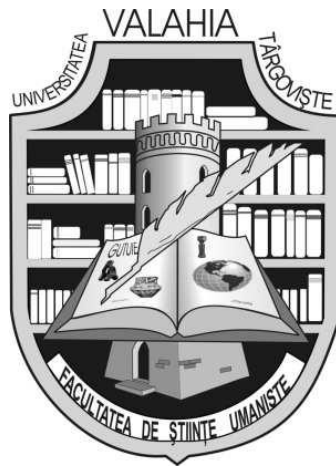


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Technological Features of Decorated Ivory Artifacts in the “Classic” Collection from the Mal'ta Site (Siberia, Upper Paleolithic)

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Abstract: Mal'ta is one of the most important archeological complexes of the Siberian Upper Paleolithic. M. M. Gerasimov discovered the site in 1928 and excavated there until 1958 collections widely considered "classic" for the middle Upper Paleolithic with cultural layers dating to the Last Glacial Maximum (19 to 23 kyr). New data, based on the modern methods of the archaeological expertise, found the problem to identification of "classical" collection as the compound of the micro stratigraphy levels and propose the opportunity coexisting of different chronological or cultural complexes.

The article aims to prove the coexistence in Malta's collection of various techniques of manufacturing stable forms of ornament, as a consequence of different technological or cultural processes, and chronology. Microscopic examination of the site's ivory artifact collection revealed several methods to produce variously functioning ornamental objects. These include portable sculptures, items of personal adornment, and a few other artifacts. Microscopic analysis revealed a variety of the manufacturing techniques and functions of the mobile art. From technological position, we categorized artifacts based on the fragments of the artifacts, blanks, and finished products with and without decoration. In general, there were distinct technological approaches to produce anthropomorphic and zoomorphic figures with specific sets of tools and technological standards. In addition, we identified four categories of ivory ornaments and six different technology-processing methods. We argue that there are temporal or cultural differences in artifact's style and manufacturing techniques based on technological analysis, that may be useful in general reconstruction of the cultural process in the Upper Paleolithic (LGM-period) in the Nord-Eastern Eurasia.

Keywords: mobile art, technology, decoration, ivory, LGM, Upper Paleolithic, Siberia

Introduction

In recent years, there has been a trend to identify specific human groups and their members' phylogenetic origins through elements of visual culture and its associated variations of symbolic activity (C. M. Barton et al., 1994; F. D'Errico et al., 2003; M. Vanhaeren, 2005; L. Lbova, M. Vanhaeren, 2011). Personal ornaments as a form of art are dating more 40,000 years ¹⁴C BP in Siberia (A. P. Derevyanko, 2003; L. Lbova, 2012). In most cases, the mobile art's with series rhythmic decorative elements

date to what Russian scholars refer to as the “classical stage” of the Upper Paleolithic that coincides with the beginning of the Last Glacial in northeast Asia. Paleolithic ornament is present in several well-known Siberian archaeological collections – for example, Mal'ta, Achinskaya, and Buret' (18,000 to 24,000 ¹⁴C BP) (Y. V. Kuzmin et al., 2011). The decorated ivory collection from the Yana-site is even older with pre-Last Glacial Maximum (LGM) radiocarbon dates (28,000 to 30,000 ¹⁴C BP), but it is the only known case (V. V. Pitulko et al., 2004).



Fig.1 Map of the classic stage of Upper Paleolithic archaeological sites (Siberia), (28,000-25,000 – 18,000-19,000 BP): 1 - Tomskaya; 2 - Shestakovo; 3 - Achinskaya; 4 - Tarachikha; 5 - Afontova Gora; 6 - Novoselovo 13; 7 - Shlenka; 8 - Kurtak-4; 9 - Kashtanka; 10 - Dvuglazka Cave (b); 11 - Sabanikha; 12 - Ui 1; 13 - Igeteiskii Log; 14 - Krasnyi Jar; 15 - Mal'ta; 16 - Buret; 17- Ust-Kova; 18 - Makarovo 3; 19 - Alekseevsk; 20 - Voennyi Gospital; 21 - Kurla 3; 22 - Shishkino 8; 23 - Ikhine; 24 - Sannyi Mys; 25 - Kunalei (2); 26 - Ust-Kaykhta 17; 27 - Sokhatino 4; 28 - Arta-2; 29 - Studenoye; 30 - Ust-Menza; 31 - Ust-Karakol (5); 32 - Anui 2; 33 – Biika; 34 - Mogochino; 35 - Ust-Ulma 2; 36 - Ogonki 5; 37 - Lugovskoye

The most complete Late Pleistocene paleoclimatic sequence includes four main stages for Siberia: the Kazantsevo Interglacial, the Ermakovo (early Zyriansk) Glacial, the Karginsk Interpleniglacial, and the Sartan (late Zyriansk) Glacial; they are correlated with Marine Isotope Stages (MIS) 5-2, respectively. In general, the LGM (23,000-25,000 – 17,000 -19,000 ¹⁴C BP) (MIS-2) (P. Clark et al., 2009) in South of Siberia coincides with the Sartan Glacial (G. A Vorob'eva et al., 1990; V. Sitlivy et al., 1997). LGM conditions were cold, arid to semi-desert, tundra, and tundra-steppe landscapes. The following fauna species dominate middle Upper Paleolithic (MUP) and final Upper Paleolithic cultural complexes: mammoth (*Mammuthus primigenius*), woolly rhinoceros (*Coelodonta antiquitatus*), northern deer (*Rangifer tarandus*), and Arctic white fox (*Alopex lagopus*, *Vulpes lagopus*) (G. A Vorob'eva et al., 1990; G. Medvedev et al., 1996; *Stone age...* 2001, etc.).

Upper Paleolithic sites show evidence of intensive procurement of reindeer, mammoth, and woolly rhinoceros, and at such sites as Kashtanka I, Mal'ta and Buret', there is evidence of specialized reindeer hunting. Of course, hunting was not for meat only. Numerous remains of arctic fox, red fox, wolverine, and wolf at Mal'ta imply a source of fur for the Paleolithic inhabitants (*Stone age...* 2001; G. Medvedev et al., 1996; V. Sitlivy et al., 1997). During the classical stage, we see evidence for a flourishing culture of reindeer and mammoth hunters as evidenced by diverse bladelet lithic industries, a rich series of bone and antler implements, personal ornaments, and mobile art objects. Along with stone tool industries based on the removal of blades from prismatic cores, the classic period also witnessed the growth of bone tools and small forms of expressive art.

Most sites included residential structures and other features - the clearest and best studied cultural phenomena of the classical stage known throughout northeast Asia. Furthermore, investigations in the Sayan-Altai Mountains and in basins of major Siberian rivers - the Yenisei, Angara, Lena, Vitim, Selenga, Amur, etc. – revealed more than 50 clearly stratified, relevant sites. Examples include Western Siberia (Tomskaya, Shestakovo, and Achinskaya sites), in East Siberia (Tarachikha, Novoselovo, Shlenka, Ui-1, Igeteisky Log, Mal'ta, Buret', and Ust-Kova), in Yakutia (Diuktai, Ikhine-2), the Transbaikal (Sannyi Mys, and Ust-Menza), and the

Russian Far East (Selemdja, Osinovka, and Ogonki) (A. P. Derevyanko et al., 2003, 2009; Y. V. Kuzmin et al., 2011; L. Lbova, 2014; S. V. Markin, 2009; S. A. Vasil'ev, 1993, 2000; G. A Vorob'eva et al., 1990) (Fig.1).

“Classical stage” also saw different patterns of site locations and distributions. For example, in the Middle Yenisei Valley, the majority of sites are associated with buried soils and slope deposits blanketing high alluvial terraces levels, while in the Angara Basin, sites are mostly located on low alluvial terraces where it seems prehistoric bands settled near water. In the Chulym River Valley, and along the rivers of the Transbaikal, sites are mostly on hill slopes. There is also some evidence for differences in site function, such as seasonal hunting camps (Kashtanka I), lithic workshops (Sosnovyi Bor), and habitation sites (Mal'ta, Buret', and Achinskaya). In the past, sites with thick cultural deposits (Mal'ta, Buret', and Achinskaya) were interpreted as long-term settlements (S. A. Vasil'ev, 2000; L. Lbova, 2014).

Siberia is also relevant to the timing and conditions of human adaptation to the high latitudes of Eurasia, as well as the initial colonization of Pleistocene Beringia and the northwestern part of the American continent. The Mal'ta Site is key to understanding Paleolithic migration processes in northeast Eurasia (M. Raghavan et al., 2014).

The time-space structure of the classical stage of the Upper Paleolithic in Siberia is very complicated (S. A. Vasil'ev, 1993; S. V. Markin, 2009; L. Lbova, 2014). Industries based on advanced blade technologies with rich, diversified lithic, bone, and antler tools, predominate. The MUP assemblages of Mal'ta, Buret' and Achinskaya, with the majority of tools on small blades, were contemporaneous with such sites as Shestakovo, where both blade and flake technology were exploited (*Stone age...* 2001; A. P. Derevyanko et al., 2003). Despite some shared features, mostly in litho technology, there are marked differences, and entirely grouping them is impossible. Similarities in tool types, ornamental designs, and art styles of Mal'ta and Buret', however, gave rise to the definition of the Mal'ta Culture (A. P. Okladnikov, 1968). Z. Abramova, on the basis of detailed stylistic analysis of European and Siberian female statuettes, identified some specific features of Mal'ta and Buret' collections (Z. Abramova, 1995). Thus, a complex mosaic of cultural variation can be reconstructed. Worth mentioning here is the

appearance of micro blade technology, which became ubiquitous in Siberia in the Final Paleolithic.

Siberian Upper Paleolithic assemblages display cultural traits similar to European Upper Paleolithic assemblages. However, this superficial similarity does not provide ground either for the correspondence of the European to the northeast Asian Paleolithic record, or for speculations about long-distance migration of prehistoric European populations. The Mal'ta assemblage includes many archaic components such as side scrapers, pebble tools, and Levalloisian and discoïd cores. As such, the Mal'ta Culture is now regarded as having local roots (S. A. Vasil'ev, 1993, 2000; G. Medvedev et al., 1996; *Stone age...*, 2001; E. A. Lipnina, 2002). The period is, like in other parts of the Old World, rich in artifacts, such as superb mobile art and personal ornaments, which reflect more than their utilitarian way of life. No other period in Paleolithic northeast Asia is comparable.

To summarize, Mal'ta is the type-site of the

classical stage of Siberia's Upper Paleolithic Period. The site was discovered and excavated between 1928 and 1958 by M. M. Gerasimov. A group of Irkutsk State University scholars has continued research there until now. Currently, Mal'ta has produced stratified culture deposits dating from 43,000/41,000 to 12,000 years ¹⁴C BP (*Stone age...*, 2001; G. Medvedev et al., 1996; Y. V. Kuzmin et al., 2011; E. A. Lipnina, 2002). The "classical" component from Gerasimov's excavation, characterized by ivory artifacts, anthropomorphic sculptures, and habitation features, dates between 21,000 and 23,000 years ¹⁴C BP (*Stone age...*, 2001; E. A. Lipnina, 2002). New data, based on the modern methods of the archaeological expertise, found the problem to identification of "classical" collection as the compound of the micro stratigraphy levels and propose the opportunity coexisting of different chronological or cultural complexes.

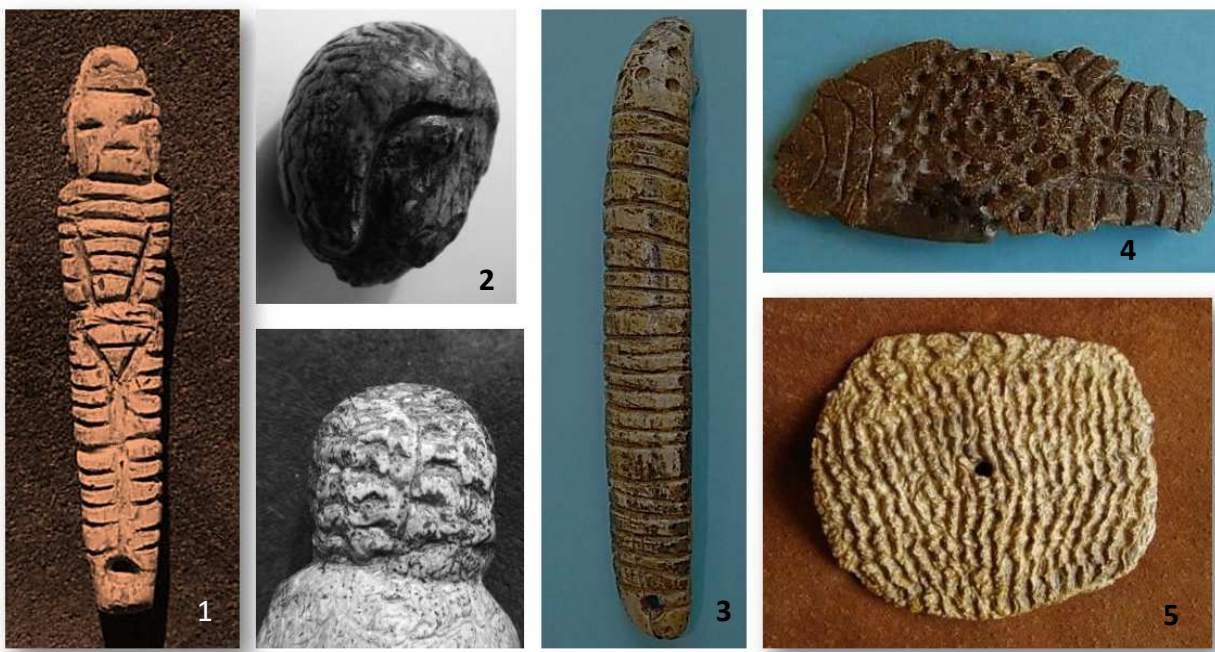


Fig. 2 - Decorated examples from the Mal'ta Site (Hermitage's collection): 1 – the little anthropomorphic figure; 2 – the heads of the anthropomorphic figures; 3 – the herpetofauna's sculpture; 4 – the fish sculpture; 5 – the decorated discs.

Methods and Materials

All ivory's artifacts were examined using bright field reflected light microscopy at magnifications ranging from 20 to 100 diameters using an Olympus BX-30 microscope for the

presence of residues or wear related to use, also ALTAMI microscope and digital camera. Complete technology, use-wear and residue analysis have the potential to provide a reliable basis for reconstructing and evaluating the nature of

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prehistoric tasks, resource utilization, and hunting’s settlement technology history (S. A. Semenov, 1964; L. H. Keeley, 1980; F. D’Errico et al., 2003; R. Fullagar, C. Matherson, 2013; M. Lombard, M. L. Haidle, 2012; etc.). Investigation of the ivory sample focused on morphology, technical and typological classification, and microscopic analysis. First, however, a series of experiments with flint tools analogous to Mal’ta’s, and woolly mammoth ivory, was carried out. Our study of ivory’s collection was based on technology-experimental methods established by M. Gerasimov (1941), S. Semenov (1964), A. Filippov (2004), G. Khlopachev and E. Girya (2010), and P. Volkov (2013). In experiments, we used dry, wet, and frozen ivory to replicate the ornamental technology. We believe the decorative surfaces of moister ivory were easier to the work.

Second, microscopic analysis of the remaining traces on the objects from the Mal’ta collection contributes to revealing the system in the techniques of produce and technological stages used for giving particular shape to an ivory or horn object, and polishing or making-up ornamental décor of artifacts (L. Lbova, P. Volkov, 2016). M. Gerasimov (1931, 1941, 1958), A. Salmony (1948), Z. Abramova (1966, 1995), V. Larichev (1999), and others, identified four categories of decoration based on morphology:

Type 1. Rhythmic parallel lines.

Type 2. Round indentations (or "cupule" patterns) and their combinations.

Type 3. Scalloped or C-shaped marks.

Type 4. Zigzag (a.k.a. wave-like) pattern

In the present paper we have attempt to improve this classification based on microscopic analysis and analyze of technology process.

The ivory anthropomorphic and zoomorphic sculptures, rods, and disks (Fig. 2) are of the utmost importance when we evaluate Mal’ta’s symbolic material culture. One of our tasks is to find continuity to understand if there is retention of elements, techniques, and composition. Here, we do not consider the method of engraving the surface of the product. Typically, engraving produced body parts, clothing, and accessories in deep, but also subtle and light, relief.

Anthropomorphic sculptures (i.e., finished products) comprise three categories:

1. Shaped figures with body elements with and without decoration, but with clothes and accessories engraved,

2. Flat, engraved figures with and without decoration (Fig. 2/1), and

3. Decorated heads (Fig. 2/2).

Traces of the engraving using a burin was observed on all products. Ornamentation as a decor process, attends only on the part of the collection (Fig. 3). Decorated body parts include: heads (N=16), the trunk (N=7), and feet (N=2), or the entire body (N=6), identified as ornamental types 1, 2, 3, and 4, respectively.

Classification of *zoomorphic figures* is based on animal types, the character of the pose, the style, and the degree of stylization. There are only two types in the ornithological group; flying birds (swans/geese), and sitting birds (swan, polar quail, and loon). Only the swan is undecorated. The ichthyic sculpture, a single piece engraved on a flat ivory flake, is similar to a perch. For scale, prehistoric artisans first inscribed a thin line, then carved small cupules arranged in specific patterns. The fin and tail were straight, simple lines made with a burin (Fig.2/4). Herpetofauna sculptures include stylized snakes or worms (Fig. 2/3), type 1 and C-shape. Other zoomorphic examples include an otter, gopher, or what some authors believe to be a wolverine or a stylized mammoth (*Stone age...*, 2001). These sculptures have characteristic crescent cavities, both deep and shallow, arranged in horizontal and vertical rows like fur (types 1, 2, 3).

Decorated discs and plates as a group express the greatest variability of ornamental types. We replicated all of Mal’ta's - pits (cupules), spiral and circular patterns, deep wavy grooves, and crescents. In addition, we looked at items with polishing, but no decoration. We labeled on them all ornamental types (Fig. 2/5). It should be noted, that ivory, bone, and antler were used in manufacturing *decorated rods*. We divided rods into groups with carved spiral lines, ringed relief, C-shaped elements, horizontal lines, and anthropomorphic (?) masks, and undecorated items.

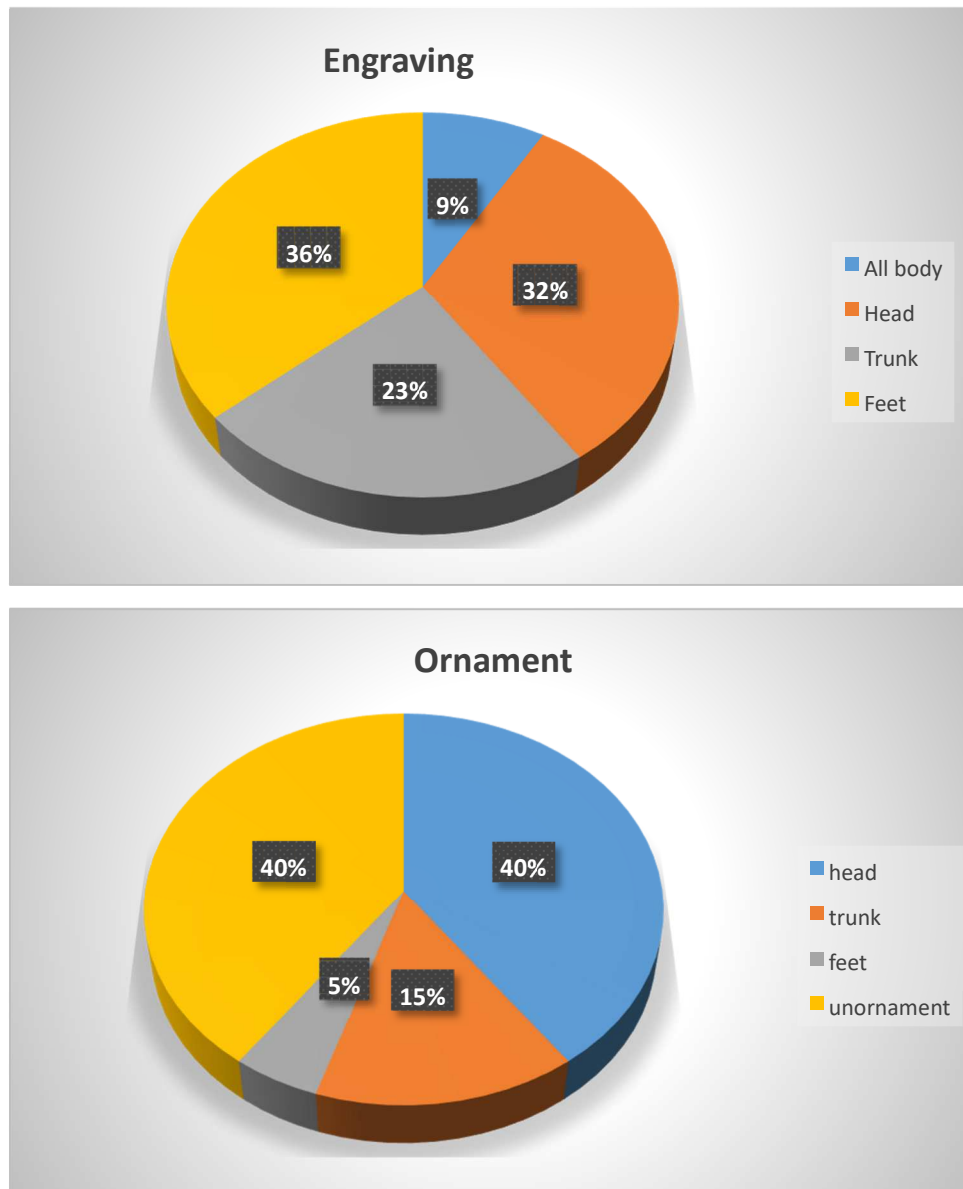


Figure 3 - Zones of ornamentation (Mal'ta anthropomorphic figurines)

The Mal'ta collection contains all known examples of Siberian Upper Paleolithic personal adornment including beads, pendants, bracelets, and tiaras with devices for securing the items on clothing or on the body. Beads and pendants have both simple and complex shapes. Small beads adorned clothing. On many of them, we identified traces of sewing and light polishing from contact with hide or fur. Beads, recycled from elements of clothing décor with evidence of sewing, were on a buried child's necklace.

Bracelets and tiaras were decorated with solitary or paired rows of recesses. The bracelets and tiaras are divided by form and size. A narrow bracelet was identified with pit and cupule patterns made by high-speed drilling with special tools such as a bow and drilling stone. The tiara was on a much wider ivory blank with an engraving of a mammoth, and also pits and cupules made by speed drilling.

The shapes of the decoration were quite conventional, and every type was applied with a special set of tools (Fig. 4). For example, parallel

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lines were usually made with a stone knife or burin (Fig.4/1, 2). Crescent-shaped decorations, both shallow and deep, were made with a burin and engraver (Fig.4/3, 4). A. Filippov believes that this type of ornamentation was applied in several stages. Initially, two or three shallow pits with using the stone point were drilled, and then by pressure were joined into a single element like the letter “C” (A.

Filippov, 2004, p. 115). The zigzag design was made with similar tools as a burin or engraver on the soft surface of the ivory (A. Filippov, 2004; L. Lbova. P. Volkov, 2015). While pits, small holes, and cupules were made with a burin or engraver. First, a line was inscribed with the burin, and then a point was marked for hand drilling. Next, a depression was made for future drilling (Fig. 4/7,8).

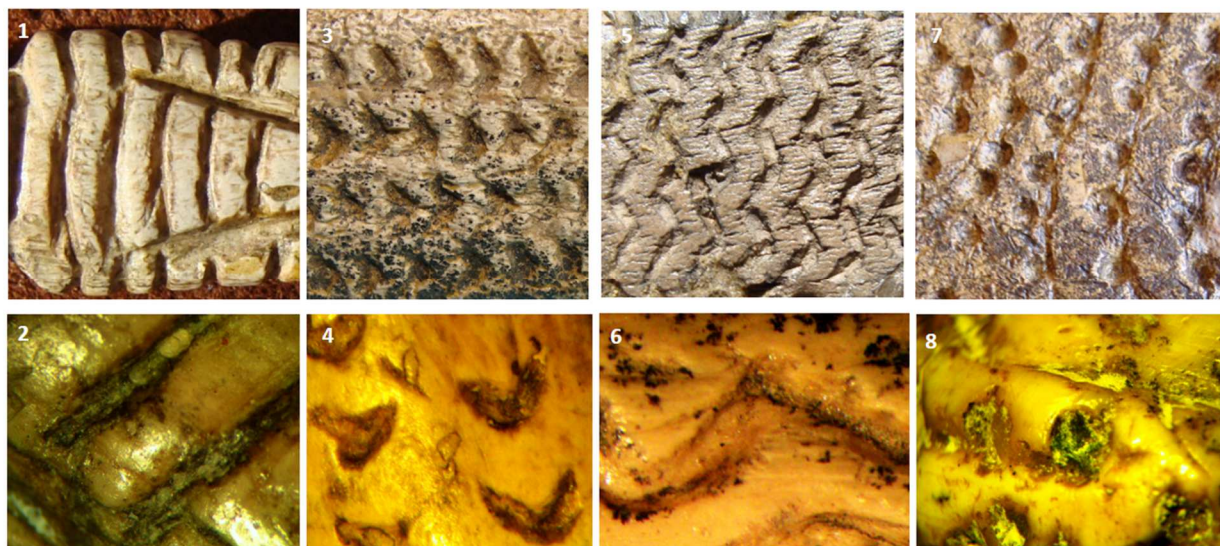


Fig. 4 - Base Mal'ta ornamental composition: 1. simple rhythmic patterns of parallel lines, made by a knife; 2 – traces of the knife 15x; 3 - “scalloped”, or “C-shaped” ornament; 4 - traces of the burin; 5 – zigzag ornament; 6 – traces of the burin; 7 - round indentations (caverns, cupula); 8 – cupula, made by flake with sharp end.

Several techniques were used for the manufacture of pits or cupules. One was with a stone perforator. A second option, based on experimentation and analysis of the few artefacts, was to inscribe a preliminary layout with a thin line, and then to mark the point for drilling with a hand tool. A third method involved high-speed drilling.

Results

We believe the technology had direct influence on the character of the ornamental composition in general and specifically on rhythm and graphic images as decor. According to technological principals, we propose design types 2 and 3 of Mal'ta's ornament complex. Four basic motifs, described earlier by researchers, have wider meaning based on analysis of basic technological elements of production. Thus, we identified 11 decorative variations on Mammoth ivory's artifacts in the “classic” part of the collection based on

technological differences (Fig. 4, 5). Such differences in the decorative technology may be explained also by different short-term or new cultural trends. Because of this investigation, we propose the following decorative categories based on morphological and technological principals.

1. *Simple rhythmic patterns* of parallel lines, made by a knife, constructed in two variations: one made with a reciprocating motion (1A) and another one as a simple cut (1B). This pattern is observed on female anthropomorphic and zoomorphic figures, and on rods, which have a ring - or spiral-shaped character (Fig, 5).

2. *“Scalloped”, or “C-shaped”* ornament presents by two variants. One has deep traces formed by the engraver (Type 2, variant 2A), and another shallow one made with a burin (Type 2, variant 2B). This pattern prevails in the design of the sculpture's anthropomorphic heads, zoomorphic

bodies, and on the surface of disks. Also, method described by A.Filippov (2004) (Fig. 5).

3. *Round indentations* (cupules, and recesses patterns). We highlight two variations. The first is by speed drilling with clearly recessed edges arranged equidistant in a row or in pairs observed on bracelets and bars. The second option is more complex and has two categories. The first (3A) appears more archaic. In this case, cupules are arranged in a circle or a spiral. Application has two

steps: 1) a preliminary mark was made on the surface by a burin (line, circle, or spiral) (Fig. 4-7), and 2) deepening was made by the flake with sharp end (Fig. 4/8). As a result, there are pits with jagged edges. Therefore, cupules are spaced roughly equidistant on the line of circle, or spiral. This design covers flat discs, "heads" of anthropomorphic figures, ichthyic sculptures, and objects of personal ornamentation (shaped like 8-image) pendants (Type 3, variant 3A) (Fig. 5).

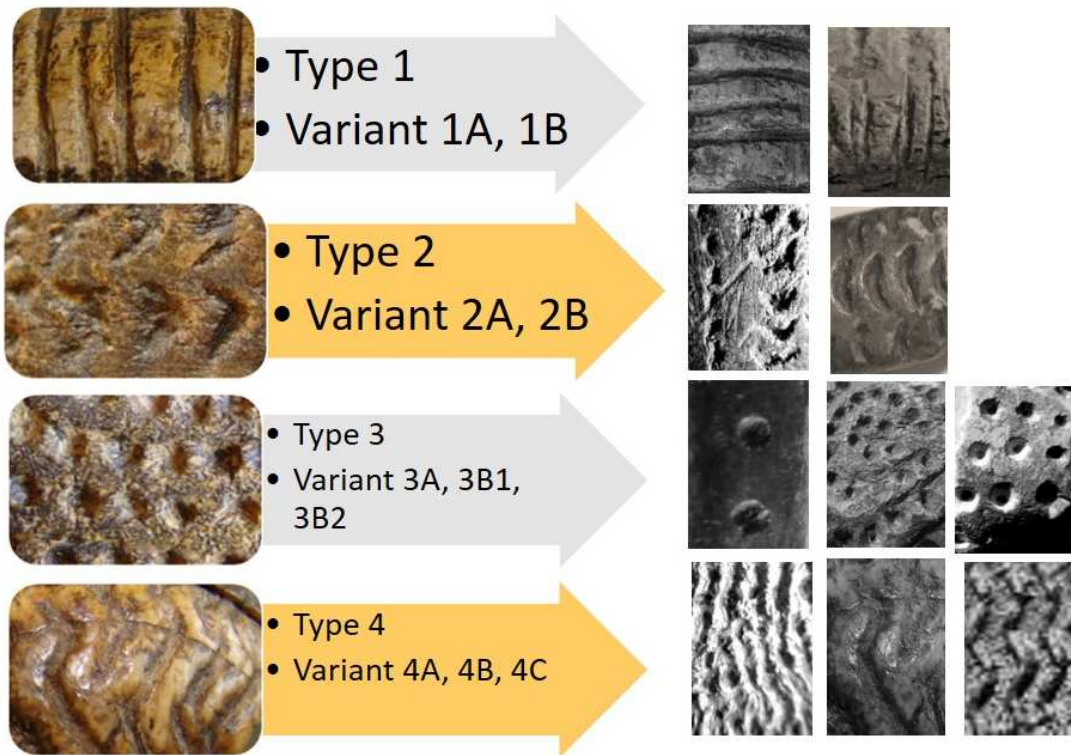


Fig. 5 - Schema of the types (variants) of the Mal'ta design.

The second option (B) presents three steps using another tool kit. First step has the same analogic to applying preliminary marks along a thin line. Next, the points for drilling are planned. The third step involves speed drilling the decorations (Type 3, 3B1).

As an independent variant, we selected solitary or paired recesses produced by speed drilling (Type 3, 3B2). The recessed element has smooth, clear edges. This type of design was found only on the central pendant of a necklace from a burial (3B1, 3B2) (Fig. 5).

4. *The zigzag* and its smoother ornament, or a

wave-like pattern. Design characteristics (such as the corner between fragments of the line, distance between lines, density of the elements, the tool used, and the quality of the Mammoth ivory) are difference between variants of the drawing. Simple zigzags were produced by a burin on the dry surface of Mammoth ivory. The lines have nearly 90° corners (Type 4, variant 4A) (Fig. 4/5, 6).

Another variant was produced with a burin on a wet ivory. The lines have wave-like patterns and a smoother character (Type 4, variant 4B). Once more differentiation is present as deep wave-like ornaments. The lines have high relief, looking as a

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blurred, much smoother, and made by an engraver (Type 4, variant 4C) (Fig. 5). The desired effect may be achieved according to preliminary preparation of the ivory surface. A. Filippov (2004) believed Gravettian people used chemicals, such as oxalic acid or urea, to affect the hardness of the surface layer of the ivory to soften the surface of row. The zigzag ornament covers the discs, tiara and the heads of anthropomorphic sculptures.

Discussion

A variety of terms, such as "Mal'ta Upper Paleolithic culture", "Mal'ta-Buret' stage of the ancient history of Siberia", "Mal'ta-Afontovo's circle", "Paleolithic art of Mal'ta" and others have been used in various Upper Paleolithic classifications. However, until now, the origins of this Sartanian classical culture are still debatable. The Mal'ta lithic collection associated with stratigraphic layer 8 (23,000 – 21,000 ¹⁴C BP) is well-correlated with other well-known archaeological sites of the Baikal Region in Eastern Siberia: the Military Hospital, Schapovo, Buret', Krasny Yar (VII), IgeteyskyLog I, Afontova Gora II, Druzhiniha, and others (E. A. Lipnina, 2002). Buret', which yielded a ¹⁴C-date of 21,190 ± 190 (SD RAS-1680) and apparently belonging to the same geographical area, chronological period, and economic development stage, is comparable to Mal'ta. A single group of Pleistocene hunters might have used these two sites. Both sites were recognized within the early Middle Sartanian (Sr) stratigraphic sequence. It makes it possible to correlate the Buret' lithic collection with the Mal'ta classic lithic collection from stratum 8.2. The sites are located 12 km N-S from one another separated by the low-elevated Belaya watershed.

Focusing on the technological aspects of manufacture, we were able to identify several common methods of preparation of ivory for subsequent decoration, the basic forms of composition, and patterns of categorical design elements specific to the Mal'ta Site. We propose also for other coeval complexes in Siberia.

According to conclusion of the microscopic analysis of the Mal'ta assemblage there were revealed different ways of the decorations and different tool kits for processing the ivory for the same morphological element of the base ornament (line, cavern, C-enveloped, zigzag). Such a situation can be explained by chronological differences of the archaeological components in the "classical"

complex of the cultural levels of the Mal'ta site, or by the coexistence of heterogeneous groups of Paleolithic inhabitants of the Siberia with a variety of technological traditions in one time.

Mal'ta produced the only Paleolithic burial from this period. It is difficult to understand the ethnicity of the Upper Paleolithic inhabitants of Siberia based on anthropological data. C. Turner argued that the dentition of the Mal'ta children is more similar to European *Homo sapiens sapiens* such as from Sungir' and Kostenki, than to Upper Palaeolithic Asians, such as from Zhoukoudian Upper Cave, or the Paleoindians of North and South America. On the other hand, V. Alexeev and I. Gochman believe that the incisors of the Mal'ta children are shovel-shaped which is considered a Mongoloid feature. Z. Abramova suggested that different styles of female figurines could provide a clue to this matter, and pointed out that the Mal'ta-Buret' statuettes may be taken as evidence of a Mongoloid component in the population of Paleolithic Siberians (S. V. Vasil'ev, 1993).

Ancient DNA from the remains of a boy (one of the two children from the Mal'ta burial) is pertinent to our study. The team headed by E. Willerslev showed that the specimen from Mal'ta belongs to the Y-haplogroup R and the mtDNA haplogroup U (M. Raghavan, et al, 2014). Previous studies have shown that the haplogroup U appears in a number of the Upper Paleolithic cultures in Europe (Kostenki-XIV, Dolni Vestonice, Hohle Fels, and Oberkassel), and possibly are connected to some Paleoindian groups of North America.

Conclusions

Summing up the results of the investigation, we propose, the production of ornamented artifacts made of ivory at the Mal'ta site was stable and serial. For each of the types of objects, their own production processes and a special technology were applied, each involving specific sets of tools. The categories of ornamental decoration of the surfaces were quite conventional, and every type of ornamental decor was made with a special set of tools and surface of ivory. Degree of moisture of the surface has important.

For example, parallel lines usually were made with a knife, while the caverns (small holes or cupules) were made with a burin or a cutter, the cavern being placed on the line performed with a cutter. After that, hand drilling was done at the site of the cavern, since the cavern was the mark for

future drilling. Another type of drilling is the speed drilling, which demonstrate the innovation in technology. The C-moon-shaped ornamental decoration and more shallow decoration were made with a burin and a cutter on the surface with different degree of moisture. Also, method described by A. Filippov, was possible. The zigzag decoration was made with a similar cutter, on the ivory's surface with different degree of moisturizing: we established different corner of zigzag (like-wave, or like triangular).

Obvious differences in technological methods of decorating the surfaces of mammoth ivory testifies to the multicultural components within one settlement. We do not exclude artifacts of different ages. It should be noted, that different methods for producing the various decorations are found in the burial objects. Obviously, the different manufacturing techniques do not influence the image in whole. Generally, the composition reflects standard elements. Nowhere else in Eastern, Northern, or Central Asia are similar decorated ivory materials for comparison unknown. Collections called "Mal'ta – Buret' mobile art" are exceptional, but we continue to look for the technological analogies for other synchronically archaeological sites. We hope, that there are temporal or cultural differences in artifact's style and manufacturing techniques based on microscopic and technological analysis, that may be useful in general reconstruction of the cultural process in the Upper Paleolithic (LGM-period) in Eurasia.

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