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The Techniques of Modeling and Decorating Upper Paleolithic Anthropomorphic Figurines from Malta, Eastern Siberia

We present the results of a microscopic analysis of anthropomorphic figurines from Malta, southeastern Siberia. The bulk of the collection comprises "classical" specimens unearthed by M.M. Gerasimov in 1928–1958. Recent studies by G.I. Medvedev and others in Irkutsk focused on the chronology, microstratigraphy, and cultural subdivision of the deposits. The analysis of the figurines excavated by Gerasimov has revealed the manufacturing sequence, as well as modeling and decoration techniques. The process included the primary processing of mammoth ivory, preparation of a blank with key elements being marked, final modeling, and decoration. At each stage, specific tools were used. Especial attention is paid to decorative elements: patterns, engraving, rendition of clothing and accessories, and painting. Tools included planing-knives, scrapers, cutters, burins, and reamers. The decoration process was subject to a certain canon, which concerned key elements of design, their combination, and choice of the decorated area. One of the most intriguing facts about the decoration of Malta figurines is that in certain instances, traces of several pigments such as scarlet, green, and blue were revealed.

Keywords: Siberia, Malta, Upper Paleolithic, anthropomorphic figurines, ivory processing, decoration.

Introduction

Archaeologists mostly agree that the pieces of portable art might have had various purposes, and their function, semantics, and attribution can be interpreted in various ways (Abramova, 1960; 1966: 195–199; Gerasimov, 1958; Demeshchenko, 2008; Larichev, 1999: 148–160, 180–196; Lbova, 2014a; Lipnina, 2008; Okladnikov, 1960; Frolov, 1987; Conroy, 1993: 180–196; Marshack, 1991; and others). Siberian Paleolithic anthropomorphic figurines, including fragments and blanks, represent series of articles and isolated specimens from the key Upper Paleolithic sites in Northern Eurasia (Malta, Buret, Krasny Yar, Listvenka, Shestakovo, Yana, etc.) (Abramova, 1966: 195–200; Okladnikov, 1960; Akimova, 2002; Derevianko et al., 2003: 66–71; Pitulko et al., 2004; and others).

On the basis of technological, morphological, functional, and stylistic features, the Malta collection

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of "classical" artifacts, made of ivory, bone, horn, and stone, was classified into groups of "conventionally synchronous articles" (Kamennyi vek…, 2001: 67). The anthropomorphic portable art represents the largest assemblage (about 40 specimens*). The Buret figurines (5 spec.) generally fit well into the same stylistic canon of typical postures and elements characteristic of the Malta tradition (Okladnikov, 1960).

Use of microscopic analysis and modern digital technologies for investigation of modeling, detailed elaboration, and decoration of the Malta anthropomorphic figurines provides new methodic approaches to assessment of the available materials. The sample under study contains 29 specimens (including blanks and fragments) from the "classical" collection (the artifacts are deposited in the State Hermitage Museum in St. Petersburg, and the State Historical Museum in Moscow).

This paper addresses mostly the cultural specificity of the technology (various manufacturing techniques, tools used, properties of raw material, and artisan skills) rather than interpretation of the symbolic significance and reconstructions of ideology, which issues represent popular issues in the archaeological literature.

Research methods

Methods of technological and use-wear analysis of the Malta collection were based on the research approaches elaborated by S.A. Semenov (1957) and his scientific school. For comparative analysis, materials from the reference collection of experimental traceological specimens of the Institute of Archaeology and Ethnography SB RAS (Novosibirsk, Russia) were used. Manufacturing techniques and tools were defined using the terminology developed in the course of experimental use-wear and technological studies (Volkov, 2013: 94–154; Lbova, Volkov, 2016). Archaeological and experimental specimens were examined using the binocular microscope and Altami digital camera with 7, 15, 20, and 25-fold magnification.

Apart from manufacture and use-wear signs, microscopic examination has shown traces of various pigments on the surfaces of figurines. Pigments were analyzed using the BRUKER M1 Mistral Micro X-ray Fluorescence Spectrometer (held by the State Historical Museum, Moscow). This is a nondestructive method, requiring no preliminary sample-preparation. This method enables elemental analysis of composite and multilayered samples. The M1 Mistral microfocus X-ray tube reveals the elemental composition of a sample by irradiating it with a thin beam of X-rays on a spot sized as small as 100 μm, depending on the collimator settings. The video microscope ensures that measurement takes place at the specific spot. The spectrometer ensures detection limits as low as 0.01 %. Such detectors, system of digital pulse processing, and optimized system geometry ensure maximum quantum efficiency and accurate information on the elemental composition of the material. This article provides the preliminary results of the analysis of three pigment types, obtained using collimator setting of 0.4 mm and a processing time of 180 sec.

3D spatial images were generated mainly by photogrammetry. A series of photographic images was taken from various positions in order to get a stereoscopic view of an object. The images should have covered the entire object and overlapped one another for at least 30 %. Then, the special program transformed the photographs into a 3D-model. An electromechanical rotary table regulated by a controller was used for automatic shooting. Each object was subjected to double, sometimes triple, scanning with a step of 5° in order of avoid dead-zones. On the rotary table, a colored pattern with established squares was fixed, which made it possible, after the creation of a model, to reconstruct the correct colors of the texture and automatically to correlate the size of the model with that of the original object. Agisoft Photoscan and Geomagic Studio software were used for processing the photographs and generating the 3D-images. Apart from the high presentational potential of 3D-models, this technique is useful in distant examination of artifacts and in creation of high-quality and accurate replicas of them.

Materials and discussion

Using the results of technological analysis, we propose the following classification of the aggregated collection of anthropomorphic figurines:

1) blanks—prepared ivory bars with profiled or marked out heads, shoulders, and hips (6 spec.);

2) ready artifacts, including fragmented ones (19 spec.):

– profiled, with modeled parts of the body (ornamented and unornamented),

– slightly profiled (with marked out heads and engraved details),

– flat (ornamented and unornamented),

– fragments of anthropomorphic figurines;

3) figurine details (heads) as separate objects (4 spec.) (Lbova, Volkov, 2015).

For the blanks of anthropomorphic figurines, elongated fragments of mammoth ivory were used (rods, bars, and

*Statistical analysis of this collection has not yet been finished. The artifacts are deposited in four different museums and have not been consolidated into a single set. Publications provide discrepant data. In the course of our research, new artifacts have been added to the category of anthropomorphic figurines.

chips). Analysis of parameters of the main group of figurines and blanks supported the correctness of the proposed classification. The categories of blanks and ready artifacts display practically identical parameters, classifiable into three main classes: small (3–5 cm), middle-sized (6–8 cm), and long (10 cm and more) figurines. The artifacts of the "heads" category have not been taken into account in the statistical analysis of parameters, yet the size of the heads (exceeding 3 cm) suggests rather large anthropomorphic sculptures (exceeding 10 cm), the missing parts of which might have been made of a different material.

Judging by the processing of the tops and bottoms of the figurines, we can propose that the mammoth tusk, initially split longwise, was then cut into blanks of the intended length using a planing-knife (Fig. 1, *1*, *b*), which was also utilized as a saw (Fig. 1, *1*, *d*). Surfaces and separate details of objects were processed mostly with two tools: a planing-knife (Fig. 1, *1*, *c*; *2*, *d*) and a burin (Fig. 1, *1*, *a*). Surfaces were finished using a burin with a considerably wide working-edge (Fig. 1, *1*, *a*), and a scraper (Fig. 1, *2*, *a*). Ornamentation and detailed elaboration of the objects were carried out with the aid of burin, knife, or cutter (Fig. 1, *3*). A burin was used for processing surfaces simulating fur, elements of clothing, hair, and personal accessories (Fig. 1, *3*, *b*, *c*). In some cases, certain details (arms, legs, loins, and breasts) were deeply cut out with a knife and finished with a cutter (Fig. 1, *3*, *a*). Drilling was executed with a reamer (Fig. 1, *3*, *d*).

The ornamentation of a part, or an entire artifact, shows stable decorative patterns. Decoration of only heads is most typical (11 spec.). Decoration all over the body is observed in seven specimens (all these figurines, except for one specimen, belong to small artifacts). Additional ornamentation with small holes and parallel lines marking elements of clothing or accessories (parka's edge, sash, belts, and bracelets) is noted on three specimens (Fig. 2).

Anthropomorphic figurines were decorated with various combinations of four main graphical motifs: small pits, straight lines, crescents, and "waves" or zigzag lines (Fig. 3) (Lbova, 2014b).

1. Simple pattern of recurrent parallel lines executed with a knife. In rod-like blanks, these lines sometimes go around, or form a zigzag pattern (Fig. 3, *1*). This pattern is typical of the anthropomorphic figurines of children (State Hermitage Museum, 370/753, 759; State Historical Museum, 1820/207, 1822/629).

2. Decoration with small depressions ("pit" design). This design is more complicated in terms of composition and technology: the pits usually form circles or spirals; linear patterns are less common. The manufacturing process

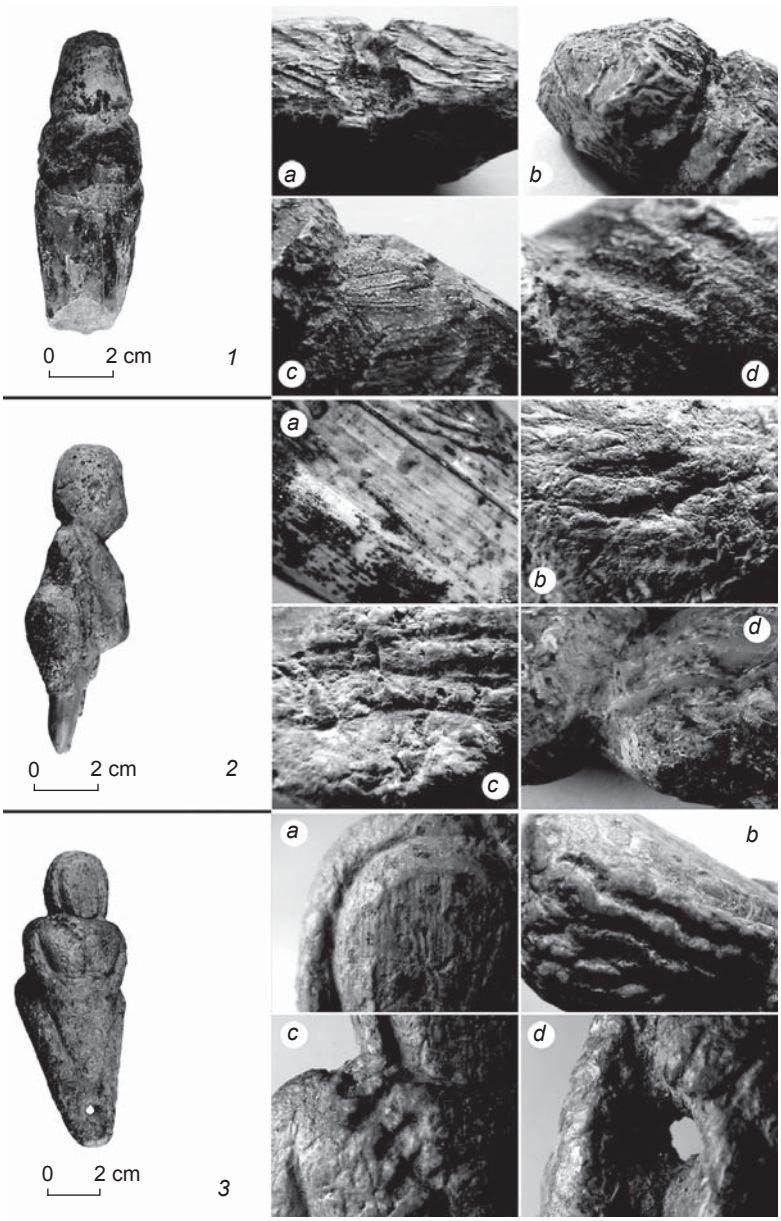


Fig. 1. Stages of figurine-modeling, and traces of the tools used.
1 – stage 1: *a* – traces of burin, *b*, *c* – traces of planing-knife, *d* – traces of knife used as saw (State Hermitage Museum, 370/760); *2* – stage 2: *a* – traces of scraper, *b* – traces of burin, *c* – traces of cutter, *d* – traces of planing-knife (State Historical Museum, 1822/622); *3* – finale stage 3: *a* – traces of cutter and planing-knife, *b* – traces of burin and cutter, *c* – traces of burin, *d* – traces of reamer (State Historical Museum, 1820/208).

included preliminary marking (circular or spiral) of the surface, where artisans made dots for future pits using a burin, and then shallow irregular pits using a reamer or burin. The elements were approximately equidistant from one another (Fig. 3, *2*, *3*). Such a pattern is observed on the figurines' heads, imitating hair (State Historical Museum, 1820/209, 506) or the fur trimming of headgear (State Hermitage Museum, 370/748, 755).

3. Crescent, or C-shaped, pattern. In terms of technology, this was made either deep with a cutter (Fig. 3, *4*), or shallow-carved with a burin. Such a pattern often covers the entire surfaces of large objects, but prevails on the heads of figurines (State Historical Museum, 1820/206, 208; State Hermitage Museum, 370/748, 752).

4. Zigzag pattern. This was usually made with a burin (Fig. 3, *5*). Its variety of wavy pattern, was additionally finished with a cutter over the traces of burin processing (Fig. 3, *6*). Such a pattern is observed mostly on the figurines' heads (State Hermitage Museum, 370/743, 746, 766).

The rendering of elements of clothing, shoes, and accessories (bags, belts, adornments, and sashes) is of especial interest. A.K. Filippov believed that the Malta collection included figurines with and without clothes; the "naked" figurines were subsequently either painted or dressed like dolls (2005: 122). In this collection, we recognize such types of clothing as *kamleya* (the traditional closed overcoat of indigenous Siberian peoples; State Hermitage Museum, 370/748), and fur overall, or *kerker* (typical clothing of Koryak children and women) (Lbova, 2014a). Notably, overalls were more typical of miniature figurines (State Hermitage Museum, 370/752–754, 757, 759; State Historical Museum, 1820/206, 1822/629). The surfaces were decorated with two main motifs: crescent-shaped cut-outs made with a cutter, and transverse circular incised lines made with a knife (Fig. 3, *1*, *4*).

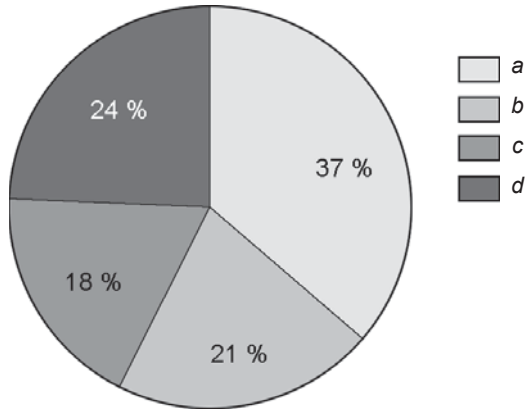


Fig. 2. Ratio between decorated areas on anthropomorphic figurines.
a – head; *b* – body; *c* – details; *d* – no decoration.

The design of the figurines' heads attracts special attention. Currently, researchers argue whether there was hair or headgear rendered on the Paleolithic anthropomorphic figurines (Abramova, 1960; Gvozdover, 1985; Soffer, Adovasio, Hyland, 2000); we can state that specimens of the analyzed sample of the Malta collection display variations in both headgear (helmets, hats, hoods) and hair (Lbova, 2014a). Their combination has also been noted (for example, figurine from the State Hermitage Museum, 370/751)

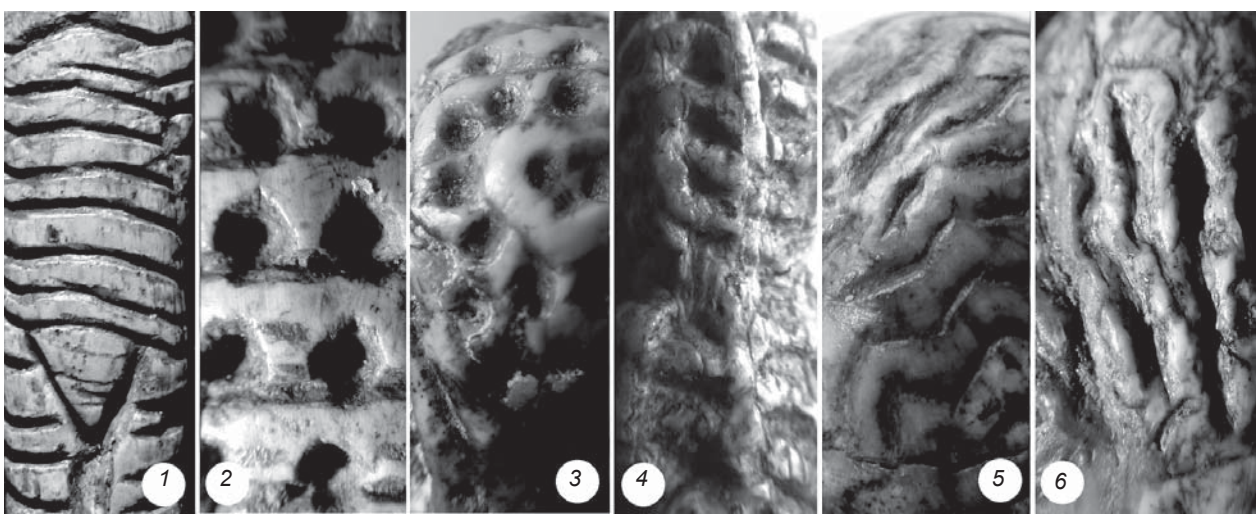
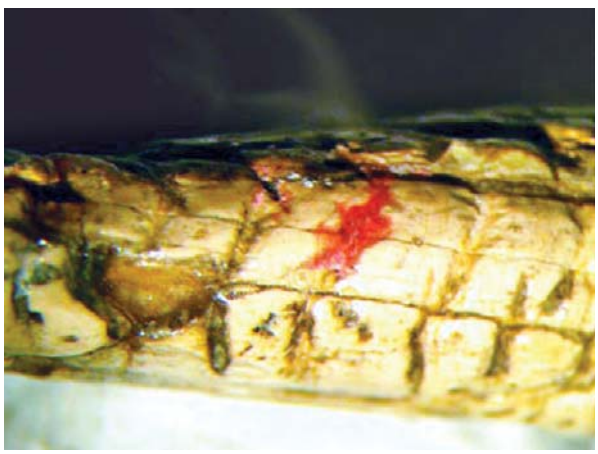


Fig. 3. Types of decoration and traces of the used tools.
1 – type 1, traces of knife (State Hermitage Museum, 370/753); *2*, *3* – type 2, traces of reamer and burin (State Historical Museum, 1820/506, 209); *4* – type 3, traces of burin (State Hermitage Museum, 370/752); *5*, *6* – type 4, traces of burin and cutter (State Hermitage Museum, 370/743, 766).

(Lbova, Volkov, 2015). The lowermost parts of almost all finished figurines (that are not fully decorated) demonstrate manufacturing traces of shaping (whittling).

Only three figurines show marked out shoes, resembling *torbasa* ('fur boots'); these are represented by shallow carved lines at the front and back sides of the knee area. The distal ends of the majority of figurines are broken off; in some cases, such ends have fixing-holes.

In the iconography of the Paleolithic figurines from Europe and the Russian Plain, elements like belts, sashes, and strings are distinctly marked, and their interpretation is unambiguous. Differences can be identified only in the materials of accessories (leather braided straps, fur, shells, fabric, etc.) (Abramova, 1960; Gvozdover, 1985; Soffer, Adovasio, Hyland, 2000; and others). The macroscopic examination of the Malta collection revealed six subjects of this kind (Lbova, 2014a). Belts are clearly seen; these are rendered with thin lines carved on the front and back surfaces of the figurines. In one case, the belt is shown with regular pits. There are thin cord-like girdles, and wide belts rendered with parallel lines. In one figurine (State Hermitage Museum, 370/748, or figurine No. 1 of 1956



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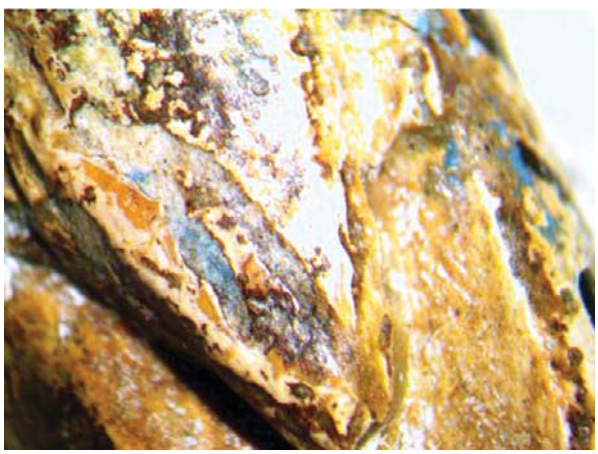

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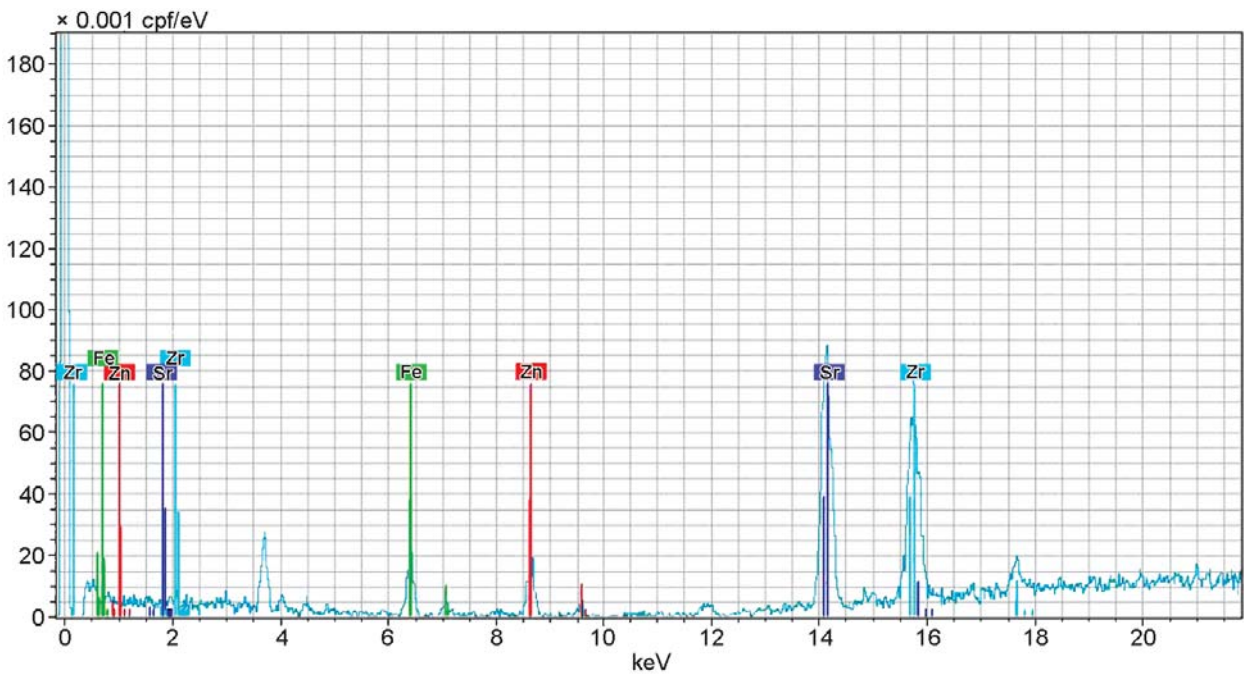

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Fig. 4. Traces of scarlet (*1*) and blue (*2*) pigments on the surface of anthropomorphic figurines (State Historical Museum, 1822/629; 1957/625), and the results of micro X-ray fluorescence spectrometry analysis of the scarlet pigment (*3*).

after (Abramova, 1960)), there are two transverse lines on the left arm above the elbow, possibly representing an armlet. In another case (i.e. State Historical Museum, 1820/208), armlets are rendered in relief, in a form of convex rolls, and a cross belt is noted (see Fig. 1, *3*, *c*). Exactly in such position (in the middle of a shoulder), armlets and cross belts (including leather straps, sinew strings with suspended beads, and other items) are known to be worn next to the skin (Bogoraz, 1991: 189–192; Lbova, 2014a). Notably, the Malta collection includes fractured and intact bracelets made of boghead coal and ivory, and also narrow bracelets of thin twisted ivory plates.

One of the most interesting discoveries during examination in 2016 of the Malta collection from the State Historical Museum was detection of traces of scarlet, green, and blue pigments on some figurines (Fig. 4). At present, only preliminary identification of their chemical composition is possible using the equipment available at the State Historical Museum. The scarlet pigment is observed on two figurines (State Historical Museum, 1820/208, 1822/629) on the loins and at the bottom of the heads (Fig. 4, *1*). It contains iron, strontium, zinc, and zirconium (Fig. 4, *3*). The blue pigment is noted on two figurines (State Historical Museum, 1820/209, 1957/625) on the loins and at the heads (Fig. 4, *2*). Its chemical composition includes strontium, calcium, iron, zinc, and bromine. The green pigment was detected on two figurines (State Historical Museum, 1820/206, 208), in the form of spots on the heads and in the knee-areas. In composition, it is close to the blue pigment, but contains chromium.

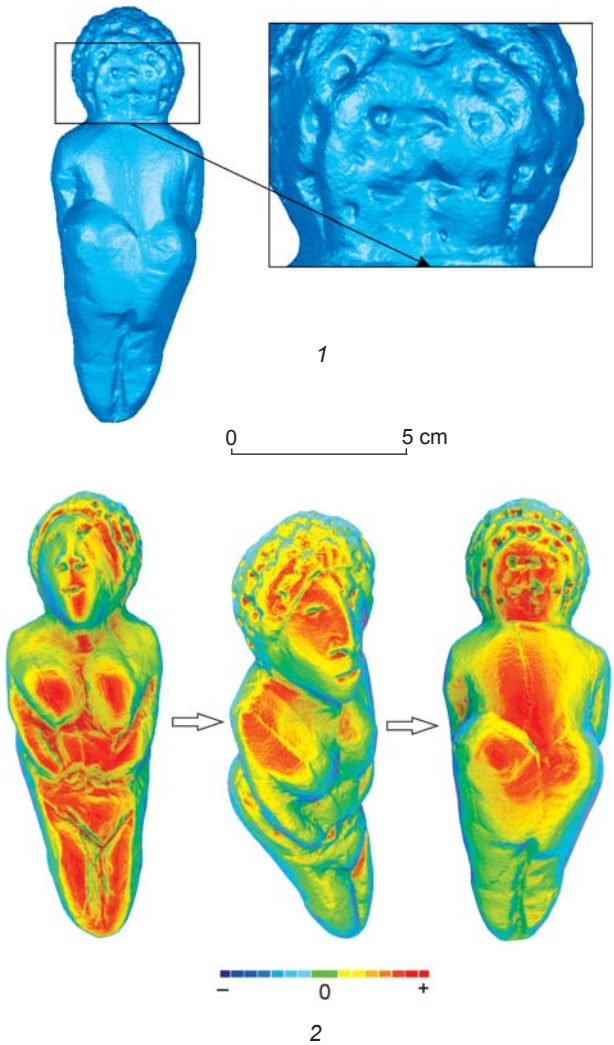

Fig. 5. 3D-model of anthropomorphic figurine (State Historical Museum, 1820/209).
1 – details of a figurine's relief; *2* – model of surface relief generated by Geomagic Studio program.

Conclusions

Descriptions and studies of the anthropomorphic portable art and the art of ivory carving of the Paleolithic population of Malta have been addressed in numerous publications. M.M. Gerasimov, A.P. Okladnikov, Z.A. Abramova, V.E. Larichev, and other researchers have focused on various features of figurines' decoration, body-ornamentation, rendering of clothing, headgear, and adornments. In most cases, scholars made attempts to interpret the decoration-motifs (Abramova, 1960; Larichev, 1999: 148–160, 180–196; Soffer, Adovasio, Hyland, 2000; Frolov, 1987; Marshack, 1991, and others). In this situation, the microscopic study of the ivory artifacts, aimed at identification of the specificity of manufacture, tools, decoration techniques, and use-wear signs, represents a new approach.

Summarizing the obtained data on the manufacturing techniques of the Malta anthropomorphic figurines from the collections of the State Hermitage Museum (St. Petersburg) and the State Historical Museum (Moscow), it should be noted that the figurines were manufactured according to certain standards of modeling and decoration. Processing of mammoth tusks at the site looked like stable serial production. Modeling and decoration of articles were performed using a certain set of tools. Ornamentation and engraving of the finished figurines represented strictly standardized elements of décor and stylistic composition.

No clear use-wear signs (suspending, fastening) have been recognized on the figurines. Holes are observed only on six figurines (five figurines show damage at the leg-ends). The majority of figurines demonstrate slight traces of polishing (use-wear) as a result of contact with some soft resilient material (leather or fur). It can be hypothesized that the figurines were either stored or worn in pouches (or were dressed, according to A.K. Filippov);

they were also often held in hands and used in everyday life through attaching them with a cord to some fur or leather object—not necessarily to clothing.

The technological analysis of the figurine's modeling and decoration, performed though 3D visualization, allows us to gain more information about ivory processing and to identify new elements (Fig. 5, *1*), general techniques of preparation (marking) for subsequent ornamentation, changes in the figurine's surface-relief (Fig 5, *2*), main forms, compositions, and motifs typical of the Malta culture. In archaeological study of Paleolithic art, technological analysis of the context of a site, and its set of goods and toolkit, makes it possible to recognize certain cultural, chronological, and other distinctions. The approach of understanding through the "visual arts", and trends towards identify symbolic behavior through the links of art-objects with particular population groups (D'Errico et al., 2003) and their phylogenetic features, have recently become quite popular in studies of Paleolithic art and the Prehistoric period in general.

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References

Abramova Z.A. 1960

Elementy odezhdy i ukrasheniy na skulpturnykh izobrazheniyakh cheloveka verkhnego paleolita v Evrope i Sibiri. In *Paleolit i neolit SSSR*, vol. 4. Moscow, Leningrad: Izd. AN SSSR, pp. 126–149. (MIA; No. 79).

Abramova Z.A. 1966

Izobrazheniye cheloveka v paleoliticheskom iskusstve Evrazii. Moscow, Leningrad: Nauka.

Akimova E.V. 2002

Evidence of Mammoth tusk working from the multilayered Paleolithic site of Listvenka. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 3 (11): 2–11.

Bogoraz V.G. 1991

Materialnaya kultura chukchei. Moscow: Nauka. (Etnograficheskaya biblioteka).

Conroy L.P. 1993

Female figurines of the Upper Paleolithic and the emergence of gender. In *Women in Archaeology: A Feminist Critique*, H. du Cros, L. Smith (eds.). Canberra: National Univ., pp. 153–160.

Demeshchenko S.A. 2008

Semanticheskaya interpretatsiya arkheologicheskikh artefaktov. In *Homo Eurasicus v glubinakh i prostranstvakh istorii*. St. Petersburg: Asterion, pp. 191–201.

Derevianko A.P., Molodin V.I., Zenin V.N., Leshchinski S.V., Mashchenko E.N. 2003

Pozdnepaleoliticheskoye mestonakhozhdeniye Shestakovo. Novosibirsk: Izd. IAE SO RAN. (Paleolit Zapadno-Sibirskoi ravniny).

D'Errico F., Henshilwood C., Lawson G., Vanhaeren M., Tillier A.-M., Soressi M. 2003

Archaeological evidence for the emergence of language, symbolism, and music – an alternative multidisciplinary perspective. *Journal of World Prehistory*, vol. 17 (1): 1–70.

Filippov A.K. 2005

Khaos i garmoniya v iskusstve paleolita. St. Petersburg: Nestor-Istoriya.

Frolov B.A. 1987

Otkrytiye cheloveka (k opytu novykh issledovaniy pervobytnogo iskusstva). In *Antropomorfnye izobrazheniya*. Novosibirsk: Nauka, pp. 8–18.

Gerasimov M.M. 1958

Paleoliticheskaya stoyanka Malta (raskopki 1956–1957 gg.). *Sovetskaya etnografiya*, No. 3: 28–53.

Gvozdover M.D. 1985

Tipologiya zhenskikh statuetok kostenkovskoi paleoliticheskoi kultury. *Voprosy antropologii*, iss. 75: 27–66.

Kamennyi vek Yuzhnogo Priangarya: Belskiy geoarkheologicheskiy rayon. 2001

Vol. 2. G.I. Medvedev, E.A. Slagoda, E.A. Lipnina, N.E. Berdnikova, A.G. Generalov, E.O. Rogovskoy, E.B. Oshchepkova, G.A. Vorobieva, P.E. Shmygun. Irkutsk: Izd. Irkut. Gos. Univ.

Larichev V.E. 1999

Zarya astrologii. Novosibirsk: Izd. IAE SO RAN.

Lbova L.V. 2014a

Preikonograficheskiy analiz maltinskoi antropomorfnoi skulptury (odezhda i aksessuary). In *Arkhaicheskoye i traditsionnoye iskusstvo: Problemy nauchnoi i khudozhestvennoi interpretatsii: Materialy Vseros. (s mezhdunar. uchastiyem) nauch. konf.* Novosibirsk: Izd. IAE SO RAN, pp. 44–47.

Lbova L.V. 2014b

Tekhnologicheskiye osobennosti ornamentatsii bivnya v maltinskoi kollektsii (v ramkakh kontseptsii izobrazitelnykh invariantov). In *Evrazia v Kainozoe: Stratigrafiya, paleoekologiya, kultury*, iss. 3. Irkutsk: Izd. Irkut. Gos. Univ., pp. 70–76.

Lbova L.V., Volkov P.V. 2015

Mikroskopicheskiy analiz maltinskoi antropomorfnoi skulptury (tekhnologiya formoobrazovaniya, detalizatsii, dekorirovaniya). *Stratum plus*, vol. 1: 161–168.

Lbova L., Volkov P. 2016

Processing technology for the objects of mobile art in the Upper Paleolithic of Siberia (the Malta site). *Quaternary International*, vol. 403: 16–22.

Lipnina E.A. 2008

Antropomorfnye i zoomorfnye skulpturnye izobrazheniya paleoliticheskogo ansamblya Malty. In *Antropogen:*

Paleoantropologiya, geoarkheologiya, etnologiya Azii. Irkutsk: Ottisk, pp. 112–132.

Marshack A. 1991

The female image: A "time-factored" symbol: a study in style and aspects of image use in the Upper Paleolithic. *Proceedings of the Prehistoric Society*, vol. 57 (1): 17–31.

Okladnikov A.P. 1960

Paleoliticheskiye zhenskiye statuetki Bureti. *MIA*, No. 79: 281–288.

Pitulko V.V., Nikolsky P.A., Girya E.Y., Basilyan A.E., Tumskoy V.E., Koulakov S.A., Astakhov S.N., Pavlova E.Y., Anisimov M.A. 2004

The Yana RHS site: Humans in the Arctic before the Last Glaciation. *Science*, vol. 303 (333): 642–659.

Semenov S.A. 1957

Pervobytnaya tekhnika. Moscow, Leningrad: Nauka. (MIA; No. 54).

Soffer O., Adovasio J.M., Hyland D.C. 2000

The well-dressed "Venus": Women's wear ca 27,000 BP. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 1: 37–47.

Volkov P.V. 2013

Opyt eksperimenta v arkheologii. St. Petersburg: Nestor-Istoriya.

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