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The oldest snail (*Lithoglyphus naticoides)* necklace discovered in Romania in the Gravettian III stratum of Poiana Cireşului-Piatra Neamț [25.760±160 –27.321±234 B.P. (31.969 ka)]

Marin Cârciumaru, Minodora Ţuţuianu-Cârciumaru***

*and ** Valahia University Târgovişte, Faculty of Humanities, Str. Locotenent Stancu Ion, nr. 34-36, Târgovişte, 130018, Dâmboviţa County, e-mail: *mcarciumaru@yahoo.com; **m.carciumaru@gmail.com.

Abstract: **The oldest snail (*Lithoglyphus naticoides)* necklace discovered in Romania in the Gravettian III stratum of Poiana Cireşului-Piatra Neamț [25.760±160 –27.321±234 B.P. (31.969 ka)].** The settlement of Poiana Cireşului-Piatra Neamț may be indisputably considered, especially through the hard animal material industry found here and mostly through its ornaments and art objects, the most significant in Romania and probably in this part of Europe. The settlement is located 4 km far from Piatra Neamț, on the right bank of the Bistriţa river, close to the confluence with the Doamna brook. In the Gravettian III level, dated, as we have already mentioned, between 25.760 ± 160 B.P. and 27.321 ± 234 B.P. (C. Zeeden et al., 2009), the archaeological campaign of 2004 revealed only 12 pierced snail shells, found at an average depth of approximately 375 cm. they were assigned to the *Lithoglyphus naticoides* species. As the freshwater snail necklace of Poiana Cireşului is the oldest testimony of this kind in Romania, we can presume the transmission, for future cultural stages, of a powerful tradition in this respect. Furthermore, we cannot ignore that it is unique, from a certain point of view, in the European Gravettian. Experimental reconstitution was essential in understanding the reason of choosing certain materials to make mobiliary art objects. This type of research resulted in revealing data on the relations between gesture, material and tool, the transformation of the blank into a symbol depending on its behaviour during the engraving or piercing operation. The snail shell necklace from the Gravettian of Poiana Cireşului is an illustrative example. The Gravettian man, acting according to a tradition which was deep-rooted in his conscience, exploited what the environment was offering him, the necessary symbolic message being obtained through adaptive means.

Key words: Gravettian; snail; *Lithoglyphus naticoides*; Romania.

Introduction

The settlement of Poiana Cireşului-Piatra Neamț may be indisputably considered, especially through the hard animal material industry found here and mostly through its ornaments and art objects, the most significant in Romania and probably in this part of Europe. The settlement is located 4 km far from Piatra Neamț, on the right bank of the Bistriţa river, close to the confluence with the Doamna brook. It stands on a level of erosion carved by the Bistriţa in the flysch substratum, equivalent of the 45-metre river bench. The absolute altitude ranges from 395 to 405 metres because of the wavy surface resulted from erosion and differential accumulation, and also from the anthropic alterations occurred during historic times (M. Cârciumaru et al., 2006).

Researches were conducted in several stages (V. Căpitanu, 1969; C. Scorpan, 1976; M. Cârciumaru et al., 2002; 2002-2003; 2003; 2004; 2005; 2006; 2007; 2007-2008; 2010; 2011), and the cultural classification varied from the Eastern Upper Aurignacian to the Gravettian and even Epigravettian.

Ever since 1998 the site has been investigated by an international team which brings together specialists from various interdisciplinary fields

who have performed significant excavations, allowing a profound change both of the geological and the archaeological stratigraphy and especially of the cultural succession. By 2011 nine sections had been executed, totalling 83 m (M. Cârciumaru et al., 2002-2003; 2003; 2004; 2005; 2006; 2007; 2007-2008; 2009; 2010; 2011). The deposit was investigated and completely recovered, with the utmost care, by scrapings of maximum 2 cm thick in the cultural strata and by efficient screening of the sediment. All artefacts related to a unique zero point (situated at the absolute altitude of 398 m), being recorded by three coordinates specified in standard charts, and the entire material was then transposed on graph paper.

As regards the archaeological stratigraphy, four levels of Palaeolithic occupation have been initially reported: the first two were attributed to the Epigravettian, and the last two to the Gravettian. Several instances of absolute dating recently obtained regarding the Poiana Cireşului deposit (C. Zeeden et al., 2009), complete the existing ones (table 1). A re-evaluation of the chronostratigraphic situation and, partly, of the archaeological material composition have allowed another definition of strata succession (M. Cârciumaru, I. Lazăr, E.-C. Nițu, M. Ţuţuianu-Cârciumaru, 2011; M. Cârciumaru, M. Ţuţuianu-Cârciumaru, 2011):

- on the upper part of the deposit an Epigravettian level was identified (more than 1,500 lithic pieces);

- Gravettian I level between 170-210 cm (initially considered, before the absolute dating, as Epigravettian II), dated between 19.459 ± 96 B.P. (ER 12.162) and 20.154 ± 97 B.P. (ER 12.163). The recovered lithic material is extremely rich, totalling approximately 15,000 pieces;

- Gravettian II level (former Gravettian I) between 290-310 cm, dating 25.135 ± 150 B.P. (Beta Analytic 244.072). This level revealed a small number of lithic pieces, around 200 items;

- Gravettian III level (former Gravettian II) between 375-415 cm, dating beween 25.760 ± 160 B.P. (Beta Analytic 244.073) and 27.321 ± 234 B.P. (ER 11.859).This level, as it was excavated in fewer sections, delivered only around 2,600 pieces.

Following some probing investigations performed in 2005 using a mechanical core drill, we can presume, as shown in table 1, the existence of three more levels of habitation: at 530-540 cm (menilite and coal chips), 595 cm (a bone fragment) and 690 cm (sandstone fragment) (M. Cârciumaru et al., 2007; L. Steguweit, 2009; M. Cârciumaru, M. Ţuţuianu-Cârciumaru, 2011).

In the Gravettian III level, dated, as we have already mentioned, between 25.760 ± 160 B.P. and 27.321 ± 234 B.P. (C. Zeeden et al., 2009), the archaeological campaign of 2004 revealed only 12 pierced snail shells, found at an average depth of approximately 375 cm. they were assigned to the *Lithoglyphus naticoides* species (M. Cârciumaru et al., 2002-2003; 2003; 2004; 2006; 2007; 2010; 2011) and represent the oldest snail necklace discovered on the Romanian territory so far.

A brief retrospect of the technological and experimental researches in the study of mobiliary art in general and of Palaeolithic ornaments in particular

In order to further understand the meaning of our approach, we shall try to review some of the concepts regarding the necessity of technological studies and the role of experiment in the modern research of prehistoric mobiliary art.

With the acknowledgment of Palaeolithic art at the end of the 19th century, technological researches performed on hard animal materials raised the interest of many prehistorians. Although, initially, most of the approaches regarding the Palaeolithic art were mainly dedicated to the stylistic and chronological analyses, in time the importance of "technological reading" (examining the surface of the object in order to decode, to read the methods of intervention on the blank) has been not only recognized but, mostly, applied in the majority of studies.

In this sense, a first opinion belongs to the researcher L. Leguay (1877), without a doubt the first one who made experimental pieces with a view to pertinently supporting his own observations. His main concern was to prove the authenticity, while the technique of manufacturing objects remained a secondary interest.

The decisive step, in this sense, was taken by A. Leroi-Gourhan's studies (1943), followed by those of L. Pales and T. de Saint-Péreuse (1969; 1976; 1981; 1989) when a new body and tools vision, a new approach to the analysis of

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No.	Depth (m)	Culture	Type of material	Laboratory	Age B.P. (uncal.ka)	Age (ka)
1.	3.83	Gravettian	Charcoal	Beta 206.708	10.590±60 (?)	-
2.	-	Gravettian I (Epigravettian II)	OSL	BT 499	-	22.66±1. 81
3.	-	Gravettian I (Epigravettian II)	-	ER 12.162	19.459± 96	23.24
4.	1.92-1.93	Gravettian I (Epigravettian II)	Charcoal	Beta 224.156	20.020±110	-
5.	2.10	Gravettian I (Epigravettian II)	Charcoal	Beta Analytic 244.071	20.050±110	-
6.	2.07	Gravettian I (Epigravettian II)	Charcoal	ER 9.964	20.053±188	23.978
7.	2.10	Gravettian I (Epigravettian II)	Charcoal	ER 9.965	20.076±185	24
8.	-	Gravettian I (Epigravettian II)	-	ER 12.163	20.154 ± 97	24.096
9.	3.03	Gravettian II (Gravettian I)	Charcoal	Beta Analytic 244.072	25.135±150	-
10.	3.64	**Gravettian III (Gravettian II)**	Charcoal	Beta Analytic 244.073	25.760±160	-
11.	3.71	**Gravettian III (Gravettian II)**	Charcoal	Beta 206.707	26.070±340	31
12.	3.82	**Gravettian III (Gravettian II)**	Charcoal	Beta 224.157	25.860±170	-
13.	4.08	**Gravettian III (Gravettian II)**	Charcoal	ER 9.963	26.185±379	31.057
14.	4.15	**Gravettian III (Gravettian II)**	Charcoal	ER 9.962	26.347±387	31.141
15.	-	**Gravettian III (Gravettian II)**	-	ER 11.860	26.677±24	31.379
16.	-	**Gravettian III (Gravettian II)**	-	ER 11.859	27.321±24	31.969
17.	6.90	-	-	ER 11.858	-	55.92± 12.196

Table 1 – C-14 Dating at the settlement of Poiana Cireşului – Piatra Neamţ.

mobiliary art objects was noted, having deep influences on researches to come. They compiled a data base resulted from technological observations (analysis of raw matter, forms, natural accidents), emphasizing the importance of used for engraving. Undoubtedly, it was the first time that a study of art objects highlighted the importance of the quality of the blank in engraving.

A huge contribution to the study of Palaeolithic art was made by A. Marshack (1970). Ever since the 60's of the last century, he has systematically applied microscopic analysis in studying objects, making use of new notions and methods in order to get, out of an object, multiple data and a dynamic vision of gesture. One of Marshack's initiatives was to have emphasized the importance of microscopic analysis, placing this type of research within an autonomous framework, independent from the stylistic study.

In this stage of research, almost a century after L. Leguay's studies (1877), experiment reappears. Highlighting the real difficulty in engraving some materials, H. Delporte and L. Mons (1973; 1975) tried to decipher the gestures of the artisan, thus defining the "operational sequence". Their method offered valuable information regarding the time required to make an engraving and the type of tool used for such an operation. Following their study, several types of incisions were identified, defined according to profile (*V*, asymmetric *V*, symmetric *U* / asymmetric *U*) and the active part of the tools. The result of H. Delporte and L. Mons's researches was re-launching the experiment and proving its fundamental contribution.

The path to this type of research was completely open. The technical study of prehistoric art is increasingly being taken into account and described in publications and is supplemented by experimental stages. Most experts made their own observations starting from this kind of research. A significant example is that of A. Roussot (1990) and G. Tosello (1997) who made imitations of Palaeolithic works with a view to observing the interaction between blank and tool and reconstituting the technique used.

M. Dauvois (1977) was equally interested in explaining the marks observed on the active part of the tools. At this level, a turning point, which opened new perspectives, was the work of the Russian researcher S. A. Semenov (1964) entitled *"Prehistoric Technology"*. The results of his activity in microscopically studying the traces of manufacture and wear of lithic and hard animal material pieces became the basis of the traseological discipline, applied to the field of prehistory.

Starting with the second half of the 20th century, such studies have widely spread and perfected in many western European countries, the USA and Canada. Using the electronic microscope, traseologists observed the traces left on stone or bone tools as a result of their usage, which they later compared to those obtained experimentally (F. d'Errico, G. Giacobini, P. Puech, 1984; P. Anderson-Gerfaut, E. Moss, H. Plisson, 1987; L. H. Keeley, 1980; P. Vaughan, 1983). The type of research was to bring fundamental clarifications regarding the way the prehistoric men manufactured then used tools.

F. d'Errico's approach (1988; 1991; 1993; 1994) was based on the above stated principle, namely that of combining research and experiment, an important part of his work relying on microscopic observations. The data obtained answer many of the important questions regarding the origin of settings: the type of tool used, the number of passages through the same incision, reconstitution of gestures, the sense of motion of the tool, chronology of engraving.

In his study on mobiliary engravings, M. Crémadès (1991) delivered a series of observations based on experiments and microscopic analyses. Following a procedure developed by L. Pales (L. Pales, T. de Saint-Péreuse, 1969), namely using the binocular magnifier for the analysis of incisions, he revealed different technical features between figurative art and geometrical art.

A significant contribution to the technological study of mobiliary art objects belongs to the researcher C. Fritz (1999). Her results and observations (reproducing Palaeolithic traces through experiment, confronting experimental results with microscopic observations, reconstituting the operational sequence by decomposing the engraver's gestures and spotting the decision moments etc.) came righteously to the attention of the experts.

The importance of applying experiment in the analysis of hard animal material objects was also

appreciated by I. Sidéra and A. Legrand (2006). That is precisely why it was considered as essential in understanding the origin of marks, of wear mechanisms, of how both material and type of tool behave, of working conditions required. The aim is to analyze and experimentally reconstitute the Palaeolithic engraver's gestures, to identify the direction of execution of the incisions and alterations of the implement, to find if they were made in one or several movements, to determine the time interval between them, to know whether it is a unique graphical event or the process unfolds in time. To many technologists, gesture may become a means which allows the identification of the significance of the engraving (F. d'Errico, 1994).

The results obtained by D. Stordeur (1983) and Y. Taborin (1993) in analyzing hard animal materials and snail shells are also to be mentioned.

A definitive contribution to the study of hard animal materials was made by Henriette Camps-Fabrer, whose activity in the field started in the 70's of the last century. Among the major results of her research, we should mention organizing international conferences on prehistoric bone industry, setting up the Committee of Nomenclature of Prehistoric Bone Industry, the Committee of Nomenclature's launching the project of the Books of Typological Cards (1974; 1977). In this sense, between 1988 and 2003, *11 Books* were published, representing indispensible tools for the study of artefacts, providing definitions and methodological criteria accepted and used particularly by French and Francophone researchers.

The application of technical studies carried out by efficient means of observation, often completed by experimental stages, led to the identification of techniques and methods of making artefacts and, at the same time, conduced to a real progress in cultural technology (F. Poplin, 1974; M. Dauvois, 1974; H. Camps-Fabrer, A. d'Anna, 1977; M. H. Newcomer, 1977; D. Stordeur, 1977; H. Barge-Mathieu, 1982; J. G. Nandris, H. Camps-Fabrer, 1993; I. Sidéra, 1993; E. David, 1999; A. Averbouh, 2000; N. Goutas, 2004; A. Legrand, 2005).

The researches of A. Marshack (1996) and F. d'Errico (1996) relied on the compared theories and patterns risen from ethnographic data. On the other hand, applying these patterns and especially verifying assumptions lead, inevitably, to the technological study of traces, which involves the use of microscope and experiment.

During the last decade, technological analyses of mobiliary art objects have received increased attention in Romanian studies as well.

A number of approaches to the phenomenon of mobiliary art focused mainly on general aspects: repertory, description, analogies (M. Cârciumaru, M. Mărgărit, 2002; M. Cârciumaru et al., 2003; M. Cârciumaru et al., 2004; M. Mărgărit, 2003). Essential data on the technological study of mobiliary art objects were obtained by C. Beldiman (2003; 2004 a, b, c,) following a thorough analysis of traces preserved on several items.

The different interpretations regarding the method of study prompt the scientists to reflect upon choosing the most efficient methods of analysis and conceive their theoretical bases more rigorously. We consider the level of observation or the thoroughness with which objects are studied to be important and so are the interpretative principles, the questions which derive from such an analysis. It is precisely from this point of view that the analytical means are essential in answering questions and verifying assumptions.

Once the conclusions drawn and especially proved by experiments, the hesitations between several interpretations with phrases like *"we cannot exclude"* or *"in all probability"* are not justified, at least when it comes to differentiating anthropic from natural traces (M. Lorblanchet, 1999, p. 177).

Considerations on the morphometry, morphology and elements of technological study of Gravettian shells of Poiana Cireșului

The properties of the raw material chosen to make mobiliary art objects can determine their function and the methods of manufacture. That is why it is necessary to introduce in technological analyses some concepts regarding the physics of the blank. Therefore, we have considered it useful to mention several general notions concerning the structure of snail shells.

The shell, of various shapes and sizes, plays an important role in determining genera and species, alongside other characteristics (fig. 1). It consists of several layers. On the surface, the external part is covered with a very thin

membrane, called *periostracum*, which is often coloured or has certain stripes, dots or spots of different colours.

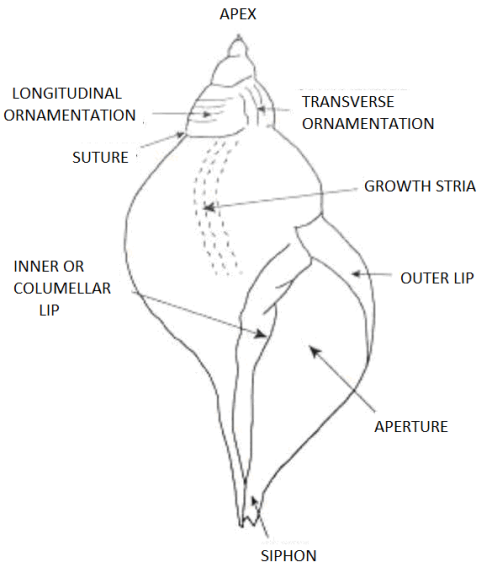

Fig. 1 – Morphological scheme of a shell (acc. to F. Poplin, 2004, fig. 5).

As it is organic, this membrane quickly wears off on dead or old snails and the shell takes on a whitish colour. Under this membrane there is the chalky layer, the *ostracum*, which forms the principal thickness of the shell, and which is composed of several layers of calcium carbonate or aragonite. Under this chalky layer comes another inorganic, chalky layer, namely the nacreous layer or the *hypostracum*. With land snails and freshwater snails, the nacreous layer may be absent or may be very thin (F. Poplin, 2004).

Under all these layers there is the mantle, a membrane which covers the innermost part of the shell. The mantle ends at the edge of the shell where it forms a particular hump. The growth is marked by humps and notches, always parallel with the edge or the aperture of the shell (A. V. Grossu, 1955).

As the shells found at Piatra Neamţ (the only findings of this sort belonging to the Gravettian in Romania) were attributed to the *Lithoglyphus naticoides*, we shall present a few characteristics of this species.

The shell is ovoid, with a finely and irregularly ridgy, mat-smooth surface, whose colours range from greyish-white to green-yellow. It has 5 pretty convex whorls which broaden sharply, separated by a deep suture, like a trough. It lives in running waters, brooks, rivers, streams as well as in lakes, channels or the detritus on the bottom of these (A. V. Grossu, 1956).

In order to avoid any confusion, the twelve *Lithoglyphus naticoides* snails discovered in the Gravettian III stratum of Poiana Cireşului (fig. 2) were numbered from 1 to 12, depending on the moment of discovery of each of them (fig. 3).

Morphometry

Shell no. 1: height (maximum diameter) – 7.5 mm, width – 6.9 mm; shell no. 2: height (maximum diameter) - indeterminable, width – 6.1 mm; shell no. 3: height (maximum diameter) – 7.6 mm, width – 6.7 mm; shell no. 4: height (maximum diameter) – 7.2 mm, width - 6.4 mm; shell no. 5: height (maximum diameter) - 7.7 mm, width - 6.6 mm; shell no. 6: height (maximum diameter) - 7.8 mm, width - 6.9 mm; shell no. 7: height (maximum diameter) – 7.7 mm, width – 7.0 mm; shell no. 8: height (maximum diameter) - 7.8 mm, width – 6.7 mm; shell no. 9: indeterminable sizes; shell no. 10: height (maximum diameter) – 6.9 mm, width – 5.9 mm; shell no. 11: height (maximum diameter) – 7.5 mm, width – 6.9 mm; shell no. 12: indeterminable sizes (fig. 2, 3).

Morphology

The shells belong to *Lithoglyphus* naticoides, a species which has survived until our days, even in the region where the settlement of Poiana Cireşului is located. The biotope specific to this species is represented by running waters, rivers or streams, the detritus on the bottom of lakes or even stones on the banks of waters (A. V. Grossu, 1955). The modest sizes of the species exclude the interest in these snails for nourishing reasons.

Of the 12 pieces, 9 are intact (fig. 3/1, 3-8, 10-11), while the others are more or less fragmented (fig. 3/2, 9, 12). All of them were pierced in order to obtain an orifice for hanging. As a matter of fact, it is the only anthropic intervention on the shells found in the Gravettian III layer from Poiana Cireşului. Moreover, one of the shells was burnt (fig. 3/7), perhaps for aesthetic reasons, without, however, ruling out completely the possibility of an accident. Consequently, it is black, unlike the others, which are white (fig. 2-3). This means that for the snail shells of Poiana Cireşului making the orifice was essential in

Fig. 2 – The *Lithoglyphus naticoides* snail shell necklace belonging to the Gravettian III, found at Poiana Cireşului–Piatra Neamţ.

determining their function as adornment objects,possibly in the form of a necklace. As it is an important operation, it is necessary to find how the orifice was made, the technical methods and tools used. In order to do that, modern researches involve experiment with a view to getting closer and closer to the Gravettian man's gestures and thinking.

Technological study

Piercing

Lately, various experts in the field such as Y. Taborin (1993 a, b), d'Errico Fr., P. Jardón-Giner, B. Soler-Mayor (1993), B. Avezuela (2010) etc. have made technological considerations on choosing gastropods to turn into hanged objects functioning as adornments, how to make the orifice or set the most appropriate spot, depending on a number of factors, the area to be pierced, etc.

Unfortunately, experimental studies suggested by various authors were performed on marine gastropods whose shell has a totally different structure and texture, being generally more consistent and more solid than that of freshwater snails. Therefore, freshwater gastropod shells are much more fragile and behave rather different in the process of making the orifice for hanging. This has prompted us to attempt our own experimental studies which focused exclusively on freshwater gastropods of various sizes.

To understand the sense of the experimental studies, we shall make a brief review of the assumptions shaped during those particular attempts.

Y. Taborin (1993 a, b) implies that the shell was pierced from the outer part, by previously preparing the surface through different techniques (fig. 4-5). In contrast, F. d'Errico, C. Henshilwood, M. Vanhaeren and K. van Niekerk (2005), following laborious experimental studies supported by traseological observations, suggest a totally different scenario (fig. 6). The main feature of the pattern they provide lies in the way the orifice was made, more specifically by pressure, from the inside of the shell, which is contrary to Y. Taborin's opinion (1993 b).

In his turn, Avezuela (2010) offers an experimental study of obtaining the orifice on marine gastropods by indirect percussion, using a lithic implement, both from the inside and from the outside of the shell. The advantage of this experiment is that it presents the marks observed under the microscope for each of the two cases (fig. 7).

These are the most important references, often supported by experimental studies, to how the orifice was made on the gastropods found in prehistoric archaeological contexts we were provided with when we began to study, from a technological point of view, the Gravettian necklace from Poiana Cireşului.

From the very beginning, we must mention that the great advantage of our approach (fig. 8) was the ability to research every shell of the Poiana Cireşului necklace using the VHX-600 digital microscope, which gave us unexpected resolutions of the image and marks on the orifices that might have been impossible to obtain through conventional means of microscopy (fig. 9-15).

The most striking aspect which was difficult to explain at a first glance, following the microscopic study, was the generally geometrical shape of the orifice, its blunt edges, as if cut with an instrument held bevelled at approx. 45°. This operational sequence imagined was hard to accept, as the *Lithoglyphus naticoides* snail shells are small-sized, less than 8 mm long, and their fragility is an additional handicap.

Such being the case, the experimental studies on freshwater or land snail shells, having a similar fragility, have become indispensible. They verified, from the start, Y. Taborin's assumption (1993 b), according to which the orifice would be the result of several interventions from the outside of the shell.

Fig. 3 – Piercings in *Lithoglyphus naticoides* snail shells from the Gravettian III stratum of Poiana Cireşului.

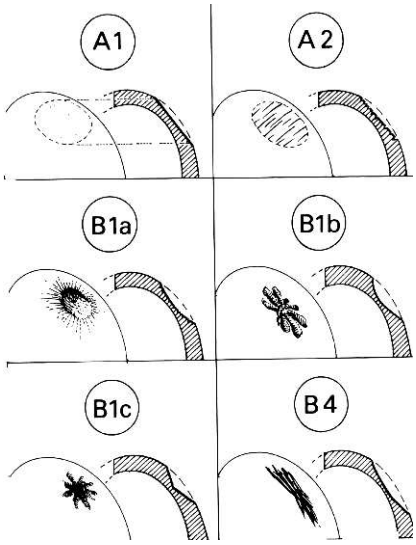

Fig. 4 – The most frequent preparation techniques used on shells. **A.** Flat preparations. **A1.** flat and smooth surface. **A2.** flat and ridged surface. **B.** Deep preparations. **B1a.** small grated *cuvette*. **B1b.** *cuvette* with hard stria. **B1c.** small *cuvette* with hard stria. **B4.** narrow notch (acc. to Y. Taborin, 1993 b, fig. 2, p. 259).

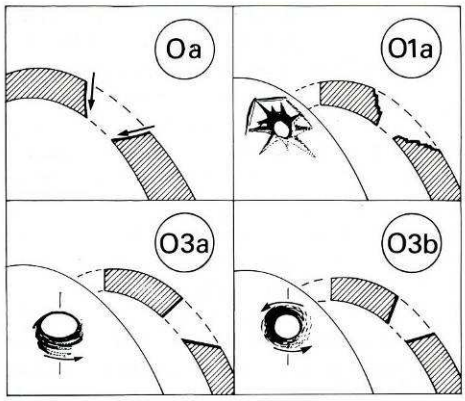

Fig. 5 – The most frequent piercing techniques used on shells.. **Oa.** Orifice made using the preparation technique until piercing. **O1a.** piercing by launched percussion, with traces of impact. **O3a.** Orifice made by indirect percussion. **O3b.** Orifice made by an alternative circular motion (acc. to Y. Taborin, 1993 b, fig. 4, p. 260).

Fig. 6 – Shells of *Nassarius kraussianus*. Experimental action performed by piercing the aperture with a lithic point (a-e); from the outside with a lithic point (f-h); from the outside with a bone point (i-k); through the aperture with a bone point (i-o) and crab pincers (p); (h şi k) micro-chipping on the inner wall of the shell, (d-e, m-p) micro-chipping on the outer wall of the shell (acc. to F. d'Errico et al., 2005, fig. 7, p. 17).

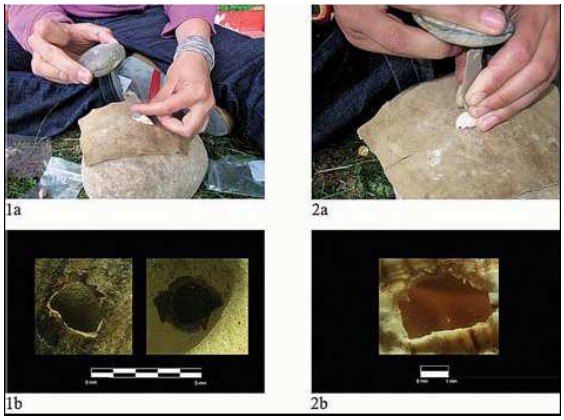

Fig. 7 – Making the orifice on marine snail shells by indirect percussion with an intermediate flint implement: 1 a-b from the inner side of the shell; 2 a-b from the outer side of the shell (acc. to B. Avezuela, 2010, fig. 5, p. 51).

Fig. 8 - Experiment regarding the method of piercing the shells of freshwater or land snails with fragile shells: 1-collection of snail shells; 2-smaples for experiment and the deer antler with which the orifice was made; 3-snail shell and deer antler; 4-antler branch used for piercing; 5-piercing from the inside of the shell, by pressure on a blank; 6- the resulting orifice; 7-observation of marks using the VHX-600 digital microscope; 8-9 marks on the upper side (8) and on the lower side of the shell piercing (9).

Unfortunately, our attempts did not have the expected results, the main impediment being precisely the freshwater or land gastropods' fragility as compared to the marine ones. The orifices on the Gravettian shells from Poiana Cireşului were by no means obtained by penetrating from the outer part of the shell.

Moreover, we do not consider it the most advantageous method of piercing the shell, neither from the inside nor from the outside, by indirect percussion, for between the striker and the surface of the shell a flint tool (a sort of *chasse lame*) is interposed, according to the scenario suggested by Avezuela (2010). The main cause may be the fragility of the shell. Under such conditions, one of the experiments proposed by F. d'Errico, C. Henshilwood, M. Vanhaeren, K. van Niekerk (2005) may be virtually applied with more success. It is the assumption which involves piercing through the aperture with a bone point or even one arm of the crab claw. Our experiment (fig. 8) started from the idea that, due to fragility of the *Lithoglyphus naticoides* snail shells and even the very small sizes of this species, the piercing, most plausibly, could not have been done but from the outside of the shell, which had been previously fixed on a support, by direct pressure.

After using several lithic implements, the most efficacious tool used for piercing proved to be the fairly sharp point of a young antler branch. We preferred the use of the deer antler in its natural state, without preparing a special instrument for this operation as it turned out to be extremely beneficial especially because it allowed an efficient hand grip to exercise adequate pressure, necessary for a quick penetration (fig. 8/3-5). This option, commonplace at first sight, was in agreement with that fact that the snail species chosen to be used as ornaments was commonplace, without any particular natural aesthetic ambitions.

The position of the orifice on the last whorl of the shell was chosen so as not to endanger the position of the blank, for efficiency reasons for hanging, so that the centre of gravity should determine a relatively similar position for all items and, not least, answers the aesthetic requirements intended.

Interesting discussions on identifying and specifying marks resulted from usage by hanging were started by Y. Taborin (1993 a, b) and refined by F. d'Errico (1993) through observations relying on modern means of electronic microscopy and even experimental studies which pointed to the mechanically determined wear or that caused by normal wearing by a person, over a certain period of time.

As regards the pierced snail shells of the Poiana Cireşului Gravettian, due to using the digital microscope to analyze them, we have succeeded in capturing extremely revealing images on wear areas caused as a result of hanging (fig. 9/3; 10/2-3; 11/2-3; 12/2, 6; 13/2-3; 15/2-3).

It is interesting that the wear spot on each shell is in direct accordance with its position when it hangs on a thread, determined by the centre of gravity (fig. 2-3).

Symbolic implications

Of the many forms of expression of Palaeolithic arts, adornment represents the most common category in sites, whether it is made of bone, horn, ivory, nacre or various rocks. The preference to transform, by perforation, the objects of natural origin such as animal teeth, shells, etc. proves the Palaeolithic man's aptitude and motivations to take certain forms from the natural environment and place them in a totally different environment (M. Lorblanchet, 1999). The aim was to apply the objects on clothes or wear as necklaces. The aspect, colour and natural shape were, sometimes, the only basis for harvesting, often revealing enough to assign a symbolic function to them. Turning them into jewellery is a particular attitude towards the environment he perceives, in this situation, not only as a source of subsistence but also as a provider of elements bearing a spiritual value. Thus, body adornment, with all its aspects (necklace, garment, make-up), becomes the means by which an individual or social group can express themselves. Beyond the undeniable aesthetic value, it is the element which distinguishes them from another social group or individuals. More specifically, body decoration is closely related to social identity. In this respect, R. White (2006) stated that adornment "*ne symbolise pas simplement un statut mais définit le statut social de celui qui les porte"* (p. 27).

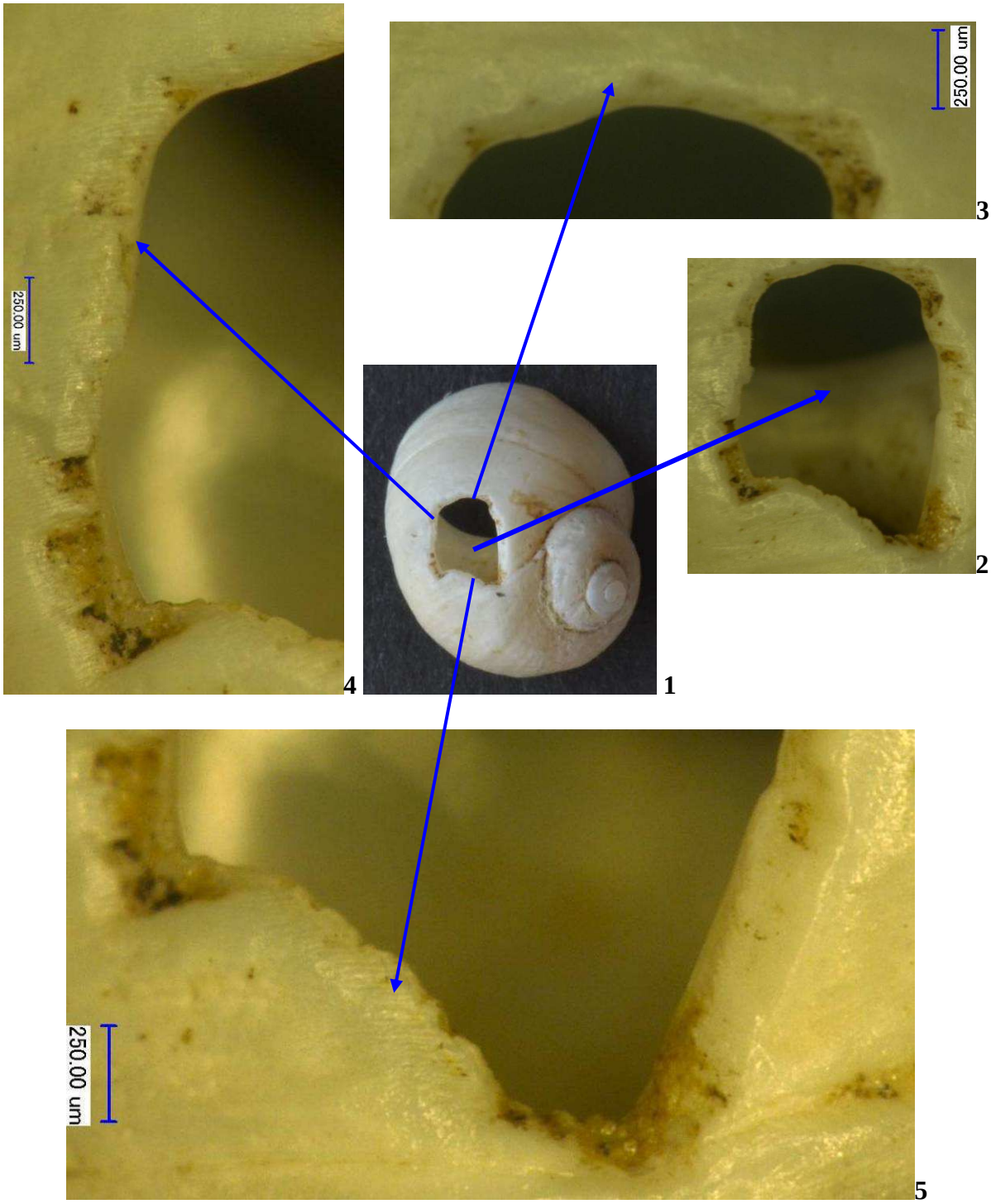

Fig. 9 – Details of manufacture for shell no. 1 (details obtained with the VHX-600 digital optical microscope).

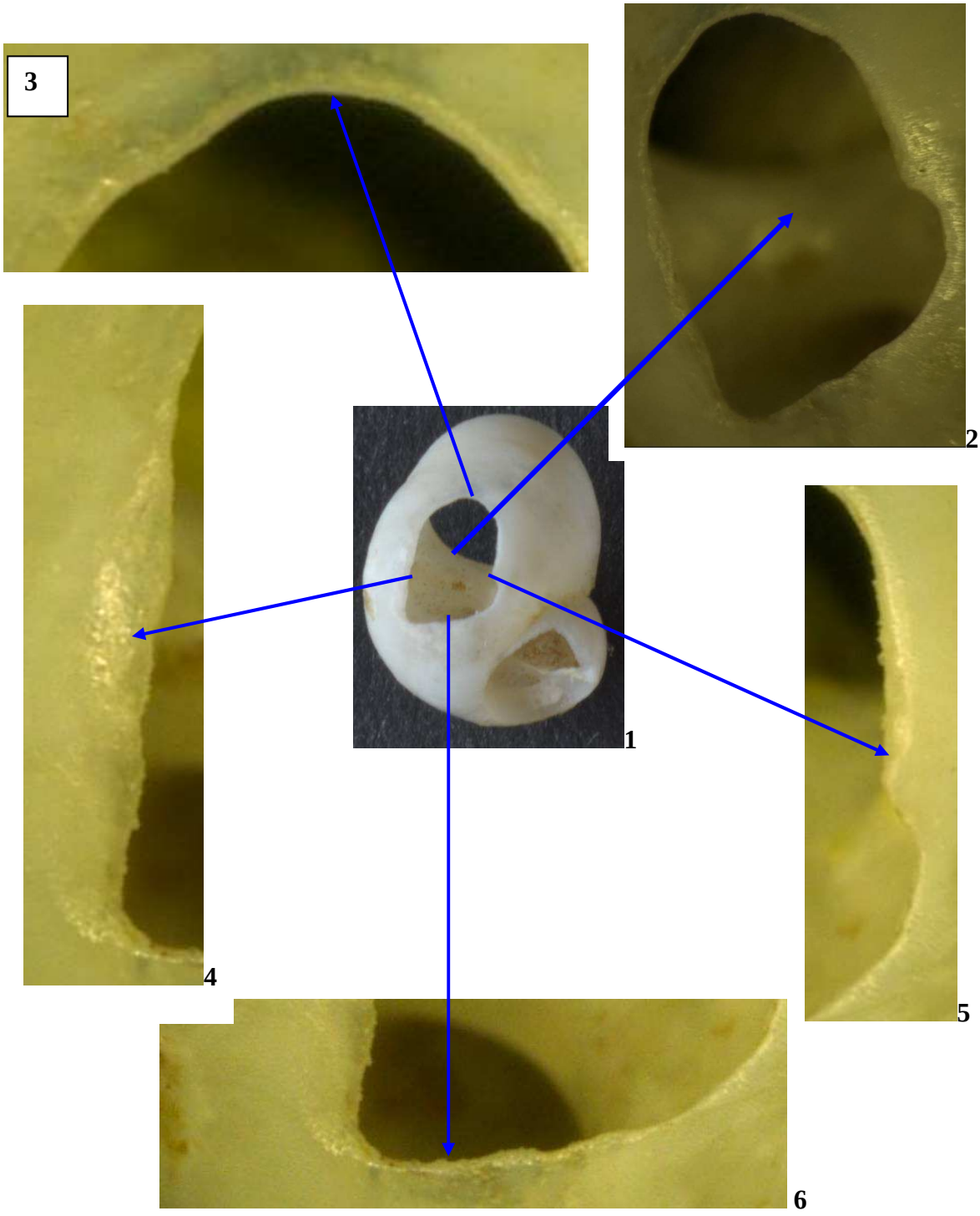

Fig. 10 - Details of manufacture for shell no. 2 (details obtained with the VHX-600 digital optical microscope).

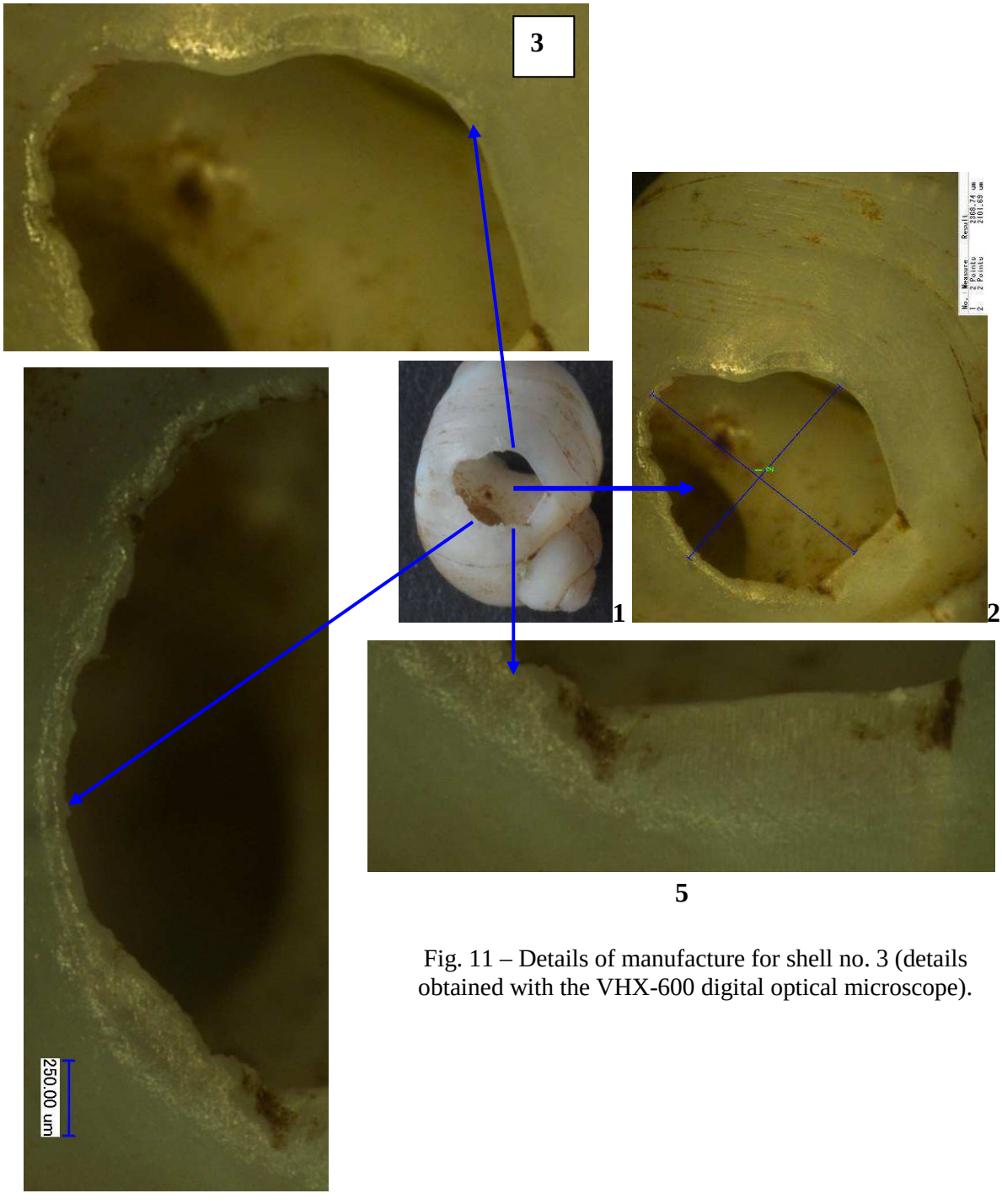

Fig. 11 – Details of manufacture for shell no. 3 (details obtained with the VHX-600 digital optical microscope).

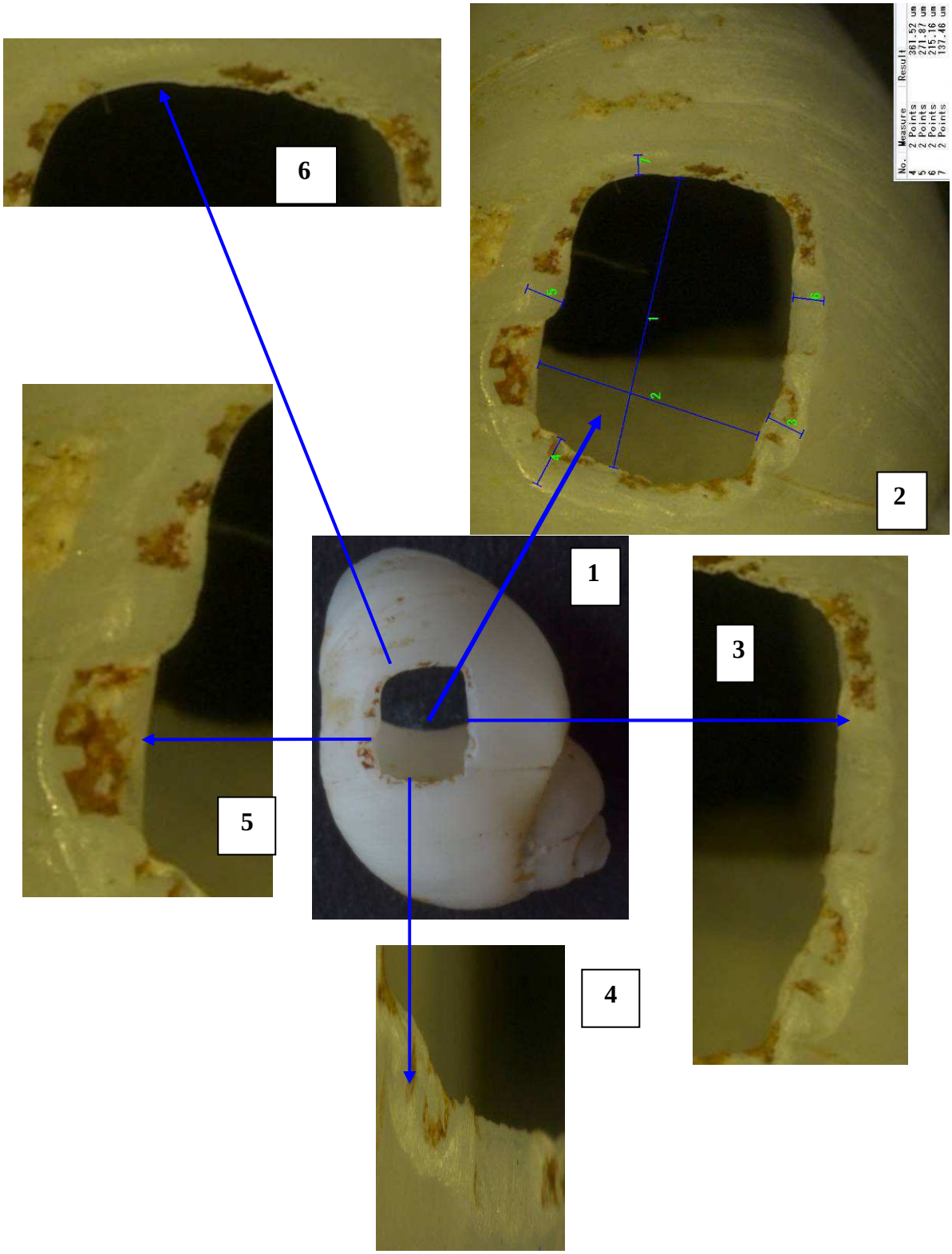

Fig. 12 - Details of manufacture for shell no. 5 (details obtained with the VHX-600 digital optical microscope).

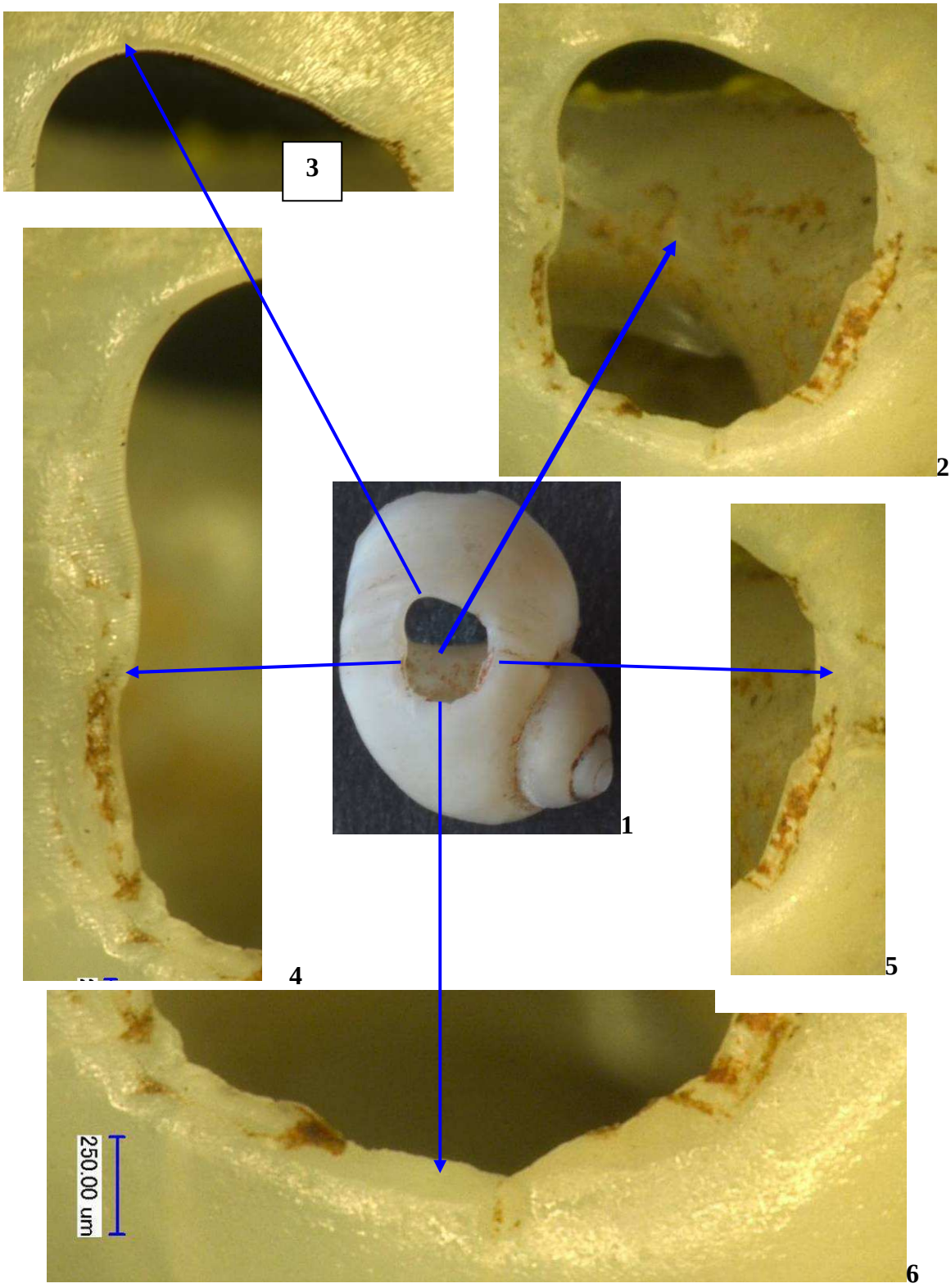

Fig. 13 – Details of manufacture for shell no. 6 (details obtained with the VHX-600 digital optical microscope).

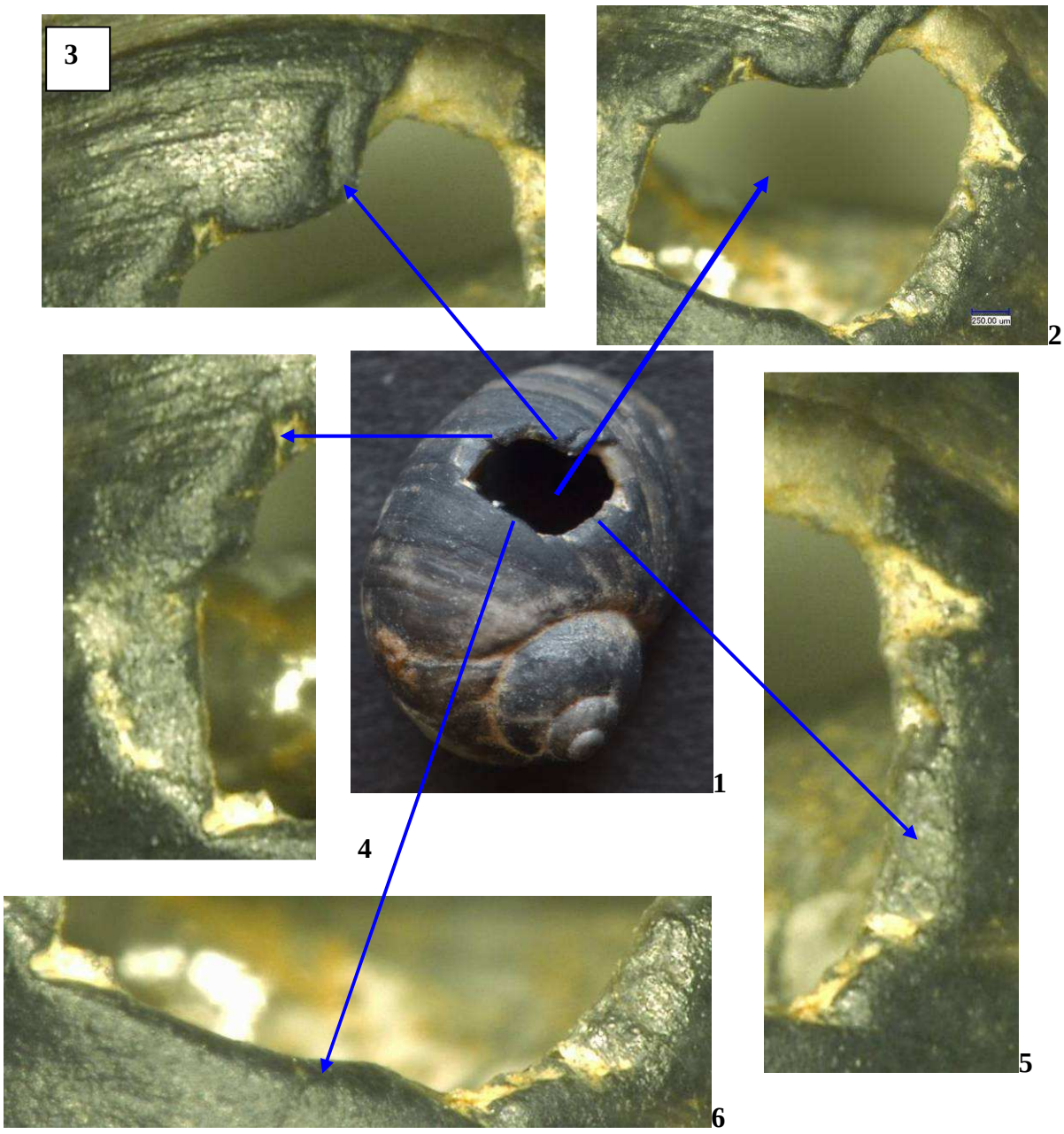

Fig. 14 – Details of manufacture for shell no. 7 (details obtained with the VHX-600 digital optical microscope).

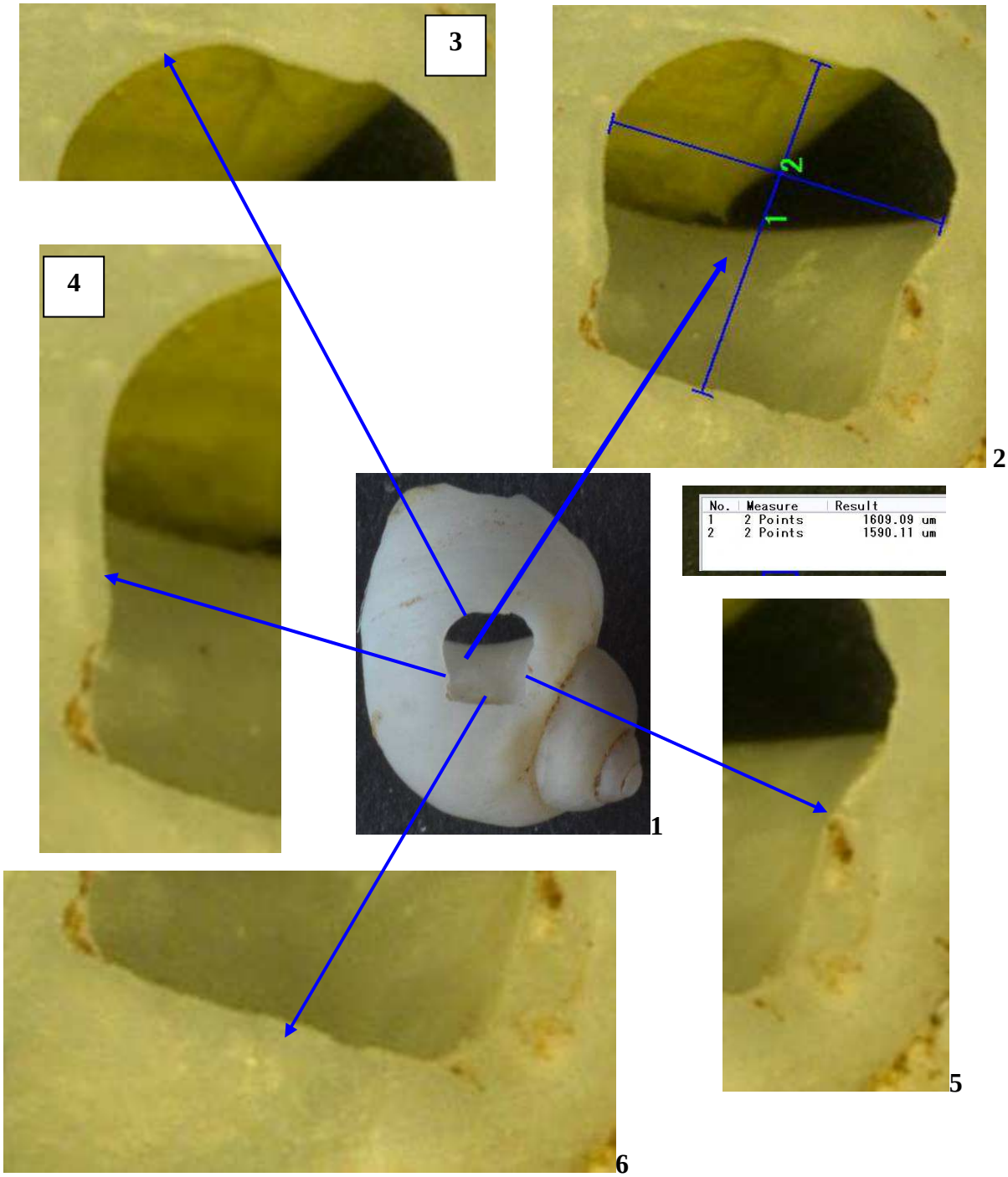

Fig. 15 – Details of manufacture for shell no. 8 (details obtained with the VHX-600 digital optical microscope).

The snail shells found in the Gravettian settlement of Poiana Cireşului-Piatra Neamţ (fig. 2-3) fall in the same category of natural objects turned into adornment elements. Transformation and, implicitly, use of shells as adornment objects are one of *Homo sapiens sapiens*'s preoccupations expressed at the beginning of the Upper Palaeolithic. The diversity of data provided by these objects prompted the emergence of new paths of research (Y. Taborin, 1993; 2004; F. d'Errico, 1993).

The shells were often turned into ornaments by piercing and the various marks could be the result of their use. By identifying the traces, one could also reconstitute the way shells were fastened: hanged or sewn. The wear of piercing is a clue of how important the adornment was to those who wore it. As some ornaments were deposed with the deceased, as part of the funerary inventory, we may assume that their role was preserved after the death of the individual as well. In this sense, S. A. de Beaune (2004) remarked that "*leur role se prolongeait meme dans l'au- dela puisque nombre d'entre eux ont été retrouvés sur des corps inhumés*" (p. 179). Thus, they may be interpreted as personal attributes which individuals did not separate from even after death. Others were passed from generation to generation or made the object of exchanges.

The Upper Palaeolithic people were obviously more and more interested in natural objects they sought to turn, according to their thinking, into an idea, thus giving a certain meaning to them, a personalized shape. They harvested the shells in order to make adornment items, one criterion of selection being linked to a number of features, such as shape, size or colour. Evidently, this tendency to collect natural objects which drew attention through their distinct aspect, apparently without having a well-defined utility, would go beyond a mere curiosity and get a symbolic value. Y. Taborin (2004) noticed how difficult it was to recognize the real criteria of selection and especially to identify the meaning assigned to each shell, nuancing the importance of knowing the origin as an essential indicator of the relations among human groups, "*un document essentiel pour connaître le dynamisme social*" (p. 68).

The fundamental role of the adornment is to communicate, the adornment is a sign which has to be grasped, understood. The diversity of methods of transformation (choosing the elements as blank, type of hanging) involves a diversity of meanings expressed (Y. Taborin, 1993).

As a means of representation, shells may be in general embellishment objects attached to hairdos, various garments, in necklaces or rings adorning arms and feet (A. Leroi-Gourhan, 2001). As is well known, an embellishment can be either represented by a single suspended pendant or included in an ensemble of several distinct elements, both as raw material and shape or size, as is the case of the necklace discovered at Poiana Cireşului-Piatra Neamţ, which is made of *Lithoglyphus naticoides* snail shells. The shells' not coming from particular marine species or not being rare (as shape, size, colour, importance in nourishment) does not mean that their symbolic value should be reduced because of this.

Natural forms were more or less accepted in their initial state, they were often preferred because of their particular features which eased the creation of the desired object. Making adornment objects out of what was at hand, out of materials which did not excel as raw matter did not entail a fall in their symbolic value. The intimate significance, where it came from (inheritance, gift), the remembrance of an event etc., which represented their undeniable symbolic value, were important for the person who was wearing the adornment.

The technological and mainly the experimental study performed (fig. 8) emphasized the easiness with which snails resembling the *Lithoglyphus naticoides* were turned into embellishment items, by hanging, a feature of which the Gravettian people of Poiana Cireşului made use and, therefore, exploited. Their coming from a common species (land and freshwater snails), without any particular aesthetic ambitions, seems not to have been a handicap in their selection, on the contrary, it was an opportunity to give an apparently common, ordinary object a very special value transmitted by its usage as an embellishment item, part of a

necklace.

Consequently, harvesting snail shells existing in the habitat of the settlement was determined by a powerful cultural tradition of the Gravettian communities, that of turning gastropods and Lamellibranchiata into adornment items.

Combining technological study with the shells' significance, transmitted by having turned them into objects of embellishment, we have to say that, with the species encountered at Poiana Cireşului site, a few elements that are rather difficult to explain were identified:

- Choosing a freshwater species instead of a marine one. In this sense, those particular communities had to choose between using marine species, dictated by a tradition proved by Gravettian communities from other regions, and accepting a common species, without any particular aesthetic ambitions, which was present in the habitat exploited by Poiana Cireşului communities.

- Fragility of freshwater or land species. First of all, this reality entails questions regarding how the orifices for hanging were made. This paradox, at first sight, could be later understood following the experimental studies which showed that making the hole was fairly easy when the most adequate accessories were used. During the technological study, we revealed such aspects, we only wish to underline that, probably, the easiness of making the orifice through adequate procedures practically annulled the unreliability of the products obtained. In other words, for the Gravettian artisan and even the hunter, the much more rapid deterioration of adornment objects made of such species, as opposed to the marine ones for instance, was made up for by the possibility of quickly manufacture similar ones. This does not mean that the symbolic value of the shells transformed into necklace was diminished by the ephemeral character of the blanks used.

According to the outcome of our analyses, it is clear that we cannot rule out the desire to turn the shells into personalized items, and their value increases precisely by the attention paid to the selection of the form which inspires a certain symmetry and aesthetic interest, even though they did not excel in outstanding colours and shapes.

As the freshwater snail necklace of Poiana Cireşului is the oldest testimony of this kind in Romania (the Gravettian III level where it was found was dated as follows: Beta Analytic 244.073: 25.760 ± 160 B.P. – ER 11.859: 27.321 ± 234 B.P. (31.969 ka) (C. Zeeden et al., 2009), we can presume the transmission, for future cultural stages, of a powerful tradition in this respect. Furthermore, we cannot ignore that it is unique, from a certain point of view, in the European Gravettian.

In conclusion, experimental reconstitution was essential in understanding the reason of choosing certain materials to make mobiliary art objects. This type of research resulted in revealing data on the relations between gesture, material and tool, the transformation of the blank into a symbol depending on its behaviour during the engraving or piercing operation. The snail shell necklace from the Gravettian of Poiana Cireşului is an illustrative example. The Gravettian man, acting according to a tradition which was deep-rooted in his conscience, exploited what the environment was offering him, the necessary symbolic message being obtained through adaptive means.

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