

A Paleolithic eyed needle from Bistricioara-Lutărie III (Ceahlău Basin, Northeastern Romania)

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Abstract: *Eyed needles have been traditionally linked to sewing/embroidering actions, clearly associated with means of processing/decorating clothes or adornment clasping. For a long time, the appearance of these tools was placed in Central and Western Europe, in Magdalenian times. Recent discoveries have pushed back this moment with ca. 50 ka. On the Romanian territory, such items were not signaled in Paleolithic contexts up to now. Here we report a fragment of a perforated bone fragment recovered at Bistricioara-Lutărie III settlement (Ceahlău Basin). The purpose of this study is to verify the item's functional attribution – an eyed needle – based both on tracing the technical transformation scheme and on identifying the wearing areas. Several implications of this find are briefly discussed.*

Rezumat: *În mod tradițional, acele au fost corelate acțiunilor de coasere/brodare, asociate, la rândul lor, cu modalitățile de confecționare/decorare a hainelor sau de prindere a podoabelor. Pentru o lungă perioadă de timp, apariția acestor unelte a fost plasată în Europa Centrală și Occidentală, în Magdalenian. Descoperiri recente au împins acest moment cu cca. 50000 de ani în urmă. Pe teritoriul României, până de curând nu fuseseră semnalate astfel de descoperiri, în contexte paleolitice. Studiul de față prezintă un fragment de os perforat descoperit în așezarea de la Bistricioara-Lutărie III (Bazinul Ceahlău). Obiectivul nostru a fost acela de a verifica atribuirea funcțională a piesei – ac de cusut –, atât prin identificarea schemei tehnologice de transformare, cât și a zonelor de uzură. Câteva implicații ale acestei descoperiri sunt discutate pe scurt.*

Keywords: *Epigravettian, eyed needle, technical transformation scheme, use-wear analysis.*

Cuvinte cheie: *Epigravettian, ac de cusut, schema tehnologică de transformare, analiza urmelor de uzură.*

◆ Introduction

The eyed needles are defined as fine and elongated objects, with a pointed distal extremity and a proximal end that was often flattened, where they bear a perforation disposed perpendicularly on the item's major axis (D. Stordeur 1990). The studies have traditionally linked the eyed needles to sewing/embroidering actions (D. Stordeur-Yedid 1979), themselves associated with means of processing clothes or adornment clasping. The first eyed needles seem to have been used approx. 50 ka years ago, as demonstrated by the sample discovered in the Denisova cave¹. In Asia, such items are mentioned in the site of Shizitan (China), with an age of 26-23 ka cal BP (Y. Song *et alii* 2016). For the Caucasus area, similar discoveries are attested in Mezmaiskaya cave (ca. 40-33 ka cal BP) (L.V. Golovanova *et alii* 2010) or Dzudzuana cave (27-24 ka cal BP) (O. Bar-Yosef *et alii* 2011). For the European territory, the oldest sample

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¹ <http://siberiantimes.com/science/casestudy/news/n0711-worlds-oldest-needle-found-in-siberian-cave-that-stitches-together-human-history/>. Accessed: 30 September 2017.

seems to derive from an Aurignacian level in the Potočka cave (Slovakia) (B. Odar 2008). The number of discoveries grows significantly in the Magdalenian levels from Moravia (M. Lázničková-Galetová 2010) or Western Europe (D. Stordeur-Yedid 1979). Several eyed needles have been reported in the Epigravettian layers at Cosăuți (P. Noiret 2009). Also, eyed bone needles have been recovered from Paleoindian sites in North America dated between 12.6-10 cal BP (A.J. Osborn 2014).

Despite a consistent Upper Paleolithic presence, including many open air/cave settlements with a good preservation of organic items, such artifacts have not been reported so far on Romanian territory². One possible explanation for this absence stands in the excavation techniques applied during older stages of research, rarely if ever using wet or even dry sieving.

Here we report a perforated bone fragment recovered during wet sieving from an Epigravettian layer at Bistricioara-Lutărie III settlement (Ceahlău Basin, Northeastern Romania). The tiny item's manufacture and use-wear traces argue for the presumed function of an eyed needle.

◆ The find context

The Bistricioara-Lutărie III settlement has been first identified in 2007 on a lower Bistrița terrace (16-18 m), about 200 m to the NE from the better known and extensively excavated site at Bistricioara-Lutărie I, located on the 40-50 m terrace (Al. Păunescu 1998). An unknown portion of the settlement has been destroyed by clay exploitation and erosion. Small scale excavations took place in 2008, followed by paleoclimatic and chronometric (magnetic susceptibility, sedimentological, OSL, TL, and radiocarbon) sampling in 2013, and a more systematic archaeological exploration in 2015 (M. Anghelinu *et alii* 2012; O. Trandafir *et alii* 2015; M. Anghelinu *et alii* 2016). The geological sequence, with a wide chronology covering a large part of the Last Glacial from ca. 74 ka BP to Holocene, stands in a ca. 3.5-4.5 m thick loess-derivates accumulated on a gentle slope and covering the terrace gravels. Six distinct archaeological layers preserving lithics, combustion traces and occasionally organic remains have been identified so far. With the exception of the lowermost layer, radiocarbon dated to 33-31 ka cal BP but lacking diagnostic items, all the remaining layers belong to Gravettian and Epigravettian. While the settlement preserves massive combustion traces and rich lithic collections, the organic preservation is very poor; with the exception of the single Gravettian layer with shouldered points, which provided identifiable faunal remains, the Epigravettian layers contain only small (< 1 cm) and usually heavily burnt fragments.

The item analyzed here comes from the second Epigravettian layer, identified in trench II/2015, between 70 and 100 cm in depth. This dense archaeological accumulation provided ca. 3000 lithics, combustion traces and small fragments of burnt bones. The lithic collection is made in various raw materials (black shales, sandstone, opal, flint, and obsidian), suggesting a large provisioning area. Only 43 items have been transformed/retouched into formal tools (i.e. endscrapers, burins, backed bladelets, truncated blade), the bulk of the collection being dominated by chips and knapping debris. Much like the bone item discussed here, most of the small finds have been actually recovered during wet sieving of the massive combustion feature

² A needle was reported in the Palaeolithic settlement of Poiana Cireșului-Piatra Neamț (E.-C. Nițu *et alii* 2015). Unfortunately, no technological detail which would allow us to compare it with the artifact presented here has been so far published.

identified in the northern part of the small survey trench (4 sqm), between 85 and 96 cm in depth.

The chronology of the find layer is clearly older than a charcoal sample recovered in the upper part (75 cm in depth) of this accumulation, AMS dated to 20.2-20.6 ka cal BP; although the results are still preliminary, one thermoluminescence (TL) sample (burnt flint) recovered from the same accumulation provided ages ranging between 18 and 20.8 ka cal BP on single-aliquot and multiple-aliquot protocols (C. Schmidt, pers. comm. to M. A., 2016). Given the low carbon content of the AMS sample, suggesting a possibly underestimated age, and the superior reliability of the multiple-aliquot TL protocol (providing the oldest age of 20.8 ka BP), the chronology of the find is thus likely close to the luminescence estimation. Whatever the case, the raw material composition, the structure of the lithic assemblage and the estimated chronology fit well the acknowledged chrono-cultural framework of the regional Epigravettian (M. Anghelinu *et alii* 2012).

◆ Methodology

The item in discussion is a small medial-proximal fragment, with an ellipsoidal section, rectilinear and parallel edges (fig. 1a-c). The grey color, much like the context of the find, suggests it has been burned. Most of the morphometric data are indeterminable. We were able to establish the width of the piece – 2.1 mm and its thickness - 1.1 mm.

In a first stage, the piece benefited from a macroscopic examination, with the purpose of identifying the technological operations involved in the processing of the item. In this stage, it was important to make an accurate characterization of the morphology of the technological traces and of their succession, especially for the subsequent analysis stage. During the following microscopic analysis, the object was examined with a Keyence VHX-600 digital microscope (magnifications ranging from 30x to 200x), the images being taken using an embedded camera. The manner of use-wear traces developing, with the deformation of the initial volume and the erasing of the technological traces, was analyzed with an Olympus BX53M metallographic microscope (magnifications ranging from 100x to 200x), equipped with a EOS 1200D Canon camera. After the microscopic study, starting both from the general morphology and from the use-wear present at the perforation level, we were able to establish that most likely we are dealing with a fragment of an eyed bone needle. Analytical criteria for the technological and functional interpretation of marks were established based upon the comparison with recent publications on prehistoric eyed needles (E.A. Stone 2009, 2011; M. Lázníčková-Galetová 2010; N. Buc 2011; A.J. Osborn 2014; R. Lee Lyman 2015; O. Bignon-Lau, M. Lázníčková-Galetová 2016; Y. Song *et alii* 2016).

◆ Technical transformation scheme

Debitage operation

The fragment has been found in a finished form, so we are no longer able to identify the procedures involved in the debitage operation. Nevertheless, we can refer to the two acknowledged variants of obtaining the blank: percussion or extraction of several blanks from the bone's diaphysis side. In the first case, from the diaphysis splinters were obtained, with irregular shapes and dimensions, from which those that could be transformed into needle after the shaping operation were chosen. In the second case, the blank's shape and dimensions can be pre-visualized. Judging from data available from roughly contemporary Magdalenian

settlements (T. Boroń 2010; M. Lázničková-Galetová 2010; O. Bignon-Lau, M. Lázničková-Galetová 2016), an extraction method has been likely used, from a single bone resulting from four up to eight blanks. This method has been signaled in the caves of Pekarna (M. Lázničková-Galetová 2010) or at Wilczyce 10 settlement (T. Boroń 2010).

Shaping operation

The blank was afterwards shaped by longitudinal scraping (fig. 1d), applied around the entire circumference, with the purpose of regularizing the blank and creating the sharp extremity. The finishing work was made by abrasion (fig. 1e), documented by some regular and fine traces, disposed slightly oblique to the item's axis, thus creating the ellipsoidal section of the piece.

Regarding the perforation, the biconical section (fig. 1f) suggests it was made by rotation applied alternatively from both sides. On one of the sides we were able to see specific rotation traces (fig. 1g).

◆ **Use-wear analysis**

In the case of the median part of the needle, the use-wear traces can be difficult to identify macroscopically, given the minimal preserved surface. The microscopic study becomes the only solution of acquiring data about the item's use. We identified two areas of use-wear development. Obviously, the first one is located at the perforation's periphery, being characterized by surface flattening, strong polish, erasure of the rotation traces and their replacement with very smooth striations, perpendicularly disposed on the perforation (fig. 2a-b). This type of use-wearing has resulted, probably, from the friction process between the bone and the sewing thread.

The second use-wearing area has developed on the small surface preserved in the median portion. The volume's initial rises have thus become smooth, with a flat aspect, associated to some areas displaying strong polish. Striations are superficial, long and parallel. The series of striations are disposed obliquely to the item's axis (fig. 2c). This type of use-wear could have resulted from the sewing process. We also identified small areas of residues (fig. 2d-e), but their nature is indeterminate. Most likely, we are dealing with secondary depositions during the burning process the item suffered after its abandonment.

◆ **Discussion and conclusions**

The analyzed item could have been used in two ways: to sew/embroider clothes or to make perforations and string out adornments (e.g. shells of gastropods). In the first case, the perforation procedure was initiated with a bone awl, used in indirect percussion, to create the perforation, so that the needle could pass with a thread of sinew. The perforation could not be made directly with a needle, given its small dimensions: the item would have fractured immediately at higher pressure. We personally experimented the method of shells perforation (M. Mărgărit *et alii* 2017). The gastropods shells can be perforated straightaway with the tip of the needle. After several attempts, the point significantly changes its volume, gaining a flattened morphology and it is no longer efficient, because it may produce perforations of unnecessary sizes or it may fracture the shell. The advantage of a bone point is that it can be fixed immediately by re-sharpening. Thus, the item's life may be prolonged, until the complete abandonment, usually determined by small dimensions, which do not allow re-sharpening, or by a significant fracture that doesn't allow fixing – an observation which is also valid in the

case of eyed needle used for sewing. At present, no perforated shells have been reported in the regional Epigravettian contexts, suggesting that the item was most likely used for sewing/embroidering.

Bone eyed needles represent an important technological innovation conventionally seen as an adaptive response to climate change and cold stress (e.g. A.J. Osborn 2014). However, while tailored/ sewn clothes were obviously essential for surviving in the Last Glacial environments, it is important to stress that eyed needles were not: many ethnographic examples attest the use of simple awls for piercing leather, furs and skins and making tailored clothes. Eyed needles were/are usually used in these contexts for decorative stitching and embroidery (M.D. Speth 2017), formal aspects of clothing having less to do with clothes' thermal properties and more with the social realm in terms of individual/group affiliation. While bone awls have been archaeologically reported at least from the Chatelperronian (F. d'Errico *et alii* 2003), eyed needles multiplied during the Upper Paleolithic. In these contexts, however, they seem to tell less about thermal efficiency – a problem already solved at latest during the Middle Paleolithic (M.D. Speth 2017) – and more about the social transformations that took place among these hunter-gatherer societies in terms of individual and collective identity, now materially marked in various forms (e.g. mineral pigments, pendants, bracelets), of which some survived archaeologically. Perhaps not irrelevant for the further functional interpretation of the settlement at Bistricioara-Lutărie III, the use of such tiny items for sewing/embroidery is ethnographically correlated to the women's presence and activity. Hopefully, the ongoing researches at Bistricioara will provide additional data on all these matters.

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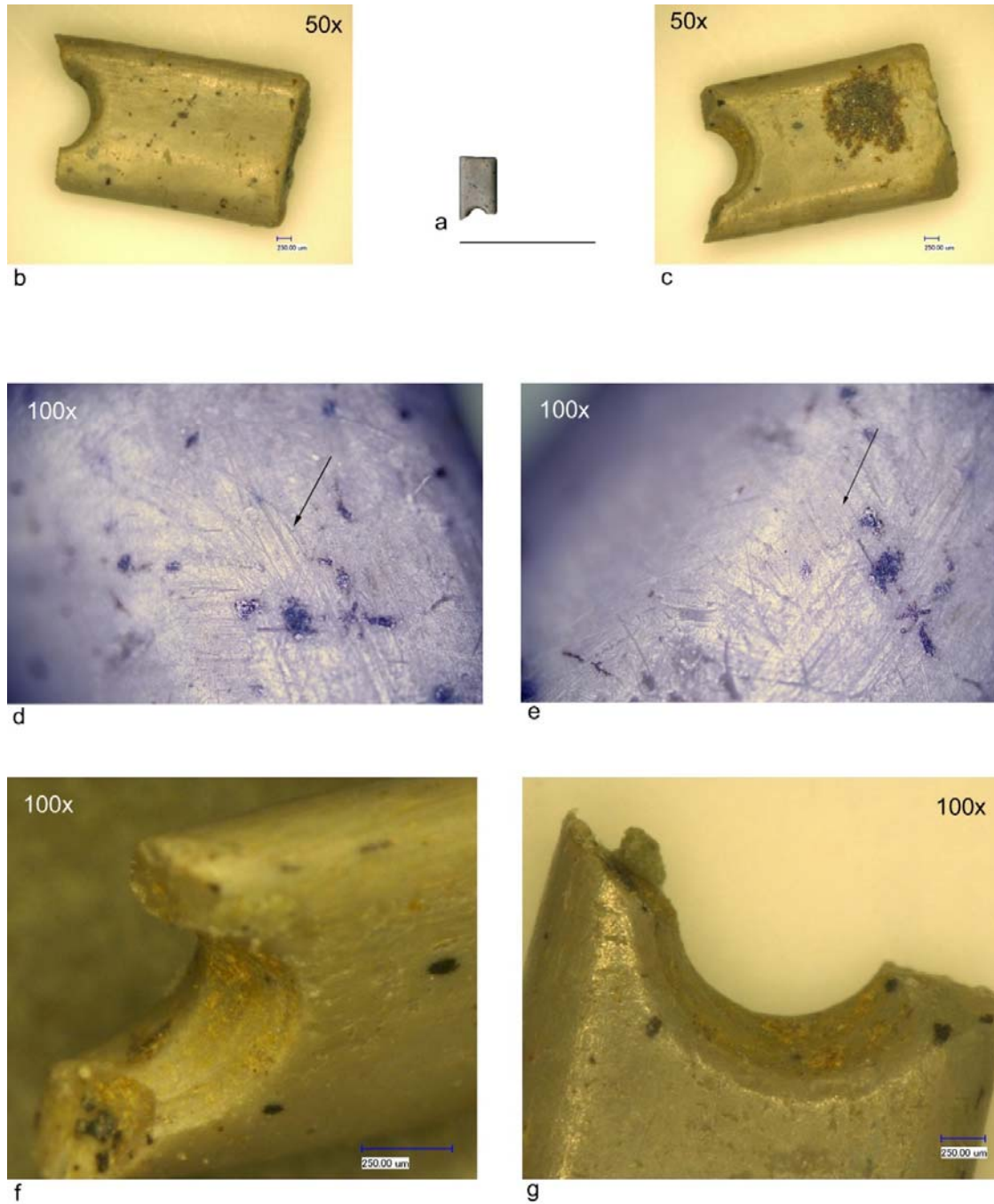


Fig. 1. a. Eyed-needle made of bone (scale: 1 cm); b.-c. details of the piece (digital microscope); d. detail of the processed surface by scraping (metallographic microscope); e. detail of the processed surface by abrasion (metallographic microscope); f.-g. details of the perforation performed by rotation (digital microscope).

a. Ac confecționat din os (scara: 1 cm); b.-c. detalii ale piesei (microscop digital); d. detaliu al regularizării suprafeței prin *raclage* (microscop metalografic); e. detaliu al regularizării suprafeței prin abraziune (microscop metalografic); f.-g. detalii ale perforației realizată prin rotație (microscop digital).

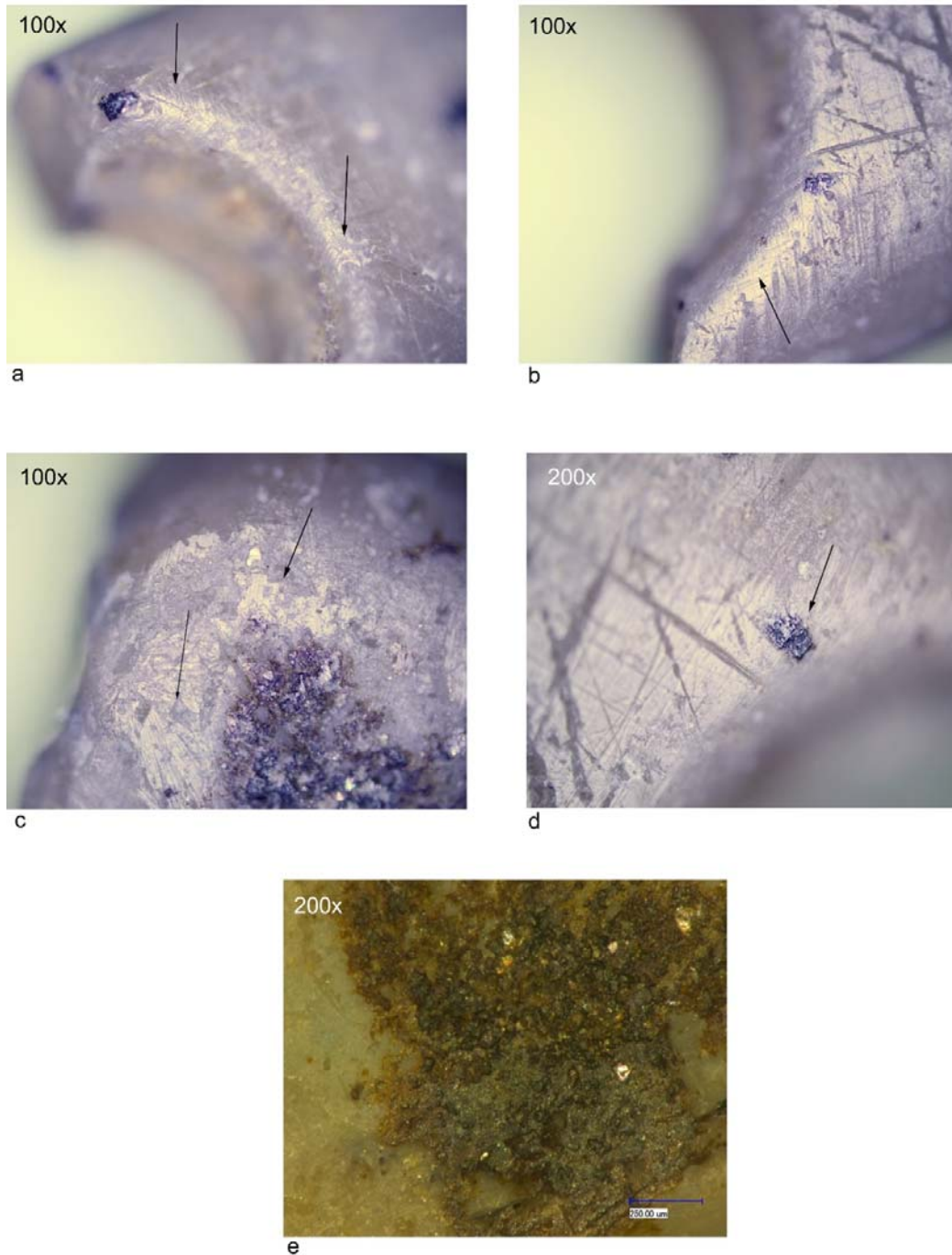


Fig. 2. a.-b. Details of the use-wear at perforation level (metallographic microscope); c. use-wear of the surface (metallographic microscope); d-e. traces of residues (metallographic and digital microscope).

a.-b. Detalii ale stigmatelor de uzură la nivelul perforației (microscop metalografic); c. uzura în suprafață (microscop metalografic); d-e. urme de reziduuri (microscop metalografic și digital).