., 2023), but only exceptional among Late Neolithic communities in the central Balkans (see Vitezović, 2021 and 2023).

At the site of Hadzhidimitrovo, the most common method for extracting longitudinal blanks was by grooving the bone along the natural sulcus with a chipped stone tool (fig. 2/3a-c). The bone was either completely sawn through the groove or, when the groove would reach sufficient depth, it was divided into two halves by indirect percussion. The final form was obtained with some abrasion, or by a combination of scraping with a chipped stone tool and abrasion. Scraping and abrasion were also used for the resharpening and repairing of the tools. One of the epiphyses would be removed by direct or indirect percussion, while the other would be preserved as a handle; usually the distal epiphysis was retained, although there are examples of awls with the proximal epiphysis. The most common end-products were medium-sized pointed tools with one half of the distal epiphysis on the basal part, semi-circular cross-section of the mesial part, with a more or less triangular shape of the distal portion and with a sharp, fine pointed end (fig. 2/3).

One roe deer metatarsal bone represents a technical piece obtained by this method (fig. 3)—it is one longitudinal half of the bone with clear traces of grooving by a fine chipped stone tool; the groove was rather deep and only small remains of the bone were cut off, most likely by indirect percussion. Abrasion-only or the abrasion-first methods were used rarely, but one technical piece demonstrates the usage of one (or both) of these techniques—one metapodial bone that was abraded from both the ventral and the dorsal side.

Quartering was less common, but several awls and fine pointed tools were most likely obtained by this technique. These pointed tools are thinner, usually with just a small segment of the epiphysis preserved, with a V-shaped cross-section. At some of them, traces of grooving with a chipped stone tool may be noticed on the edges.

3.3, Artefacts produced from segments obtained by transversal division

Artefacts with circular cross-sections were produced by transversal cutting of long bones. Transversal division was done by sawing with a chipped stone tool and by wet abrasive fibre. Usually, a small groove was outlined first by a chipped stone tool, then the wet abrasive fibre was used, and when the groove would reach sufficient depth, the bone was snapped off or broken off, leaving a somewhat ragged edge that was subsequently curated by abrasion (see Pascual Benito, 1988, p. 25; Sidéra, 2004, fig. 8; Sidéra, 2005, p. 84, fig. 6; Mărgărit et al., 2018; Mărgărit and Voinea, 2020).

Several technical pieces enabled the reconstruction of this technique (fig. 4); on several pieces with incomplete transversal division, it is possible to observe how the grooves were outlined by sawing with a chipped stone tool, and also the traces of usage of abrasive wet fibre may be visible (see Mărgărit et al., 2018; Mărgărit and Voinea, 2020).

The end-products were either short circular, ring-shaped objects, used as some sort of an ornament (either as actual rings or some other type of clothing or ornamental items), or elongated cylindrical objects. These cylinders have different lengths, and also display differences in the degree of curation and use-wear traces, thus suggesting that their use was two-fold: some of the cylinders were used as some type of handle or haft for another tool, while the remaining were ornamental pieces. Items interpreted as handles are simply polished and burnished and have specific use-wear traces: polished, worn surfaces, especially near the edge and in the interior, where another tool was placed, damages on surface, such as striations, lines, incisions, small grooves (for criteria for distinguishing handles from other artefact types, see also Barge-Mahieu, 1990). The items interpreted as ornaments exhibit much more careful working, with more time and skill investments: the edge where the bone was transversally cut is so carefully burnished and polished that all the technical traces are obliterated; the groove is no longer visible, and instead, the surface is completely flat, smoothed and even (fig. 5/1a and fig. 5/2a). Furthermore, these artefacts are carefully burnished on both outside and inside—on broken pieces it is possible to note parallel lines in the

Fig. 3 – Metapodial bone divided longitudinally by grooving and sawing: a) anterior view; b) posterior view; c-e) details of the groove made by a chipped stone tool.
Fig. 3 *– Os métapodial divisé longitudinalement par rainurage et sciage : a) vue antérieure ; b) vue postérieure ; c-e) détails de la rainure effectuée par un outil lithique.*

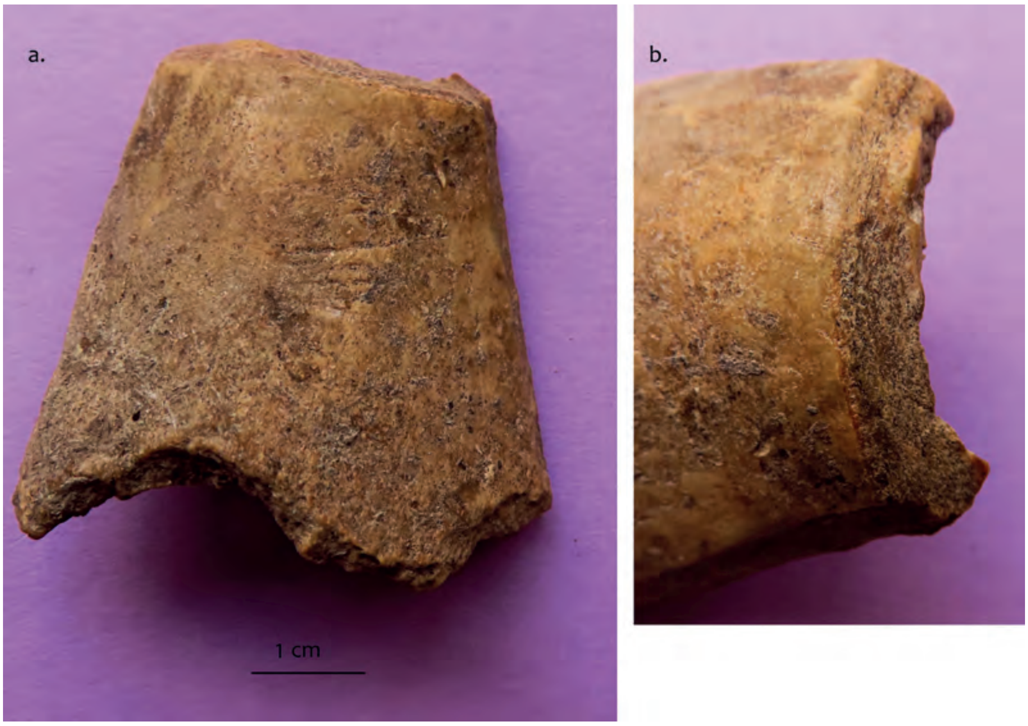

Fig. 4 – Manufacture debris with traces of transversal division: a) entire segment; b) detail of traces of manufacture.
Fig. 4 *– Débris avec des traces de division transversale : a) segment entier ; b) détail des traces de production.*

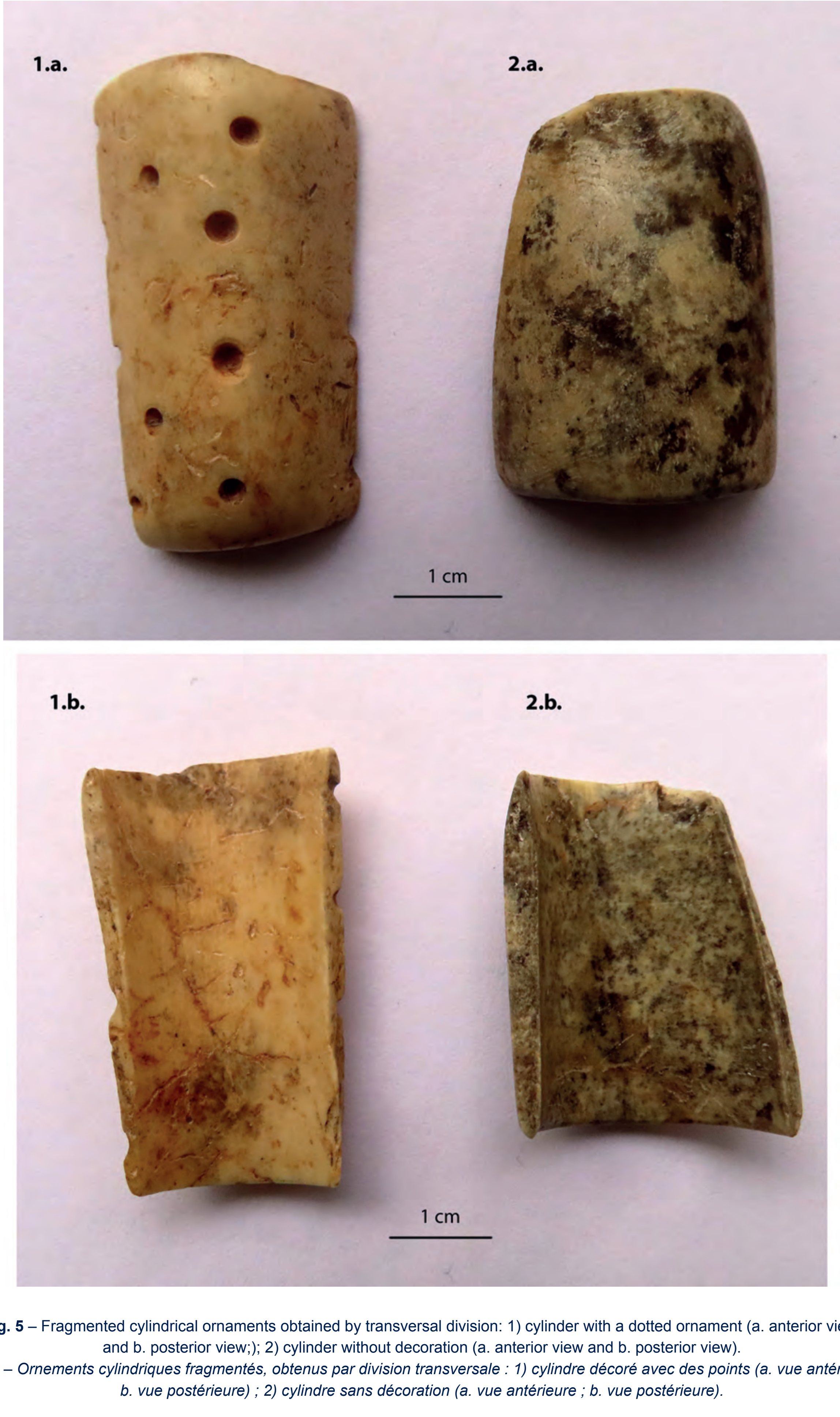

Fig. 5 – Fragmented cylindrical ornaments obtained by transversal division: 1) cylinder with a dotted ornament (a. anterior view, and b. posterior view;); 2) cylinder without decoration (a. anterior view and b. posterior view).

Fig. 5 *– Ornements cylindriques fragmentés, obtenus par division transversale : 1) cylindre décoré avec des points (a. vue antérieure ; b. vue postérieure) ; 2) cylindre sans décoration (a. vue antérieure ; b. vue postérieure).*

interior from burnishing (fig. 5/1b and fig. 5/2b). Some of them even have added perforations and/or decorations—incised lines and dots, created by unfinished perforations (fig. 5/1a). Finally, polish from manipulation may be noted.

Some of the debris pieces, leftovers from transversal cutting, namely the epiphysis with a small segment of the diaphysis, were sometimes also used, as some sort of a handle, haft or supporter, judging from the presence of traces of use on them.

Artefacts produced from irregular segments obtained by percussion

Some of the tools were produced from segments of iaphysis of less regular shape. Blanks for these items were obtained mainly by direct percussion, but it is difficult to say whether the application of this method was deliberate, or these segments represent ad hoc use of kitchen debris, or they were made from manufacture debris or broken tools. Furthermore, it is difficult to assess their overall number, since in the case of heavily fragmented items it is not possible to determine the manufacturing method.

They were mainly curated by scraping and/or abrasion into pointed tools or small burnishing and cutting tools. Usually, they were regularised only in the distal portion, while the mesial and proximal portions were less regular and sometimes without any traces of modification.

4. DISCUSSION

Exploitation of long bones was an important part of the craft production for the prehistoric communities at Hadzhidimitrovo. They used a variety of bones, but with the preference for sheep/goat metapodials and tibiae. These bones were usually separated during the primary butchering processes (see Olive, 1987; Isaakidou, 2003), suggesting that the selection of raw materials was strictly planned. The manufacturing procedures were also planned, with an occasional usage of less regular blanks (selected probably from manufacturing or kitchen debris).

Single method for obtaining blanks was used for several final techno-types: ulnae were modified by cutting and abrasion at their distal ends into both points and tools with a working edge; longitudinal division (single or double; i.e. quartering) was used for different pointed tools (fine, medium and heavy points), while transversal division was used for several artefact types (handles, different ornaments). On the other hand, tools with identical or similar morphology may be obtained by different methods (points produced from almost entire bones, by different methods of longitudinal division or from irregular blanks). I. Sidéra (2005) labelled these features in bone technology as continuity of techniques, discontinuity of morphology/discontinuity of techniques, continuity of morphology.

These technological choices open interesting questions regarding the knowledge transmission, as well as identities of craftspersons who produced osseous artefacts.

The strict choices of skeletal elements and related technological procedures show that bone production was an important, planned activity, revealing at the same time a high level of standardisation. Continuity of techniques and discontinuity of morphology suggest that standardised methods were used to prepare blanks for different end-products, indicating, again, a high level of standardisation in the production process. On the other hand, discontinuity of techniques reveals skilful craftspersons, as these techniques are well adapted to the raw material and desired end-products (different techniques used to produced points from ulnae vs. techniques for processing metapodial bones). These traits of bone technology also suggest that there were certain traditions in bone manufacturing within the Hadzhidimitrovo communities.

Furthermore, we may argue that the tool production was not practised by all members of a community, but a certain (limited) number of craftspersons instead, who, in turn, produced diverse objects, intended for different activities. This would further imply that the person(s) who produced bone tools were not necessarily those who used them later—i.e. some members of the community were engaged in bone production and other members in the production of textile, basketry, leather items, etc., and not every member of the community needed to be engaged in all of these tasks and activities. Perhaps the production of items from irregular blanks, obtained most likely in an ad hoc manner, reflects adaptation to "emergency" situations (when a required tool is broken and no adequate raw material is available to make a replacement), but may also point to the production of tools by less experienced members of the community—i.e. by those who did not engage normally in bone production, but were in fact those who used them.

Craft production transforms raw materials into valuable and functional goods, and objects represent an expression of identities and social relations. Objects in prehistoric communities are both utilitarian and means of social interaction and communication, and material culture is an expression of identity (Appadurai, 1986; Costin, 2005 and 2008). The studies of use and meaning of the material culture must consider the questions of how the objects were made and by whom, and, as C. L. Costin pointed out, the studies of craft production are "integral to investigations of the role material culture plays in daily, social, and ritual life" (Costin, 2005, p. 1035).

The organisation of production in Neolithic communities is a complex question; often, researchers are focused on the evidence for the presence or absence of specialisation. However, as some authors pointed out, specialisation is not simply present or absent, instead, there are different modes and degrees of specialisation (see Costin, 1991 and 2005); furthermore, some authors stated that we should not focus on specialisation, but on the organisation of production instead (Clark, 2007;

Vitezović, 2022). An open question is also the identity of the persons who crafted and/or used bone tools—in particular, if there was some (and what) kind of division of labour by age and sex among the prehistoric communities. Recently, C. Houmard and I. Sidéra (2024) argued that technological choices may be indicators of gender and lifestyle. In the case of Hadzhidimitrovo prehistoric communities, it is not possible to offer any hypotheses regarding the identity of the craftspersons; these questions cannot be answered from bone tools alone, but from complex analyses of intertwined technologies; however, careful analyses of methods of production of bone objects may serve as a starting point.

NOTE

1. For all the details, please see VITEZOVIĆ S., KARASTOYANOVA N., ZIDAROV P. (forthcoming) – Chapter VII. The bone tool assemblage from Hadzhidimitrovo, in V. Petrova (ed.), *Hadzhidimitrovo. Aprehistoric pit site of the late sixth-early fifth millennium BC in Bulgaria*. For the majority of objects it was not possible to determine which long bone was used. The numbers are rounded because the identifaction to skeletal elements for some of the bones is probable, but not certain (e.g. smaller long bone/possible caprine metapodial).

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