A Late Magdalenian ›coat of many colours‹? A new look at well-worn evidence from the sites Gönnersdorf and Andernach-Martinsberg (Germany)

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Zusammenfassung

Ein spätmagdalénienzeitlicher »Vielfarbenmantel«? Ein neuer Blick auf altbekannte Funde von den Fundplätzen Gönnersdorf und Andernach-Martinsberg (Deutschland)

Die spätmagdalénienzeitlichen Fundplätze von Gönnersdorf, Lkr. Neuwied, und Andernach-Martinsberg, Lkr. Mayen-Koblenz, haben einen äußerst reichhaltigen und vielfältigen archäologischen Materialcorpus hervorgebracht, der Einblicke in die wirtschaftlichen und sozialen Lebensweisen des späten Magdaléniens gewährt.

Der ökologische Kontext der spätpleistozänen Fundstellen ist eine Landschaft, die gemeinhin als »Mammutsteppe« bezeichnet wird, die von Pferden, Rentieren, Polarfüchsen und anderen eiszeitlichen Arten, einschließlich der namensgebenden Spezies, geprägt ist. Es liegt auf der Hand, dass die Bewohner von Gönnersdorf und Andernach-Martinsberg zum Überleben in dieser Umgebung nicht nur über effektive Jagdwaffen sowie als Witterungsschutz über kälteangepasste Behausungen verfügen mussten, sondern auch über äußerst durchdachte Bekleidung. In diesem Beitrag werden mögliche Nachweise für Kleidung aus den beiden Fundplätzen untersucht. Dabei wird ein ganzheitlicher Ansatz verfolgt, der sich auf das Vorhandensein zahlreicher Materialgruppen und die Anwendung mehrerer Analysestrategien stützt.

Schlagwörter Magdalénien, Kleidung, Zooarchäologie, Gebrauchsspurenanalyse, Symbolik

Summary

The Late Magdalenian sites of Gönnersdorf, Neuwied District, and Andernach-Martinsberg, Mayen-Koblenz District (Germany), have produced an extremely rich and diverse corpus of archaeological material, providing insights into late Magdalenian economic and social lifeways.

The ecological context of the late Pleistocene sites is a landscape characterised by horse, reindeer, arctic fox, and other Ice Age species including the eponymous species of what is commonly referred to as the ›mammoth-steppe‹. Clearly, survival in this environment would require the inhabitants of Gönnersdorf and Andernach-Martinsberg to possess not only effective hunting weapons and the shelter of cold-adapted dwellings but also extremely sophisticated clothing. This paper examines potential evidence for clothing from the two sites, taking a holistic approach and drawing on the presence of numerous material categories and the application of several analytical strategies.

Keywords Magdalenian, clothing, zooarchaeology, traceology, symbolism

1. Location, context and chronology

The Late Magdalenian sites of Gönnersdorf, Neuwied District, and Andernach-Martinsberg, Mayen-Koblenz District, are located in the Rhine Valley close to the northern edge of the Central European upland zone. Until the very end of the Magdalenian, the transition between this and the North European Plain represented the northern limit of the late glacial humanly occupied world. The two exceptionally similar sites lie on opposite sides of the Rhine, only 2 km apart and within clear line of sight of each other, where the river exits the wide Neuwied Basin and flows to the northwest, re-entering the narrow Rhine gorge.

Targeted radiocarbon sampling of hunted mammal remains (Street/Terberger 2004; Stevens et al. 2009) dates the main Magdalenian occupations at Gönnersdorf and Andernach-Martinsberg to around 15 600 cal BP (uncalibrated ~ 13 000 BP). Toward the end of the late glacial Allerød interstadial both sites were buried under thick ash and pumice deposits erupted by the Laacher See Volcano (van den Bogaard/Schmincke 1985; Baales et al. 2002), leading to their exceptional conservation in comparison with unprotected contemporary terrestrial localities.

2. Characterisation of the sites, paving and pits, bone preservation

The Martinsberg site was uncovered by pumice quarrying on the outskirts of the town of Andernach in the late

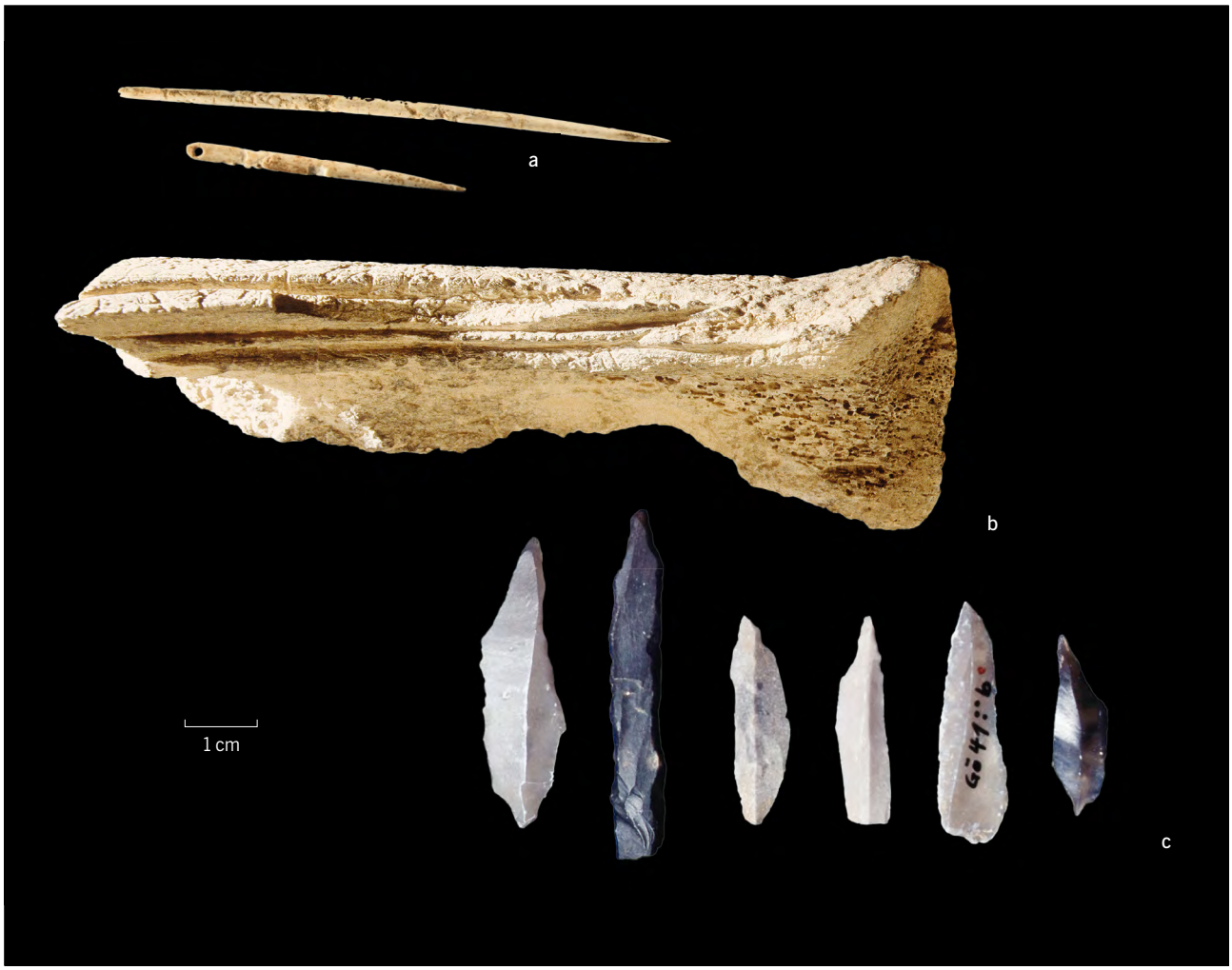

Fig. 1a–c The Magdalenian sewing-kit. a Bone eyed-needles from Andernach-Martinsberg, Mayen-Koblenz District (with intact eye), and Gönnersdorf, Neuwied District; b needle core on a horse *metatarsus* (Andernach-Martinsberg); c piercers of flint (Gönnersdorf).

Abb. 1a–c *Das magdalénienzeitliche Nähkästchen. a Knochennadeln mit Öhr aus Andernach-Martinsberg, Lkr. Mayen-Koblenz (mit intaktem Öhr), und Gönnersdorf, Lkr. Neuwied; b Nadelkern an einem* Metatarsus *vom Pferd (Andernach-Martinsberg); c Bohrer aus Feuerstein (Gönnersdorf).*

19th century; results of the 1883 excavation by H. Schaaffhausen were published soon afterwards (Schaaffhausen 1888). The exact position of the site was subsequently forgotten as the town expanded during the 20th century. It was rediscovered during building development (Veil 1978; Veil 1979) and excavated from 1979–1983 (Veil 1982; Veil 1984). Construction of new housing led to excavations at the site from 1994–1996 (Bergmann/Holzkämper 2002). In 2006, what will probably be the final investigations were undertaken at the now completely built-over site (Krahl/Maier 2020).

Gönnersdorf was discovered in 1968 during the excavation of deep foundations for new housing in the suburbs of the town of Neuwied. Until 1976, the site was investigated over a surface of approximately 700 m² during several annual campaigns of excavation that revealed some of the most complex late Upper Palaeolithic settlement structures in western Central Europe (Bosinski 1979).

Both sites are characterised by several spatially distinct large and dense concentrations of archaeological material (Bosinski 1979; Eickhoff 1995). Their rich assemblages of lithic and faunal materials are associated with standardised structural features, often interpreted as ›roofed‹ dwellings. These may include complex placements of large slabs and blocks of slate, quartzite, basalt and other rocks, and areas of ochre-staining. The structures were too large to be transportable. They remained permanently in place and were occupied and modified on repeated occasions, probably over several years (Terberger 1997).

The structures are normally associated with numbers of pits deliberately dug into the underlying sediment. The original functions of these pits are unknown. They may have had a construction function (as post holes), served as boiling pits (with heated cobbles), hearths, for storage or deposition. During their subsequent infilling, the pits served as sediment traps for the incorporation and optimal preservation of adjacent smaller-sized archaeological objects. This is particularly important in the case of less robust categories of organic material that are particularly susceptible to weathering, e.g. bird and rodent bone, elements of adornment such as teeth and fossil shell, or – particularly relevant here – finely worked bone needles.

3. Potential evidence for clothing

Bone needles

At both Gönnersdorf and Andernach, the most compelling evidence for the presence and, indeed, the production of sewn clothing are eyed needles made of bone (Fig. 1a) and, far less commonly, antler or ivory (Tinnes 1994; Street/Turner 2013). That such needles were certainly produced at the sites is shown by several cores left by their manufacture (Fig. 1b). As befits these sites where subsistence was dominated by horse hunting, the preferred materials used as cores for needle manufacture were this species' dense, straight metacarpal and metatarsal bones. Very rarely, reindeer antler and mammoth ivory were also used for needles. Twelve of the Gönnersdorf needles were identified by J. Tinnes (1994) as antler, and two specimens are described as ivory or possibly ivory. Bone elements of other species, such as reindeer metapodials, hare tibias or bird limb bones that were also used to produce needles during the Magdalenian (e.g. Berke 1987) are almost entirely absent at the two Rhineland sites, where only one fragment from Gönnersdorf might possibly be a bird bone (Tinnes 1994, 58).

Bone weathering and corrosion have visibly damaged many surviving needles and certainly will have destroyed many of those originally present. Surface weathering sometimes makes their recognition difficult; while other analysts might regard some previously identified specimens as questionable, further specimens were recognised by new examination of the smaller bone fragments.

Almost all needles from both sites were recovered in a fragmentary state. Proximal fragments are identified by their eye, usually broken but in some cases still intact or recognisably unfinished. Tubes sawn from lengths of hollow bird bone are sometimes speculated to have functioned as ›needle cases‹ (e.g. Tinnes 1994).

Awls and piercers

If the finer-eyed needles of bone perhaps seem too delicate to penetrate tough animal hides or skin, other possibilities exist. Conceivably the needles were used to pull thread through holes pre-bored by more robust awls of bone or antler, or by the fine-tipped piercers of flint present at both sites (Fig. 1c).

Sinew, cordage and fibres

Analysis of the Magdalenian bone assemblages identified cut marks on horse phalanges, which are interpreted as the result of obtaining ligaments located on these body parts (cf. Parkin et al. 1986). These could have been used for twisting into thread or cord and, indeed, O. Soffer described a Gönnersdorf antler fragment bearing an impression thought to have been due to contact with a twisted cord (Soffer et al. 2000). Theoretically, plant materials such as grasses or bark/bast might also have been twisted or plaited into cordage. No evidence for these materials survives, but the mammoth steppe would have provided a great range of resources, including bushes and some hardy species of tree that grew in sheltered locations with sufficient water supply, such as the Rhine Valley.

Hides, furs and fabric

The convex working edges of numerous end-scrapers show heavy wear and rounding, interpreted as the result of their intensive use in hide working (Plisson 2002; Vaughan 2002; Sano 2012). Some of the Magdalenian structures are characterised by zones of staining by red ochre (haematite), a mineral that can be used in hide processing and is often found on scraper working ends, perhaps due to this practice.

Were the worked hides, skins and pelts intended for clothing, blankets, tent coverings – or all of these? The faunal assemblages at Gönnersdorf and Andernach derive from the hunting and exploitation of several species of large (horse, reindeer) and medium-sized (fox, hare) mammals and birds, while the ›bestiary‹ (Poplin 1976) preserved by depictions engraved on slate slabs (Bosinski/Fischer 1980; Bosinski 1996; Bosinski 2008a) shows the Magdalenians' familiarity with the much broader spectrum of contemporary animals available to provide a wide range of exploitable resources. From robust horse hide to well-cured reindeer buckskin and insulating pelts of arctic fox and blue hare, there would have been no problem with access to raw materials suitable for producing various items of clothing. Analogy with modern-day circumpolar Indigenous peoples can provide inspiration here – for example, recognising the superior insulating properties of wolverine fur, or adapting skin from the legs of reindeer to make watertight boots for humans. Without a doubt, the pelts of arctic fox and blue hare were attractive: they turn white in the winter, a season at which both sites were occupied, and there is evidence of skinning on the bones of both species at Gönnersdorf (Street/Turner 2013). For other – now lost – resources, we must use our imagination: the dense underfur and long, tough guard hairs revealed by frozen mammoth carcasses would surely have provided materials for insulation and perhaps thread or cordage.

Rondelle

Rondelle are sub-circular discs of locally available slate (Fig. 2a), worked into this shape by percussion around their edges and finished by an approximately centrally located hole typically drilled from both sides of the disc (Bosinski 1977). While their purpose is still unknown, and some commentators have seen them as purely decorative[1], they may have had a functional use. In combination with cords and

1 Some discs are engraved (Fig. 2b), and single specimens of antler and ivory (Fig. 2c) are known at Gönnersdorf.

Fig. 2a–c Perforated discs (›rondelles‹) from Gönnersdorf. a Slate rondelles of varying size (not to scale); b slate rondelle with aligned triangular engraving (vulva?); c rondelles made of organic materials (a mammoth ivory; b–c reindeer antler).

Abb. 2a–c *Gelochte Scheiben (»Rondelle«) aus Gönnersdorf. a Schieferrondelle unterschiedlicher Größe (nicht maßstabsgetreu); b Schieferrondelle mit ausgerichteter dreieckiger Gravur (Vulva?); c Rondelle aus organischen Materialien (a Mammut-Elfenbein; b–c Rentiergeweih).*

pegs of wood, bone or antler they could have served as a form of fastening – perhaps for tents or clothing?

Adornment and decoration

Accepting the premise that complex and cold-adapted Magdalenian clothing existed, and taking inspiration from the much more abundant indirect evidence for clothing recognised in Middle Upper Palaeolithic burials, we can examine the Gönnersdorf and Andernach assemblages for indicators of how the application of decorative elements or items of personal adornment might have modified Magdalenian clothing.

Teeth

The first class of objects identified as personal adornment are the teeth of large and medium-sized mammals modified by perforation for suspension or attachment to cloth-

Fig. 3a–f Decorative elements made from perforated and otherwise modified animal teeth. a Perforated arctic fox canine tooth (Andernach-Martinsberg); b perforated premolar teeth of arctic fox (Andernach-Martinsberg); c a complete row of reindeer incisor and canine teeth removed as a unit from the mandible by sawing through the roots (Gönnersdorf); d incisor teeth of wisent or aurochs removed from the mandible by sawing through the roots (Andernach-Martinsberg); e perforated canine teeth of red deer (Gönnersdorf); f engraved and perforated mammoth ivory plaque (Andernach-Martinsberg).

Abb. 3a–f *Dekorative Elemente aus durchlochten und anderweitig bearbeiteten Tierzähnen. a Gelochter Eckzahn eines Polarfuchses (Andernach-Martinsberg); b gelochte Prämolaren des Polarfuchses (Andernach-Martinsberg); c eine komplette Reihe von Rentierschneide und -eckzähnen, die als Einheit aus dem Unterkiefer entfernt wurden, indem die Wurzeln durchgesägt wurden (Gönnersdorf); d Schneidezähne von Wisent oder Auerochse, die durch Durchsägen der Wurzeln aus dem Unterkiefer entfernt wurden (Andernach-Martinsberg); e gelochte Eckzähne von Rothirschen (Gönnersdorf); f gravierte und gelochte Plakette aus Mammutelfenbein (Andernach-Martinsberg).*

ing or other objects. The most common of these are the canine (Fig. 3a), incisor and (pre)molar teeth (Fig. 3b) of arctic fox. This may reflect a greater rate of loss or discard of the smaller fox teeth, or their relative abundance may be an effect of their greater availability. The equivalent teeth of the much larger wolf are, by contrast, very rare; at Gönnersdorf, they comprise only an unperforated canine and eight other teeth. The overall number of remains shows that fox was very commonly hunted, providing numerous teeth, while the few wolf bones and teeth might represent only a couple of pelts.

A different method was used to extract and transform the incisor and canine teeth of reindeer. Only present in the lower jaw, the row of eight adjacent teeth was removed from the mandible by sawing through the roots (Fig. 3c) but leaving them connected by gingival tissue. It is certain that many of the modified reindeer teeth were imported as personal adornments, manufactured elsewhere and not obtained from the relatively few animals butchered at the Rhineland sites.

The same method was used to extract the incisor teeth of aurochs or bison (Fig. 3d). It is still unclear which of the two species is represented. Engravings on slate plaques show that both animals were well known to the Magdalenian inhabitants of the Central Rhineland (Bosinski 2008a), but since postcranial material is rare (Gönnersdorf) or absent (Andernach) it cannot be ruled out that such items were imported over long distances.

Red deer maxillary canine teeth, modified as personal adornments, occur regularly throughout the Upper Palaeolithic and into much younger periods down to the present day. Only a few specimens were found at Gönnersdorf (Fig. 3e) and Andernach; since red deer is not one of the species hunted at the sites during the Magdalenian (Street 1993; Street/Turner 2013) they are possibly exotic imports, analogous to the far-travelled Mediterranean marine mollusc shells also found at both localities (Langley/Street 2013).

Another object which can be included in the category of modified teeth is an ivory artefact recovered at Andernach (Fig. 3f). This object – unique for the Magdalenian context – is formed from a thin, flat plaque of ivory detached from a mammoth tusk. Today its surface is weathered by corrosion and traversed by lines etched by plant roots, but originally it must have been smooth, polished, and white in appearance. Four artificial perforations are preserved adjacent to, or on, the four edges. J. Tinnes (1994) interprets the piece as only half of an originally quadratic object, in which case the larger object would have had one central perforation and, if symmetrical, six peripheral holes. This suggests a function as a decorative item, perhaps stitched to clothing.

Shell, jet and ivory

A second category of personal adornment based on animal remains comprises marine gastropod and scaphopod molluscs. *Homalopoma sanguineum* is a species of small marine gastropod mollusc, today native to the Mediterranean. The shells have a naturally reddish colour (Fig. 4a), presumably an important feature underlying their attractiveness and value for personal adornment. This is underlined by their presence in the Rhineland, far from their point of origin. The red colour contrasts with the white appearance of the associated shells of scaphopods such as *Dentalium* (Fig. 4b). Almost all the modified mollusc shells (*H. sanguineum*, *Dentalium vulgare* and *dentale*, *Cyclope neriteus*) at Andernach were recovered from Concentration II, a well-defined area of the site associated with numerous flint burins, resharpening spalls, and mammoth ivory debitage. 46 specimens of *H. sanguineum* and a single *Cyclope neriteus* were recovered from a single feature interpreted as a pit, which might indicate that they were strung together when perhaps lost or deliberately deposited (Street 1993).

A third variation of ornament is found only at Gönnersdorf, where beads have been manufactured using black jet (Fig. 4c). Some of these beads even seem to imitate the shape of red deer maxillary canine teeth, providing a jet-black counterpart (Fig. 4d) to the yellowish-white pendants of animal origin. Possibly also to be seen in this context is a small piece of ivory carved with parallel notches (Fig. 4e) interpreted as imitating a length of fossil crinoid (sea lily) stem (Bosinski 2008b). Taken together, these three variants of perforated beads suggest the possibility of a juxtaposition of red, black and white elements.

Feathers

We have previously argued (Street/Turner 2016) that the various species of birds at Gönnersdorf and Andernach represented not only a food resource but also fulfilled further roles at the sites. We suggested deliberate selection for species with white or pale plumage – swan and goose, and at Gönnersdorf snowy owl and gull – whose wings were possibly introduced to the sites as disarticulated units. They could have served as raw material for bone tools or musical instruments, provided useful pinion feathers, or been used for their decorative or potentially ritual value. The white winter plumage of ptarmigan/willow grouse would complement that of the larger species, and the relatively numerous wing bones might indicate the selection or curation of wings or even entire skins following consumption of the meat. Raven is also found at both sites, and there are plausible arguments that it was primarily valued not as food but for its skin, with jet-black plumage and claws still attached.

We speculated whether the juxtaposition of black and white feathers at Gönnersdorf and Andernach was solely for aesthetic reasons or possibly went beyond this, taking on significance in the symbolic conventions of the time. An iconic symbol of the Late Magdalenian, the abstract and headless female figurines defined as the ›Gönnersdorf type‹ (Höck 1993), can be executed in different materials such as jet and slate, or ivory and antler, which might also reflect a deliberate polarization of black and white imagery. The occurrence of both black and white female imagery, taken together with the availability of multiple materials that could transfer this imagery into actual clothing, seems worthy of consideration in the context of the present paper.

Fig. 4a–e Decorative elements of shell and jet/lignite. a Perforated shells of the Mediterranean marine gastropod *Homalopoma sanguineum* (Andernach-Martinsberg); b shells of scaphopods and (top row centre) a fossil belemnite (Gönnersdorf); c perforated beads of jet/lignite (Gönnersdorf); d perforated pieces of jet/lignite, possibly in imitation of perforated canines of red deer canine teeth (Gönnersdorf); e carved piece of mammoth ivory from Gönnersdorf (below) interpreted as a possible imitation of a fossil crinoid (above).

Abb. 4a–e *Dekorative Elemente aus Muscheln und Gagat/Lignit. a Gelochte Gehäuse der mediterranen Meeresschnecke* Homalopoma sanguineum *(Andernach-Martinsberg); b Gehäuse von Skaphopoden und (obere Reihe Mitte) ein fossiler Belemnit (Gönnersdorf); c gelochte Perlen aus Gagat/Lignit (Gönnersdorf); d gelochte Stücke aus Gagat/Lignit, möglicherweise in Nachahmung der gelochten Eckzähne von Rothirschen (Gönnersdorf); e geschnitztes Stück Mammutelfenbein aus Gönnersdorf (unten), das als mögliche Nachahmung eines fossilen Seelilienstengels interpretiert wird (oben).*

Engravings

The Late Magdalenian female image was also recorded in engraved depictions (Bosinski et al. 2001), which are highly abstracted and normally only represented by an outline. However, an engraved slate plaque from Gönnersdorf depicting four stylised female figures (Fig. 5), one of whom is carrying a smaller figure interpreted as a baby or child, might be a potential source of information for the appearance of Magdalenian clothing (Bosinski/Fischer 1974). Unusually, in this engraving, the interiors of all the figures are filled with a complex series of lines and hatching. It seems possible that this is not simple abstraction or merely done to emphasize the figures but is indeed intended to portray the actual appearance of the persons represented by the engraved figures – whether as a depiction of body ornament or clothing. If the latter, it is noteworthy that the design entirely covers the depicted women's bodies – and even the baby – from the neck to the knees. There are, nevertheless, differences of detail. The baby (Fig. 5b,4) and the smallest of

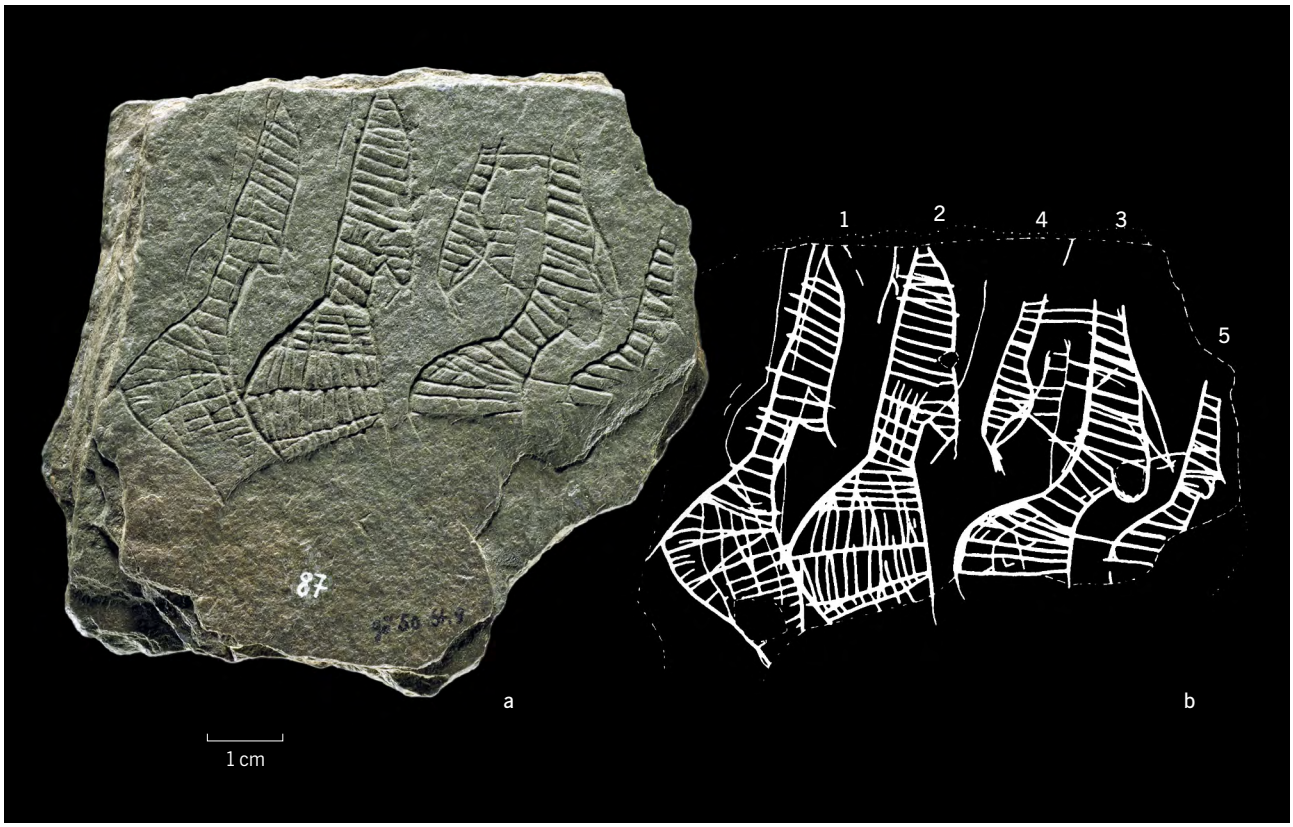

Fig. 5a–b Stylised engravings of humans possibly depict elements of clothing (Gönnersdorf). a The deeply engraved plaque shows four clearly female figures (b,1–3.5) facing to the right and a smaller figure (b,4) being carried; b a drawing of the plaque reveals details of the crossing lines and hatching within the outlines of the figures.

Abb. 5a–b *Stilisierte Gravuren von Menschen stellen möglicherweise Elemente von Kleidung dar (Gönnersdorf). a Die tief eingravierte Platte zeigt vier eindeutig weibliche Figuren (b,1–3.5), die nach rechts blicken und eine kleinere Figur (b,4), die getragen wird; b die Umzeichnung der Tafel verdeutlicht Details der sich kreuzenden Linien und Schraffuren innerhalb der Umrisse der Figuren.*

the four female figures at the right (Fig. 5b,5) have the simplest design consisting only of horizontal lines. The figure carrying the baby (Fig. 5b,3) has more complex lines around the hips and the buttocks. The most complex patterns are seen on the two figures at left (Fig. 5b,1–2), each of whom has an individual style.

4. Discussion

The rich and diverse corpus of archaeological material from the sites of Gönnersdorf and Andernach provides several lines of evidence relevant to the discussion of clothing during the late Magdalenian. A complex and standardised toolkit for the working and cutting of hides and their transformation into clothing comprised scrapers and sharp-edged lithic artefacts, awls and piercers made of stone and organic materials, and eyed needles for sewing. The appearance of late Magdalenian clothing at Gönnersdorf and Andernach remains unknown. The numerous highly abstract depictions of female figures offer almost no evidence for clothing; we have, however, described a rare potential exception above.

A logical first consideration might be the colour of the clothing. Clearly, any mammal pelts or feathered bird skins used for clothing would preserve their original colour scheme. For several animal species found at our sites, these would have been highly contrasting black and white elements. In the case of skins worked into leather – whether more or less supple depending on species and method of preparation – the use of ochre would probably introduce a red element to the palette of available colours. Without a doubt, yellows and browns of mineral origin (such as the ubiquitous loess) and similarly coloured organic elements, such as dried grasses, were also available.

To expand on this, we can emphasise the wide variety of organic and inorganic materials suitable as decoration for clothing, whatever form this took. Significantly, many of the decorative elements duplicate the colours suggested as likely for the clothing itself. Red, black and white beads, black and white plumage, and trimmings of white fur could have been stitched onto clothing, suspended as pendants, or attached as threaded elements, potentially determining the aesthetics of the clothing of the time. Other factors such as the perceived value of the various items (due to rarity?), any symbolism associated with the objects or their colours, and certainly the societal status of the person wearing the clothing would have been the crucial factors determining exactly who could dress in which way.

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Bibliography

Baales et al. 2002
M. Baales/O. Jöris/M. Street/F. Bittmann/B. Weninger et al., Impact of the Late Glacial eruption of the Laacher See volcano, Central Rhineland, Germany. Quaternary Research 58, 2002, 273–288.

Bergmann/Holzkämper 2002
S. Bergmann/J. Holzkämper, Die Konzentration IV des Magdalénien von Andernach-Martinsberg, Grabung 1994–1996. Erste Ergebnisse. Arch. Korrbl. 32, 2002, 471–486.

Berke 1987
H. Berke, Archäozoologische Detailuntersuchungen an Knochen aus südwestdeutschen Magdalénien-Inventaren. Urgesch. Materialh. 8 (Tübingen 1987).

van den Bogaard/Schmincke 1985
P. van den Bogaard/H.-U. Schmincke, Laacher See Tephra: A widespread isochronous late Quaternary tephra layer in central and northern Europe. Geol. Soc. Am. Bull. 96, 1985, 1554–1571.

Bosinski 1977
H. Bosinski, Die Rondelle des Magdalénien-Fundplatzes Gönnersdorf. Ein Arbeitsbericht. Quartär 27, 1976/1977, 153–160.

Bosinski 1979
G. Bosinski, Die Ausgrabungen in Gönnersdorf 1968–1976 und die Siedlungsbefunde der Grabung 1968. Magdalénien-Fundplatz Gönnersdorf 3 (Wiesbaden 1979).

Bosinski 1996
G. Bosinski, Die Nashorndarstellungen von Gönnersdorf. In: I. Campen/J. Hahn/M. Uerpmann (eds.), Spuren der Jagd – Die Jagd nach Spuren. Festschrift für Hansjürgen Müller-Beck. Tübinger Monogr. Urgesch. 11 (Tübingen 1996) 177–189.

Bosinski 2008a
G. Bosinski, Tierdarstellungen von Gönnersdorf. Nachträge zu Mammut und Pferd sowie die übrigen Tierdarstellungen. Magdalénien-Fundplatz Gönnersdorf 9 = Monogr. RGZM 72 (Mainz 2008).

Bosinski 2008b
G. Bosinski, Urgeschichte am Rhein. Tübinger Monogr. Urgesch. (Tübingen 2008).

Bosinski/Fischer 1974
G. Bosinski/G. Fischer, Die Menschendarstellungen von Gönnersdorf der Ausgrabung von 1968. Magdalénien-Fundplatz Gönnersdorf 1 (Wiesbaden 1974).

Bosinski/Fischer 1980
G. Bosinski/G. Fischer, Mammut- und Pferdedarstellungen von Gönnersdorf. Magdalénien-Fundplatz Gönnersdorf 5 (Wiesbaden 1980).

Bosinski et al. 2001
G. Bosinski/F. d'Errico/P. Schiller, Die gravierten Frauendarstellungen von Gönnersdorf. Magdalénien-Fundplatz Gönnersdorf 8 (Stuttgart 2001).

Eickhoff 1995
S. Eickhoff, Wohnplatzstrukturen. Strukturierung eines Wohnplatzes. Zur Besiedlungsgeschichte des Magdalénien-Fundplatzes Andernach. Unpubl. Diss. Univ. Köln (Köln 1995).

Höck 1993
C. Höck, Die Frauenstatuetten von Gönnersdorf und Andernach. Jahrb. RGZM 40, 1993, 253–316.

Krahl/Maier 2020
A. Krahl/A. Maier, Neue Erkenntnisse zur Ausdehnung der spätpaläolithischen Besiedelung am Martinsberg in Andernach (Lkr. Mayen-Koblenz). Arch. Korrbl. 50, 2020, 145–159.

Langley/Street 2013
M. Langley/M. Street, Long range inland-coastal networks during the Late Magdalenian: Evidence for individual acquisition of marine resources at Andernach-Martinsberg, German Central Rhineland. Journal Human Evolution 64, 2013, 457–465.

Parkin et al. 1986
R. A. Parkin/P. Rowley-Conwy/D. Serjeantson, Late Palaeolithic exploitation of horse and red deer at Gough's cave, Somerset. Proc. Univ. Bristol Spelaeological Soc. 17,3, 1986, 311–330.

Plisson 2002
H. Plisson, Étude fonctionelle de l'outillage en quartzite des concentrations magdaléniens I et III d'Andernach. In: H. Floss/T. Terberger (eds.), Die Steinartefakte des Magdalénien von Andernach (Mittelrhein). Die Grabungen von 1979–1983. Tübinger Arbeiten Urgesch. 1 (Tübingen 2002) 139–157.

Poplin 1976
F. Poplin, Les grands vertébrés de Gönnersdorf. Fouilles 1968. Magdalénien-Fundplatz Gönnersdorf 2 (Wiesbaden 1976).

Sano 2012
K. Sano, Functional Variability in the Late Upper Palaeolithic of North-Western Europe. Univforsch. Prähist. Arch. 219 (Köln 2012).

Schaaffhausen 1888
H. Schaaffhausen, Die vorgeschichtliche Ansiedelung in Andernach. Bonner Jahrb. 86, 1888, 1–41.

Soffer et al. 2000
O. Soffer/J. M. Adovasio/J. S. Illingworth/H. A. Amirkhanov/N. D. Praslov et al., Palaeolithic Perishables Made Permanent. Antiquity 74,286, 2000, 812–821.

Stevens et al. 2009
R. E. Stevens/T. C. O'Connell/R. E. M. Hedges/M. Street, Radiocarbon and stable isotope investigations at the central Rhineland sites of Gönnersdorf and Andernach-Martinsberg, Germany. Journal Human Evolution 57, 2009, 131–148.

Street 1993
M. Street, Analysis of Late Palaeolithic and Mesolithic Faunal Assemblages in the Northern Rhineland, Germany. Unpubl. Diss. Univ. Birmingham (Birmingham 1993).

Street/Terberger 2004
M. Street/T. Terberger, The radiocarbon chronology of the German Upper Palaeolithic: fifteen years of co-operation with the ORAU. In: T. F. G. Higham/C. Bronk Ramsey/C. Owen (eds.), Radiocarbon and Archaeology. Fourth International Symposium. St Catherine's College, Oxford. 9–14 April 2002. Oxford Univ. School Arch. Monogr. 62 (Oxford 2004) 281–302.

Street/Turner 2013
M. Street/E. Turner, The Faunal Remains from Gönnersdorf. Monogr. RGZM 104 (Mainz 2013).

Street/Turner 2016
M. Street/E. Turner, Eating crow or a feather in the cap? The avifauna from the Magdalenian sites of Gönnersdorf and Andernach (Germany). Quaternary Internat. 421,9, 2016, 201–218, doi:10.1016/j.quaint.2015.10.006.

Terberger 1997
T. Terberger, Die Siedlungsbefunde des Magdalénien-Fundplatzes Gönnersdorf, Konzentration III und IV. Magdalénien-Fundplatz Gönnersdorf 6 (Stuttgart 1997).

Tinnes 1994
J. Tinnes, Die Geweih-, Elfenbein- und Knochenartefakte der Magdalénienfundplätze Gönnersdorf und Andernach. Unpubl. Diss. Univ. Köln (Köln 1994).

Vaughan 2002
P. C. Vaughan, Gebrauchspurenanalyse der Feuersteinartefakte aus der Konzentration II. In: H. Floss/T. Terberger (eds.), Die Steinartefakte des Magdalénien von Andernach (Mittelrhein). Die Grabungen von 1979–1983. Tübinger Arbeiten Urgesch. 1 (Tübingen 2002) 159–172.

Veil 1978
S. Veil, Neue Untersuchungen auf dem Magdalenien-Fundplatz Martinsberg in Andernach. Trierer Zeitschr. 40/41, 1978, 9–40.

Veil 1979
S. Veil, Neue Ausgrabungen auf dem Magdalénien-Fundplatz Andernach-Martinsberg (Rheinland-Pfalz). Arch. Korrbl. 9, 1979, 251–260.

Veil 1982
S. Veil, Der späteiszeitliche Fundplatz Andernach, Martinsberg. Germania 60, 1982, 391–424.

Veil 1984
S. Veil, Siedlungsbefunde vom Magdalenien-Fundplatz Andernach. Zwischenbericht über die Grabungen 1979–1983. In: H. Berke/J. Hahn/C. J. Kind (eds.), Jungpaläolithische Siedlungsstrukturen in Europa. Urgesch. Materialh. 6 (Tübingen 1984) 181–193.

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