Thoughts on the Grotesque torc and the Snettisham (Ken Hill) hoards in the light of new research.

by Tess Machling & Roland Williamson

Abstract

This paper examines the Grotesque torc and its repairs in relation to the hoards from Ken Hill, Snettisham. It looks at the materials used to repair/modify torcs, and their likely source in Hoards B/C and F. It suggests an alternative biography for the repair of this torc, and others from the site which, in their immediacy and lack of competence, would appear to be atypical in Iron Age metal repairs. Further insights into the metalworking processes being carried out in East Anglia in the later Iron Age are also offered.

Introduction

The site of Snettisham (Ken Hill) is best known in Iron Age studies as the find-spot of the largest number of Iron Age torcs in Europe. Ken Hill is located in north-west Norfolk, on a raised Carstone hill (120m OD), *c*.2km from the eastern shore of The Wash. The site is prominently visible from the sea (Clarke 1954, 32) and it is likely that the sea was closer to Ken Hill in prehistoric times.

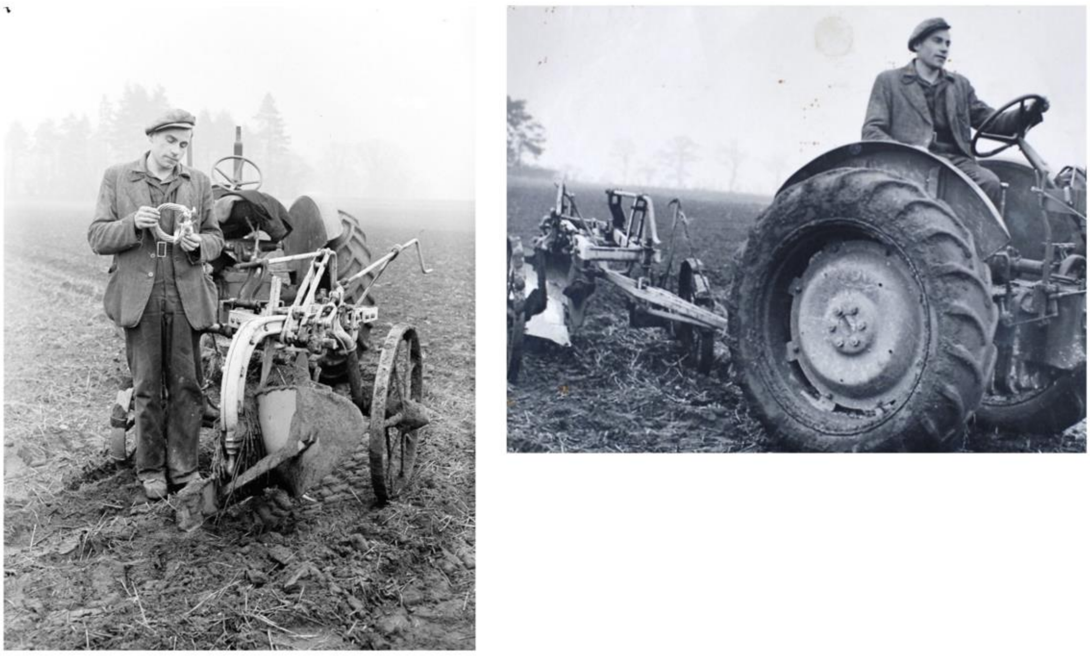

Figure 1: Tom Rout in the Gold Field of Ken Hill, Snettisham (Image © Eastern Daily Press)

The site was unknown until 1948, when a ploughman, Ray Williamson, turned up what he thought were parts of a brass bedstead. These turned out to be the pieces of four, largely complete, gold tubular torcs (Clarke 1954, 36). In 1950, Ray's colleague, Tom Rout, ploughed up the Snettisham Great torc (Brailsford 1951; Clarke 1954) and an associated bracelet which was linked to the Great torc by a partial buffer torc (Fig. 1).

From this time until the late 1980s sporadic torc finds occurred, but it was not until 1989/1990—when further torc finds were located by metal detecting—that concerted investigations were carried out at the site. From 1990–1992 the British Museum carried out extensive excavations, with a full topsoil stripping and detecting survey of the area (Stead 1991).

By the end of 1992, fourteen discrete hoards had been located in total with 60 complete torcs, and the fragments from up to 158 more, recovered from the Gold Field (Joy 2018, 3) (Fig. 2). Three of the hoards (M, N & P) appear to date to the Roman period, with the rest currently assumed (from coin data) to have been buried between the later 2nd and mid-1st centuries BC (Joy 2016, 6).

The 1990–1992 excavations have yet to be published, but a volume is expected in 2020/2021 (Joy & Farley forthcoming). As such, all interpretation of the Snettisham hoards currently relies upon examination of the torcs themselves, earlier published material (Brailsford 1951; Clarke 1954; Fitzpatrick 1992; Longworth 1992; Hautenauve 1999; 2004; 2005; Garrow *et al.* 2009; Cartwright *et al.* 2012; Meeks *et al.* 2014; Joy 2015; 2016; 2018; 2019; La Niece *et al.* 2018) and data from the British Museum and Norwich Castle Museum catalogues. In addition, Ian Stead, who led the 1990–1992 excavations, has kindly shared his draft notes for the site with the authors. All British Museum (BM) records cited in text are accessible via: https://www.britishmuseum.org/collection and all Norwich Castle Museum (NWHCM) finds can be found at http://norfolkmuseumscollections.org/#!/home

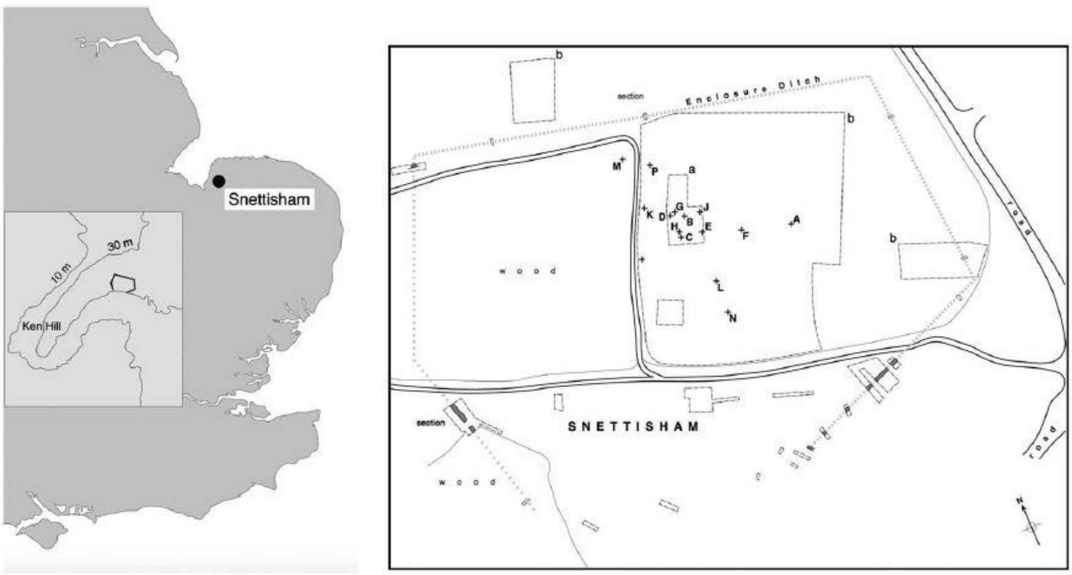

Figure 2: The location of Ken Hill, Snettisham and the hoards (Image from Joy 2016, 5; © The Trustees of the British Museum)

Prior to the publication of the full Snettisham catalogue, all interpretation should be treated with caution. However, the authors believe that their recent investigations into torc technology (Machling & Williamson 2016; 2017; 2018; 2019a; 2019b; 2020; Machling *et al.* 2019), the subsequent discovery of a number of previously unrecognised manufacturing techniques (and the implications thereof) alongside the publication of several papers in advance of the Snettisham volume (e.g. Hutcheson 2007; Meeks *et al.* 2014; Joy 2019; La Niece *et al.* 2019) justifies a timely reassessment of the available material evidence prior to the publication of the full Snettisham volume.

This paper does not attempt to examine ‘why’ the hoards were deposited and, prior to the full publication of the site, a detailed examination of the hoards and their wider national relevance seems unwise: when more is publicly shared about Snettisham, such examinations will become possible, and will be addressed then. With these caveats noted, this paper looks at what the torcs and related artefacts themselves can tell us and how this may help in understanding the processes occurring at the site, and the possible character of, and relationships between, the different hoards.

The hoards

Hoards A–E were located in 1948 and 1950, with Hoards F, G, H, J, K, L, M, N and P found during the 1990–1992 investigations (Stead 1991). The character of the Snettisham hoards can be broadly divided into two main types: 1) hoards comprising nests of complete, or near complete, torcs; and 2) hoards comprising more fragmentary material and more diverse ranges of items (Joy 2016, 5). Those hoards classified under the first type are Hoards A, D, E, G, H, J, K and L. The hoards comprising fragments are Hoards B/C and F. A brief description of the hoards and their contents follows (Fig. 2).

Figure 3: Selection of material from Hoard F (Image © Trustees of the British Museum)

Hoard A included four gold tubular torcs and a perforated gritstone pebble; Hoards B/C (which were mixed after finding) contained fragmentary material, including torcs, pieces of torc, coins, wires, bar ingots, ring ingots, ‘bracelets’ and metal ‘cake’ (an older term for a roughly shaped piece of metal that has previously been melted). In at least one case, and similar to items found in Hoard F (see below), several items were strung together on a ring ingot/bracelet. Hoard D comprised a complete two-bar twist, ring terminal torc with an ingot ring threaded through one terminal; Hoard E contained the Great torc and associated bracelet, buffer torc and coin (Brailsford 1951; Clarke 1954; Stead 1991).

Hoard F is the largest of the Snettisham hoards and was made up of 595 pieces of material, weighing 9.2kg (Stead, unpublished notes). The majority of the material is fragmentary and includes, as with Hoards B/C, pieces of torc, wires, bar ingots, ring ingots, 'bracelets' and metal 'cake' (Fig. 3). Similarly to Hoards B/C, there are at least 11 examples of rings with multiple items strung onto them and strings of linked ring ingots.

In addition, many items within Hoard F are fused together or show evidence of metal droplets/splatter on the surface of the material, implying that this material has been subject to some form of molten metalworking process. Hoard G comprised 16 largely complete torcs and a handful of ingot rings and torc fragments, Hoard H comprised 11 complete torcs; Hoard J comprised eight torcs, although several were badly plough damaged. Hoard K, again plough damaged, contained seven torcs. Hoard L (Fig. 4), the largest torc assemblage, contained 21 complete, or near complete stacked torcs, with the Grotesque torc being discovered towards the base of this deposit.

Figure 4: The Grotesque torc (Hoard L) showing extra wires threaded through the terminal (Image from Joy 2019, 468, © Trustees of the British Museum)

Importantly, this hoard also contained several separate pieces of silver ribbon strip, but which have been catalogued with the Grotesque torc in the British Museum catalogue (BM 1991,0407.37). Hoard M comprised several pieces of melted silver and copper alloy with charcoal inclusions, whilst Hoards N and P respectively comprised a scattered hoard of coins and a silver bowl and coins (Stead 1991).

During the course of our research we have discovered various aspects which appear not to have been recognised in previous work on the Snettisham material: these include insights into the object biography of the Grotesque torc and links between hoards in the assemblage.

The Grotesque torc: background

The Grotesque torc (BM 1991,0407.37) was uncovered within Hoard L, close to the base of the stacked torc deposit, and with only two torcs lying beneath it (Fig. 4). Thought to have been 100–200 years old at the time of its deposition (Joy 2019, 469), the torc has an external diameter of 210mm, with terminals measuring *c*.63mm in length (Fig. 5). These terminals were constructed in sheet gold using the torus and core method (identified by the authors (Machling & Williamson 2016; 2018)) and appear to have been attached to the wire neck ring using a manual crimping method, with perhaps a light amount of securing solder, although this is by no means certain. The neck ring is 19mm wide. This torc has been very obviously repaired using lengths of silver strip wire, a length of square cross-section, twisted, wire and a section of two-bar twisted torc neck ring. At the rear of the Grotesque neck ring, a section of broken tubular torc has been threaded over the neck ring to cover a break in the wires.

Figure 5: The Grotesque torc (Image © Trustees of the British Museum)

These repairs have gained attention in recent years and have been the subject of research (Joy 2019), which suggests that they are intentionally visible repairs whose overall effect "is to bestow an impression of great age on the artefact" (Joy 2019, 468). This has been expanded to other Iron Age metalwork such as swords, cauldrons and shields (e.g. Joy 2014; 2019; Chittock 2019; 2020).

This aspect has been further developed by Chittock (2020) who suggests that visible repairs were perhaps carried out in the manner of Japanese Kintsugi (Chittock 2020), where breaks and repairs are made prominent to accentuate the age and lifetime of an item (Kanışkan 2018).

However, we would argue that these previous approaches have misunderstood aspects of manufacturing and metalworking processes in the British Iron Age and we suggest an alternative, more prosaic, explanation for the Grotesque torc. This remains consistent with the evidential basis, but may instead offer more insight into the practices and processes that were occurring on Ken Hill, Snettisham, at the time of the hoards' deposition.

The repair biography of the Grotesque torc

At some point during its lifetime the Grotesque torc broke: a terminal became insecure, or perhaps even detached, and the multi-strand neck ring broke fully across the back. To remedy these faults, the torc was repaired. The repairs involved the addition of four extra pieces of material: some silver strip wire, a length of square cross-section, twisted wire, a section from a two-bar twisted torc and a section of tubular torc. All the materials appear to have once been part of other artefacts and do not appear to have been created for the task. All repairs could have been done by hand, without the use of tools, and there is no evidence of any metalworking technique, such as solder or hammering. The precise detail of the repairs is as follows.

Figure 6: Wire strip and twisted wire repairs to the Grotesque torc (Image © Trustees of the British Museum)

The loose/detached terminal was secured with a length of silver strip wire, 3.5mm in width, which has been threaded through the terminal's central hole and then wound around the neck ring at least five times (Fig. 6). The strip wire appears to have broken between leaving the terminal and joining the neck ring, with a gap of *c*.40mm of missing strip (Fig. 7).

Figure 7: The twisted wire, hooked over the two bar torc (Image © Trustees of the British Museum)

A twisted, two-bar, neck ring has been threaded through the central holes in each terminal (Fig. 8), with the ends apparent on the reverse of the terminals. In addition, a piece of square cross-section, twisted wire has been hooked over the twisted two-bar torc (Fig. 7), close to the terminal, and has then been threaded lightly through the terminal, before being wound loosely around the neck ring (Fig. 5). It was initially assumed that this piece of wire may have been part of the original Grotesque torc neck ring—which includes square cross-section, twisted, wire—but the slightly more silvery colour of the repair wire (Fig. 6, right), and a slightly larger diameter, suggests it was not part of the original.

Figure 8: The two bar torc threaded through the terminals (Image © Trustees of the British Museum)

This piece of twisted wire extends along the neck ring of the torc to the back of the neck ring, where a section of tubular torc has been threaded over the neck ring (Fig. 5) to cover a full break in the neck ring wire coils (seen on an x-radiograph on display in Room 50 of the

British Museum[1]). Further silver strip wire was wound around the neck ring, apparently to secure the tubular torc sleeve in place. The twisted wire used in the securing of the terminal continues to this sleeve, and is also wound through and around the sleeve and the neck ring.

The winding of the twisted wire and strip wire is loose (Fig. 6) and there is no evidence of the repairs moulding to the shape of the underlying neck ring as would be expected—especially in the case of the thin strip wire—had the torc been worn for any length of time after repair. This would suggest the torc was not worn for any period of time after the repair.

The looseness of the wound wire is also another hint that the person repairing the torc lacked metalworking knowledge: if the wires had been annealed (heated to a high temperature and then cooled), they would have become malleable and could have been wound snugly around the broken torc. That they clearly were not annealed, and thus sprung free, again shows that the person carrying out this repair was not aware of, or did not have the facilities to carry out, annealing (Giovanna Fregni, pers. comm.).

The order of repair would appear to be that the tubular torc sleeve was added first, with the strip wire next and then the square cross-section twisted wire overlaying both. The similarity of the strip wires used in both the terminal and neck ring repairs would suggest that, even if they were two separate repairs, “the two repairs probably took place at the same time” (Joy 2019, 467) using the same material. The insertion of the two-bar twisted torc through the terminals may have occurred first in the repair sequence, as the end of the square cross-section wire is anchored over the two-bar torc in the central hole of one of the terminals.

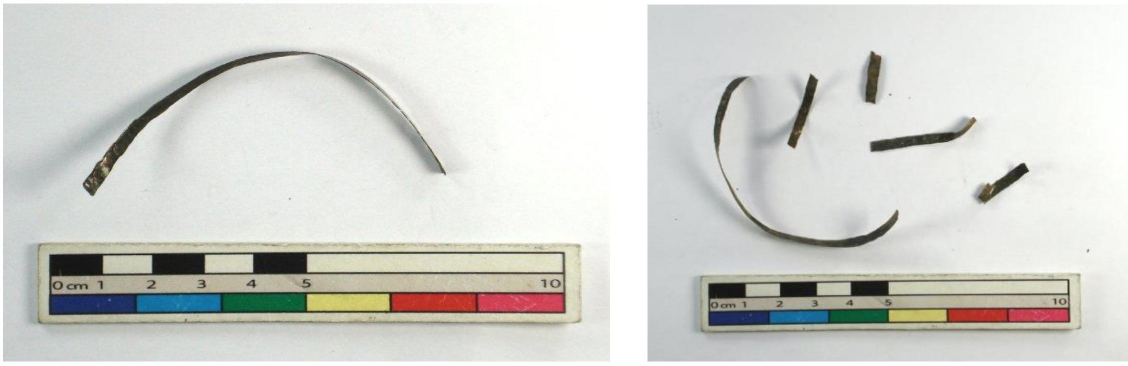

Figure 9: The additional strip wire, catalogued under BM 1991,0407.37 (Image © Trustees of the British Museum)

Included within the British Museum record for the Grotesque torc (BM 1991,0407.37) are six separate pieces of silver strip wire (Fig. 9). Four of these strips are curved and are between *c*.20–40mm in length, with two larger pieces measuring *c*.90mm and *c*.100mm. One of the smaller pieces was almost certainly originally part of the broken strip wire which runs from the terminal to the collar and where there is now a *c*.40mm gap (Fig. 7). The other three curved smaller strips can also be placed as pieces that have broken from the strip wound around the neck ring.

However, both larger pieces are less easily placed: although curved they do not show the tight bends or curvature that would be expected had they been wound around the 19mm diameter neck ring. An explanation for one of the pieces can be offered: excavation photos (Fig. 4) appear to show a further wind of strip wire through the terminal hole which is no longer present (Joy 2019, 468: fig. 4). The missing piece would be *c*.90–100mm which corresponds well. It is also possible that the silver strip, now in two parts, was once one piece, with a section missing that would have once linked the terminal repairs with those at the back of the torc. However, this does not appear on *in situ* excavation photos (Stead 1991, 457; Joy 2019, 468, fig. 4) and so is unlikely to be the case.

As such, the fourth piece of spare strip wire is difficult to provenance and is problematic to account for in the repairs. It cannot be matched with materials used in the other repaired/modified torcs within Hoard L (BM 1991,0407.39; BM 1991,0407.28 and BM 1991,0407.38) and its absence from *in situ* excavation photos of the Grotesque torc suggests it could be spare material. X-ray fluorescence (XRF) on all the wire strip sections would help confirm their common origin.

The materials used in the other Hoard L torc repairs

As mentioned above, several of the stacked torcs within Hoard L have been repaired or had material added prior to deposition. These include BM 1991,0407.28 which had a section of square cross-section, twisted, wire pushed through the central hole of the terminal and BM 1990,1101.7 which has ‘leather’ string binding around the back of the neck ring. In addition, torc BM 1991,0407.33, a partial ‘cage’ terminal torc, shows evidence of formerly molten metal droplets adhering to the neck ring (Fig. 10).

Figure 10: BM 1991,0407.28 (left), BM 1990,1101.7 (centre) and BM 1991,0407.33 (right) (Image © Trustees of the British Museum)

Of greatest interest to this study are the three stacked torcs at the base of Hoard L (Joy 2019, 468). The first torc deposited in the hoard, BM 1991,0407.39 (Fig. 11), “has a similar repair to the Grotesque torc, with a terminal having become detached or loose and reaffixed using metal ribbon” (Joy 2019, 470). As with the Grotesque torc, this thin metal strip wire has been repeatedly threaded through the torc terminal before being wound around the wires of the neck ring.

Lying above this torc was BM 1991,0407.38 (Fig. 12). Currently in two parts, excavation photos show that this torc was placed in the ground to appear as if it was ‘complete’, with square cross-section, twisted wires used to combine the two broken sections (Joy 2019, 468: fig. 4). These repair wires do not appear to derive from the torc, and one shows a ring at the end of the wire suggesting it was once part of another ring terminal torc. Interestingly, the repair wire also shows evidence of molten metal droplets/splatter on the wire section emerging from a hole in the terminal (Fig. 12, right). However, it would appear that the droplets/splatter did not occur *in situ*, as none can be found on the torc itself, but rather appear to have been already on the wire *prior* to its use in the repair.

Above this torc lay the Grotesque torc (BM 1991,0407.37) which, as described above, shows repairs with square cross-section, twisted wire, silver strip wire, a section of two-bar torc and a section of gold tubular torc.

Figure 11: Torc BM 1991,0407.39 (Image © Trustees of the British Museum)

Figure 12: Torc BM 1991,0407.38 (left) and droplets on repair wire (right)
(Image © Trustees of the British Museum)

The manner of the other Hoard L repairs

As in the case of the Grotesque torc, all the repairs carried out to the other torcs in the hoard were achieved using fragmentary and recycled materials, with some showing evidence of molten metal droplets/splatter and fusing. A range of materials have been used including strip wire, pieces of other torcs and, most commonly, square cross-section, twisted wire. As with the Grotesque torc, all the repairs could have been carried out 'by hand', with no tools or metalworking techniques used. All materials used were seemingly repurposed from other artefacts. The repair materials do not appear to have been broken up specifically for the task, with evident metal droplets and fragmentation being consistent with the 'scrap' nature of Hoards B/C and F (see below).

Similar to the Grotesque torc, there is no evidence of the repairs moulding to the underlying torcs and, particularly in torc BM 1991,0407.39 where the wire used in the repair is extremely thin, it looks as if the wires have not deformed since their winding (Fig. 11). With such thin wires, this makes it highly improbable that the torc had been worn prior to its deposition.

Again, these were not skilled or competent repairs and, as in the case of torc BM 1991,0407.38, appear to have been carried out to allow the torcs to be deposited in a seemingly, but not actually, 'complete' condition. This might echo the Ferry Fryston chariot, where unmatched wheels were used in the burial (Giles 2012, 198) and apparently purpose made, but possibly unusable, terrets were also included (Giles 2012, 203). The repairs to this torc would certainly not have withstood wearing, as indicated by the separation of BM 1991,0407.38 into two parts following excavation.

From the above, we would argue that there may be several types of 'repair' present in Iron Age Britain. Some repairs, such as those seen in the many cauldrons, the Torrs pony cap and the swords, served a purpose to restore the item to a 'usable' form. In the case of the Snettisham torcs the repairs may have satisfied another purpose similar to that seen with the Ferry Fryston chariot: repairs or, perhaps more correctly 'modifications', which allowed an item to appear 'whole' when deposited, even when it was not.

Repairs in the Iron Age.

The subject of the Grotesque torc repairs has been discussed in a number of recent papers (Joy 2016; 2019; La Niece *et al.* 2018; Chittock 2019, 82, 89). These studies see visible repairs as integral to the importance and understanding of torcs and other items of Iron Age metalwork during their use, whose "life has been 'written' onto it through its visible and crude repairs" (Joy 2019, 471). These repairs are said to have "contributed to an identity that was fluid and changing, but one in which age and use become increasingly significant" (Joy 2019, 471) as the number of repairs were added to. In short, such repairs are seen as separate and cumulative and are viewed as visible markers of an item's age, and its continued relevance to the society it was part of (La Niece *et al.* 2018, 421).

Joy argues that although "there is enough evidence to indicate that many Iron Age metalworkers were capable of executing functional and sophisticated repairs" (Joy 2019, 471) the obvious repairing of artefacts, such as the Grotesque torc, would make "the age of particular objects visibly manifest" (Joy 2019, 472). He goes on to suggest that the object's 'plurality' would be "made manifest in its many repairs and the different objects selected to repair it" (Joy 2019, 473) with others commentators suggesting that torcs and other Iron Age metalwork had "their value and effects derived, in part, from their patinas of age, which developed through use, repair and modification" (Chittock 2019, 89).

However, underlying these theories, and those that develop from them, are two assumptions:

1) the repairs carried out to the Grotesque torc and other metalwork items did not have to be of high craft quality as long as they were noticeable; and
2) the repairs were carried out in several episodes, over a prolonged length of time.

As such, these repairs have been seen as evidence of longevity of meaning within a society that aimed for visible repairs and that the means of achieving this goal would permit, perhaps even prize, repairs which—in the case of the Grotesque torc—to modern sensibilities, were of extremely low craft quality.

This is where the authors of this study would disagree. We believe that we can demonstrate that Iron Age metalsmiths were incredibly talented in their craft, valued quality of making and that most repairs were carried out within the tenets of skilled craft. Furthermore, we would suggest that the Hoard L torc repairs bear no comparison to the majority of other repairs and are unique in Iron Age repaired finds. We believe that these repairs are the result of a very personal, very immediate, one-off event, where there was little time to do anything other than use materials, and people, close at hand to put things right. As such, we would suggest that the Hoard L repairs were carried out very shortly prior to—or even contemporary with—the deposition of the items. The reasoning for such a theory is given below.

Figure 13: Repairs to the Torrs pony cap (Image © National Museums of Scotland)

The diversity of repair skill

As Chittock (2019; 2020) and Joy (2019) have noted, repairs to broken, damaged or worn items are well known from the Iron Age: from the Kirkburn (Stead 1996, 184) and South Cave (Chittock 2016) swords and the Torrs pony cap (Jope 2000, pl. 100–101) (Fig. 13), to the Chiseldon (Baldwin & Joy 2017, 47–49, figs 56–58) and Kyleakin (Joy 2014, no. 4) cauldrons, repairs are relatively common in Iron Age metalwork. Within East Anglia, the

Snettisham Great torc and Sedgeford torc terminals have also been repaired (Machling & Williamson 2019b, 193; 2020) (Fig. 14 & 15). However, all these repairs show an element of skilled metal craft, with additional, purpose-made, repair materials being soldered or riveted to the original item.

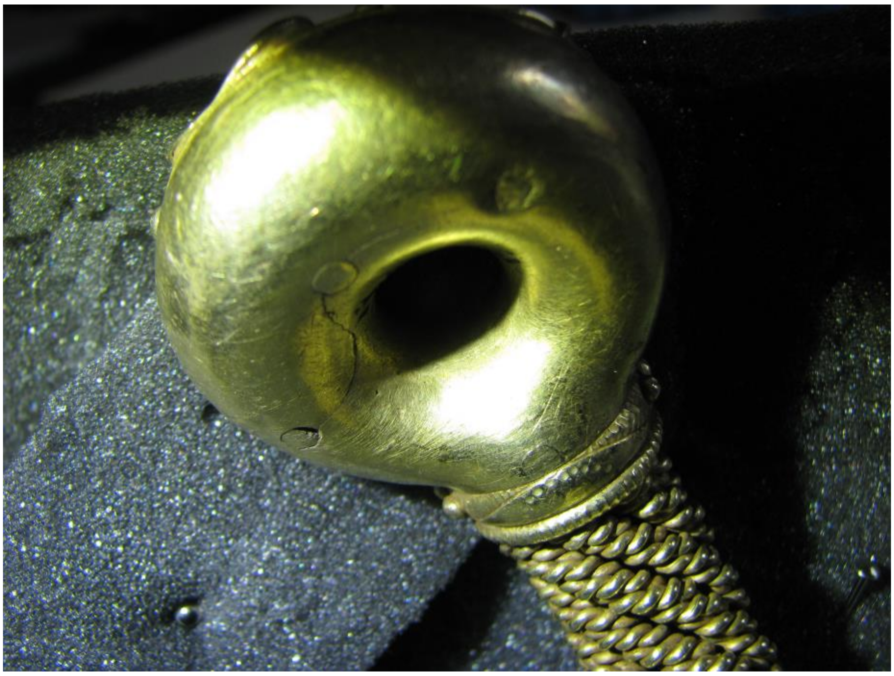

Figure 14: Repairs to the Sedgeford terminal (Image © Trustees of the British Museum)

For the Torrs pony cap (Fig. 13) or some of the cauldrons (Joy 2014, 341), the practice of Kintsugi (Chittock 2020) could be argued, as the shaped metal patches with decorative additions—and added by a skilled and knowledgeable hand—can be seen to be enhancing the repair, rather than making it invisible. For the South Cave RF40 sword scabbard (Chittock 2019, 78) the replacement of the chape has been carried out by a skilled craftsperson, with a new, well-fitted, chape attached using small bronze rivets. For the cauldrons, the potential functional use of these artefacts makes these repairs difficult to quantify, however, even if visible and functional (rather than for solely decorative purpose) they are competent repairs, carried out by metalworkers with access to sheet metal, solder and riveting materials and the competency to know how to use them.

However, despite an initial resemblance to Kintsugi, it is worth remembering that certain repairs required certain techniques to achieve them: to repair torn, cracked or broken metal sheets, the repair of choice is to add a patch of sheet on the front (and often back) of the sheet to bridge the break, and either rivet or solder them in place. Therefore, one could see the addition of sheet patches to the Torrs pony cap, scabbards and cauldrons as unavoidably visible. As such, the decoration of these patches could be seen as an attempt to disguise the obvious, or make it decorative so that it was more aesthetically pleasing: the Iron Age metalworker's efforts to make a crude repair patch into a work of art, to match the quality of the item under repair.

Indeed, in all the items with added repair elements cited above, the addition of materials is the only way to repair these items, and so visibility was less of a choice and more of a necessity. We would therefore argue that any decoration seen was actually the result of the craftsperson trying to cover, rather than accentuate, their repair.

It should also be noted that the repairs seen on artefacts are often currently more obvious due to the corrosion and fragmentation caused by deposition and recovery: when newly repaired, and as complete items, especially if polished, many of the more ‘obvious’ repairs would have been much less visible than they are today, after thousands of years in the ground.

Figure 15: ‘Invisible’ repairs on the front face of the Sedgeford terminal (Image © Trustees of the British Museum)

In the case of the Snettisham Great torc, although the repairs are not as well achieved as perhaps the Torrs pony cap and its ilk, the use of solder points to them having been carried out by someone with a good knowledge of goldworking (Machling & Williamson 2019b, 193). Both Sedgeford terminals apparently cracked during casting and were deftly and invisibly repaired (Fig. 14) using multiple, and alloy matched, fine gold alloy rivets (Brailsford 1971, 17; Machling & Williamson 2020). In both the Great and Sedgeford torcs these repairs were not designed to be seen. For example, on the decorated faces of the Sedgeford terminals, the rivets are almost impossible to see as they have been so well blended into the terminal shell (Fig. 15).

When the items above are compared with the repairs seen on the Grotesque and other torcs from Snettisham Hoard L, the difference is starkly apparent: the Hoard L repairs were carried out with reused/scrap materials with no evidence of metalworking techniques or metalworking skill: these were temporary, unskilled and expedient repairs almost certainly carried out by hand and without the use of any tools. We would argue that, when compared to other Iron Age items, the Snettisham repairs are very much atypical in Iron Age metalworking and, as will be argued below, were perhaps the result of a one-off, very immediate, requirement to fix the torcs prior to deposition, using materials to hand at the time, and carried out by people with little or no metalworking knowledge or skill.

The source of the Snettisham repair material

Materials of the type used to repair the Snettisham Hoard L torcs can be found close at hand: Hoards B/C and F contain very similar material (Fig. 16). From Hoards B/C and particularly F, thin gold or silver alloy wire (e.g. BM 1991,0501.218; BM 1991,0501.195; BM 1991,0501.197; BM 1991,0501.196), gold alloy, square cross-section, twisted wire (e.g. BM 1991,0702.9; BM 1991,0501.62; BM 1991,0501.7), silver/bronze alloy strip wire (e.g. BM 1991,0702.56), partial two-bar twisted torcs (e.g. BM 1991,0501.55; BM 1991,0501.122; BM 1991,0501.48; BM 1991,0501.38) and sections of tubular torc (e.g. BM 1991,0501.161; BM 1991,0501.104; BM 1991,0501.9; BM 1991,0501.31; BM 1991,0501.97; BM 1991,0501.76; BM 1991,0501.135; BM 1991,0501.118; BM 1991,0501.28) are not uncommon. In addition, a considerable proportion of the Hoard B/C and F material (e.g. BM 1991,0501.103; BM 1991,0501.113; BM 1991,0501.122; BM 1991,0501.7) shows evidence of the molten metal droplets/splatter seen on the wires repairing torc BM 1991,0407.38 and on the partial 'cage' terminal torc, BM 1991,0407.33.

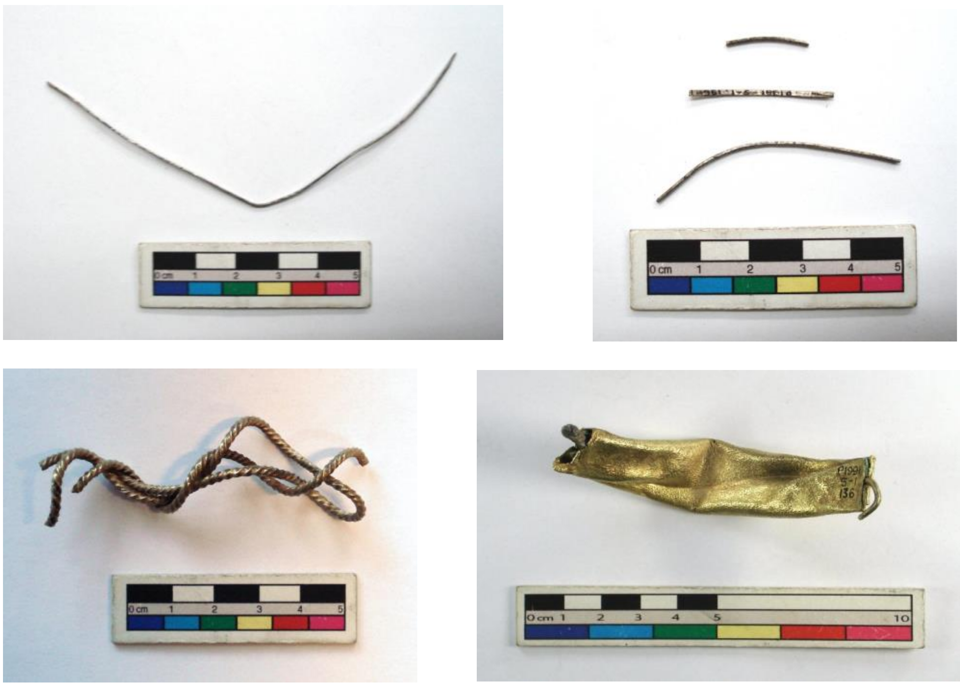

Figure 16: Suitable repair materials from Hoard F: BM 1991,0501.195 (top left), BM 1991,0501.196 (top right) , BM 1991,0501.153 (bottom left) and BM 1991,0501.135 (bottom right) (Image © Trustees of the British Museum)

Interestingly, two other hoards, Hoards D and E, from Snettisham also show evidence of modification/repair, with materials which could have originated from Hoards B/C and F. The torc in Hoard D (NWHCM 1951.93.3:A) has had an ingot ring, similar to those from Hoards B/C, F or G (for example, BM 1991,0501.140–143; Clarke 1954, Plate XII), threaded through its terminal. In Hoard E, the Great torc and bracelet have been linked using a partial buffer torc (BM 1951,0402.3) similar to the partial buffer torcs that were found in Hoard F (BM 1991,0501.26, BM 1991,0501.119, BM 1991,0501.21, BM 1991,0501.25 and BM 1991,0501.77) (Fig. 17).

Figure 17: Torc from Hoard D (left) and the Great torc assemblage (right) (Image © Trustees of the British Museum)

Figure 18: The buffer terminal torc BM 1951,0402.3 attached to the Great torc (left) and torc BM 1991, 0501.21 from Hoard F (right) (Image © Trustees of the British Museum)

Further, the terminal of the partial buffer torc BM 1951,0402.3 in Hoard E has droplets of gold alloy and gold alloy wires fused to it, similar to that seen on Hoard F's BM 1991,0501.21 buffer terminal and on many other items from this hoard. Again, as with the repair wires used on torc BM 1991,0407.38 from Hoard L, the partial buffer terminal torc linking the Great torc and bracelet appears to have received its gold droplets and fused material *prior* to its use as a link (Fig. 18).

Linking the hoards

As discussed above, the repairs seen in the Hoard L torcs—and indeed the modifications seen in Hoards D and E—can be considered simple, unskilled repairs, using materials commonly found in Hoards B/C and F. These materials were not adapted for the task, but appear to have been used 'as found'. The simplicity and crudeness of the repairs would also suggest that these repairs were carried out in haste, with the aim of 'completing' several broken torcs ready for deposition.

Put plainly, we believe that those who repaired the Grotesque and the Hoard L torcs, and who strung the buffer torc through the Great torc, raided Hoards B/C and, more probably, Hoard F for materials. This almost certainly happened prior to deposition, although the poor contextual information for these 'scrap' hoards does not rule out the disturbance of an already deposited hoard. These people were probably not metalworkers.

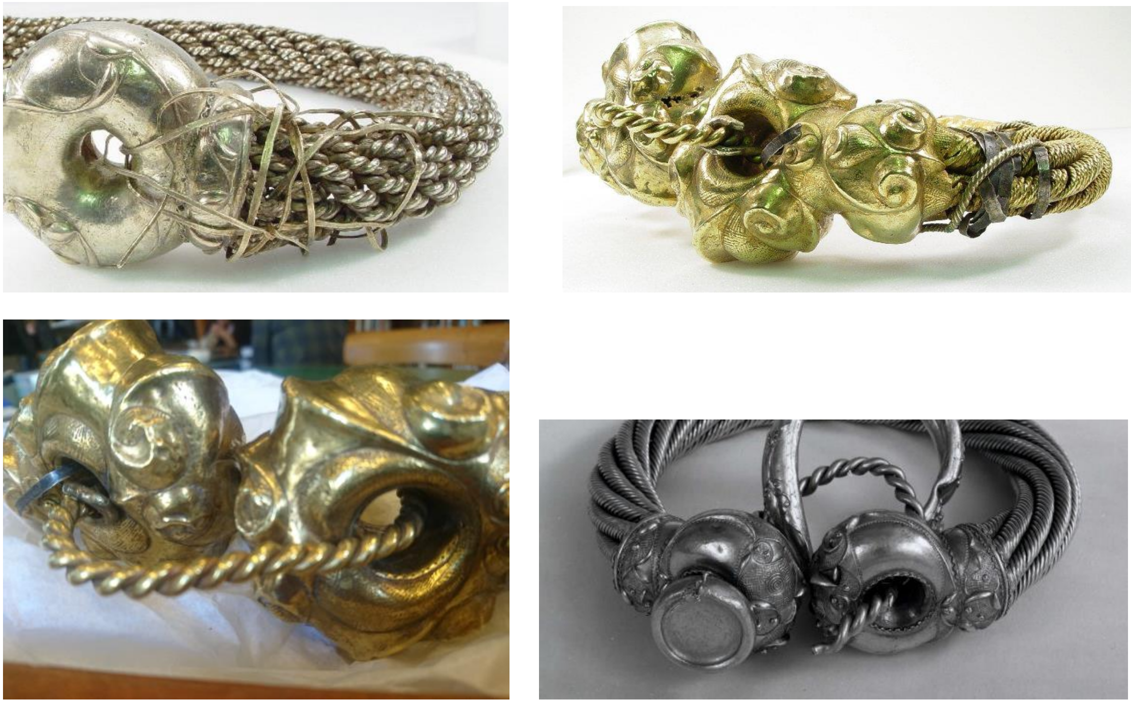

Figure 19: Similar wire fixings between torc BM 1991,0407.39 (top left) and the Grotesque torc (top right) and similar torcs threaded through the terminals of the Grotesque (bottom left) and Great (bottom right) torcs (Image © Trustees of the British Museum)

From similarities in the methods used (Fig. 19) (for example, the same winding of wire through terminals and neck ring in two torcs, the lack of wire annealing and the insertion of half torcs through the terminals of both the Grotesque and Great torcs) it could be argued that the repairs and modifications show the hand of a single person, although this is difficult to prove with certainty. Without access to tools or knowledge, they performed the best repairs within their ability, but these were inevitably poor and clumsy. It would appear that this was sufficient to ensure the deposition of visibly 'complete' torcs.

However, this theory, although plausible, raises a number of questions: as shown from other Iron Age metalwork, extremely competent repairs were possible and so why were the skills and tools not to hand to repair the Hoard L torcs to a recognised Iron Age standard? In addition, the spare piece of strip wire within Hoard L may even suggest a repair at the same time as the deposition of the torc and, if this is the case, why were these repairs left until the last moment before deposition? And perhaps, most importantly, where does this leave other theories regarding torc deposition? To answer these questions we need to understand how torcs break and, once again, this is not as straightforward as current theories suggest.

How do torcs break?

It has been previously assumed that torc neck rings of whatever type break at the back through wear: the back of the torc being the area most under pressure during the opening and closing when a torc is put on and taken off (Farley 2016; Joy 2019, 466). Although this could be conceivable in the case of rigid bar torcs (for example, NWHCM: 1994.106; BM 1991,0702.52) which have little flexibility, there are numerous examples of two-bar torcs where the neck ring is entire and not deformed (for example, NWHCM: 1942.126; BM 1951, 0402.1; BM 1991,0407.24; BM 1991,0407.1; BM 1991,0407.20; BM 1991,0407.21; BM 1991,0407.5).

Figure 20: Deliberately cut torcs: BM 1991,0702.69 (top left) and BM 1991,0501.89 (top right) and pulled apart torcs BM 1991,0702.58 (bottom left) and BM 1991,0407.17 (bottom right) torcs (Image © Trustees of the British Museum)

In other broken torcs, breaks would appear to be deliberate and there is evidence of torcs being cut (e.g. BM 1991,0702.69; BM 1991,0501.157; BM 1991,0501.89; BM 1991,0501.129) or pulled apart (e.g. BM 1991,0702.58; BM 1991,0702.16; BM 1991,0501.190; BM 1991,0407.17; BM 1991,0501.15). In fact, it would appear that breaking across the back of the neck ring due to wear was extremely unusual (Fig. 20).

Furthermore, in the case of the multi-strand wire neck rings, which often have tens of wires comprising the neck ring rope (e.g. 64 wires for the Great torc, 32 for the Newark torc), breakages caused by wear have not yet been identified by the authors, with several complete torcs known, such as from Newark (Machling & Williamson 2018; 2020), Needwood Forest (Hawkes 1936) and south west Norfolk (Norwich Castle Museum & Art Gallery 2018) and multiple examples from Snettisham (e.g. the Great torc, BM 1991,0407.15; BM 1991,0407.39; BM 1991,0407.32 and BM 1991,0407.36).

The 'wear-related breakage' argument is also improbable if thought about in the context of multi-strand torcs. In such torcs, the pressures of opening and closing would be shared across many wires and, should one wire break (perhaps due to a flaw) then there were many more left. Even if more wires broke, still more would continue to hold the neck ring together. One would also expect an attempt at repair before the problem got too bad. However, in the case of the Grotesque torc, it was only when all 36 of the wires (32 spring wires and 4 twisted wires) had broken that any attempt was made to repair the torc. It could be argued that repair of a torc was perhaps in some way taboo, although the repairing of many other torcs, and indeed the final repairs to the Grotesque torc, would strongly suggest this was not the case.

As such the Grotesque torc and the torc found below it in Hoard L (BM 1991,0407.38) stand out as oddities. The damage seen on torc BM 1991,0407.38 is easier to explain as intentional damage with many of the four coils of the neck ring no longer being present (Fig. 12). There is also a hole in one of the sheet terminals which would appear to be the result of intentional damage, rather than natural wear, with the margins of the hole showing evidence of cracking and deformation caused by the puncturing of the sheet (Fig. 12, right). However, several of the *individual* wires within the neck ring show cracking and breaking where an element of natural breakage could be argued. The manner of the repairs to this torc make no sense; it was clearly heavily broken to the point of being unwearable, and the 'repairs' can only be explained as an attempt to make this item look like a complete torc for the purpose of deposition.

However, in the case of the Grotesque torc (and in the case of torc BM 1991,0407.39 found below BM 1991,0407.38), the fixing of the terminal and the break in the back at least created a recognisably complete item, that could potentially have been worn, although it appears not to have been. The break in the back of the torc Grotesque, nonetheless, remains problematic.

From the x-radiograph on display in Room 50 of the British Museum[1], it is clear that the break happened to all 36 wires, in approximately the same place and apparently at the same time. It is possible that the torc was deliberately cut; the sleeve covering the wire ends however, does not allow for close examination. But if it is wear, as is currently assumed (Joy 2019), why wait until all the wires had fractured, and why did they break in the first place? Discussions with an expert in spring metal fatigue may provide an unexpected possible solution.

Age hardening in gold alloy

In discussions with a Research Metallurgist (Conor McCaughey pers. comm.) the possibility was raised that the Grotesque torc breakage may represent a catastrophic failure of all the wires in one event. McCaughey (pers. comm.) suggested to the authors this could be possible due to a material process known as 'age hardening'.

This process might have contributed to the failure of a torc that has been repeatedly opened and closed, then rested in a stable environment, before being moved again after a considerable length of time. The new movement, or perhaps even being dropped, could cause the alloy to fail in the area of previous stress, in this case the rear of the neck ring. Further work is planned using a replica torc to see if this possibility could explain the breakage, but at present remains merely an interesting theory worthy of mention as a consideration in this study.

Metalsmiths at Snettisham

A Roman period metalworkers' hoard from the nearby village of Snettisham (Johns 1997) and evidence of 1st–2nd century AD metalworking from Hoard M (Garrow *et al.* 2009, Table 2) would suggest that, in the Roman period at least, there were metalworkers in the vicinity of the Ken Hill site, although whether they were practicing their craft in the area is uncertain as no evidence of tools or workshops has been found. Again in the Iron Age, direct evidence of metalworking is absent; however, from Hoards B/C, F and G there are numerous items in the form of ingots, ring ingots, cut up torcs and wires and, as mentioned, several pieces of fused alloy or metals with metal droplets/splatter which are evidence of the processes involved in metalworking.

Indeed, in the initial Snettisham report "the dismemberment of most of the ornaments, the disappearance of component parts and the presence of metal 'cake' and other obvious signs of metal-working" suggested "that this represents the stock-in-trade of a metal-smith" (Clarke 1954, 27). That view has fallen out of favour in modern academia with theories that favour the symbolic gathering of material "linked together to represent broader social groupings and a collective effort" (Joy 2016, 9), gaining popularity. In these theories, the lost material is presumed to have been recycled to make coins (Joy 2018, 5).

The basis of these theories lies not only in the many fragmentary pieces within the hoards, but is also given credence due to the presence of at least eleven pieces from Hoards B/C and F which comprise a number of torc pieces strung onto rings of metal (for example, BM 1991,0501.1; 1991,0501.6–13; BM 1991,0501.53–59; BM 1991,0501.62; BM 1991,0501.103–108; BM 1991,0501.120–124; BM 1991,0702.2; BM 1991,0702.3; 1991,0702.4; BM 1991,0702.8; BM 1991,0702.10–12; BM 1991,0702.64). In addition, there are strings of linked ring ingots from Hoard F (for example, BM 1991,0501.14; BM 1991,0501.66–72; BM 1991,0501.140–143) which are deemed to be linked groups representative of collective meaning (Joy 2018, 5).

However, when shown to contemporary goldsmiths, several different possible explanations have been offered. The first would suggest that these are pieces of material strung together, in relevant different alloy percentages, ready for melting. For example, if taken as a whole group, BM 1991,0501.1–5/BM 1991,0501.53–59 by weight is *c*.30% silver and *c*.70% gold alloy and the group BM 1991,0501.103–108 is 6% silver and 94% gold alloy, by weight. Others are 100% silver (BM 1991,0501.14; BM 1991,0702.29–30) whilst others are 100% gold alloy (BM 1991,0501.167–168; BM 1991,0501.160–161; BM 1991,0501.66–72; BM 1991,0501.62–65; BM 1991,0501.46–51; BM 1991,0501.6–13). Some show ternary (gold, silver and copper alloy) alloy selections (BM 1991,0702.10–12; BM 1991, 0501.216), with a few groups capable of creating silver rich alloys with copper alloy (BM 1991,0501.209) or gold (BM 1991,0501.206–207; BM 1991,0501.140–143).

In addition to the 'alloy grouping' possibility, a further metalsmithing explanation for the BM 1991,0501.109–113/BM 1991,0702.3–4 assemblage has been suggested by several goldsmiths. They have pointed out that such 'swatches' of wire are commonly used by gold- and silversmiths as a means of showing clients the range of wire twists and formations that are possible. One of the craftspeople, Bob Davies, also suggested a use as an *aide-mémoire* of previous work and how it was achieved. Bob backed this up with a photo of such a swatch from his 'scrap drawer' and the similarities of this swatch to BM 1991,0501.109–113/BM 1991,0702.3–4 are remarkable (Fig. 21).

Figure 21: Assemblage BM 1991,0501.109–113/BM 1991,0702.3–4 (left) and modern wire 'swatch' (right) (Images © Trustees of the British Museum & Bob Davies)

Further possible evidence of metalworking practice can be seen in the fused material and that with metal droplets/splatters seen on it (Fig. 22). The current suggestion is that this action is deliberate and aimed at "creating new artefacts or mini-collections" (Joy 2016, 7) but, again, we believe it is possible that there could be a metalworking explanation for these occurrences.

Figure 22: Fused material and material with droplets/splatters (Top left to bottom right: BM 1991,0501.21; BM 1991,0501.122 , BM 1991,0501.29; BM 1991,0501.23; BM 1991, 0501.43) (Images © Trustees of the British Museum)

Discussions with metalsmiths have suggested that the fusing could be the result of an aborted melt, either because a crucible fractured, or there was a problem with the heating source. The metal droplets and splatters can be similarly explained, or may even be the result of a failed casting, carried out close to the metal from the hoard. If a clay mould is insufficiently dry prior to use, or if a wax model is insufficiently burnt out, when molten metal is poured into the mould an explosion of molten metal droplets is violently expelled from the mould aperture and will deposit over anything in close proximity. Having personally witnessed this during a bronze casting, the authors can vouch for the similarity of this to droplets seen on the Hoard F material, and on the Hoard L torcs BM 1991,0407.33 and BM 1991, 0407.38.

From all the evidence presented above—the ingots, cut up material, metal droplets/splatter, fusing, possible pre-melt alloy groupings and wire swatches—we would suggest that the characters of Hoards B/C and F are very much that of metalsmiths' scrap hoards, as first suggested by Clarke in 1954 (Clarke 1954), and furthermore possibly those of metalworkers carrying out various casting processes, rather than sheet-working. However, we would not go as far as to suggest that this hoard had an entirely practical purpose, as the deposition of this and other hoards would suggest a careful selection of material and placing for purposes other than hiding from view. We would rather suggest that metalsmiths/goldworkers/ silversmiths had an input into these hoards, and their contribution, and presence, in the selection of material deposited at Snettisham should be recognised.

An alternative biography for the Snettisham hoard repairs and modifications.

From the evidence of the Grotesque torc and torcs BM 1991,0407.38 and BM 1991,0407.39 from Hoard L, it would appear that there was a necessity, within certain hoards, to present torcs for deposition to appear as 'complete' as possible. It would seem that for whatever reason, these repairs were not carried out prior to the time of deposition, but needed to be done on the spot.

In the case of the Great torc and bracelet linkage from Hoard E, there was a necessity to join these two objects together, again apparently immediately prior to deposition. As Joy states, it is assumed that these torcs were "…fixed in one episode, using materials to hand at the time. The repairs certainly have an *ad hoc* appearance. If this were the case, the repairer must have had scrap metal readily available from other torcs" (Joy 2019, 468).

We would suggest that the close similarity of the repair/modification materials used within Hoards D, E and L to materials found in Hoards B/C and F point to the source of the "scrap metal readily available" (Joy 2019, 468) being from one, or all, of these hoards. We would further suggest that the presence of metal droplets/splatter on several of the repairs/modifications would likely narrow the source to Hoard F. In addition, the inclusion of the apparently 'spare' strip wire (used to repair the Grotesque torc) in Hoard L would point to the repairs being carried out either shortly before, or contemporary with, deposition. This would further imply either knowledge of where previous hoards lay buried (although there appears to be no archaeological evidence of hoard robbing) or a contemporaneity of deposition between at least Hoards B/C, D, E, F and L.

The clumsy, and simple, nature of the repairs, if contrasted with those seen on other Iron Age metal artefacts (for example, the Sedgeford torc), would indicate that either competent metalworkers were not available or present at this event, or that the immediacy of the repairs did not allow time for them to be consulted and the repairs to be completed with competency. In short, we believe that the repairs were carried out quickly, by someone with little skill, and almost certainly at the time of, or very shortly before, the deposition of the hoards.

This interpretation is not inconsistent with what we so far know about the making and repair of Iron Age torcs in Britain. Previous work (Machling & Williamson 2018; 2019b; 2020) has shown that it is likely that skilled gold sheet-workers were less common during the later Iron Age, with numerous failed and faulty cast torcs (Machling & Williamson 2020, 88) showing that the attempts to copy the, likely earlier, products of more accomplished sheet goldsmiths were not successful.

As such we would argue that the deposition of the hoards at Ken Hill, Snettisham, as well as marking the end of the torc tradition of Iron Age Britain, may also indicate the end of centuries-old, multi-skilled, torc-making knowledge. As we have noted previously (Machling & Williamson 2020, 92), it would appear that torcs increasingly were becoming of lower craft quality, and perhaps of less relevance, within Iron Age society, with less competent casting in baser gold, bronze and silver alloys being the new preferred form of manufacture; the deposition of what may well be a caster's 'scrap drawer' in Hoards B/C and F may be relevant to this. The skilled goldsmiths who created the high quality gold, sheet-worked, torcs and whose origins can be argued to be found some 250 years prior to the date of the Snettisham deposits (Machling & Williamson 2019a), had skills that were perhaps no longer required or were perhaps even no longer in existence.

We cannot know for certain why skilled goldworking appears to have declined, although the possible reduction in good quality gold supplies (Northover 1995: 301), the wider move to casting (Machling & Williamson 2020), the replacement of torcs with gold coins (Gosden 2013, 49; La Niece *et al.* 2018, 419), the addition of silver and gold gilding to the metalworkers repertoire, changing social structures/a shift in what was considered appropriate to deposit, and the influence of the markets and fashions of Rome may all have played a part.

With such torc-making skills in decline, it is therefore unsurprising to find objects like the Grotesque torc, and others from Hoard L, so badly repaired. The skilled goldsmiths of earlier years, specialists in a range of sheet and casting techniques—who created such wonders as the Snettisham Great torc, the Netherurd terminal and the Newark torc—would, we think, have been horrified to see one of their masterpieces, the Grotesque torc, so crudely repaired before it was offered to the ground in the final act of its Iron Age life.

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As ever, all interpretations and omissions remain the authors' own.

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Endnotes

[1] The authors acknowledge that, although publicly available, this x-radiograph has not yet been formally published and they are extremely grateful to the late Janet Ambers of the British Museum Science Department for her work in creating this image.

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