

Possible visual impacts of double perforated ivory beads found in the Swabian Aurignacian

Shuqin Guo, Stefanie Kölbl, Marian Vanhaeren, Sibylle Wolf, and Nicholas J. Conard

Zusammenfassung

Mögliche visuelle Effekte von doppelt durchlochtem Elfenbeinperlen aus dem Schwäbischen Aurignacien

Doppelt durchlochte Perlen aus Elfenbein (DPIBs) sind ein wesentliches Element des Schmucks im Schwäbischen Aurignacien und zeichnen sich durch ihre geringe Größe, ihre einzigartige Form und die zwei Perforationen aus. Trotz ihrer im Vergleich zu anderen Schmuckformen hohen Zahl bleibt die Art und Weise, wie sie als Perlen getragen wurden, ungewiss. In dieser Studie werden die verschiedenen Möglichkeiten des Arrangierens von DPIBs anhand der Analyse von 74 archäologischen Objekten aus der Höhle Hohle Fels, Alb-Donau-Kreis, experimentellen Nachbildungen und Online-Recherchen zu modernen Perlenarbeitstechniken untersucht. Die Ergebnisse deuten darauf hin, dass das Auffädeln und nicht das Nähen die plausibelste Befestigungsmethode war, die auch mit den beobachteten Abnutzungsmustern übereinstimmt. Experimentelle und moderne Perlarbeiten lassen darauf schließen, dass DPIBs komplexe dreidimensionale Perlenstrukturen gebildet haben könnten, die sowohl dekorativen als auch praktischen Zwecken dienen. Diese Studie verdeutlicht die Raffinesse des frühen symbolischen Ausdrucks sowie der Handwerkskunst und unterstreicht das Potenzial der Kombination von archäologischen Analysen mit experimentellen Ansätzen und Vergleichen mit heutigen Perlarbeiten zum Verständnis der visuellen Kultur des Paläolithikums.

Schlagwörter Schmuckstücke, Hohle Fels, Perlarbeit, Morphometrie, Handwerkskunst

Double perforated ivory beads (DPIBs) are a prominent feature in the personal ornament assemblages of the Swabian Aurignacian (cf. e.g. Conard 2003; Kölbl/Conard 2003; Wolf 2015). Their extremely small size and distinctive shape have sparked a range of speculations about their function. The sheer number of these beads is intriguing and raises the question: Why two holes when a single one might have sufficed? Unfortunately, DPIBs have not been found in direct association with primary burials, and their method of assembly and wear – possibly sewn onto clothing – remains a subject of speculation.

To explore their likely modes of assembly, a sample of 74 DPIBs from archaeological horizon IV at Hohle Fels Cave,

Summary

Double perforated ivory beads (DPIBs) represent an essential element of personal ornaments in the Swabian Aurignacian, notable for their small size, unique shape, and the two perforations. Despite their prevalence, the way in which they were worn as beads remains uncertain. This study investigates the methods of assembly of DPIBs through the analysis of 74 archaeological specimens from Hohle Fels Cave, Alb-Donau-Kreis District, experimental replication, and online research into modern beadwork techniques. The findings indicate that stringing, rather than sewing, is the most plausible method of use in accordance with observed wear patterns. Experimental and modern beadwork suggest that DPIBs could have formed complex three-dimensional beadwork structures, serving both decorative and practical roles. This study highlights the sophistication of early symbolic expression and craftsmanship, emphasising the potential of combining archaeological analysis with experimental approaches and modern beadwork to understand Palaeolithic visual culture.

Keywords Personal ornaments, Hohle Fels, beadwork, morphometry, craftsmanship

Alb-Donau-Kreis District, was analysed. In addition, replica DPIBs were produced, assembled, suspended, and worn in experimental setups. An online search was also conducted to identify possible linking techniques for other types of beads with two perforations.

Analysis of the archaeological material reveals that DPIBs varied in size, e.g. ranging between 5.9 and 10.6 mm in length (mean is 7.8, SD is 1.2), and were shaped into a distinctive pinched-oval form with two perforations separated by a curved central ridge.

Experimental results suggest that threading across the thick ridge between the holes offers little practical value. Suspension experiments – testing both loosely and tightly

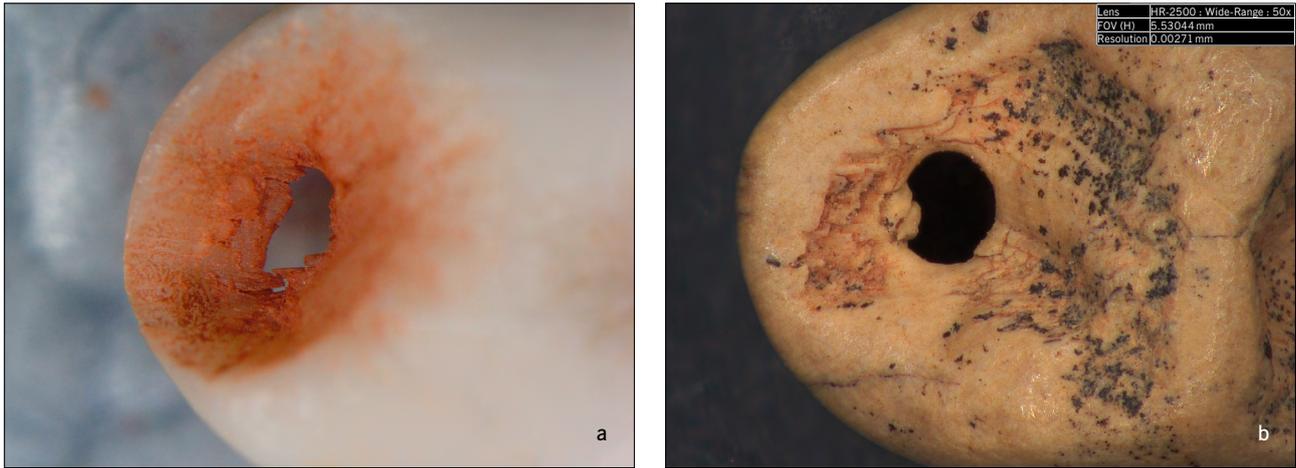


Fig. 1a–b Comparable fish scale patterns found on archaeological and replicated double perforated ivory beads. a Fish scale pattern around the perforation of a double perforated ivory bead replica worn experimentally on a sieve shaker (item strung vertically on a sinew string and processed for 120 minutes on a Retsch AS 400 with a speed set to rpm/g: 200); b fish scale pattern on an archaeological double perforated ivory bead (item number 55-1668.1 from Hohle Fels Cave, Alb Donau Kreis District, archaeological horizon IV).

Abb. 1a–b Das vergleichbare Fischschuppenmuster auf archaischen und nachgebildeten doppelt durchlochten Elfenbeinperlen. a Fischschuppenmuster auf einer doppelt durchlochten Perlreplik aus Elfenbein, die experimentell getragen wurde (vertikal auf einer Sehne aufgereiht für 120 Minuten mit einer Retsch AS 400 Siebmaschine mit einer Drehzahl von rpm/g: 200); b Fischschuppenmuster auf einer archaischen doppelt durchlochten Perle aus Elfenbein (Nr. 55-1668.1, aus dem archaischen Horizont IV der Höhle Hohle Fels, Alb-Donau-Kreis).

strung, as well as sewn replicas – produced only minimal modification of the perforations. These findings suggest that the characteristic fish-scale wear patterns observed around the perforations in archaeological items are more consistent with stringing than with sewing (Fig. 1).

The online query, based primarily on Google searches for keywords, images, and videos, as well as the results of the

2018 beadwork competition hosted by the Museum of Prehistory in Blaubeuren, yielded additional insights. A search for ›two-hole bead‹ reveals that such beads are commonly known among modern bead workers. The online material surveyed provided an enormous variety of beadwork patterns. A closer look at these patterns reveals key insights into their visual and structural properties:



Fig. 2 String of beads made from dried berries with double perforated ivory bead replicas used as spacers; no scale.

Abb. 2 Perlenkette aus getrockneten Beeren mit Nachbildungen von doppelt durchlochten Elfenbeinperlen als Abstandhalter; o. M.

Fig. 3 Production of a solid band by stringing double perforated ivory bead replicas; no scale.

Abb. 3 Herstellung eines festen Bandes durch Aneinanderreihen von Nachbildungen doppelt durchlochter Elfenbeinperlen; o.M.



1. The unique shape allows such beads to nest neatly together.
2. They can be connected to form flat sturdy bands.
3. They are often and easily used in combination with other bead types.
4. Three-dimensional beadwork patterns are possible and can be quite complex.

The artwork produced by participants in the Blaubeuren competition shows strong parallels with modern beadwork techniques seen online. One participant, for instance, used replicated DPIBs as bead spacers to separate and anchor different strands of beads (Fig. 2). In this context, the curved ridge between the holes helps to keep two strands distinct while providing a smooth connection to adjacent beads or decorative elements. Another participant expanded on this idea by assembling several DPIBs into a solid band (Fig. 3), which not only creates a visually striking pattern but could also offer some protection for the wearer's skin or body. One competitor used DPIBs in a zipper-like configuration (Fig. 4), enabling the joining of two leather parts. This setup could have been used to gather fabric into folds or make clothing more adjustable for different body shapes and sizes.

In summary, the results suggest that the use of DPIBs in beadwork is potentially very sophisticated. These beads can serve not only as simple decorative elements strung together but also as components of complex three-dimen-

sionally-patterned structures. Moreover, modern beadwork often involves combining double perforated beads with other bead types. Future experimental research should aim to identify diagnostic features that can distinguish specific DPIB beadwork patterns. Such insights may provide a deeper understanding of Aurignacian visual expression and concepts of beauty.

Acknowledgements

Our thanks go to the editors of the Proceedings of the 17th Archaeological Conference of Central Germany, ›A Stone Age History of Clothing‹, for offering us the opportunity to share our research. We thank Johannes Wiedmann for generously providing carved ivory beads, Rudolf Walter for offering suggestions on the replication experiments, and Bernhard Röck and Louis Corrigan for providing mammoth ivory to replicate DPIBs. We appreciate that the University of Applied Forest Sciences Rottenburg, Germany (specifically Andrej Bösiger, Christina Zwanger, and Rainer Kirchhof) let us use their sieve shaker. We are grateful to the participants of the bead competition in the Museum of Prehistory in Blaubeuren. This research benefited from the bilateral French-German Procope program (French Partenariat Hubert Curien [PHC] 2024 Project no. 50971QG – German Academic Exchange Service [DAAD] 2024 Project no. 57705111).

Fig. 4 Double perforated ivory bead replicas sewn on leather to fulfil the function of a zipper in the middle and to create decorative patterns (left and right); no scale.

Abb. 4 Nachbildungen von doppelt durchlochtem Perlen aus Elfenbein, die auf Leder genäht wurden. Sie erfüllen die Funktion eines Verschlusses in der Mitte und erzeugen dekorative Muster an den Seiten (links und rechts); o.M.



Bibliography

Conard 2003

N. J. Conard, Eiszeitlicher Schmuck auf der Schwäbischen Alb. in S. Kölbl/N. J. Conard (eds.), Eiszeitschmuck. Status und Schönheit. Museumsh. 6, Urgesch. Mus. Blaubeuren (Blaubeuren 2003) 15–49.

Kölbl/Conard 2003

S. Kölbl/N. J. Conard (eds.), Eiszeitschmuck. Status und Schönheit. Museumsh. 6, Urgesch. Mus. Blaubeuren (Blaubeuren 2003).

Wolf 2015

S. Wolf, Schmuckstücke. Die Elfenbeinbearbeitung im Schwäbischen Aurignacien. Tübinger Monogr. Urgesch. (Tübingen 2015).

Source of figures

- 1 S. Guo
- 2 E. Cooper, Texas

- 3 F. Strassmann, Switzerland
- 4 C. Kröner, Blaubeuren

Addresses

Shuqin Guo MSc
Eberhard Karls University of Tübingen
Department of Early Prehistory and
Quaternary Ecology
Schloss Hohentübingen
72072 Tübingen
Germany
shuqin.guo@ifu.uni-tuebingen.de
ORCID: 0009-0008-2092-1057

Dr. Stefanie Kölbl
Urgeschichtliches Museum Blaubeuren
(Museum of Prehistory)
Kirchplatz 10
89143 Blaubeuren
Germany
koelbl@urmu.de

Dr. Marian Vanhaeren
University of Bordeaux
CNRS – UMR 5199 PACEA – From Prehistory to
nowadays: culture, environment, anthropology
Bâtiment B2
Allée Geoffroy Saint-Hilaire
CS 50023
33615 Pessac Cedex
France
marian.vanhaeren@u-bordeaux.fr

and

Eberhard Karls University of Tübingen
Department of Early Prehistory and
Quaternary Ecology
Schloss Hohentübingen
72072 Tübingen
Germany
ORCID: 0000-0002-0724-0539

Dr. Sibylle Wolf
Senckenberg Centre for Human Evolution and
Palaeoenvironment at the University of Tübingen
Hölderlinstraße 12
72074 Tübingen
sibylle.wolf@senckenberg.de

and

Eberhard Karls University of Tübingen
Department of Early Prehistory and
Quaternary Ecology
Schloss Hohentübingen
Burgsteige 11
72070 Tübingen
sibylle.wolf@ifu.uni-tuebingen.de
ORCID: 0000-0003-3454-3612

Prof. Dr. Nicholas J. Conard
Eberhard Karls University of Tübingen
Department of Early Prehistory and
Quaternary Ecology
Schloss Hohentübingen
Burgsteige 11
72070 Tübingen
nicholas.conard@uni-tuebingen.de

and

Senckenberg Centre for Human Evolution and
Palaeoenvironment at the University of Tübingen
Hölderlinstraße 12
72074 Tübingen
nicholas.conard@senckenberg.de

and

Urgeschichtliches Museum Blaubeuren
(Museum of Prehistory)
Kirchplatz 10
89143 Blaubeuren
Germany
ORCID: 0000-0002-4633-0385