



KEYWORDS: *Upper Palaeolithic – Figurine – Decoration – Pigment – Mal'ta – Siberia*

PIGMENT DECORATION OF PALAEOOLITHIC ANTHROPOMORPHOUS FIGURINES FROM SIBERIA

L. V. Lbova and P. V. Volkov

Abstract. Microscopic research of samples taken from anthropomorphous sculptures that were discovered at the Upper Palaeolithic site of Mal'ta (19–23 ka BP) in southern Siberia provide new information on the decoration of the so-called 'Palaeolithic Venuses'. The article enumerates the technological stages of making the objects, including the initial stage of ivory processing, creating the blanks of the sculptures, modelling their main features, and focuses on the stage of decoration and final treatment of the objects. Typically applied sets of tools are identified for each stage of processing. Special attention is paid to the details of figurine decoration: ornamentation, engraving, detailing of 'clothing' and accessories, and colouring. Decoration was applied using a standard set of techniques and involved typical elements of ornamentation and combinations of elements, as well as specific areas of ornamentation and colouring. Additional decoration of anthropomorphous figurines in Mal'ta was made using pigments (red, green and blue) on some objects. Traces of pigments were identified using an Altami microscope and Bruker M1 Mistral spectrometer.

Introduction

Mal'ta is a multi-layer archaeological site in Siberia with cultural deposits belonging to the chronological range from 43–41 ka to 12 ka BP (Medvedev et al. 1996). The main collection of finds was obtained during the excavations under the leadership of M. Gerasimov in 1928–1958 (Gerasimov 1958). More recent excavations at the site by Irkutsk archeologists under the direction of German I. Medvedev have brought the issues of dating, microstratigraphy and cultural differentiation of the assemblage to the forefront of research (Medvedev et al. 1996) (Fig. 1). The 'classical' Mal'ta layer (according to Gerasimov's conclusions) contained 'Gravettian' stone tool industry, more ivory objects, anthropomorphous sculptures and dwelling structures with dates ranging from 19 to 23 ka BP (Kuzmin et al. 2011; Lipnina 2012). In addition to the figurines, the Mal'ta collection numbers over eight hundred and fifty ivory and bone artefacts, including more than 30 anthropomorphous and 25 zoomorphic sculptures and a lot of pendants, objects with ornamental decoration, ivory and stone bracelets, perforated disks, beads, an ivory plaque engraved with the representation of a mammoth, and nail-like pins.

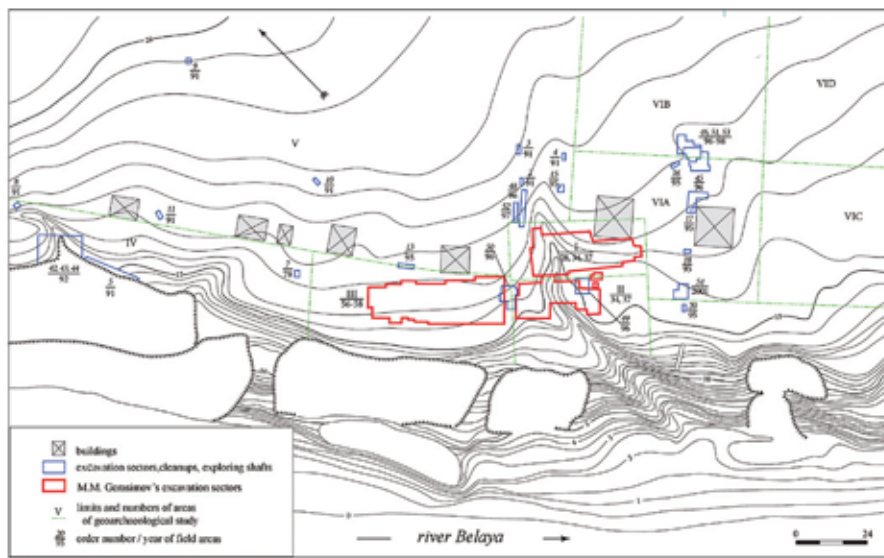
Before going into details, we should mention an intense discussion concerning the meaning and function of anthropomorphous Palaeolithic sculptures, including Siberian objects, beginning in the 1960s (Abramova 1966, 1995; Barton et al. 1994; Bednarik 1989, 1990, 1996; Delporte 1979; Dobres 1992; Duhard 1990; Gvozdover

1985, 1989; Gimbutas 1991; McDermott 1996; Nesbitt 2001; Russell 2006). Presently, the discussion has resumed due to new finds and discoveries in the archaeology of the Palaeolithic and in palaeogenetics, new scholarly standards of research and new insights into phenomena of Eurasian pre-Historic 'art', as well as the use of new research approaches, techniques and equipment (Bednarik 2013a; Conard 2009; Dixson and Dixson 2011; Lbova and Volkov 2016; Raghavan et al. 2014; Soffer et al. 2000 etc).

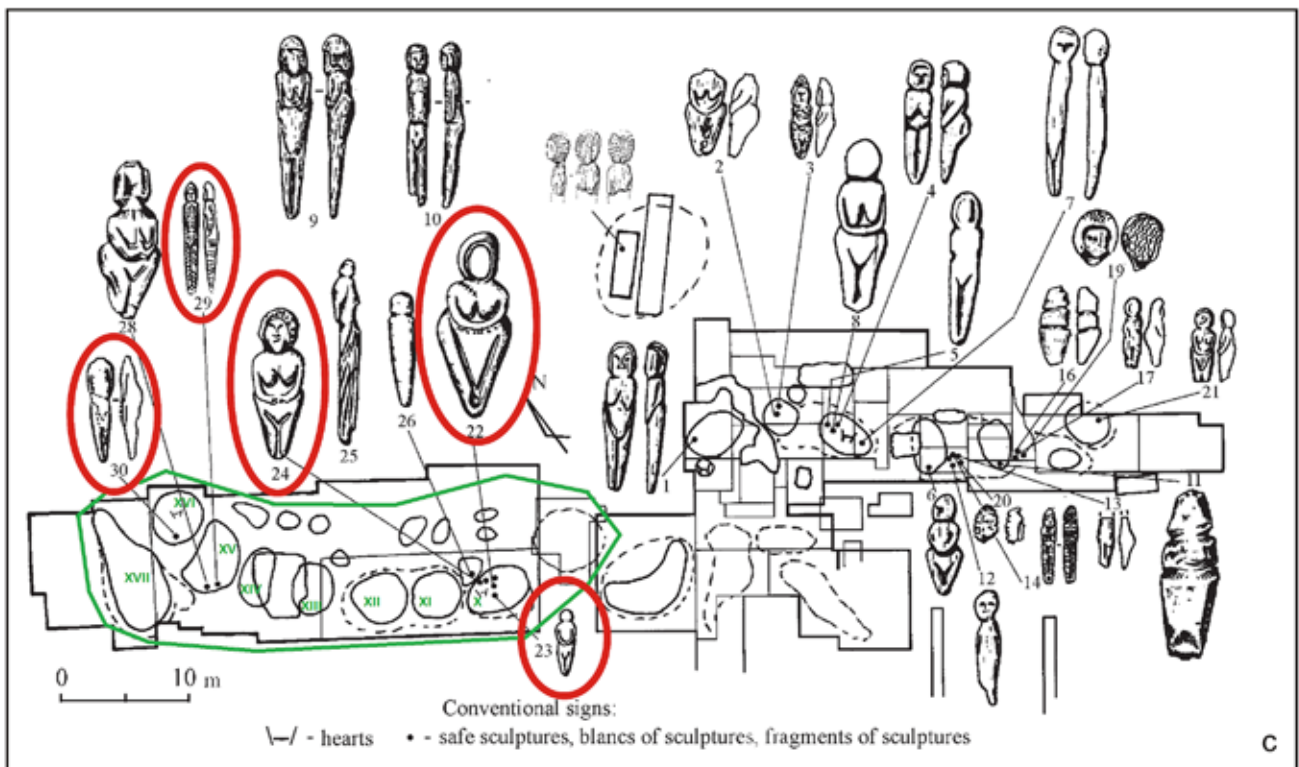
The best known collection of pre-Historic art from Siberia consists of forty anthropomorphous figurines from various Upper Palaeolithic sites, such as Mal'ta (31 objects), Buret' (5 objects), Listvenka, Krasnyi Yar, Shestakovo and Maiyna (one object from each site), which are traditionally described as female figurines. Some scholars noted considerable diversity among the Palaeolithic anthropomorphous figurines from Siberia. Collectively, these objects differ substantially from the supposedly female figurines found in Europe and the European part of Russia, which prompted some scholars to view them as a specific group of objects (Abramova 1966, 1995; Bednarik 1990, 1996). Although ivory figurines from Mal'ta are traditionally described as female figurines, they do not look similar to the typical 'Venus figurines' of Europe, and the main part of the Mal'ta sculptures show no evidence of gender. Most of them (60%) seem to be depicted wearing clothes, have some accessories, and their facial features are present



a



b



c

Figure 1. Mal'ta site: a – geographical location; b – squares of Gerasimov's and recent excavations; c – locations of figurines in the dwelling complexes recorded by Gerasimov's excavations 1928–58; No 22, 23, 24, 29, 30 with the red marks indicate pigmented figurines; X–XVII: numbers of complexes in 'dwelling'; 1–30: numbers of figurines in the collection.

(except for the blanks). Nearly 30% of them have large-sized heads with the head-to-body ratio of nearly 1:4, which led some scholars to believe that the figurines might have represented children or the souls of children. Five figurines clearly represent males (Gerasimov 1958; Medvedev et al. 1996; Bednarik 2013a; Lbova 2016 etc.).

This study analyses the results of the microscopic research into the objects of mobile 'art' discovered at the Mal'ta site – the Gerasimov's collection of anthropomorphous figurines. The microscopic analysis has revealed the sequence of the treatment process and main methods of shaping and decorating the objects belonging to the Mal'ta collection of palaeoart. The data on the manufacturing technology of Palaeolithic figurines manifests regularity in using specific sets of tools and standards (Lbova and Volkov 2015, 2016). The experimental, microscopic and spectral analyses, as well as the use of current digital technologies made it possible to reach a new methodological level in the study of the known archaeological materials from Mal'ta. Painting of the objects appears as a part of the technological process of manufacturing the figurines; thus it is natural to view this stage of treatment in a context of the overall working process of the Mal'ta artisans.

Methodology

Experimental work as well as detailed morphological, technical, typological and microscopic analysis was conducted with the largest part of the collection, which is now kept in the State Hermitage Museum in St Petersburg and in the State Historical Museum in Moscow. The resulting data made it possible to establish specific stages in the manufacturing process of hard animal materials such as ivory, antler and bone.

The trace analysis was based on the technique of experimental research developed by S. A. Semenov and G. F. Korobkova (Semenov 1964; Korobkova 1999 etc.) and followed an integrated methodological approach adapted to working with the materials of archaeological collections of the Palaeolithic and Neolithic sites of north and central Asia (Volkov 1999). An Altami microscope with lateral illumination of the object under observation and magnification from 10× to 50× was used for general examination. As a specialised research tool, an Olympus BH2-UMA microscope adapted for micro-trace analysis with non-reflective illumination and magnification from 50× to 500× was used. The samples were compared with the Siberian collection of trace standards. The vocabulary and the functional typology of the investigated artefacts correspond to the catalogue of terms in the book *Opyt experimenta v arkheologii* [Experiment in Archaeology] (Volkov 2013: 99–126).

The collection includes the finished figurines of 'humans', 'birds', 'fish' etc., as well as plaques, rods and personal adornments with ornamental decoration.

In some cases, the production stages of the finished objects can be reconstructed from the traces left by stone tools following the methodology described in several publications (Khlopachev and Girya 2010; Lbova and Volkov 2016).

Microscopic examination and identification of traces using low- and high-power microscopes revealed the presence of ornamental decoration and pigments on the surface of the sculptures. Preliminary analysis of the pigments was carried out using a Bruker M1 Mistral spectrometer (State Historical Museum, Moscow). Depending on collimator settings and video microscope, the micro-focus x-ray tubes of the M1 Mistral spectrometer may focus the x-ray beam at the spot size of 100 μm, which ensures the accuracy of the measurement in the selected sample point. The sensitivity of the spectrometer makes it possible to detect elements up to 0.01 wt. %. In addition to these detectors, digital pulse processing and optimised geometry of the system ensure the best efficiency and speed of x-ray analysis, and accuracy of results. This article will present the preliminary results of research into three types of pigments (collimator setting of 0.4 mm; time of analysis 180 sec).

Materials

There are six main groups of anthropomorphous figurines, which we previously identified in the Mal'ta collection in accordance with basic technological principles (Lbova and Volkov 2015):

1. Profiled type with well-expressed modelling of the head and the body. Microscopic analysis has shown that every single object had some elements of clothing and accessories. This argues for invalidity of dividing the sculptures into two types (dressed and undressed).
2. Weakly profiled type; the head is modelled in relief; the body is rod-shaped with holes in the feet.
3. Contoured flat objects with engraving and ornamental decoration.
4. Only heads.
5. Objects with the initial stage of executing the details.
6. Blanks prepared for future sculpture.

The analysis has shown that the following tools were used for producing anthropomorphous sculptures: knives, burins, cutters, hand drills and abrasives. This is the most diverse tool kit used at the site. The results of studying the typical use-wear traces left by various tools on the surfaces of each artefact from the Mal'ta site have revealed that a number of tools were used in Palaeolithic times. Our analysis has resulted in reconstructing the manufacturing process for all ivory artefacts of the collection. The sequence of manufacturing steps for each of the morphological types of objects has been established.

The data on the manufacturing technology of

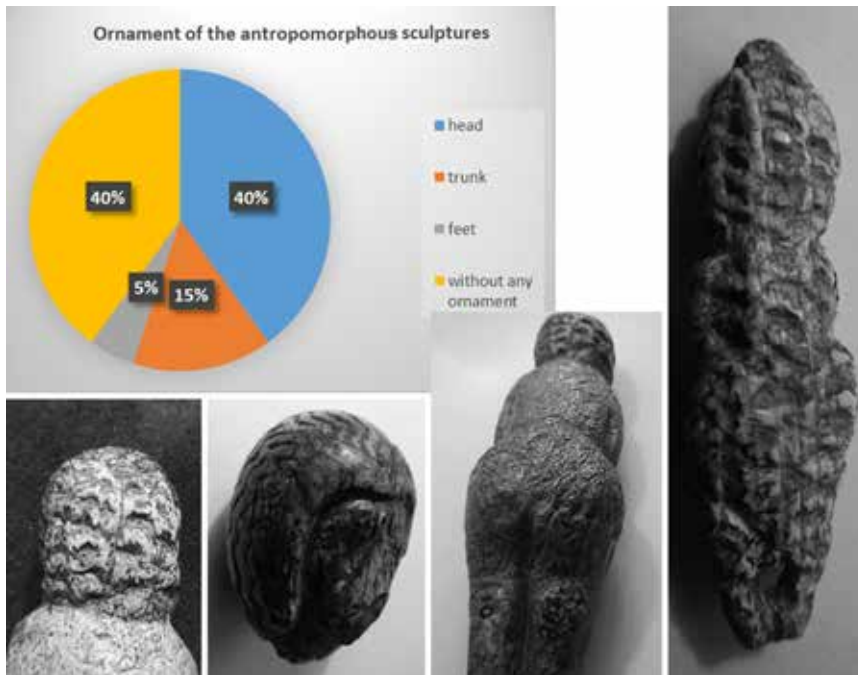


Figure 2. Decoration of anthropomorphic figurines.

anthropomorphic sculptures from the collections of the State Hermitage (St Petersburg) and the State Historical Museum (Moscow) reveals a certain pattern and distinctive standards of manufacturing and decorating. Production of artefacts from ivory at the Mal'ta settlement had relatively standardised and serial nature (Lbova and Volkov 2015, 2016).

The traces of using the sculptures (suspension, fasteners) were in most cases not observed. However, we have found faint traces of polishing (wear) on the surface of the majority of the objects, particularly on the protruding parts, which indicates their long contact with soft elastic material (presumably leather or fur).

It should be noted that for shaping the surface of the artefacts, a standard set of tools was used, including planer knives, drawing knives, hard scrapers and abrasives. A limited set of tools including knives, cutters, knife-cutters and special drills was used for making the ornamental decoration on the artefacts. The elements of ornamentation and engraving of the finished sculptures produced strictly standardised variants of decoration and stylistic composition. Decoration of the objects followed a canon of established technology and consisted of typical elements of ornamental decor, combinations of these elements, and application of ornamentation to specific areas.

In accordance with the technological principles we divided all anthropomorphic sculptures, that is, the finished artefacts, into three categories:

1. Round and flat figurines with some elements (clothing and accessories) engraved.
2. Round and flat figurines entirely covered with engraving.
3. Decorated heads as independent and individual artefacts.

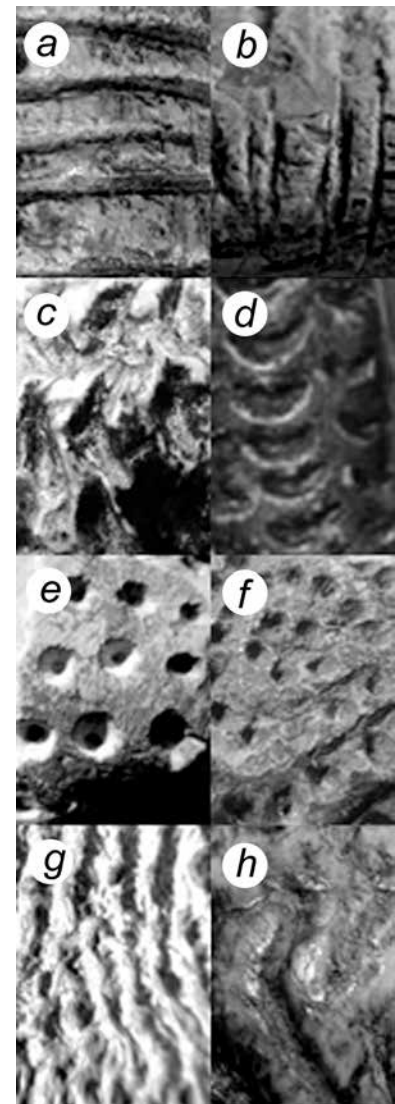


Figure 3. Types of ornamentation in the Mal'ta ivory collection.

It was found that over 60% of human representations underwent intentional decoration (Fig. 2). The representations showed the modelling of the hair, headwear (caps, hoods), straps and belts, bracelets, short outerwear of the parka type, shoes and shoulder bags. Gerasimov (1931, 1941, 1958), Salmony (1948), Abramova (1966, 1995), Larichev (1999) and other scholars identified four types of decoration based on their morphology:

Type 1. Rhythmic parallel lines.

Type 2. Round indentations (or cup-shaped patterns) and their combinations.

Type 3. Scalloped or C-shaped marks.

Type 4. Zigzag or wave-like patterns.

We attempted to improve this classification by using microscopic analysis (Fig. 3). Previously, the types of decoration were identified conventionally on the basis of their resemblance to a certain symbol. We have established that every type of decoration was made with a special set of tools. For example, parallel lines were usually executed with a stone knife or burin, while indentations, small holes and cup-like holes were made with the burin or engraver. First, a line would be incised with the burin, and then a point would be marked for

hand-drilling, followed by making a depression for future drilling. Crescent-shaped decorations, both shallow and deep, would be made with the burin and engraver. A. Filippov believed that this type of ornamentation was executed in several stages. Initially, two or three shallow holes were drilled using the stone point; then by applying pressure they were joined into a single C-shaped element. Zigzag patterns would be made with a similar tool on the relatively soft surface of ivory (Filippov 2004; Lbova and Volkov 2016).

Several techniques were applied for producing indentations or cup-like holes. The first technique implied the use of the stone perforator. Based on experimental data, the second technique was inscribing a preliminary layout with a thin line, and then marking the points for drilling with the hand tool. The third technique involved high-speed drilling. In total, we identified eleven kinds of decoration techniques.

It should be noted that some traces show that the artefacts had frequent and prolonged contact with leather. They might have been kept in leather bags or tied to the clothing; the ethnographic data show that such objects could have been tied to any fur or leather item, not necessarily of clothing. They could have also been frequently held in hands.

The most interesting discovery in the study of Malta's collection (in the State Historical Museum) was identification of the pigments of scarlet colour (vermillion), as well as green and blue (dark-blue) colours on the surface of some sculptures.

The figure of a 'teenage girl' (No. 102027: A 1822/629) (Fig. 4) appears to be dressed in a one-piece garment with hood, which covers the entire body and head. The front and back show long engraved triangles, probably representing the tails of furs from which the clothing was made. The presence of scarlet pigment has been detected in the area under the tail, on the right thigh and on the right arm.

Representation of an 'adult woman' (No. 1820/208) (Fig. 5). This object is a full-figured round sculpture of the classic type with ornamental decoration. A characteristic feature is the image of straps (or maybe locks of hair), and mark of the girdle in the upper abdomen. The head is decorated with different types of ornamentation. Green pigment on the head marks the part ornamented by wavy lines. Scarlet color also appears on the head; spots of pink

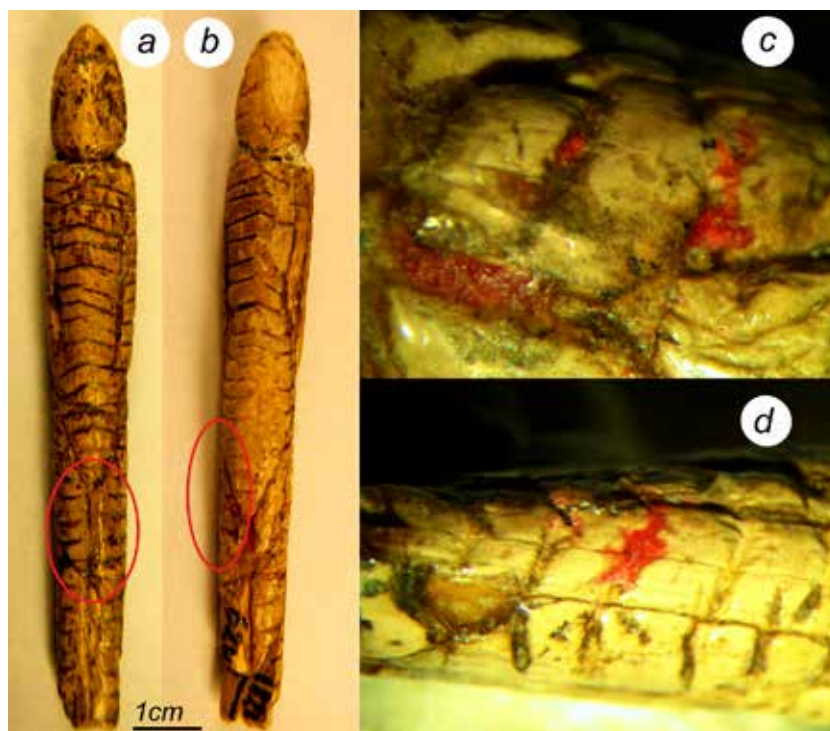


Figure 4. Representation of a presumed teenage girl (No. 1822/629) and scarlet pigment (15 \times).

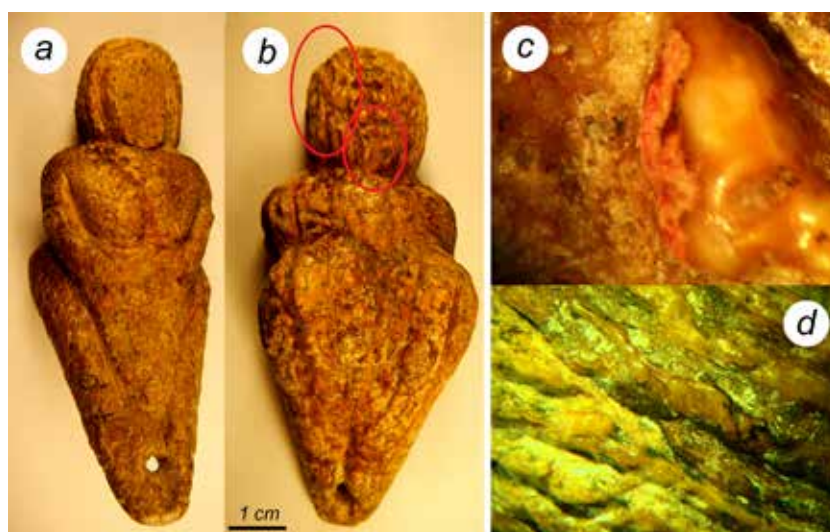


Figure 5. Representation of a presumed adult woman (No. 1820/208), pink and green pigment (20 \times).

color were observed at the base of the head (Fig. 5c).

At this point we have only preliminary analytical results of pigment composition provided by the available equipment. Traces of red, pink and scarlet pigments have been found on the surface of two figurines (Nos 1822/629 and 1820/208). These marks are concentrated in the abdomen area, on the legs and at the base of the head. The composition of the scarlet pigment includes iron (Fe), strontium (Sr), zinc (Zn), and zirconium (Zr) (Fig. 6).

Representation of an 'adult woman' (No. 101937:1820/209) (Fig. 7). It is a full-figured round sculpture of the classic type with ornamental decoration. The head is large

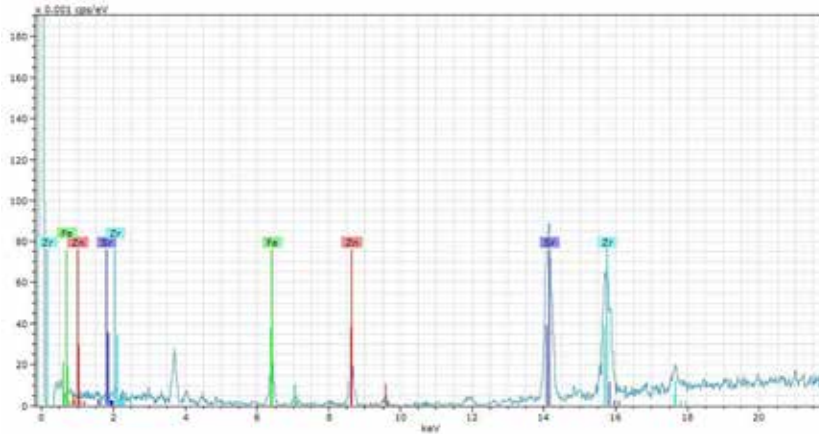


Figure 6. Spectrum of the scarlet pigment.

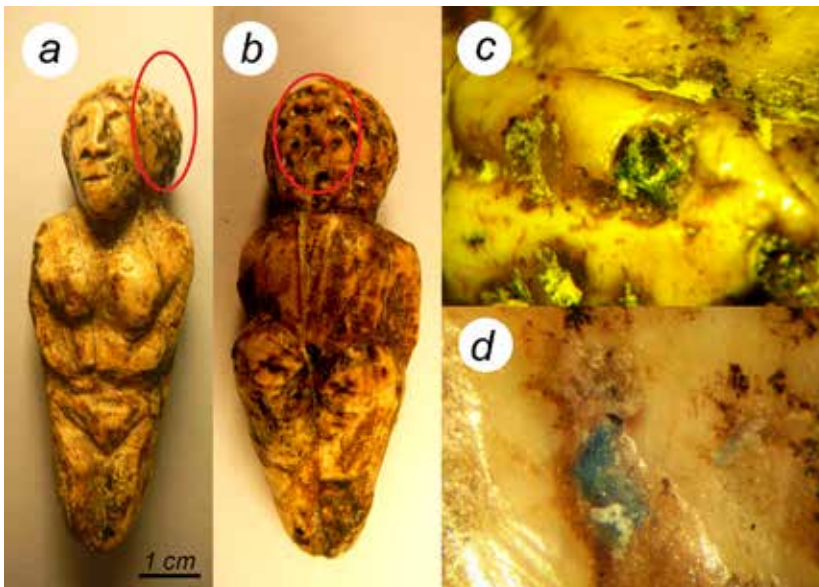


Figure 7. Representation of an 'adult woman' (No. 1820/209), dark-blue pigment (20×).

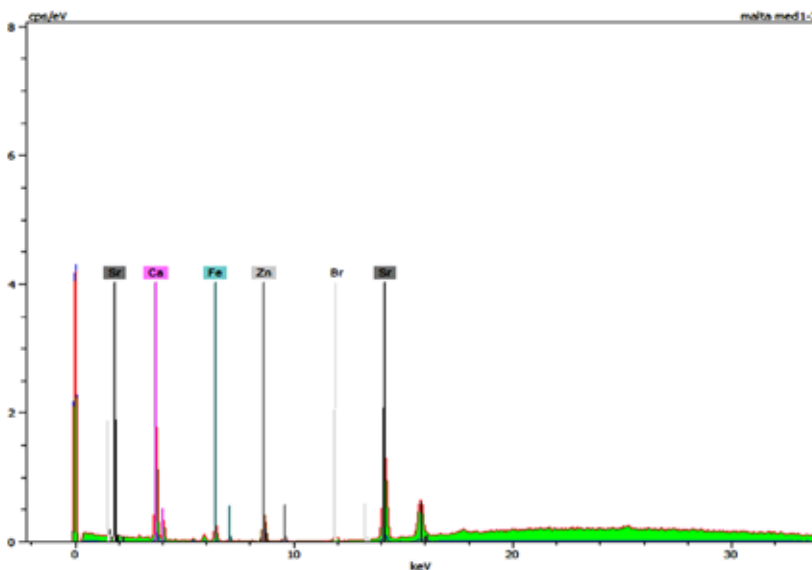


Figure 8. Spectrum of green pigment.

and disproportionate in relation to the body. Distinct spiral ornamentation is present on the head. The face is profiled; the eyes, high nose, and a massive chin are well-modelled. Massive 'bracelets' are depicted on the arms of the figurine. Traces of dark-blue pigment were found in the recesses (cavities) of the ornamentation on the head, in the area of the spirally decorated hair.

Green pigment was identified in two cases (Nos. 1820/208 and 1820/206). The coloured spots are located on the head and in the area of the knees of presumed teenage figurine. The composition of green pigment is identical to the blue pigment, with the addition of chromium (Cr) (Fig. 8).

Representation of a 'young male' (No. A1822/625) (Fig. 10) is an elongated figurine with presumed phallus. The details of the body are outlined by shallow lines. Traces of blue paint have been observed in the area of the thighs, chest and left arm.

Dark-blue and bright-blue pigments were found on two sculptures (No. 1820/209, 1822/625). The traces of this pigment appear in the abdomen area and on the head, as well as in the cavities of the hair. The composition of the blue/dark-blue pigment shows the predominance of strontium (Sr), calcium (Ca), iron (Fe), zinc (Zn) and bromine (Br).

Discussion

Humans used various pigments as early as 800 ka BP in Africa (Bednarik 2013b), and well before 200 ka BP in Asia and Europe. Evidence of the use of pigments in a wide cultural context clearly reveals the behaviours of cognitively modern humans (d'Errico et al. 2003; Mellars 2005; Mithen 1996; Tixier et al. 2010; Vandenabeele et al. 2007 etc).

Cultural assemblages associated with *Homo sapiens sapiens* in Siberia appeared around 50–40 ka BP, revealing the evidence of the use of various pigments along with other signs of modern behaviour. Multi-element composition of pigment materials appearing on some early Upper Palaeolithic objects (30–40 ka BP), which was obtained using SEM-EDX analysis, showed differences in the use of various natural ingredients in the territories of southern Siberia (at Kara-Bom, Malaya Syya, Khotyk and

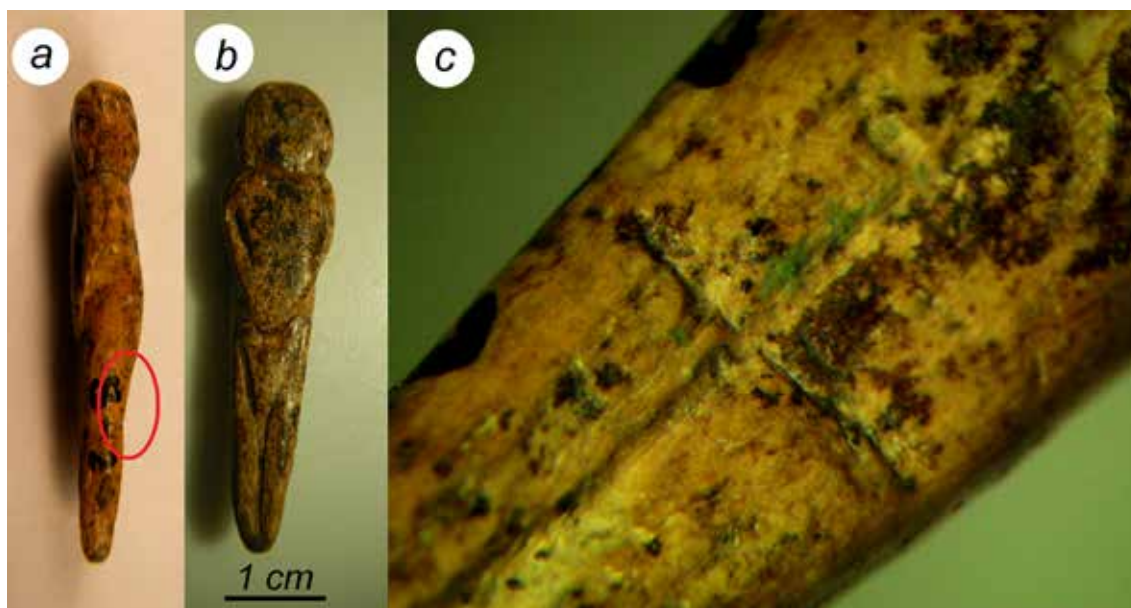


Figure 9. Representation of a 'young man' (No. A1820/206), green pigment (15×).

Kamenka) (Lbova et al. 2016).

Pigments (usually red ochre) were attested in the decoration of sculpture among the Upper Palaeolithic materials of Willendorf, Dolní Věstonice, Kostenki and other sites (McDermott 1996; Christopher L. C. E. Witcombe 2003; Lázníčková-Galetová et al. 2016; Praslov 1990 etc), and much earlier on an Acheulian proto-figurine (Bednarik 2003). The presence of pigments of various colours has been discovered on the surface of Mal'ta sculptures for the first time, although N. Praslov mentioned this possibility. Based on visual examination, Praslov suggested that the Mal'ta figurines could have been painted with black pigment (Praslov 1992). However, it was later proven that black colouring derived from the development of dendrites on the surface of the ivory, and this hypothesis proved to be wrong.

Later A. Filippov, who first studied the traces of use and wear on Mal'ta sculptures, noted the likely presence of pigment on the surface of some of the artefacts in the Hermitage collection. This investigator believed that some sculptures were 'dressed' and some were without clothes, and the 'naked' figurines were later painted or dressed like dolls (Filippov 2004).

It should be noted that some traces of ochre and bright red pigments were also found on the blanks of sculptures in both collections: on the internal parts of the bracelet of torbanite, on the beads, as well as on long sticks, which might have been used for fastening the hair or for the nose.

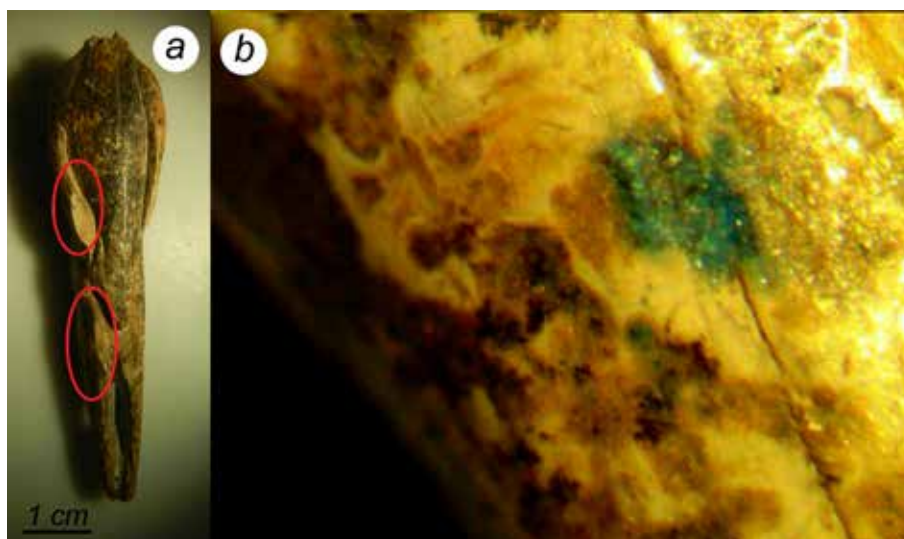


Figure 10. Representation of a 'young man' (No. A1822/625), blue pigment (20×).

During the excavations 1956–58, Gerasimov noted the spots of red, blue, green, white and violet colours in the sediment of the cultural layer (Gerasimov 1958). Unfortunately, most of the field records of the 1930s have been lost, and no other data on the proximity of sculpture finds to these spots have been found. Thanks to the Medvedev's efforts, an approximate scheme for the arrangement of figures in the excavations by Gerasimov was drawn up (Fig. 1c). The principle of Medvedev is based on the number of the collection field inventory. It was a surprise for us; one can recognise that all the figurines bearing pigment come from one dwelling complex. In the descriptions by Gerasimov it is designated as a long, horseshoe-shaped dwelling. Three figurines come from location X (Nos 22, 23, 24), the other two, both of presumed teenagers (Nos 29, 30) are from locations XV and XVII (Fig. 1c). This observation can be

very fruitful for social and cultural interpretations in the future.

The Mal'ta collection contains a large number of haematite pieces with traces of processing. Haematite was the basis for producing different shades of ochre colour. The discovery of blue and green pigments in the context of the Palaeolithic was unexpected in Siberia. Such a variety of pigments is also known in the cultural complex of earlier objects dated to 60 000 years ago, for example in Diepkloof Cave, South Africa (Tixier et al. 2010). In both cases, copper (Cu) would give colour to blue and green pigment, and the Mal'ta collection includes pieces of native copper, which makes it possible to explain the presence of blue and green pigment in the composition of the Mal'ta pigments even more confidently.

Conclusion

No other period of the Palaeolithic in northeast Asia is comparable to the Ice Age in Siberia in terms of richness of artefacts — superb objects of mobiliary 'art' and personal adornments that reflect more than utilitarian use in the life of the humans. The Upper Palaeolithic sites show the evidence of intensive procurement of reindeer, mammoth and woolly rhinoceros, and such sites as Mal'ta and Buret' show the evidence of specialised reindeer hunting. During the classical stage of the Upper Palaeolithic, we see the evidence for a flourishing culture of 'reindeer and mammoth hunters', which is represented by diverse blade lithic industries, rich series of bone and antler implements, personal adornments and objects of mobile 'art'. Along with lithic industries based on removing blades from prismatic cores, this classic period also witnessed the growth of bone tools and small forms of expressive 'art'.

The middle Upper Palaeolithic assemblages with the majority of tools on small blades were contemporaneous with other sites in eastern and western parts of Siberia (Lbova 2014). Despite some shared features, mostly in the techniques of lithic reduction, there are marked differences and it is not possible to unite these assemblages into a single group. However, the similarities in tool types, ornamental designs and artistic styles of Mal'ta and Buret' made it possible to introduce the definition of the 'Mal'ta culture' (Okladnikov 1968). The emergence of microblade technology, which became common in Siberia in the Upper Palaeolithic is worth mentioning in this connection. In sum, Mal'ta is a typical site of the middle period of the Upper Palaeolithic in Siberia according to features of stone tool industry standards.

Technological analysis of figurines manufacturing and decorating using three-dimensional imaging allows us not only to clarify some aspects of ivory treatment and discover new elements, but also to define the common techniques of making layouts for the subsequent application of the ornamental decor, basic forms of composition, and rhythm of the graphic elements, which are specific to the 'Mal'ta culture'.

The identified realistic imagery decorating Palaeolithic anthropomorphous figurines from the Mal'ta site con-

firms the opinion that the human representation was a way to represent the natural patterns of human behaviour. The choice of attributes reflected specific cultural and historical conditions behind certain traditions of material culture (Abramova 1995; Barton et al. 1994; Marshack 1991; Lipnina 2012; Lbova 2016; Salmony 1948; Soffer et al. 2000 etc.).

The archaeological study of the Palaeolithic objects of the portable palaeoart in the technological context and the tool set used for their manufacturing and decorating indicates cultural, chronological and other differences. The typical characteristics revealed through the 'visual culture' and variations of expressing symbolic activities by means of communication between the objects of the 'art' and specific human groups, as well as their different phylogenetic origins have recently come to the forefront of research, not only in the field of palaeoart but also in the entire pre-Historic period.

Decoration of the objects followed the canon of stable technology, including the typical elements of the ornamental decoration and their combinations, and specific areas of ornamentation. One of the most interesting facts of the additional decoration of the anthropomorphous sculptures from Mal'ta is the application of pigments on some objects, the traces of which have been identified in this study. We are not entirely sure that the traces of pigments resulted from intentional painting of the figurines (excluding a 'teenage girl' (No. 102027: A 1822/629). It is also possible that the figurines were carried in bags together with various pigments, thus preserving the traces of colouring only in recessed areas. Traces of pigments on other objects (bracelets, hair pins) imply the use of pigments at the Mal'ta site for colouring the human body.

One of the main principles of symbolic communication is that any individual person is always social, that is, that the personality cannot be formed outside of society. According to the symbolic concept of communication, the behaviour of an individual is determined by three variables: the structure of the personality, the role of the reference group and the 'recognition' symbol. From our understanding, the Mal'ta figurines constitute the element of social communication, which defines the realistic nature of their artistic style. The accumulated knowledge and the collection of databases can be used successfully for studying materials from similar Upper Palaeolithic sites in Eurasia.

Acknowledgments

The authors would like to express their deep gratitude to N. Khaikunova and other employees of the State Historical Museum (Moscow) for providing the opportunity to work with the collections and for fruitful discussions. We also thank the administration of Novosibirsk State University, who supported the archaeological research of the LIA ARTEMIR. We are very grateful to the Russian Foundation for Basic Research and *Le Centre national de la recherche scientifique* (CNRS, France) for funding this study (project No. 17-56-16016). We also thank the anonymous RAR referees for their welcome and constructive reviews of our work.

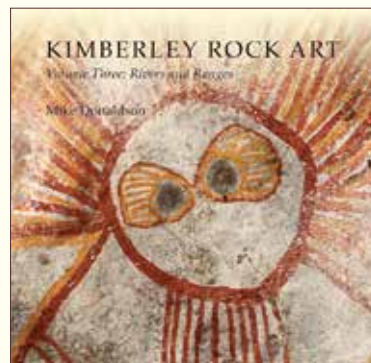
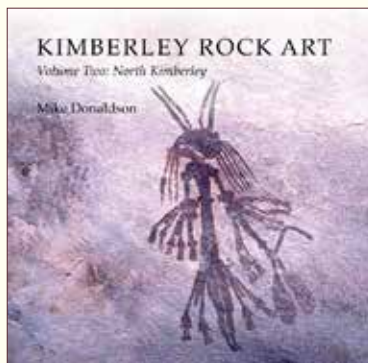
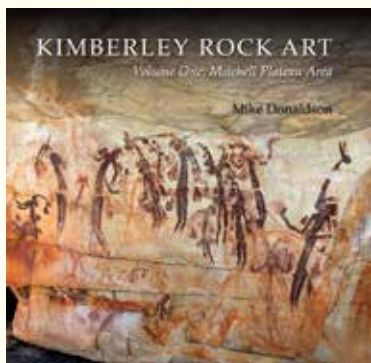
Dr L. V. Lbova and Dr P. V. Volkov
 Institute of Archaeology and Ethnography of the SB RAS
 Prospekt Akademika Lavrentieva 17
 Novosibirsk, 630090
 Russia
 and Novosibirsk State University
 Ulitsa Pirogova 1
 Novosibirsk, 630090
 Russia
 lbvovapnr5@gmail.com
 volkov100@yandex.ru

REFERENCES

- АБРАМОВА, З. А. 1966. *Образ человека в палеолитическом искусстве Евразии (Men's image in Palaeolithic art of Eurasia)*, ed. P. I. Boriskovsky. Nauka, Moscow-Leningrad (in Russian).
- АБРАМОВА, З. А. 1995. *L'art paléolithique d'Europe orientale et de Sibérie*. J. Millon, Grenoble.
- BARTON, C. M., G. A. CLARK and A. E. COHEN 1994. Art as information explaining Upper Paleolithic art in western Europe. *World Archaeology* 26(2): 185–207.
- BEDNARIK, R. G. 1989. The Galgenberg figurine from Krems, Austria. *Rock Art Research* 6(2): 118–125.
- BEDNARIK, R. G. 1990. More to Palaeolithic females than meets the eye. *Rock Art Research* 7: 133–137.
- BEDNARIK, R. G. 1996. Palaeolithic love goddesses of feminism. *Anthropos* 91: 183–190.
- BEDNARIK, R. G. 2003. A figurine from the African Acheulian. *Current Anthropology* 44(3): 405–413.
- BEDNARIK, R. G. 2013a. Pleistocene palaeoart of Asia. *Arts* 2(2): 46–76; doi:10.3390/arts2020046; <http://www.mdpi.com/2076-0752/2/2/46>.
- BEDNARIK, R. G. 2013b. Pleistocene palaeoart of Africa. *Arts* 2(1): 6–34; doi:10.3390/arts2010006; <http://www.mdpi.com/2076-0752/2/1/6>.
- CONARD, N. J. 2009. A female figurine from the basal Aurignacian of Hohle Fels Cave in southwestern Germany. *Nature* 459 (7244): 248–252.
- DELPORTE, H. 1979. *L'Image de la femme dans l'art préhistorique*. Picard, Paris.
- D'ERRICO F., C. HENSHILWOOD, G. LAWSON, M. VANHAEREN, A.-M. TILLIER, M. SORESSI, F. BRESSON, B. MAUREILLE, A. NOWELL, J. LAKARRA, L. BACKWELL and M. JULIEN 2003. Archaeological evidence for the origins of language, symbolism and music: an alternative multidisciplinary perspective. *Journal of World Prehistory* 17: 1–70.
- DIXSON, A. F. and B. J. DIXSON 2011. Venus figurines of the European Paleolithic: symbols of fertility or attractiveness? *Journal of Anthropology* 2011 (<http://dx.doi.org/10.1155/2011/569120>).
- DOBRES, M.-A. 1992. Re-considering Venus figurines: a feminist-inspired re-analysis. In A. S. Goldsmith, S. Garvie, D. Selin and J. Smith (eds), *Ancient images, ancient thought: the archaeology of ideology*, pp. 245–262. Proceedings of the 23rd Annual Chacmool Conference, University of Calgary.
- DUHARD, J.-P. 1990. La posture des mains pendant la grossesse. *Rock Art Research* 7(2): 137–140.
- FILIPPOV, A. K. 2004. *Хаос и гармония в искусстве палеолита (Chaos and harmony in the Palaeolithic art)*. Preservation of the Natural and Cultural Heritage, St Petersburg (in Russian).
- GERASIMOV, M. M. 1931. *Мальта – палеолитическая стоянка (предварительные данные): раскопки 1928–29 гг (Malta – Palaeolithic station (preliminary data): findings of excavations in 1928–29)*. Vlast' truda, Irkutsk (in Russian).
- GERASIMOV, M. M. 1941. Обработка кости на палеолитической стоянке Мальта (Treatment of bones of the Palaeolithic site of Mal'ta). *Materials of research in archaeology USSR* 2, pp. 65–85. Institute of Archaeology, Moscow-Leningrad (in Russian).
- GERASIMOV, M. M. 1958. Палеолитическое местонахождение Мальта Palaeolithic (Mal'ta-site [excavation 1956–1957]). *Soviet Ethnography* 3: 28–53 (in Russian).
- GIMBUTAS, M. 1991. *The civilization of the goddess: the world of old Europe*. Harper, San Francisco.
- GVOZDOVER, M. D. 1985. Типология женских статуэток в костенковской палеолитической культуре (The typology of female figurines of the Kostenki Palaeolithic culture). *Questions of Anthropology* 75: 32–94 (in Russian).
- GVOZDOVER, M. D. 1989. The typology of female figurines of the Kostenki Palaeolithic culture. *Soviet Anthropology and Archaeology* 27(4): 32–94.
- КНЛОРАШЕВ, Г. А. and Е. Y. ГИРЯ 2010. *Секреты древних косторезов Восточной Европы и Сибири. Приемы обработки бивня мамонта и рога северного оленя в каменном веке (Secrets of ancient carvers of eastern Europe and Siberia. Treatment techniques of ivory and reindeer antler in the Stone Age)*. Nauka, St Petersburg (in Russian).
- КОРОВОКОВА, Г., F. 1999. *Narzedzia w pradziejach (Tools in prehistory)*. Publishing House of Nicolaus Copernicus University, Torino (in Polish).
- KUZMIN, Y. V., L. A. ORLOVA, V. N. ZENIN, L. V. LBOVA and V. N. DEMENTYEV 2011. Radiocarbon dating of the Paleolithic of Siberia and the Russian Far East: the materials to the directory C-14 dates (at the end of 2010). *Stratum Plus* 1: 171–202.
- LARICHEV, V. E. 1999. *Звездные боги (Star gods)*. Publishing Centre of the Institute of Geology and Mineralogy, Siberian Division, Novosibirsk (in Russian)
- LÁZNÍČKOVÁ-GALETOVÁ, M., A. BALZEAU, T. ZIKMUND and J. KAISER 2016. CT scanning of a crust with perforated animal teeth belonging to individual DV. *The Dolní Věstonice studies, Vol. 21, Studies in Palaeoanthropology and Palaeoethnology of Eurasia*, pp. 372–376. Academy of Sciences of the Czech Republic, Institute of Archeology, Brno.
- LBOVA, L. 2014. The Upper Palaeolithic in northeast Asia. In *The Cambridge World Prehistory*, Vol. 2: 707–723. Cambridge University Press, Cambridge.
- LBOVA, L. 2016. Anthropomorphic figurines of Ice Age art in Siberia: new data and perspectives on the function of prehistoric mobile art. *Expression* 12: 16–25.
- LBOVA, L., V. PANOV, M. PETRUSHINA and E. RYBIN 2016. Multi-elements pigments composition on the mobile art subjects of the Early Upper Palaeolithic in Siberia (preliminary data using SEM-EDX). Couleurs et Paroisornes (abstract of seminar).
- LBOVA, L. and P. VOLKOV 2015. Microscopic analysis of the Mal'ta's anthropomorphic sculptures (the technology of the morfogenesis, detailing, and decorating). *Stratum Plus* N1: 161–168.
- LBOVA, L. and P. VOLKOV 2016. Processing technology of the object of mobile art in the Upper Palaeolithic of Siberia (Malta site). *Quaternary International* 403: 16–22.
- LIPNINA, E. A. 2012. Mal'ta: Paleolithic cultures and small form sculptures. *Archaeometria*, The University of Tokyo, pp. 71–79.
- MARSHACK, A. 1991. The female image: a 'time-factored' symbol. A style and aspect of image use in the Upper Palaeolithic. *Proceedings of the Prehistoric Society* 57, Part 1: 17–31.
- MCDERMOTT, L. D. 1996. Self-representation in Upper Paleolithic

- female figurines. *Current Anthropology* 37(2): 227-275.
- MEDVEDEV, G., N. CAUWE, G. VOROBYEVA, D. COUPE, L. CLAES, E. LIPNINA, S. MODRIE, S. MUKHARRAMOV, S. OSADCHY, P. PETITTE, P. REBRIKOV, E. ROGOVSKY, V. SITLIVYI, L. SULERZHITSKY and D. KHENZUKHENOVA 1996. *Палеолитическое местонахождение Мальта (The Mal'ta Palaeolithic locality)*. ARCOM Press, Irkutsk (in Russian).
- MELLARS, P. 2005. The impossible coincidence: a single species model for the origins of modern human behavior in Europe. *Evolutionary Anthropology* 14: 12-27.
- MITHEN, S. 1996. *The prehistory of the mind: a search for the origin of art, science and religion*. Thames and Hudson, London.
- NESBITT, S. 2001. Venus figurines of the Upper Paleolithic. *Totem: The University of Western Ontario Journal of Anthropology* 9(1), Article 6. Available at: <http://ir.lib.uwo.ca/totem/vol9/iss1/6>.
- OKLADNIKOV, A. P. 1968. *Сибирь в древнекаменном веке: эпоха палеолита (Siberia in Old Stone Age: Paleolithic epoch)*. History of Siberia, Vol. 1, Novosibirsk (in Russian).
- PRASLOV, N. D. 1992. Использование красок в палеолите (Use of color in the Palaeolithic). *Kratkiye Soobsheniya Instituta Archeologii (Short Informations of the Institute of Archaeology, Moscow)* 206: 95-100 (in Russian).
- RAGHAVAN, M., P. SKOGLUND, K. GRAF, M. METSPALU, A. ALBRECHTSEN, I. MOLTKE, S. RASMUSSEN, M. REEDIK, P. CAMPOS, E. BALANOVSKA et al. 2014. User Palaeolithic Siberian genome reveals dual ancestry of Native Americans. *Nature* 505(7481): 87-91; doi: 10.1038/nature12736.
- RUSSELL, P. 2006. Learning from curves: the female figure in Palaeolithic Europe. *Rock Art Research* 23(1): 41-49.
- SALMONY, A. 1948. An ivory carving from Malta (Siberia) and its significance. *Atribus Asiae* 11(4): 285-288.
- SEMENOV, S. A. 1964. *Prehistoric technology. An experimental study of the oldest tools and artifacts from the traces of manufacture and wear*. Cory, Adams and Mackey, London.
- SOFFER, O., J. M. ADOVASIO and D. C. HYLAND 2000. 'Venus' figurines, textiles, basketry, gender, and status in the Upper Paleolithic. *Current Anthropology* 41(4): 511-537.
- TIXIER, P.-J., G. PORRAZ, J. PARKINGTON et al. 2010. A Howieson's Poort tradition of engraving ostrich eggshell containers dated to 60 000 years ago at Diepkloof Rock Shelter, South Africa. *Proceedings of the National Academy of Sciences, U.S.A.* 107: 6180-6185.
- VANDENABEELE, P., H. M. EDWARDS and L. MOENCE 2007. A decade of Raman spectroscopy in art and archaeology. *Chemical Reviews* 107(3): 676-677.
- VOLKOV, P. V. 1999. *Трасологические исследования в археологии Северной Азии (Tracological investigations in the archaeology of northern Asia)*. Publishing House of Institute of Archaeology and Ethnography, Novosibirsk (in Russian).
- VOLKOV, P. V. 2013. *Эксперимент в археологии (Experience in experimental archaeology)*. Nestor-Historia, St Petersburg (in Russian).
- WITCOMBE, C. L. C. E. 2003. *Venus of Willendorf*. <http://arthistoryresources.net/willendorf/willendorfdiscovery.html>.

RAR 34-1232



The Kimberley area of north-west Australia is well-known for its ancient and dramatic Wanjinia and Gwion rock art, but the sites are mostly remote and inaccessible. These books by Mike Donaldson bring the amazing art to life with high quality photographs obtained over more than 25 years backpacking the Kimberley wilderness. Available separately or as a set. More details on the website.

270 x 270 mm, hardcover. Printed in Western Australia by Scott Print.
Available online: Volumes 1 & 3: 528 pages; Volume 2: 396 pages.
AUS\$110 each (incl GST and postage within Australia).
Email for postage charges to other destinations.



WILDROCKS PUBLICATIONS

PO Box 930, Mount Lawley, Western Australia 6929
Web: www.wildrocks.com.au
Email: info@wildrocks.com.au

