**Supplementary Material: Microwear analysis of bracers**

**Methodology**

The analysis of the stone bracers draws upon a broader body of technological and microwear studies of ground stone assemblages with well-established methodologies (Adams 2002; Adams et al. 2009; Dubreuil et al. 2015; Tsoraki 2008; 2021). The bracers were subjected to low and high power microscopic analysis. A Leica M80 stereomicroscope and a Zeiss Stemi 2000-C stereomicroscope with an external, oblique light source were used for observations at low magnifications (up to 100 ×). At high magnifications (from 50 × to 200 × magnification) incident light (metallographic) microscopes (Leica DM1750 M, Zeiss Axioskop 2 MAT) were employed to record wear traces. Micrographs were captured with a Leica MC120 HD and a Zeiss ERc 5S microscope camera and Z-stacks were created with the Helicon Focus software. Wear features recorded include edge removals, crystal grain modification (grain edge rounding, grain fractures), levelling, grain extraction, the presence and distribution of striations and other linear features, deformation of perforation rim, micropolish features including morphology and development, microstriations, microfractures, and the presence of residues (Adams et al. 2009; Dubreuil *et al.* 2015; Hamon 2008; Hayeset al*.* 2018). The interpretation of the microwear patterns observed on the archaeological objects were interpreted in relation to the experimental reference collection at the Laboratory for Material Culture Studies at Leiden University, as well as published data (e.g., Guzzo Falci et al 2020).

*DZSWS.STHEAD.232 Tytherington and Corton Downs, Wiltshire Museum* (Figure 9 main paper)

Dimensions: 105.69x48.34x3.21mm Weight: 37.13 g

The bracer was found in a barrow on Tytherington and Corton Downs that contained a primary crouched inhumation burial dated to the Beaker period. It was placed in the grave together with a drinking cup and two boars’ tusks (Annable and Simpson 1964, 42). The bracer is missing a large part of one of its narrow ends (End B) which presumably had another four perforations. This part was restored following excavation. The bracer is rectangular in plan with a flat transverse section and slightly rounded corners and has six perforations at each end. It is attributed to Atkinson’s B3 type. It is made from a fine grained metasediment slate with an olive to greenish grey colour (miscellaneous type, Woodward and Hunter 2011, 141). The bracer does not exhibit great level of finishing and irregularities are still visible on the polished surface. The low degree of craftsmanship is also evidenced on the way the perforations were executed. The object has a series of biconically-drilled perforations, six at each end though only two survive on End B (Woodward and Hunter 2011 mention a third incomplete perforation, but the object was restored since the 2011 publication and this is no longer visible). Irregular drilling traces (i.e. lack of concentric striations) and lack of consistency in their appearance suggest that the perforations were hand-drilled with a flint drill. Perforation 2 (End A, second from left to right) is angled, while perforation 5 is off centre. An unfinished (starter) perforation is visible next to perforation 3. Localised areas of smoothing are visible in the perforation interiors though this is not consistent across all perforations.

Both faces of the object exhibit low level polishing. Micropolish of flat topography that develops in tiny patches and has a very localised distribution is visible across the surface. On Face A (dorsal) there is an area of incomplete grinding/polishing near the margin and perforation 6, suggesting that the original surface was deeper at this location. Both narrow ends have prominent striations associated with the manufacturing process.

No use-related polish was observed between perforations and across the surface of the bracer. The whole surface has a shiny appearance consistent with post-depositional surface modification (van Gijn 1990). Narrow v-shaped grooves that cut through the smoothed/polished surface are visible along the margin and above perforation 6 on Face A. It is not clear what the purpose of these are i.e. whether they relate in some way to the fastening of the object potentially with leather straps or if this is linked to another process.

Possible metal residues are visible on around the perforations on narrow End A of Face A.

On End B, two grooves were incised between perforations 7 and 8 on the dorsal face (Face A). The longest groove extends over the narrow end and is associated with the first step of the sawing technique during which the area to be broken off is delineated by incising a groove. This suggests a deliberate attempt to remove the corner of the bracer in a controlled manner.

*DZSWS:STHEAD.63 Sutton Veny, Wiltshire Museum* (Figure 12 main paper)

Dimensions: 115.5x71.8x 4.6 mm (from Woodward & Hunter 2011)

The bracer was found with a Beaker cremation in a barrow at Sutton Veny, excavated by William Cunnington (Annable and Simpson 1964, 42).

The bracer survives almost intact, with one corner missing. Edge removals are visible on the ventral surface of the fractured corner. The bracer is rectangular in plan, and in transverse section Face A is slightly convex and Face B (ventral face) is very slightly concave. It is attributed to Atkinson’s B3 type. It is made from amphibolite of light green/greyish green colour (Woodward and Hunter 2011: 142). Two natural flaws in the material are visible on the ventral surface, one right next to perforation 1, the drilling of which may have worsened the flaw.

The whole surface is highly polished, and the bracer exhibits a high level of finishing. Pecking traces associated with an earlier production stage are visible albeit very faintly on End B and near perforation 6 on Face B. The bracer has six perforations in total, three at each end, almost in a triangular arrangement. The perforations are biconically drilled and exhibit a combination of parallel, concentric striations and bands consistent with the use of mechanical drilling with a flint drill. Overall, the perforations on End A on the ventral side (Face B) of the bracer are more symmetrical. On the dorsal surface next to perforation 1 on End A bow drill marks from an earlier attempt to drill a perforation are visible to the left of perforation 1. Most of the perforations are angled (P1 towards the top, P3 towards the top, P4 towards the side, P5 towards the top), though perforation 6 has the most regular appearance. Based on the stratigraphic relationship of drilling and polishing traces, the polishing of the bracer took place after the drilling of the perforations was completed.

In terms of use-related traces, the dorsal face (Face A) exhibits a smooth-textured micropolish of localised distribution that follows the topography of the grain crystals; the micropolish has some volume and has sharp boundaries. It has a pitted appearance and micropolish starts to fill in the pits. This micropolish is visible between the perforations on End A, Face A (P1-P2-P3) and based on its directionality and other features it can be attributed to the use of a string being tied around the perforations. The same type of micropolish, which in places has a combi-appearance (rougher and smooth texture) and directionality that ranges from longitudinal to diagonal, occurs across the whole surface of the object, but has a localised distribution. This type of micropolish is consistent with animal skin/hide material. The same type of micropolish is also present on Face B, but occurs less frequently. The bracer was mounted on a piece of leather as part of the museum display and these traces likely relate to this event rather than representing actual use.

*DZSWS:STHEAD.326 Tring, Wiltshire Museum,* (Figure 5 main paper)

Dimensions: 100.5x23.5x6.4mm, Weight 33g (from Woodward & Hunter 2011)

A complete bracer that was found possibly in a Beaker inhumation grave, at Tring (Annable and Simpson 1964, 43; Woodward and Hunter 2011 ID 31). It is rectangular in shape and has a convex/concave transverse section. It has four perforation, two perforations at each end and is attributed to Atkinson’s C1 type (waisted/slightly waisted type). It is made from meta-volcaniclastic rock (Group VI, Woodward and Hunter 2011, 39) of dark greenish grey colour. The material has inclusions and flaws that result in fractures in places.

The bracer is highly polished all over including the narrow ends and at high magnification localised patches of flat, reflective micropolish consistent with contact with stone material are observed. The traces are very localised and not well developed.

Two perforations are asymmetrically placed at each end. They were drilled mostly from the ventral side and they are conical in shape, but the dorsal surface was intentionally drilled for a few mm enlarging the perforation opening on this side too (funnel-shaped). The presence of concentric striations and bands of consistent appearance suggests that the perforations were mechanically-drilled using flint drills. On the ventral surface, the drilling of the perforations was not executed very consistently and the perforations are not symmetrically placed while two perforations (P1 & P2) overlap. Just above Perforation 1 there are drilling traces from the initial stage of the drilling. Perforation 2 (on ventral side) cuts through this set of drilling traces suggesting that Perforation 2 was drilled after Perforation 1. Smoothing overlain the drilling traces and the perforation rims suggests that later stages of polishing followed the drilling of the perforation. On the ventral surface of End B, Perforation 4 is drilled very close to the margin. Pronounced drilling traces are visible in the interior of Perforation 3. Copper residue stains are visible on all four perforations but they are less pronounced on perforations on End B. The copper residue could have resulted from the use of copper studs.

Longitudinal striations with directionality parallel to the long axis of the object indicate that the polishing of the surface was one continuous action. The limited presence of striations suggests that the polishing was a multi-stage process and the last stages entailed the polishing of the surface with a soft material. Possible traces of this are visible at the centre of the ventral surface of the bracer where at high magnifications patches of localised micropolish with some volume seem to follow the microtopography of the grain crystals and to envelop them. This would be consistent with contact with a soft material, hide/leather being a possibility. The directionality of this micropolish (parallel to the long axis of the object) is similar to that of other wear traces associated with the manufacture of the bracer. The striations that remain on the surface are ones that were too deep to remove during polishing. Striations are more pronounced on the ventral surface and more specifically the edge towards the margins that curve; these would have been harder to remove without affecting the curvature of the margin.

In terms of use-related traces, a series of edge removals, mostly of the same size, are visible along the margins and on the narrow End A. This would suggest that the bracer was fastened against a hard material applying transverse pressure. Edge removals are also visible on the corners of End A. While the perforations show very pronounced drilling traces, some wear traces that may be associated with the use of the object were also noted. On End B both perforations show rounding and facets (deformation) along the perforation rim. Perforation 4 also shows localised smoothing on the interior of the perforation while on the dorsal surface there is an edge removal.

A discontinuous band of gold residue is visible on Face A; it seems that this formed originally a wide band with longitudinal directionality. Analysis by Dr Chris Standish with an SEM-EDS confirmed that this was a gold alloy of possible EBA origin with a mean composition of 93.7% ±1.1% Au, 3.8% ±0.4% Ag, and 2.4% ±1.3% Cu (uncertainties are 2 S.D. of the mean). Possible brown-coloured metal staining is visible across the surface, but this could be post-depositional.

The distribution of the gold traces along with the lack of wear traces indicative of re-use of the bracer for abrasive actions suggests that the gold traces are more likely associated with the application of gold on the surface of the bracer rather than the re-use of the bracer as a polishing tool for gold working. This possible attempt to decorate the bracer may be associated with the use of copper studs that seem to have been placed inside the perforations. The highly polished surface that brings out the greenish colour of the rock could also be perceived as a form of decoration. If indeed the gold traces are associated with an attempt to cover the surface of the object, the fact that the bracer was first highly polished may suggest that the gold coverage was a subsequent thought, part of a process with engaging with such objects in multiple ways. The high level of finishing suggests that the gold was not meant to cover irregularities on the surface of the bracer.

*Bulford South SFA Object No. 628 Context 9250, Wessex Archaeology* (Figure 8 main paper)

Dimensions: 99.82x24.01x3.02mm, Weight 17g. [The thickness varies across the length: at End A it is 2.08 mm thick, at End B 2.55mm and at the middle part it is 3.18 mm. End B is 19.89 mm wide and End A 21.56 mm wide.]

Diameter of perforations (dorsal / ventral)

P1: 2.86x3.31mm (ovate in shape) / 3.36x3.30mm

P2: 3.50x3.33mm / 3.62x3.41mm

A complete bracer that was found in a pit with a complete Low Carinated Beaker. The pit is thought to have housed a wooden box-like container, the lid of which collapsed post-deposition (Leivers 2020). It is rectangular in shape with slightly tapered ends and has a flat/ slightly plano-convex transverse section. It is attributed to Atkinson’s A1 type. It is made from a green coloured metamorphic amphibolite. The whole surface seems to be slightly weathered due to taphonomic processes and encrustations cover part of the surface.

The dorsal surface is polished but exhibits low level of polishing, and both longitudinal and diagonal striations of different depth and width are visible on the surface. The grinding was performed using abrasives of varying degrees of coarseness and multi-directional motions. The ventral surface was not well ground. Following the first stage of grinding no attempt was made to polish the surface. The margins and ends, that have been flattened, are ground in a consistent manner.

The bracer has two perforations, one at each end. The perforation at End A (1A) is angled; it is biconically-drilled and the drilling was initiated from the ventral surface. On dorsal (Face A) the perforation was has irregular walls, and no concentric striations (striations are rather irregular); while drilling with a bow-drill is possible the drilling was not executed very well. On the ventral surface perforation 1a has concentric striations and looks mechanically drilled. Other manufacturing traces include very faint edge removals on the perforation rim associated with the drilling. On the dorsal side, the perforation was drilled prior to the grinding/low polishing of the body surface, while on the ventral face, the drilling followed the grinding of the surface. The variation in the appearance of the drilling traces between dorsal and ventral surface seems to suggest that the perforation on the dorsal face was enlarged/amended at a later stage using a flint hand drill. The biconically-drilled perforation at the other end has a more regular appearance, with regular, concentric striations and a straight, circular rim that is not angled. The drilling took place after the surface was ground. No smoothing is observed inside the perforation, but there is chipping on the perforation rim, associated with the drilling process.

*Raunds Barrow 1 at Irthlingborough, Northamptonshire, (35125), English Heritage* (Figure 4 main paper)

Dimensions: 57mm x38.5x 4.4 mm, Weight 18g

The bracer was found in a primary burial from Barrow 1 (F30426 primary grave, skeleton 6410 context 30476) that is dated to the Beaker period (2201-1940 cal BC) (Harding and Healy 2011; Woodward and Hunter 2015). It is rectangular in plan view with curved ends and convex-concave in transverse section and is attributed to Atkinson’s C1 type (waisted/slightly waisted type).The bracer is made from Great Langdale tuff (Group VI) and has an olive green colour; it has natural faults and the breakage seen along the long axis relates to a pre-existing fault. At the time of deposition in the burial the wristguard had gone through different episodes of manufacture and use. It was originally longer (estimated original length ca. 110mm) and at some point in its history the wristguard broke and the fractured end was intentionally modified and was re-polished.

All surfaces are highly polished, and manufacturing traces include faint longitudinal striations on the ventral surface along with flat micropolish associated with the grinding and polishing stage using a hard mineral material. In places, there are areas that do not show polishing; these are irregularities of greater depth associated with the earlier stages of manufacture that were not obliterated during the grinding and polishing stage.

Perforations are present only at one end of the wristguard, and presumably another set of perforations were located at the end that was re-shaped. The two conical perforations A and B are not symmetrically placed. The perforation (B) which is located closer to the narrow end of the wristguard is broken, while the other survives intact Both have been drilled from the ventral surface, but they were regularised from the dorsal surface creating therefore a slight biconical shape. Perforation A (intact perforation) has a well-defined rim; concentric bands and striations that suggest the use of a conical-shaped flint drill bit are visible on the perforation interior. No indentations, facets or notches usually associated with attachment methods are visible along the perforation rim though a wide notch/indentation is visible on End A right above Perforation A; the interior of the notch is smoothed and shows rounding. Perforation B also has a well-defined circular rim; the walls of the perforation exhibit very limited and faint drilling traces which have been completely smoothed over. At high magnifications, the interior of the perforations do not show use-related micropolish. Based on variations in the appearance of the wear traces between the two perforations, we could suggest that the perforations are associated with two different drilling events. A third perforation C/hollow is centrally placed between the two other perforations. It is conically-shaped with smoothed perforation walls, regular rim while drilling traces are almost completely erased. This hollow was meant to be used as a recess for a possible stud (cf. Woodward and Hunter 2011).

Edge removals are visible on the margins on two locations: on either side of the two perforations as well as at the mid-point (centre) of the margins. On Margin A there are two bifacial edge removals which are larger on the ventral surface and smaller on the dorsal surface. The edge removals show rounding in their interior surface and along the edge. A further edge removal is located directly opposite on Margin B. At high magnifications, wear traces that are consistent with hide contact (localised micropolish that develops in poorly formed patches, has a rough texture and sinuous (slight volume) topography, pitted appearance, directionality perpendicular to long axis and affects the higher elevations of the grain topography) were observed on the central area of the dorsal face, on the ventral surface in the area between the two perforations including the area adjacent to each perforation, as well as on the area where the large edge removals are and further towards the centre of the body. On the ventral surface, long striations with transverse directionality run from perforation A towards, but not reaching, Perforation B. These striations differ from manufacturing traces (i.e. faint, longitudinal striations mainly located at the central part of the ventral surface) and may relate to the attachment method. Striations with the same directionality are also observed on the dorsal area above Perforation A and on the lower body towards reworked end. An interesting set of traces observed mainly on the dorsal surface is a highly reflective, flat striated micropolish that develops in bands/streaks, affects the higher microtopography and has a diagonal directionality. This micropolish which is consistent with contact with a semi-hard mineral/metal is visible across the dorsal surface and has limited presence on the ventral surface mainly along the upper central part of the wrist guard. No other traces such as linear features from abrasive contact accompany this type of micropolish.

The combination of the different type of wear traces and their distribution pattern (edge removals at diametrically opposite sides of the two margins, rounding of edge removals, hide micropolish, and pronounced striations between the two perforations) are consistent with the attachment of the bracer on a surface using leather thongs/straps that covered the dorsal surface of the bracer. The lack of wear traces in the perforations (lack of indentations, facets or notches along the perforation rim usually associated with attachment methods, lack of differential smoothed/ground areas and no use-related micropolish in the perforation interior) suggest that the perforations did not play a central role during the attachment of the wristguard. Though the presence of the notch on the end above Perforation A and the fracture pattern seen on Perforation B (i.e. missing part that is facing towards the end) suggest that some pressure was applied on this area of the perforation and on the end of the wristguard. This may suggest that different methods of attachment were applied.

Woodward and Hunter (2015: 489, 515) previously suggested that the wristguard was used as a tool following its breakage and the re-shaping of the fractured end. They suggested that the object was refashioned into a second ‘sponge finger’. The polishing, however, of this end is very uniform suggesting it is the result of the modification and not the effect of re-use (as a burnisher). It was previously suggested that this edge was used against ‘a resilient material containing minute abrasive grits, such as hide’ (Harding and Healy 2007: 253) but no hide micropolish or other use-related wear traces were observed at this end under the metallographic microscope that would support this interpretation. Moreover, while Woodward and Hunter interpreted the edge removals on the margins of the wristguard and the associated rounding as the result of hafting, they attributed these traces to a hafting event associated with the re-use of the objects as a tool (Woodward and Hunter 2015: 515). Based on our analysis the association of the edge removals and the hide polish suggests that these relate to the original use of the wristguard and not to episode of re-use. A combination of similar wear traces is encountered on similar bracers from the British Museum and the Wiltshire Museum collections. These examples survive complete and do not show any evidence for re-use. In all examples, the presence of edge removals along the margins suggest the application of force/pressure with transverse directionality.

*Gravelly Guy (Stanton Harcourt) SHGG 86- SF 862, 4013/12,ring ditch 4004, Oxfordshire*, (Figure 10 main paper)

Dimensions: 95.56x36.18x4.54 mm, Weight 32 gr

Diameter of perforations (Dorsal / Ventral):

1a 3.40mm (diameter of angled area 5.80 mm) / 6.30 mm

1b 4.54 mm / 5.31 mm

2a 3.85 mm (actual perforation, doesn’t include 2nd perforation) / 6.05 mm

2b 3.62 mm/ 5.33 mm

An almost intact wrist guard that was found in an inhumation burial that dates to the Beaker period (2280-1990 cal BC) (Woodward and Hunter 2015). It has four perforations, two at each end. It is rectangular in plan with rounded corners and flat in transverse section. The wristguard corresponds to type B2 in Atkinson’s typology. A piece at the corner above perforation 1b on the ventral surface is missing and the fractured edges are fresh; this does not seem to relate to pre-depositional activities. There is a natural flaw in the raw material running above Perforation 1b towards and into the end and it is likely that this flaw has resulted in the piece being detached. An extensive area of brown-coloured staining is visible on the margin and dorsal surface of the body of the object near perforation 2a.

The wristguard is made from amphibolite (spotted, amphibole-rich metamorphic rock Woodward and Hunter 2011: 40) with no precisely defined source. Sources of this type of rock exist in the NW Highlands of Scotland but fine-grained amphibolites are rarely found in the rest of Britain. In that respect the material is exotic in relation to its place of deposition. The object has a light bluish grey colour with darker grey-green veins and patches. The raw material is fine-grained with slightly molting and has foliation (for a detailed description of the petrography see Woodward and Hunter 2011: 29-30, 40) and natural linear flaws are visible on both surfaces of the object.

The dorsal surface is ground and polished with visible shallow striations of different lengths and different directionality, but mostly diagonal to the long axis. Occasional slightly deeper and wider striations, which seem to be remnants of the initial stages of production, are also visible on the surface. The drilling of the perforations took place before the final polishing of the surface. The ventral surface was not polished to the same extent as the dorsal surface; the surface feels slightly rougher and is more uneven as deeper irregularities from the earlier stage of production were not completely removed during the polishing stage. Striations of different directionality (perpendicular/slightly diagonal/diagonal to long axis) are observed across the surface. At high magnifications, manufacturing traces include deep grooves that suggest the use of a very abrasive material during the earlier stages of production. This was followed by the use of a less abrasive material. Red colour staining (ochre?) is visible on the ventral surface near Perforation 1b, in the area between perforations 1a and 1b, on the rim of perforation 1a, and on the margin near perforation 1a. SEM-EDS analysis of the red colour staining was inconclusive. The presence of possible ochre in association with the perforations may suggest the use of ochre as an abrasive for polishing/drilling purposes, but other possibilities include the application of ochre on the surface of the object for decorative purposes or as part of the treatment the object received upon its deposition in the burial. This kind of treatment has been reported for other prehistoric objects (e.g., querns deposited in burials see Verbaas and van Gijn 2007). Ochre residues have also been observed on Dutch wristguards (van der Vaart 2009).

The margins and ends of the wristguard are ground but not polished and short almost parallel striations of transverse directionality are visible. Two different grinding motions were employed during the shaping of Margin B as suggested by striations of different directionality: the upper part of margin has longitudinal striations and the lower part diagonal /transverse striations. At high magnification, manufacturing traces include localised flat, reflective micropolish consistent with stone against stone contact.

The biconical perforations are not symmetrically aligned and this is particular evident on End A. The overall careful finish of the surface contrasts with the finish of the perforations, the appearance of which suggests less skill or care in their execution though there is variation in the quality of the drilling between the perforations. Overall perforation 2b is the most consistently drilled perforation. Drilling traces are more pronounced on the ventral surface. An unfinished perforation is present adjacent to perforation 2a on the dorsal surface and this seem to indicate a production error. A depression of shallow depth that cuts through the polished surface and is rounded in shape is visible at the central part of the dorsal surface. This may represent an unfinished perforation though the interior of the hollow has an uneven topography.

Perforation 1a looks rather fresh but some smoothing is visible on the walls of the perforation on the dorsal side. The perforation is biconically-drilled and is angled towards the bottom right corner. Edge removals are visible at the rim of the perforation while an area adjacent to the perforation was detached due to pressure applied during drilling and it was subsequently smoothed over. No facets are visible on the perforation rim. On the ventral surface the perforation is less angled and it does not show consistency in the way drilling was executed. Fine ridges/bands from drilling are observed.

Perforation 1b is a biconically-drilled angled perforation. Visible drilling striations are present on the perforation interior overlain by some smoothing. Drilling traces are not consistent with the use of a mechanical drill. On the ventral surface fine striations and ridges/bands are visible.

Perforation 2a is a complete biconically-drilled perforation next to which there is an unfinished perforation. This seems to be an incorrectly drilled perforation (production error). Due to the presence of staining inside the perforation the interior of the perforation cannot be assessed. The drilling traces in the misaligned unfinished perforation consist of concentric and regular striations that have been smoothed over. On the ventral surface drilling traces (almost concentric ridges/bands) are pronounced and have not been obliterated by subsequent action. The interior of perforation 2a looks more eroded due to staining.

Perforation 2b is a biconically-drilled perforation. Drilling traces are more pronounced near the rim of the perforation and barely visible on the rest of the surface; an indentation is visible at the centre of the biconical perforation (i.e. where the two sides meet). No other indentations are visible along the rim of the perforation. On the ventral side, the perforation has very regular concentric striations. Overall, this is the most regular perforation and looks mechanically drilled using a flint drill bit as suggested by the combination of ridges and fine striations. The level of consistency in the appearance of the perforation and the execution of the drilling does not seem to be evident in the drilling of the other three perforations. Observed differences in the quality of the execution of the drilling raises the possibility that the drilling and the overall manufacture of the wristguard was not undertaken by a single person but instead these objects may represent multi-authored projects (Jones 2002, 94).

A series of fine (narrow) V-shaped grooves with diagonal directionality and of varying lengths are visible below perforations 2a and 2b. These grooves are wider and deeper than normal manufacturing striations, which are longer and finer in appearance, and therefore they are not consistent with production traces. The grooves seem to relate to the initial stages of the sawing technique during which fine grooves are incised in order to mark the area to be subsequently sawn off (Tsoraki 2011). Wristguards are often missing one of their corners (cf. Woodward and Hunter 2011) and in some cases the missing corner exhibits a straight fracture which would be consistent with the corner being carefully sawn off rather accidentally broken. The presence of multiple fine grooves often near each other may indicate multiple and less skilled attempts to saw this part of the object off.

No micropolish or other wear traces that may relate to possible hafting/attachment are observed on the areas between the two perforations on either end or on other parts of the surface. Similarly, the margins and ends exhibit only production traces and no other traces such as nicks/edge removals or abraded areas are visible. In the case of the perforations, no facets/deformation of the perforation rim (associated usually with tight attachment methods) are present. Some smoothing on the perforation walls is mainly visible on the dorsal surface and this may be an intentional attempt to smooth the perforation and to remove the drilling traces.

*KHF16 Knowlton F6, Knowle Hill Farm, Martin Green Collection* (Figure 11 main paper)

Dimensions: 178.00x37.61x5.34 mm

Diameter of perforations (Dorsal / Ventral)

1a: 4.81 / 4.05 mm

1b: 4.30 / 5.02 mm

A complete bracer with two perforations, one at each end that was found in a Beaker burial in Knowle Hill Farm (Martin et al. 2016). It is rectangular in plan with rounded corners and plano-convex in transverse section. The wristguard corresponds to type A2 in Atkinson’s typology. The bracer is made from amphibolite. Natural flaws are present across the dorsal and ventral surface and these have resulted in an irregular surface. Encrustations cover part of the surface.

The earlier stage of shaping of the broad surfaces included pecking and coarse grinding evidenced by the presence of deep wide grooves indicative of the use of abrasive material. Deep, long striations, mainly parallel/diagonal to long axis up that extend up to the central part of the surface, the result of the grinding action used to smooth the surface of the object, are still evident on the dorsal surface. Some irregularities are still visible on the surface and these relate to deeper features of the earlier stage of production that could not be levelled during the grinding/polishing stage. The surface of the bracer is better polished towards End B and here striations are less visible. The ventral face is not polished to the same extent as the dorsal face. The surface topography of the ventral surface is uneven/irregular (rougher) with grain edge rounding. Perforation 1a is biconically-drilled and slightly off-centre; the striations and bands are not exactly concentric suggesting the use of a hand drill. The perforation walls are smoothed and drilling traces have been obliterated by subsequent smoothing. Other traces include rounding of perforation rim and localised edge removals. Perforation 1b is also biconical and bands and striations from drilling have been obliterated by subsequent smoothing. On the ventral surface there is a ‘starter’/unfinished perforation between the existing perforation 1a and the margin. It is conical in shape and its diameter is 0.1mm; fine striations from drilling are visible on the perforation walls.

Along the margins are some removals/breakage that most likely occurred during the manufacture of the object; due to the presence of natural flaws in the raw material pieces have been accidentally detached/broken off and this has resulted in an irregular surface topography.

The bracer seem to have been placed in the burial not long after it was made (or at least it was carefully stored prior to deposition) and there is no evidence to suggest that it was once attached or fastened onto another material. While the ventral surface has a rougher topography, the finishing of the dorsal surface has not been executed to a high level either. The location of the unfinished perforation suggests that it was not associated with a repair event (i.e. to replace an existing perforation that was broken), and it looks out of place. Its location on the ventral surface also does not support a decorative function (i.e. part-perforation intended to hold a cap/mount, cf. Woodward and Hunter 2011: 73).

*BM 1880,0608.1- Calne, Wiltshire British Museum* (Figure 3 main paper)

Dimensions: 122.76x44.00x5.85 mm, Weight: 62 g

Perforation diameter (dorsal / ventral):

Perf 1: 2mm / 4.38mm

Perf 2: 2mm / 4.41mm

Perf 3: 1.76 / 3.40mm

Perf. 4 1.96 / 4.18mm

A complete bracer that was found in an inhumation burial (Woodward and Hunter 2011). It is made from an unusual Group VI type of rock (Woodward and Hunter 2011: 38) It is rectangular in plan and convex/concave in transverse section and is attributed to Atkinson’s C1 type (waisted/slightly waisted type).

The dorsal face and in particular End A is well polished and the levelling of the surface topography is accompanied by extremely fine striations, mostly with a directionality parallel to the long axis. The ventral surface is ground and exhibits a low level of polishing. This surface has mostly long striations that run either parallel or slightly diagonal to the long axis and have a closely distributed, concentrated distribution (cf. Adams et al. 2009). Occasionally, isolated striations with a slightly deeper morphology and of slightly diagonal directionality are also visible. These all seem part of the same manufacturing event. The topography shows levelling of grains, the result of a grinding/abrading motion. Based on the microstratigraphy of wear traces, the surface was ground after the drilling of the perforations or a sequence of grinding-drilling-finer grinding was followed.

The bracer has four conical perforations, two perforations at each end. The perforations were drilled from the ventral surface and then they were enlarged on the dorsal surface. They are all slightly angled towards the centre of the body. The perforations seem very regular on the dorsal surface, though Perforation 3 and Perforation 4 on the ventral surface are not symmetrically aligned. These two are very close to the margins and therefore more difficult to drill. The perforation walls are smoothed and very faint drilling traces are visible.

The perforations tend to show more rounding and rim deformation towards the margins and this most likely relates to fastening.

The margins are worn in a consistent manner along the two long sides. Different degrees of abrasion accompanied by flattening, irregular removals of various sizes and chipping are visible. These removals cut through the polished surface and therefore do not relate to the manufacturing process. The removals are old (i.e. not fresh/post-depositional breaks) and have the same degree of rounding. The distribution of wear on both margins correspond suggesting that the same form of action (i.e. fastening) affected equally both sides of the object. This suggests that the wristguard was fastened against a hard material in combination with a soft material applying transverse pressure.

Wear traces including uneven thickness on the narrow ends may relate to different episodes of fastening/attachment.

All corners exhibit some slight damage (edge removals and edge rounding), most likely the result of fastening. The removals were initiated from the top end, and pressure was applied towards the centre of the body.

*BM 1964,1201.1370* [*Glenhead (Antrim)*](https://www.britishmuseum.org/collection/term/x98934)*, British Museum*, (Figure 7 main paper)

Dimensions 84.61x34.89x.6.64mm, Weight 37 g

Diameter of perforations (dorsal / ventral)

Perf 1 3.40 mm / 3.12 mm

Perf 2 2.87 mm / 3.15 mm

Perf3: 5.18 mm / 5.19 mm

Perf 4 3.48 mm / 3.50mm

A sub-rectangular/irregularly-shaped bracer that is flat in transverse section. It is attributed to Atkinson’s type B2. It is a heavily modified example and has gone through multiple episodes of modification which were never completed. It is made from an indeterminate rock, possibly of metamorphic origin and has a crystalline texture. Originally, it was polished on both faces and all margins, but the bracer is worn and weathered, and Face B has a flake removal. This face has been affected possibly by burning or another process and the surface/minerals have weathered. No high power microscopic analysis was conducted due to the condition of the surface. Diagonal striations are visible on the ventral surface and on the margins. The object has four perforations, two at the wide end, one near each corner, and two at the narrow end with a diagonal arrangement. The perforations are not symmetrically aligned. The perforations have straight walls and are cylindrical in shape. All but Perforation 3 have worn rims and it would appear that they were all original perforations, while Perforation 3 was a later addition. This is also indicated by its location and its larger diameter.

End A is broken and worn, and appears to be completely reshaped. It was originally polished and was convex in shape, but part of the original surface has been removed; part of End A has been re-ground with a very coarse abrasive material. End B was originally longer and was intentionally modified; the reworked end has a polished end (diagonal end).The narrow end is polished but has red-coloured residue. The surface has pits that cut through the polish. The red-coloured residue is visible inside the pits and the polished surface. The longer side of End B is polished and has the same colour staining and some deeper striations that cut through polished surface. This part is straight and very likely this resulted from sawing the original surface off. A diagonal groove is visible at the narrow end where Perforation 4 is located; this cuts through Perforation 4 and is either the result of a tight attachment method or an attempt to remove this part of the object. The latter seems a more plausible explanation, as the groove is continuous and extends across the perforation diameter. This distribution would not be expected if it was associated with an attachment method.

A narrow groove that cuts through the polished surface, is scored across the whole surface of Margin B. This may represent an attempt to saw the object. Towards End B the line seems to join with a possible flaw in the raw material. The margins were originally polished but on margin A traces from a subsequent abrading action that consists of deep, wide, diagonal grooves are visible.

On Face B the polished surface is overlain with deep grooves that seem to be associated with an abrasive motion (gouging). This may relate to an attempt to regrinding and modify the surface. The area where the flake removal is shows an attempt to re-polish it.

*BM POA.194.3 Brandon Fields, Suffolk, British Museum* (Figure 13 main paper)

Dimension: 115.50x34.31x3.89mm (Thickness : End A 4.41mm, End B: 4mm; Width: End A: 36.23 mm, End B: 27.72mm incomplete), Weight: 39g

Diameter of perforations (dorsal / ventral)

Perf1: 6.14 mm / 3.33mm

Perf2: 6.22 mm / 5.02 mm

Perf3: 5.31 mm / 3.55 mm

Perf4: 5.08 mm / 3.10 mm

Perf5: 5.54 mm / 5.44 mm

Perf6: 5.23 mm (incomplete) / 3.07mm (incomplete)

The bracer was found in a non-funerary, archaeological context (Woodward and Hunter 2011: 137). It is rectangular in plan/slightly waisted, and slightly plano-convex in section. It is attributed to Atkinson’s type B3. It is almost complete, but missing part of one corner. The surface survives in a good condition, but the ventral surface is slightly weathered and light-coloured striations are the result of post-depositional modification. The bracer is made from a green–coloured amphibolite (Woodward and Hunter 2011: 38) and has natural flaws/inclusions.

Both dorsal and ventral surfaces are polished, with a directionality perpendicular to long axis There is no clear variation in the degree of polishing between the two surfaces.

Variations are visible in the manner the different perforations were drilled indicating that these were created during at least two distinctive events and potentially by different people with varied skills. The outer perforations (towards the corners of the objects) are all conical and the drilling was initiated from the dorsal surface while the opening on the ventral surface was regularised. The central perforations (perforations 2 and 5) are biconical and in this case the drilling was initiated from the dorsal side and they are slightly angled on the ventral surface.

Perforation 1 is conical; it was drilled from the dorsal surface, while the opening on the ventral surface was regularised. The perforations walls are regularly smoothed and polished and fine concentric striations are visible, along with more pronounced bands.

Perforation 2 is biconical with prominent concentric striations, initiated from the dorsal surface. It was mechanically drilled most likely with a flint drill. The ventral side of the perforation does not exhibit as consistent drilling traces and looks very fresh. It is slightly angled. The walls are not polished as is the case for perforations 1 and 3 on the dorsal side. The perforation rim shows rounding but no deformation or facets from attachment.

Perforation 3 is conical. The drilling was initiated from the dorsal surface, while the opening on the ventral surface was regularised. The perforation walls are polished and very faint striations and some ridges are present. The perforation rim shows more pronounced rounding in relation to Perf1 and Perf2. Part of perforation rim has been removed. The same removal also resulted in a piece to be flaked off the corner of the bracer. The corner, however, is still present. The removal shows rounding of topography. On the ventral surface the perforation is not as regular and a facet is visible.

Perforation 4 is conical; the drilling was initiated from the dorsal side and was regularised on the ventral surface. The perforation walls are polished with faint concentric striations. The drilling traces are not exactly concentric suggesting that it was possibly hand-drilled. The perforation rim has rounding and edge removals. On the ventral surface part of the perforation wall and the surrounding area has been removed.

Perforation 5 is biconicall-drilled. On the dorsal surface the perforation looks neat and more regular. The perforation walls are polished with concentric striations. On the ventral surface the perforation is slightly angled with visible concentric striations. The perforation rim shows light rounding.

Perforation 6 is conically-drilled from the dorsal surface and was regularised on the ventral. The perforation has polished walls with fine striations, and it was mechanically-drilled. This perforation is broken in half but there is no evidence for deliberate breakage or removal through sawing. The perforation rim has some small removals, but no pronounced rounding is visible.

All corners show some damage but only the ones at End B are missing. On both margins, there is a combination of abraded areas and edge removals located at the centre of the margin where the waisted area is. The removals show rounding of their topography, while short parallel grooves with transverse directionality are present on both dorsal and ventral surfaces. The observed wear traces suggest that the wristguard was fastened against a hard material in combination with a soft material applying transverse pressure.

*Sturge.2305 Mildenhall, Suffolk, British Museum* (Figure 15 main paper)

Dimensions: 99.55x54.51 mm, Weight 89 g

Diameter of perforation (dorsal / ventral)

Perf1 2.86 mm / 5.19 mm

Perf2 2.12 mm (incomplete) / 4.63 mm incomplete

Perf3 2.65 mm / 6.21 mm

Perf4 2.72 mm / 7.34 mm

This is a stray find, with no contextual information (Woodward & Hunter 2011). It is made from a sedimentary sandstone with well cemented and well sorted grains (miscellaneous material Woodward and Hunter 2011). The material has natural flaws and a faultline is visible where perforation 2 is. It is missing one corner. It is rectangular in plan, and slightly plano-convex in transverse section. It is attributed to Atkinson’s type B2 (waisted form).

Both surfaces are well ground and to the same degree. The grinding of the faces was performed using a linear motion parallel to the long axis of the object. Wear traces include wide striations and intense levelling of grains. The margins are curved and there is faceting at the ends. The perforations were mechanically drilled from the ventral surface prior to the final smoothing/polishing of the surface. The opening of the perforations was enlarged on the dorsal surface. They all very regular and consistent in appearance. Pronounced ridges are more visible inside Perf3 and Perf4, while edge removals along the perforation rims are consistent with manufacture. All observed traces relate to the manufacture of the object and no use-related traces (use or attachment) are visible.

*BM 1981.0301.2 Hemp Knoll, Bishops Cannings G81 Wiltshire,* (Figure 14 main paper)

Dimensions: 117.31x43.72 x6.46 mm (width at End A 47.56 mm, width at End B 37.47mm incomplete), Weight: 79.75g

Diameter of perforations (dorsal / ventral):

Perf1 3.82 mm / 5.86 mm

Perf2 3.83 mm /6.17 mm

Perf3 3.02 mm / 7.09 mm

The bracer was found in a Beaker inhumation burial (Robertson-Mackay 1980). It is made from a fine-grained Group VI type of rock (Woodward and Hunter 2011: 37). Natural faults are present in the material. It is rectangular in plan and convex/concave in transverse section. The bracer has four perforations, two at each end. It is attributed to Atkinson’s C1 type (waisted/slightly waisted type). It is missing one corner.

The earlier stages of production included pecking and coarse grinding that resulted in an irregular topography. The use of very abrasive materials resulted in pronounced striations and grooves that were smoothed over but not erased during the subsequent finer grinding/polishing stages. The dorsal surface Is polished and random striations of varying length and depth are visible. The ventral surface is also polished, though not to the same degree as the dorsal surface. Though polished, the final stage of polishing with a soft material was not applied to the ventral surface. Perforations 1, 2 and 3 are consistent in form: they are conical perforations mechanically drilled from the ventral side (concentric striations are visible) and then were regularised on the dorsal side before the surface was polished. Perforation 4, however, is biconical and the perforation walls look polished, but due to the presence of encrustations it was not possible to conduct a more thorough analysis.

Between the perforations are white bands that were originally interpreted as ‘possible thong markings’ that appear as staining of the surface (Woodward and Hunter 2011: 82). Their form is very regular and they may indeed represent staining from organic material. Yet they are similar to other random lines/bands that are present on the surface of the bracer including the large, wide white band of material that covers 2/3 of the ventral surface, and areas on the margins.

Both margins exhibit a series of different-sized edge removals along their length; these were initiated from the margin towards the body. The removals show rounding consistently and this suggests that first pressure was applied and this was followed by material abrasion. The edge removals are in places associated with abraded areas that show flattening and slight deformation. The wristguard was fastened against a hard material in combination with a soft material applying transverse pressure.

In addition, two corner tips show damage, most likely the result of fastening and one corner is missing. The missing corner is covered in sediments so it cannot be assessed in detail, though there is a groove and possibly this area was sawn off intentionally rather broken.

*BM 1879, 1209.1877 Aldbourne G13, Wiltshire British Museum,* (Figure 16 main paper)

Dimensions: 59.15x33.37x5.40 mm, Weight 23 g

Diameter of perforations (dorsal / ventral):

Perf1 3.96 mm / 3.36 mm

Perf2 4.23 mm / 2.92 mm

Unfinished perforation: 3.30 / 3.44 mm

The bracer was found in an Early Bronze Age cremation burial (Woodward and Hunter 2011). It is a complete but reworked example and originally the length would have been longer. It is made from amphibolite (Woodward and Hunter 2011: 38) and natural fault lines are visible. It is rectangular in plan and elliptical/flat in transverse section. It is attributed to Atkinson’s B2 type. The bracer is complete but is a reworked example and the original length would have been longer. It is partly covered with encrustations while a slight discolouration from burning is visible on the ventral surface. In places flaking is visible, possibly from contact with heat.

Both surfaces are well ground with levelling of grains, but no visible striations. A fine yellowish layer covers the ventral surface and detailed assessment of the surface finish is not possible. Two perforations are present at one end, while at the end there is an unfinished perforation. The perforations were mechanically drilled prior to the final polishing of the surface. Perforations 1 and 2 are biconical with fine concentric striations associated with fine ridges/bands visible on the perforation interior. U-shaped perforation 3 is unfinished; unfinished hollows are visible on both dorsal and ventral surfaces suggesting that drilling was a gradual process. No second unfinished perforation is visible on End B.

In terms of possible use-related wear traces, on End A the tip above Perf1 is thinner and the corner has some slight damage (edge removal), but this is not accompanied by abrasion traces as seen on other examples (e.g. the bracer from Calne). Moreover, there are no traces along the margins to suggest some form of attachment. On the dorsal surface, however, below Perforation 2 there are two diagonal grooves and a facet that were created after the surface was polished. These traces may relate to the attachment of the bracer.

*BM 1978,1101.1220- Cliffe 78 British Museum,* (Figure 2 main paper)

Dimensions: 56.45x18.38x5.64 mm, Weight 5 g

Diameter of perforations (dorsal / ventral):

PerfA 5.98 mm/ 3.34 mm

PerfB 7.19 mm / 4.13 mm

The object was found in an inhumation burial dated to the Beaker period (Woodward and Hunter 2011). It is made from probably from Kimmeridge shale from Dorset ((Woodward and Hunter 2011: 45). It survives complete, but it was broken in half during post-deposition. It is sub-rectangular in plan and ovate in transverse section. It has two perforations, one at each end and is attributed to Atkinson’s type A1.

The dorsal surface is polished, while the ventral surface was shaped by rough abrasion/gouging that resulted in wide grooves/striations across the whole surface. Conical perforations were drilled from the dorsal surface using a hand-drill before the dorsal surface was polished. A diagonal, biconical perforation cut through the ventral surface of the object. This was drilled before the surface was ground.

Heavy rounding is visible on the perforation rim on the dorsal surface and mainly on the area towards the narrow end. Both narrow ends show deformation (removals) accompanied by abrasion, while End B is unevenly worn. These suggest that the object was tightly attached onto a soft material, using both perforations. This object cannot have functioned in the same manner as other bracers and it is more consistent with a perforated stone attached on soft material, possibly clothing.

*BM 1977,0501.3 Milner's Gravel Pit, Sturry, British Museum,* (Figure 6 main paper)

Dimensions: 153.43x35.61x6.27 mm, Weight: 65 g

Diameter of perforations (dorsal / ventral):

PerfA: 2.82 mm / 5.92 mm

PerfB. 5.47 mm / 3.08 mm

The object was found in an inhumation burial dated to the Beaker period (Woodward and Hunter 2011). It is rectangular in plan and elliptical in transverse section. It has two perforations, one at each narrow end. It is attributed to Atkinson’s B1 type.

Both dorsal surface and ventral surfaces are highly polished to the same extent. The earlier stage of manufacture entailed pecking and coarser multi-directional grinding as evidenced by wide and deep striations, that have not been erased by subsequent polishing. Perforation A was drilled from the ventral side and was slightly expanded/regularised on the dorsal face. On the dorsal surface, two deep grooves flank the perforation; these seem to have acted as location markers that guide the drilling of the perforation. The perforation interior is evenly smoothed and no drilling traces are visible. Perforation B is biconically drilled; it was initiated from the ventral surface and at some point it was enlarged on the dorsal surface. It is partially smoothed and drilling striations are partly visible. The margins were ground in longitudinal motion, but not polished to the same degree as the rest of the body. On the ventral surface, the fractured area was in the process of being re-ground at the time of deposition.

Both perforations show rounding and deformation. On the dorsal face along Edge A there is a series of impact fractures, while on the ventral surface the narrow end above the perforation is heavily abraded and has edge damage. A bevel has been formed above the perforation. No edge removals or abraded areas are present on the margins of the object. The traces suggest that the bracer was attached using a soft material that was tied through the perforations and towards the narrow ends of the object. This form of fastening/attachment differs to the one associated with the type C2 bracers.

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