Archaeological Journal

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/raij20

Hillfort gate-mechanisms: a contextual, architectural reassessment of Eddisbury, Hembury, and Cadbury hillforts

Rachel Pope , Richard Mason , Derek Hamilton , Eddie Rule & John Swogger

To cite this article: Rachel Pope , Richard Mason , Derek Hamilton , Eddie Rule & John Swogger (2020): Hillfort gate-mechanisms: a contextual, architectural reassessment of Eddisbury, Hembury, and Cadbury hillforts, Archaeological Journal, DOI: 10.1080/00665983.2019.1711301

To link to this article: https://doi.org/10.1080/00665983.2019.1711301

Published online: 04 Sep 2020.

ARCHAEOLOGICAL JOURNAL, 2020
https://doi.org/10.1080/00665983.2019.1711301

Routledge
Taylor & Francis Group

OPEN ACCESS Check for updates

Hillfort gate-mechanisms: a contextual, architectural reassessment of Eddisbury, Hembury, and Cadbury hillforts

Rachel Pope[a], Richard Mason[b], Derek Hamilton[c], Eddie Rule[a] and John Swogger[d]

[a]Department of Archaeology, Classics, and Egyptology, University of Liverpool, Liverpool, UK; [b]English Heritage, Collections and Interiors (North), Helmsley, UK; [c]Scottish Universities Environmental Research Centre (SUERC), University of Glasgow, Glasgow, Scotland; [d]Independent Researcher

ABSTRACT

This paper offers a typology of hillfort gate-mechanisms, and a developed understanding of temporal depth in hillfort architecture – via applied contextual analysis. Rediscovery of the Eddisbury hillfort archive revealed three iron gate-mechanisms. To situate these rare objects, detailed analyses of entrance architecture and stratigraphy was conducted – for Eddisbury and parallels (Hembury, South Cadbury) – enabling new sequences, resolution of the Mid-Late Cadbury sequence, and reconstruction of the Cadbury gate-fittings. Crucially, Bayesian analysis of C-14 dates from Eddisbury confirm a 400 BC date for *developed hillforts*. Eddisbury's gate-mechanisms are revealed as the earliest in Europe, with Roman adoption of Iron Age technology.

Introduction: new information from old excavations

In an important *Archaeological Journal* article in 1987, John Barrett – developing the ideas of Leslie Alcock – discussed the challenges inherent in reinterpreting sites from old excavation reports. As Barrett successfully demonstrated, using David Clarke's Glastonbury, this involves not only critical textual analysis – to gain an understanding of the excavator's thinking, their assumptions and expectations; but also a painstaking reconstruction of past method – a technical unpicking, and patient re-building, of the units of evidence. More than source criticism alone, the process is more akin to the single-context method of archaeological excavation: the skill-set that we employ during the post-excavation process – a bringing together of multiple lines of evidence to construct the most logical sequence of events. It is how we order time, be that in prehistory itself, or in the report or archive of a twentieth century excavation. Fundamental to our approach here is critical thinking on elucidating temporal depth: both in prehistoric architecture/construction itself, and also on its excavation (McFadyen 2006; Knight and McFadyen 2019); alongside new ideas too around the archaeology of archives, with both 'archive-as-practice' and as subject (see McFadyen 2011; Baird and McFayden 2014). The suggestion here is that we can also apply our understanding of contextual method to old excavations: breaking them down

CONTACT Rachel Pope rachel.pope@liverpool.ac.uk

contextually, as we do our stratigraphy. As such, we can indeed gain new information from old excavations, providing we are suitably meticulous in our method.

As part of the Heritage Lottery-funded *Habitats and Hillforts Project* on the hillforts of the Cheshire Sandstone Ridge, three hillfort-gate pivot-mechanisms – excavated by Bill Varley during his 1936–37 seasons at two of the gateways to the 3.7 ha hillfort of Eddisbury – were re-discovered in 2011 (Mason and Pope 2016a; Figure 1). It was previously assumed that Varley's (1936-1938) Eddisbury archive had been lost or destroyed in WWII (Hughes 1994, 47–48), but it was in fact held by Varley's former student Adrian Havercroft, who took on the role of 'archaeological executor' after Bill Varley's death in 1976. Following the death of Mary Varley (Bill's wife) in 2006, Havercroft recovered the iron gate-pivots from a caravan, in a box packed with sawdust. The survival of the iron gate-pivots was associated with the mineralization of the gate-posts, at least one of which had still been standing three-feet tall on excavation (Varley 1950). Late in 2011, funded by *Habitats and Hillforts*, a project was designed to document and re-assess the Eddisbury archive (Mason and Pope 2016a). The previous storage environment of the pivots had resulted in substantial fragmentation and delamination, to the extent that even initial handling had to be avoided until conservation funding was secured. In 2015, funding was awarded by Historic England's National Heritage Protection Plan to enable object stabilization, and sampling of the gate-pivots for metallurgical analysis.

At present, there are nineteen known examples of iron gate-furniture in the archaeological literature, dating to the Iron Age and Roman periods (Figure 2).

Figure 1. Eddisbury pivot components (with object numbers) after sampling and conservation treatment (Image JR Peterson © University of Liverpool).

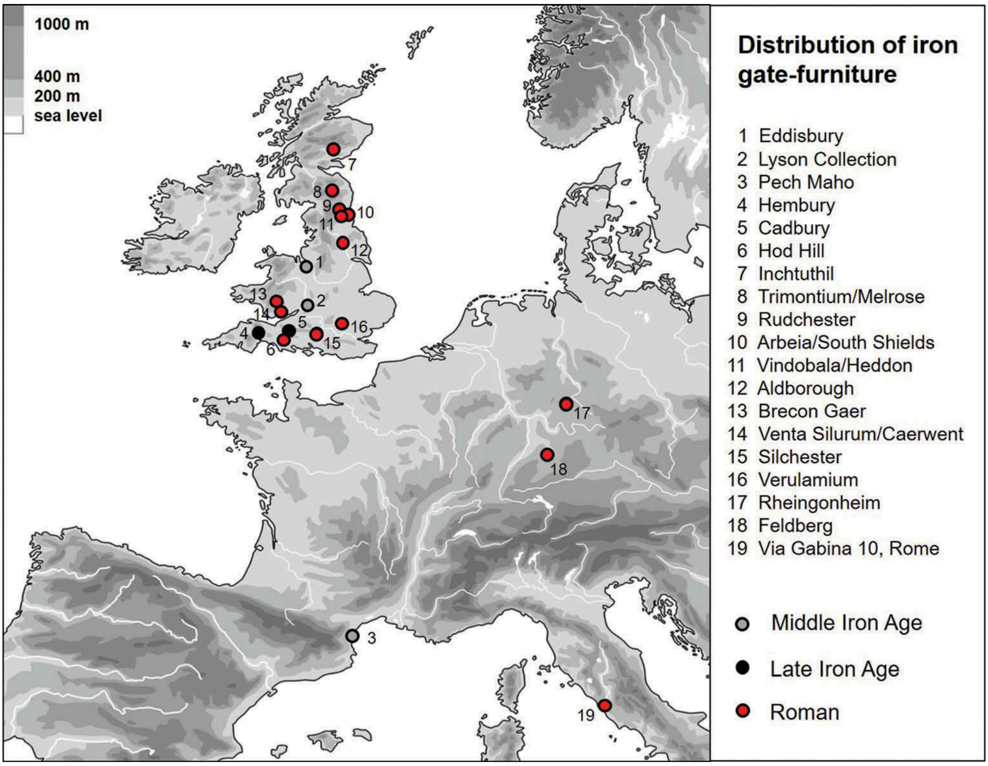

Figure 2. Distribution of known Later Iron Age and Roman iron gate-furniture.

Rediscovery of three early examples of the object class from Eddisbury hillfort (Middle-Late Iron Age) thus provided a unique opportunity to develop a typology for this previously under-studied architectural device, as well as an opportunity for analysis to uncover details about artefact composition and Iron Age production (Appendix 2). Only three other examples of hillfort gate-furniture are known: one object each from the Late Iron Age phases of Hembury (Devon) and South Cadbury (Somerset) hillforts, and one from the *oppidum* of Pech Maho (Aude, France; Ralston 2006, 72; Fig. 36). For us to provide dates for the Eddisbury objects, we needed first to understand the archaeological context of the objects. This entailed a return to the archaeology of the gateway sequences – as excavated by Bill Varley (1936-38) – as well as those of object parallels from Dorothy Liddell's Hembury (1930-35) and Leslie Alcock's South Cadbury (1970). Performing new, contextual analysis of these sites also provided a suitable context for developing Barrett's (1987) ideas regarding the critical reinterpretation of past work.

The Eddisbury discoveries provided the opportunity to re-examine qualitative evidence for hillfort gateway construction, and its chronological development, utilizing the three important twentieth century excavations that produced gate furniture. To this end, our method involves a close-reading of the recorded stratigraphy, photographs, analysis of feature dimensions/character, structural layout of features (alignments, axial symmetry) and axes of orientation, both for cut features and associated earthworks.[1]

The originality of the approach then, lies in building phasing by combining a detailed reading of the archaeological stratigraphy/finds, with a structural interpretation of architectural features. Whilst developed first by Stan Stanford in the 1960s, we still find work that considers neither the temporal depth of architecture, nor takes structural function into account (e.g. Garner 2016). When dealing with prehistoric architecture, an appreciation of such matters is critical: regarding both layout and structural role (Drury 1982; Harding 2012, 78). Our broader aim then, is that through demonstrating applied contextual method, and architectural principles, we can update our understanding of the temporality of hillfort architecture, and to showcase developed method for reintegrating new information from old excavations.

The Eddisbury gate-mechanisms: resolving the assemblage

Our initial concern regarding the Eddisbury gate-pivots was for object conservation. In 2015, the objects were taken to York Archaeological Trust, where corrosion products were removed using gentle air abrasion, and the objects selectively treated with tanic acid, and stabilised with Paraloid B62, with sampling undertaken for metallurgical analysis. Initial x-rays suggested the presence of two discs (one with surviving upright spike *in situ*) (Figure 3). Following conservation, the refitting of fragments was explored, with a number of successful joints identified. This enabled the identification of previously fragmentary remains, and increased the overall object count to a minimum of five discs, and a further two spikes – giving five spikes in total, two of which were adhered to the discs (Appendix 1). Mineralised preserved organics were found on each of the upright spikes, and occasionally within the corrosion layers of the discs; the majority were of wood, but also included charcoal and grass/reed-like strands. The grain direction of the wood was uniform – the result of the upright spike being driven into the end of a timber round. The organic fragments on the surface of the discs were small and unaligned, indicating the (secondary) presence of wood in the burial environment, rather than as *in situ* (primary) preservation on the disc.[2] The only samples that provided sufficient detail for species identification were from Object 11 (Type B): fragments of the tangential section of ring-porous hardwood, possibly *Fraxinus excelsior* L. (ash).

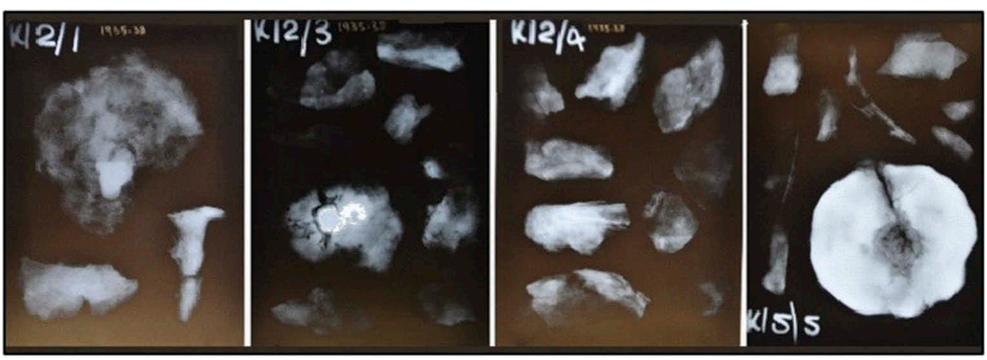

Figure 3. X-ray photography of Eddisbury gate mechanism samples (not to scale).

The Eddisbury pivot assemblage represents a minimum of five objects – comprising three types of iron discs, with composite tapering spikes and fragments of the same form (see Figure 4). An initial challenge for the Eddisbury assemblage was correlation with known contexts of discovery: with two mechanisms recorded from the hillfort's eastern entrance and one from the north-west entrance, versus a minimum of five objects in the assemblage. Accepting the idea of two-part pivots, with an upper and lower element to align with the 'double-spiked' description (Varley et al. 1937, 447), we at first expected six pivot-components from the three postholes. We are told in the 1937 description of the eastern entrance that the surviving gatepost (Posthole 4) had a 'double-spiked shoe'. We also know from an archive photograph (Figure 5(a)) that Posthole 4 certainly had an *upper* pivot with upturned rim and concave upper surface – which is believed here, on the basis of the rather thick rim, to be the Type A1 upper (Object 5 or 6/7 in the assemblage; see Appendix 1). From the surviving assemblage, however, a lower Type A1 component is less easy to resolve, and critically, the Type A mechanisms seem only to comprise three spikes. As a result, if the archive photograph (Figure 5(a)) is, as we believe, of Posthole 4/Type A1, then either: 1) the Prehistoric Society's 1937 'double-spiked' description was actually relating to the type in Posthole 3;[3] or alternatively, 2) there were *originally* three dual-component mechanisms, and the lower component of Type A1/Posthole 4 simply no longer survives in the assemblage. We do know from our work on the Eddisbury archive that Varley had been pro-active in sending the Eddisbury material off for specialist analysis (Mason and Pope 2016a).

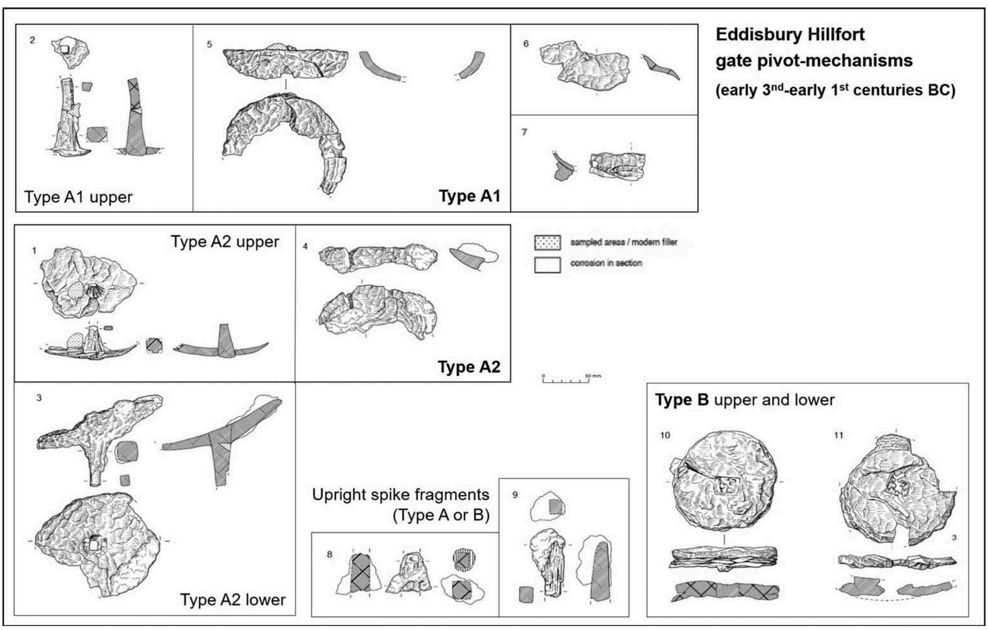

Figure 4. Eddisbury hillfort gate pivot assemblage; Type A1 (objects 2, 5-7); Type A2 (objects 1, 3-4); Type B (10-11); and upright fragments (8-9) (illustration by Lesley Collett Graphics).

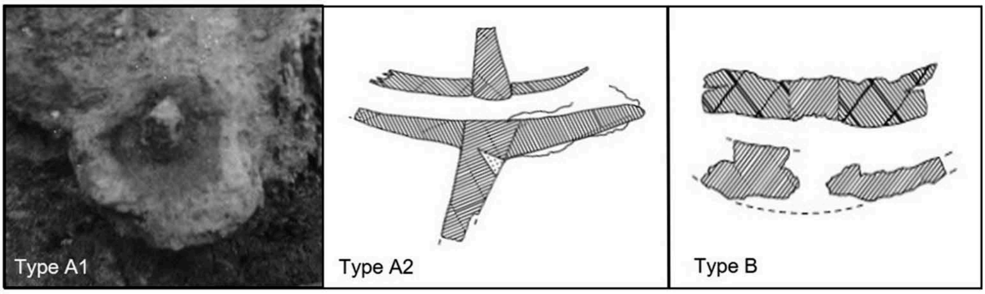

Figure 5. a) Varley's 1937 archive photograph of *in situ* Type A1 iron pivot (eastern entrance, Posthole 4); b) reconstructed Eddisbury Type A2 composite pivot (using objects 1 and 3), revealing lower distortion (eastern entrance, Posthole 3, early third century BC); c) reconstructed Eddisbury Type B pivot (north-west entrance, early first century BC).

This issue to one side, what we can suppose is that the pivot found in the corresponding posthole (i.e. Posthole 3) was likely to be of a similar type (i.e. also Type A). This seems more certainly to have consisted of a two-part pivot (Type A2). This corresponds with the minimum of three Type A objects (upper and lower) present in the assemblage (across object numbers 1–7, Appendix 1). The suggestion is a two-part pivot in Posthole 3, and certainly a corresponding upper-pivot in Posthole 4, potentially with a lower component (now lost). The two remaining objects (a further two-part pivot) are of a markedly different form (Type B; Objects 10–11) and seem most likely to be those of the north-west entrance. The difference in form is supported by the later (early first century BC) date now assigned to the final phase of that entrance (below).

As such, the assemblage most likely represents five objects, from two dual-component and one potentially single- iron gate-mechanisms. Figures 4–5 draw together the most likely reconstruction of the artefacts, based largely on bowl/socket curviture. Objects 5–7 (possibly with Object 2) seem to represent an upper 'bowl-type' (Type A1) – whilst Objects 1, 3 and 4 represent a dual-component 'dish-type' (Type A2) pivot-mechanism (see Appendix 1). Objects 10–11 represent a different, flat-disc dual-component form (Type B), whilst spike fragments 8–9 could derive from any of the object types. The presence of at least two dual-component mechanisms, correlates with what was reported by Varley et al. (1937, 447). The suggestion is that all objects excavated remain present in the assemblage, with the potential for loss to archive of a Type A1 lower component (given the points noted above). The technological evolution, however, from an entirely-timber pivot-mechanism, to an iron-shoe working in a timber socket – which the initial 'bowl' shape of Type A1 perhaps indicates – and from there to a dual-component mechanism, seems unproblematic, typogically, and we may as such have the full assemblage. With all this taken into account, the main types are described below, and further detail provided in the catalogue (Appendix 1).

Eddisbury East mechanisms

Bowl-type upper (Type A1) [Posthole 4]

A Type A1 upper pivot-mechanism in the assemblage (nos. 5–7; see Figure 4), reveals an acute concave and convex profile to the bowl – perhaps working to help restrict horizontal movement. This is most likely the type seen in Varley's 1937 archive photograph of Posthole 4 (Figure 5) – demonstrating an upper pivot – with upturned rim, inserted up into the base of the timber upright – with a convex underside, and diameter of 130 mm. The pivot from Posthole 4 was found *c.* 0.30 m below the hollow-way surface, suggesting that the pivot-socket comprised a timber block, sitting in the lower part of the post-pit. In essence, the type provided an iron-shoe to the pivoting gatepost, turning in a lower, timber socket.[4] Typologically, this represented the addition of an iron-shoe to what was presumably a more usual timber ball-and-socket pivot-type. The 'bowl' shape of the iron-shoe perhaps mimicking that of earlier timber sockets, which seems to support this as our first type. The iron shoe was held in place by an iron spike – welded into the bowl, to form a composite object – and driven into the gatepost end. Both Varley's photograph (Figure 5(a)) and the preserved grain direction (on upright spike 2) confirms the spike as having been inserted into the base of the timber gate-post.

Maintenance/repair of the Eddisbury East gate-post mechanisms is indicated by the large size of their associated post-pits, which suggest a degree of re-cutting activity (below). Mechanism replacement seems also to be confirmed by metallurgical analysis (Appendix 2); with mechanical fatigue cracking identified at the base of Type ?A1 spike (Object 2, EDY050) – with torsional stress on the weld joint between disc and spike given as the likely cause for mechanical failure. Distortion of the spike, to the tune of 20°, seems also to indicate gate-post failure. It seems likely that this failure of the bowl-type shoe form (Type A1) might then be implicated in the development of a markedly flatter-profiled, dual-component, iron pivot-mechanism (Type A2). The fact that we have both forms of Type A represented in the postholes of corresponding gate-posts suggests limited time-depth between them.

Dual-component dish-type (Type A2) [Posthole 3]

The Eddisbury East (Type A2) pivot-mechanism more certainly operated as a dual-component object: comprising an upper iron dish (with a shallow convex underside) rotating on a lower iron dish (with an equally shallow concave upper surface). Type A2 had a noticeably gentler profile (dish) compared to Type A1 (bowl). Dish diameter was difficult to reconstruct from the surviving objects, but seems fairly similar to Type A1's 130 mm. Both dishes see composite (welded) square-sectioned spikes; hence Varley's (1937, 447) 'double spike' description. Again, preserved grain direction (evident on all uprights, numbers 1–3 and 8–9) confirms the spikes as having been driven into the flat end of their associated timbers. This suggests not only being driven up into the gate-post timber, but also down into a timber 'socket-block' – what must have effectively been a slice of trunk – sitting in the base of the post-pit beneath.

Eddisbury North mechanism

Dual-component disc-type (Type B)

From Varley et al.'s (1937, 447) description, which draws a parallel to the eastern entrance's 'double-spiked' pivot-type, this entrance must also see a dual-component pivot-mechanism, with upper and lower disc (av. diameter 122 mm, i.e. smaller than the eastern entrance's Type A). This coincides with there being two Type B pivots in the assemblage (nos. 10–11). Type B again had a flatter profile compared to Type A2 – showing typological progression from bowl → dish → disc. The north-west entrance pivot-mechanism represents a significant development from Type A, characterised by the flattening and thickening of the circular disc, now up to 30 mm thick. The square-sectioned composite (welded) spike is retained (length unknown), but appears by now to have been set part way into the disc, instead of being welded into a complete perforation: a further attempt at strengthening the object. As with Type A, the evidence for a lower component/spike again suggests a timber socket-block set in the post-pit base.

From our assessment of the assemblage, it is now clear that the ironwork recovered from the entrances to Eddisbury hillfort do in fact represent hillfort gate-mechanisms, as Varley had it (contra. Avery 1993, 80).[5] Having resolved the character of the Eddisbury assemblage, and the function of the two main types of gate-mechanism discovered, we can now turn to better understanding the wider archaeological context of their initial discovery – in a bid to resolve the date of the objects, and ultimately to produce a full object typology.

Discovering the pivots (1936–1937)

In 1936, Bill Varley found an 'iron-ferrule' in a gate posthole at Eddisbury hillfort's north-west entrance. This entrance was approached by a cobbled roadway inside long 'perfectly symmetrical' inturns (built of horizontal oak beam layers separated by clay) with rounded terminals (Figure 6). The inturns seemed of one-build with the vertical oak uprights of the passage – 0.45 m in diameter and spaced at 2.4 m intervals (Varley 1950; Varley et al. 1936). The passage in its final state was 19 m long, cobbled (with repairs), with a dual-portal 2.0 m wide gateway at the interior: comprising a double-gate in 0.55 m diameter post-pits. On entering, the left gate was slightly narrower (0.8 m) than the right (0.9 m) – with the pivot-mechanism perhaps on the former by analogy with South Cadbury (below). Identification of mineralised wood on the pivot suggests an ash gate-post, as also found at Late Iron Age Hembury (below).

The following year, an *in situ* gate-pivot pair was also found towards the front of the eastern entrance (Varley et al. 1937, Area 3). The pivots were found in front of the entrance recesses, in Postholes 3 and 4 – which were chiselled out of the rock, and set back from the inner vallum's outer face (Figure 7). The 'naturally carbonised' oak gatepost of Posthole 4, was in a circular, stone-packed post-pit (0.85 m diameter at the base, 0.90 m at the surface), and was itself 0.55 m in diameter – essentially a small oak tree trunk – and standing 0.91 m (3 foot) above ground level on excavation, with a 'double-spiked iron shoe' still embedded in its base (Varley et al. 1937, 447; Varley 1950, 29; Garner 2016, fig. 10.27; Figure 7). At *c.* 0.75 m deep – if we accept that the

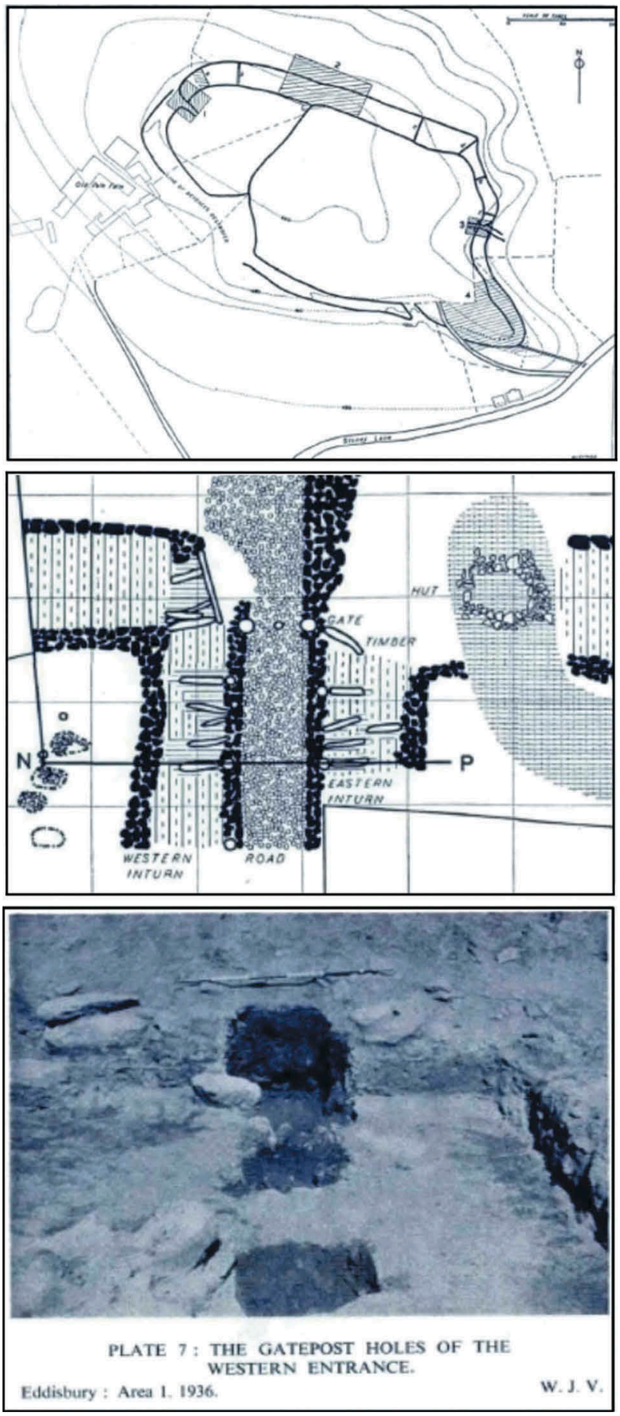

Figure 6. Varley's 1936 excavations at Eddisbury's north-west entrance; gateway photographed looking south-west.

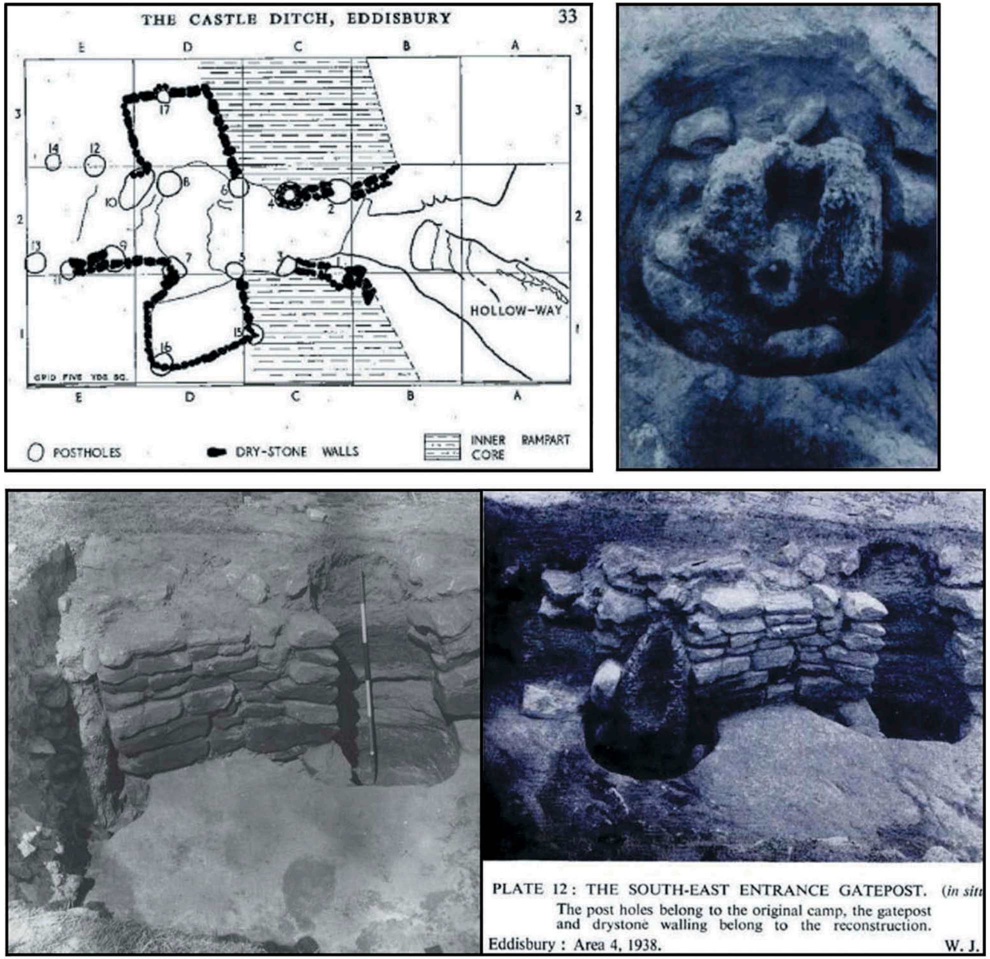

Figure 7. Varley's (1950, fig. 11) plan of Eddisbury's eastern entrance; photographs of Gatepost 4 – standing 3 feet high on excavation (1937) and post sectioned to reveal the iron gate-pivot.

lower 0.20 m was for the pivot-setting, accepting too that roughly 25% of the gate upright was sunk, then the remaining post-pit depth indicates a maximum gate height of 1.65 m (5’ 5½”) – 16.5 cm taller than calculated for its near-contemporary at Middle Iron Age Hembury (below). In its final state, the entrance-passage was 15 m long and lined by seven pairs of very large postholes – in general 0.76–0.86 m in diameter, and 0.91 m or more deep, deepening towards the east – and was ultimately re-faced with drystone walling (Varley 1950, 29).[6] Excavated a year after his timber-to-stone sequence at the north-west entrance, Varley again resolved the timber uprights as earlier than the drystone re-modelling; a relationship that was confirmed on re-excavation in 2011 (Garner 2016, fig. 10.18–10.19, 10.21). With this, Varley (1950) elucidated two structural phases for the hillfort’s eastern entrance:

Phase 1): Hollow-way into sandstone, with seven post-pair timber entrance-passage and southern recess. Varley had the Phase 1 gate as between Postholes 5/6, believing a square depression adjacent to Posthole 6 as a supporting strut. Garner (2016) does not accept this, and sees the gate on Postholes 3/4 – which is also supported here, due to their greater restriction.

Phase 2): Re-modelled drystone entrance-passage; northern recess added (which saw Posthole 8 completely filled in); main gate on Postholes 9 and (recut) 10 (Varley 1950, 29); outer gate (with pivots) now on Postholes 3/4. Varley records the timber-phase postholes (bar 3/4 and possibly 13/14) as now partially blocked up; with Posthole 10 recut to take a new gate. Varley considered Phase 2 to be contemporary with what he thought to be the western extension to the hillfort – which also employed dry-stone, also had an iron-ferrule from a gate posthole, and pottery similar to that from the northern recess in its associated hearths (Varley 1950, 33–34).

Much of Varley’s phasing here remains fundamentally sound – although as we shall see, his idea of a western extension, for which the logic is understandable, seems now to be incorrect. His separation, however, into a timber phase, that is subsequently repaired by drystone, for instance, remains secure. What we can now add to Varley’s assessment of the stratigraphic phasing, however, is a detailed architectural analysis, a structural reconstruction, of the cut features associated with his timber phase – in a bid to further

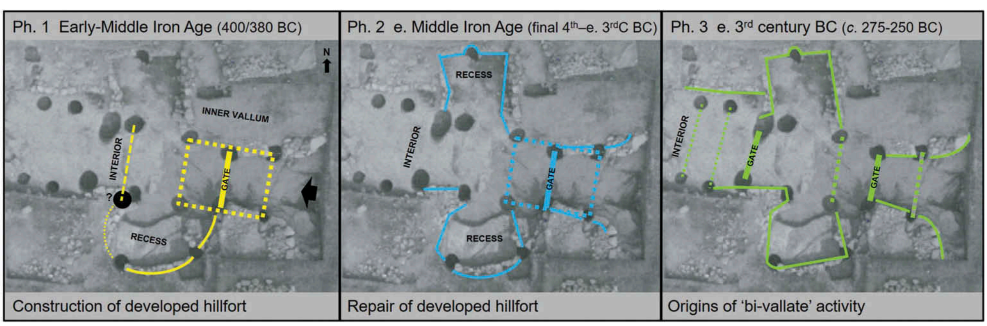

Figure 8. Spatial/structural analysis of Eddisbury’s eastern entrance.

refine the entrance sequence, and resolve the phasing/date of our associated gate-mechanisms, towards developing an object typology.

Eddisbury's entrances: architectural and Bayesian analyses

Architectural analysis of the eastern entrance features has enabled the drawing out of a third structural phase. Varley had in fact noted this in the stratigraphy, but failed to resolve the issue further: the proximity of Postholes 8/10 suggested to Varley (1950) that Posthole 10 replaced Posthole 8 on insertion of the northern recess; after which Posthole 10 was subsequently re-cut (10b) to achieve a narrowing of the passage (see Figures 7(a)). Here Varley accepts three phases of activity, but did not relate this back more broadly to entrance passage design. Similarly, Garner (2016) continued simply to accept all cut features as broadly contemporary. Instead, detailed analysis of the structural arrangement of the architectural features, as linked to the excavated sequence, has now resolved three main construction phases for the eastern entrance, as well as a late-stage repair:

E. Entrance Ph.1: A distinct structural unit exists between Post-pairs 1–4, which have good axial symmetry,[7] equidistant row spacing, and similarly sized postholes – suggesting a cohesive design unit (see Figure 8). The post-rows of Pairs 1, 3 and 4 are in alignment, with Pair 2 sitting slightly in, narrowing the passage for the gate. All four pairs are covered by Varley's Ph.2 drystone, suggesting broad contemporaneity. An issue exists with Postholes 7 and 8; with the original pair to Posthole 8 apparently remaining unexcavated (by both Varley and Garner) beneath the Ph.2 southern recess wall, and Posthole 7 instead a later addition, associated with its Ph.2 re-modelling.[8] Outermost pair (Postholes 1/2) were recorded as the widest post-pits (1.2 m in diameter) – their great dimensions suggesting most repair and apparently support for a bridge, with collapsed oak beams lying nearby on the hollow-way (Varley et al. 1937). In roundhouses, the average diameter of a roof-bearing feature is 0.30 m (Pope 2008), so at four times this – admittedly following three major phases and four centuries of use – it is likely that they supported a superstructure. Avery (1993, 79) saw a gate-house on a square with Postholes 5/6 – also accepted here. By analogy with Rainsborough, this might suggest an Early Iron Age date. As such, the Ph.1 architecture constitutes a bridge (Postholes 1/2), gate (Postholes 3/4), gatehouse (Postholes 1/2/5/6), revetment pair (Postholes '7a'/8); and a southern C-shaped stone-lined recess (Postholes 3/7a/15/16) (Figure 8).[9] With repair evident in the replacement of Posthole 6 (F410) with a new, adjacent timber to the east (Garner 2016, fig. 10.31).

E. Entrance Ph.2: Replacement of Ph.1 timber uprights – e.g. Posthole 3 has two phases (initially for gate/recess post; with Ph.2 walling subsequently laid over the top fill (see Garner 2016, fig. 10.29, Posthole 413). Posthole 2 also has two phases (initial cut; subsequent recut and walling) (Varley 1950, pl.12). Posthole 8 is de-commissioned and backfilled, (hypothetical/unexcavated) 7a is built over, and replacement Posthole 7 dug (see Figures 7(a) and 8(a)). The passage sees the addition of drystone facing,[10] involving re-modelling of the southern recess as recti-linear (on Postholes 5/7), and addition of the northern recess (on Postholes 6/10). The dimensions of Post-pair 5 are more akin to Pairs 1–4, revealing a Ph.2 association with the recesses. Ultimately, the axis of Post-pair 5 shares greater alignment with Pairs 6/7 when redesigned as the Ph.3 gate.

E. Entrance Ph.3: Less-repaired Post-pairs 6/7 present a distinct axial symmetry, and are similarly spaced and sized – their axis (further south of East) differs from that of Pairs 1–4. Their smaller dimensions, indicating a lack of repair, suggest that they are the 'youngest' features. Varley noted that Postholes 13/14 were only 0.30 m deep, and (like Posthole 3, the gate-post) were crucially also not decommissioned by his stone Ph.2. Postholes 9 and 10 share a greater degree of alignment with Post-pairs 6/7. Posthole 10b is also smaller (more akin to the dimensions of Postholes 11–14) with Pair 5 re-modelled as the interior gate, and Postholes 3/4 now performing an outer gate role.[11]

The lack of drystone between the exterior gateposts and the easternmost recess uprights reveals that the gateway/porch and recess area were considered discrete zones by the Iron Age designers/builders (see Figure 7(a)). Both recesses seem to have been 'squared up' in this phase – increasing their structural strength (Figure 8).[12] Varley records the drystone of the southern recess as all one phase, and as overlying the Ph.2 posthole fills (9, 7, 16, 15): therefore of Ph.3. From this, we know that the interior gateway was established during Ph.3, as the recess drystone respects the location of an upright in Posthole 11, part of the interior gateway arrangement. With the Ph.3 drystone also contiguous with the packing of the exterior gatepost in Posthole 4, the implication then is that Ph.3 ultimately had two gateways: one old, one new. As such, we might conclude that design problems – including mechanical failure of one of the gate-mechanisms – Type A1, Posthole 4 (see Appendix 2) – might help to explain construction of a smaller, Ph.3 interior gateway – notably *without* an iron mechanism. The internal gate perhaps compensating for problems already encountered at the older, exterior gate.

In the porch area, Varley (1950, fig. 11) recorded what appear to be two skins of drystone from the Ph.2 gate outwards, revealing a Ph.3 re-fashioning/narrowing of the entrance (see Figure 7(a)). In fact, Varley's (1950, fig. 11) earlier skin of 'drystone' seemed, on further excavation, simply to constitute the stony edge of the inner vallum (see Garner 2016, fig. 10.25–10.26). In Varley's plan, this earlier phase always respects the Ph.2 postholes, located towards the rear of the cut (e.g. see northern recess – Varley 1950, fig. 11). Meanwhile, Varley's later (Ph.3) drystone walling is recorded as sitting above the Ph.2 posthole fills, and is apparently flush with the Ph.3 posts (e.g. see Varley's southern recess) – suggesting an episode of Ph.3 timber repair. As such, it is within this phase (Ph.3) that our gate-mechanisms most likely sit.

E. Entrance Ph.3 repair: The drystone walling associated with the outermost posthole pair (Postholes 1 and 2, Garner's 412 and 414) suggests a final repair to the outermost post-pair (see Garner 2016, figs 10.26–10.30). Similarly, a re-facing of the Ph.3 drystone between Postholes 9 and 11 (i.e. behind the new gate) recorded by Varley (1950, fig. 11) must also be later in Ph.3. The final repairs to the exterior and interior of the passage-way – those areas dealing with most attrition – represent the final maintenance of the eastern entrance, but seem not to affect the gateposts or exterior gate-mechanisms (which may have already been decommissioned by this point). Taking into considera-tion our dating of the entrance sequence (below), this repair activity can be seen as taking place in the later third century BC, perhaps pushing abandonment of the eastern entrance towards the end of that century or into the second century BC.

Table 1. C-14 dates associated with Eddisbury's 'developed' hillfort phase; calibrated using OxCal v4.3.2 Bronk Ramsey (2009); r:5 IntCal13 atmospheric curve.

Date	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)	1 sigma range (68% confidence)	Context
'developed' hillfort construction					
NZA-36648	Barley grain	2483 ± 25	780–510 BC	770–540 BC	Pre-vallum ?land surface (Garner, Trench 7). *TPQ* for 'developed' inner vallum construction.
SUERC-59215	*Alnus* charcoal	2303 ± 31	410–260 BC	400–370 BC	Destruction layer above repaired Late Bronze Age palisade, in advance of 'developed' inner vallum construction (Mason & Pope, Merrick's Hill). *TPQ*.
SUERC-59217	*Alnus* charcoal	2342 ± 31	420–380 BC	410–390 BC	'developed' inner vallum core (Mason & Pope, Merrick's Hill). Material technically a *TPQ*.
NZA-36593	Emmer/spelt wheat grain	2260 ± 25	400–210 BC	390–250 BC	'developed' inner vallum core (Garner, Trench 7). Material technically a *TPQ*.
NZA-36656	Wheat grain	2347 ± 20	410–390 BC	410–390 BC	Hearth sweepings overlying inner vallum tail at eastern entrance (Garner, Trench 4). *TAQ* for 'developed' inner vallum construction.
'developed' hillfort use					
NZA-36653	*Prunus* fruit stone	2203 ± 20	370–190 BC	360–200 BC	Upper fill of posthole in 'developed' hillfort interior (Garner, Trench 12).
end of Ph.1 eastern entrance					
NZA-36592	Hazelnut shell fragment	2176 ± 25	360–160 BC	360–190 BC	Burning of Phase 1 recess (Garner, Trench 4). *TAQ* for 'developed' inner vallum construction. TPQ for Phase 2 recess.
Counterscarp bank/origins of bivallation					
Beta-317521	Charcoal	2410 ± 30	740–400 BC	540–400 BC	Pre-counterscarp bank ?land surface. *TPQ* for counterscarp formation, i.e. initial ditch clearance activity (Garner, Trench 14).
NZA-36654	Indet. roundwood charcoal	2251 ± 25	400–200 BC	390–230 BC	Outer ditch (beyond counterscarp bank): Charcoal lense above sterile primary silts (Garner, Trench 3).

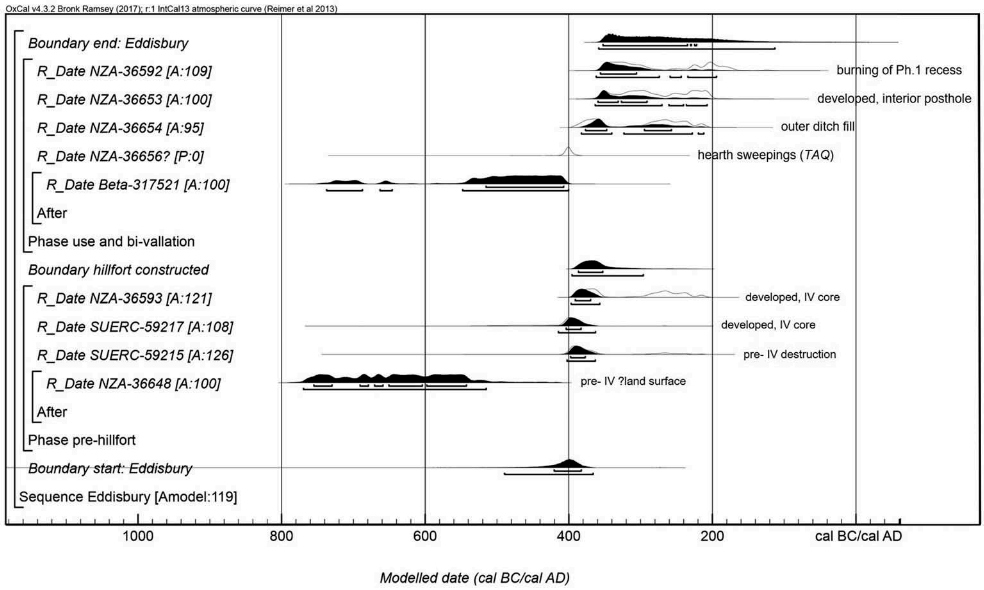

Figure 9. Chronological model for the radiocarbon-dated sequence at Eddisbury hillfort. The probabilities in outline are the result of simple calibration, whereas those in black are the product of the chronological model. Note NZA-36656 is only shown outlined and has a '?' appended to the label as it has been excluded from the modelling for reasons given in the text. The square brackets down the left-hand side define the model structure.

What we have resolved then, via a combination of architectural analysis and the recorded stratigraphy, is that there were in fact three major construction phases at the eastern entrance – developing Varley's accepted two-phase sequence. It is the third of these major construction phases, that sees the incorporation of our gate-mechanisms. At least one of the mechanisms subsequently failed (Type A1), resulting in typological development (Type A2), and presumably what ultimately results in construction of a smaller interior gateway, later in that phase. There is then a subsequent repair event(s) – to the interior and exterior of the passage only – and, by this time, maintenance of the (failed) exterior gate seems not to have continued, ahead of abandonment of the eastern entrance more generally.

Dating Eddisbury hillfort

Having resolved a developed archaeological sequence for Eddisbury's eastern entrance, via analysis of both the established stratigraphy and a detailed architectural assessment, the next stage – in moving towards dates for our gate-mechanisms and thus development of a typology – was working to date the newly established eastern entrance sequence. This was achieved via a combination of both known architectural parallels in the archaeological literature, alongside the modelling of nine new radiocarbon dates from recent excavations (Garner 2016; Mason and Pope 2016b) within a Bayesian chronological framework, to estimate the date of construction of the developed hillfort (Table 1; Figure 9).

The Bayesian modelling uses the OxCal v. 4 program (Bronk Ramsey 2009) and follows more generally the methodology presented in Bayliss et al. (2007), Hamilton and Kenney (2015), and Whittle, Healy, and Bayliss (2011). The radiocarbon dates were grouped into two distinct and contiguous phases of activity. The first group represented material that could be considered to pre-date the inner vallum, and included the pre-vallum land surface (NZA-36648), material found in a burning layer above the repaired Late Bronze Age palisade (SUERC-59215), and samples from the inner vallum core (NZA-36593 and SUERC-59217). The second group is from contexts that are thought to post-date the construction of the 'developed' hillfort, including Garner's 'hearth sweepings' that overlay the inner vallum tail (NZA-36656), material from the burned Phase 1 recess (NZA-36592), a sample from a charcoal lens above the primary silts in the outer ditch (NZA-36654), and another sample from the upper fill of a posthole in the interior of the 'developed' hillfort (NZA-38853).

There is also a result (Beta-317521) on a sample from the land surface beneath the outer vallum. This has been included in the second phase of the model because the period relates to the further development of the hillfort and its bi-vallation. However, in the case of both results from pre-vallum ground surfaces, the results are only included as *TPQ* since the dated material are not likely to have a direct functional relationship to the contexts. A primary model had poor agreement between the radiocarbon dates and the archaeological information (Amodel = 43). Garner's radiocarbon date from a grain (NZA-36656) in the 'hearth sweepings' that overlie the inner vallum tail at the eastern entrance had a very low individual agreement (A = 13), suggesting that this result was either from a residual grain or a statistical outlier.[13] As a result, NZA-36656 was excluded from the modelling, which results in good agreement (Amodel = 119). This modified model has been used to provide the robust Bayesian chronology for the site.

E. Entrance Ph.1: developed hillfort (ultimate Early Iron Age; 400/380 BC)

The dated material from contexts that pre-date the construction of the inner vallum indicate that the activity that resulted in its production began in *490–365 cal. BC* (*95% probability*; Fig. RC-1; *start: Eddisbury*), and probably in *425–380 cal. BC* (*68% probability*). The 'developed' hillfort phase began in *400–295 cal. BC* (*95% probability*; Fig. RC-1; *hillfort constructed*), and probably in *390–350 cal. BC* (*68% probability*).[14] From the archaeological literature, the single C-shaped recess provides an Early Iron Age date from parallels at Rainsborough, Leckhampton, Moel Hiraddug (Avery 1993; Cunliffe 2005).[15] Similarly, the approach to the entrance – along a hollow-way, funnelling from a 2.8 m wide splayed entrance, along an 8 m long timber passage into a gatehouse structure (5.5 m long), to a 2 m wide bridged gateway, before widening again to 3 m beyond the gate – might suggest a sixth/fifth century BC date, by analogy with passage length at Danebury.

The radiocarbon modelling suggests that the 'developed' hillfort phase, around the eastern side of Eddisbury Hill (and back onto Merrick's Hill) began at around 400/380 BC. Meanwhile the architectural traditions (C-shaped recess, 8 m long passage) are considered later Early Iron Age by analogy, suggesting that the Ph.1 eastern entrance might be considered of ultimate Early Iron Age tradition.[16] Niall Sharples has previously given a 450 BC date for *developed hillfort* construction at Maiden Castle (Dorset), however this is not based on absolute dating (1991a, 1991b, 83). A more general 400 BC start-date is preferred by Cunliffe (2005, 388) – and this latter seems more consistent with the new C-14 results from Eddisbury.[17] A 400 BC date is also currently accepted in the British settlement record more generally as one of major social change (Pope and Haselgrove 2007, 8).

In a more general sense, our dating of the 'developed' hillfort phase at Eddisbury to the early fourth century BC is in line with a general episode of Iron Age hillfort construction activity identified between the mid-fifth and mid-fourth centuries cal. BC, and not long after the start of the main phase of occupation at Danebury hillfort (Hampshire), in the closing decades of the fifth century cal. BC (Hamilton and Haselgrove 2019; Haselgrove et al. forthcoming). It also sits well with a *c*. 400 BC peak in the number of houses per settlement recorded in the Iron Age settlement data, which is then followed by a sharp increase in the number of 'sister settlements' (Pope and Haselgrove 2007, fig. 2). The suggestion being, in the evidence from both hillforts and settlements, that there was somewhat of a population 'boom' at around 400 BC. Further dating of well-chosen, taphonomically secure samples has the potential to refine the current chronological framework even further.

E. Entrance Ph.2: repair of developed hillfort (final fourth–early third century BC)

This phase sees drystone facing of the entrance passage (around the earlier timber uprights) and recti-linear recesses. Similarities in the drystone construction technique of the northern recess and passage were noted on re-excavation, with the posthole packing-stones found to be incorporated into the drystone walling, the drystone apparently constructed around the *in situ* timber uprights (Garner 2016, 163). Garner concluded that the drystone walling was a broadly contemporary 'embellishment' and not separated by any very great time-depth from the timber of Ph.1 (Garner 2016, 159). The suggestion is that the new drystone lining was linked to an episode of entrance-timber maintenance. As such, with a *TPQ* of *365–195 cal BC* (*95% probability*; Fig. RC-1; *NZA-36592* – burning of the Ph.1 recess), and probably *360–305 cal. BC* (68% probability) (Table 1) this entrance remodelling might be considered late fourth–early third century BC in date, with paired recti-linear recesses generally considered to be of the fourth/third century BC (Pope and Swogger forthcoming, Table 4).

Table 2. Architectural changes at the entrances to Eddisbury's Iron Age hillfort.

Entrance	Gateway width	Passage length	Period	Date	Hillfort	Design changes
NW Ph.1 NE	est. 7 m -	Width of vallum	EIA	?6th/5thCs BC	Uni-vallate	- -
East Ph.1	2.0 m	8 m	EIA-MIA	400/380 BC	Developed	East entrance established, C-shaped recess
East Ph.2	2.0 m	12 m	MIA	final 4th–e. 3rd century BC		East entrance repaired: R-L recess pair, drystone
East Ph.3	2.4 m	15 m		e. 3rd century BC (*c*. 275–250 BC)	Bi-vallate	Interior eastern gate built; NE entrance abandoned
NW Ph.2–3	2.0 m	19 m	late MIA-e. LIA	2nd/e. 1stC BC	LIA	East entrance abandoned

E Entrance Ph.3: origins of bi-vallation (early third century BC)

This phase represents a re-modelling, with the old outer gate receiving iron pivot-mechanisms (due to its enormous size): one of which subsequently failed, leading ultimately to construction of a smaller, interior gate. This final phase of the eastern entrance constitutes a 15 m long entrance-passage – which, by analogy to other hillfort passageways, might indicate a fourth/third century BC date (Pope and Swogger forthcoming, Table 2; Cunliffe 2005). The modelled date at Eddisbury, from a charcoal lens above a 'series of fairly sterile' primary silts in the outer ditch, provides a *TAQ* for counterscarp bank construction, with a bimodal estimate of either *385–340 cal. BC* (*46% probability*; Fig. RC-1; *NZA-36654*) or *325–210 cal BC* (*49% probability*), and probably either *380–345 cal BC* (*42% probability*) or *295–255 cal BC* (*26% probability*) (Table 1).[18] By analogy, an early fourth century BC date seems overall too early for this type of activity. As a result, taking into consideration Bayesian modelling, work elsewhere on architectural analogies, and the dating of the previous architectural phase, counterscarp bank construction at Eddisbury – arguably the origins of the process of bi-vallation – might currently be seen as having an early third century BC date. Future work is needed on this, however, with further dating of taphonomically-secure samples from outer earthworks now a priority for future work.

What we have from this modelling of the Eddisbury hillfort C-14 dates is a first step towards absolute dating of both *developed hillfort* construction/repair, and also counterscarp bank formation – arguably the origins of bi-vallation (Table 2). We see construction of the 'developed' hillfort (400/380 BC) – as relatively contemporary with the accepted date for *developed hillforts* in Wessex. Subsequent repair of the 'developed' hillfort's eastern entrance – timber maintenance in the passage, recess re-design /addition, and related drystone facing – took place broadly three generations later (final fourth–early third century BC). The question then becomes whether this maintenance activity might be contemporary with the development/formation of the counterscarp bank, with its similar, early third century BC date. The shift in structural design/layout, however, between Ph.2 and Ph.3 (including a refashioning of the Ph.2 recesses, and provision of an interior gate) does suggest time-depth between the two builds – perhaps pushing the latter phase into the second quarter of the third century BC. The dated gateway sequence at Eddisbury hillfort (Table 2) is in line with changes noted more generally at southern English hillforts – the narrowing of the passage at the new gate, via Posthole 10, to 2.4 m wide seems to reflect a broader trend for narrowing entrances at *c*. 300 BC (see Pope and Swogger forthcoming) – although here believed slightly later (*c*. 275–250 BC). The lack of modification at Eddisbury's eastern entrance following the final Ph.3 repairs (later third century BC) may suggest cessation of use of that entrance by or during the second century BC.[19] A 'heap' of slingstones discovered near Posthole 7 (southern recess) presumably date to the abandonment of the entrance.

Resolving the north-west entrance sequence

Regarding the north-west entrance, Iron Age A1-A2 ceramic from associated hearths seems to suggest an Early Iron Age date for the inner vallum in the northern part of the site (Varley and Jackson 1940, 69) – with the 1950 plan demonstrating the inturns as having

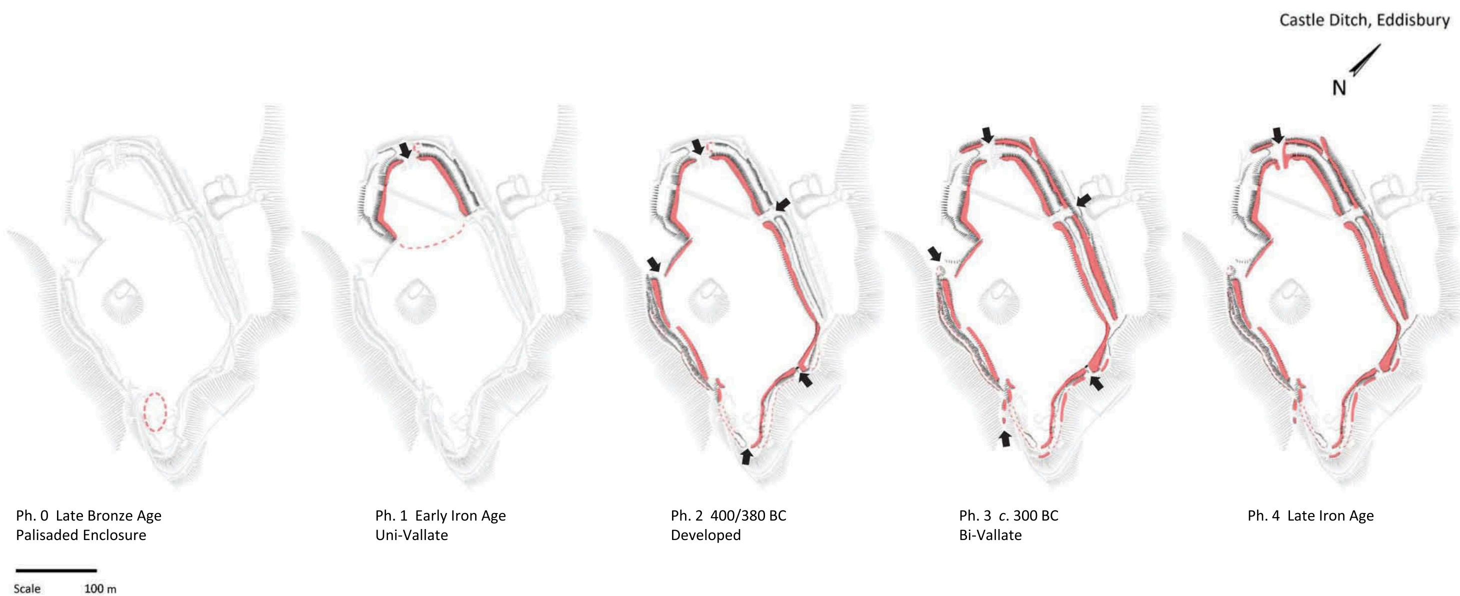

Figure 10. Revised later prehistoric sequence for Eddisbury hillfort.

been built onto the inner vallum at a later date. Varley's (1950) section reveals the drystone of the passage as again a later re-facing, as also found at the eastern entrance, leading him to believe the two to be contemporary (1940, fig. 8, 1964, 99).[20] Unlike at the eastern entrance, however, the drystone walling at the north-west in fact *covers* the passage uprights, preserving only the gateway. The 19 m long passage might suggest a final Middle Iron Age date (Pope and Swogger forthcoming; Cunliffe 2005), with its drystone re-facing (repair) activity potentially pushing that into the early decades of the first century BC. As such, the date of our Type B gate-mechanism seems to lie in the early part of the Late Iron Age, later than the (early third century BC) mechanism-pair at the eastern entrance, which are of a distinct type. From the available evidence then, Eddisbury's north-west entrance had at least three major construction phases:

Ph.1) Early Iron Age (univallate hillfort): original entrance (est. 7 m wide) through the inner rampart (not revealed).

Ph.2) late Middle Iron Age: inturns, ultimately 19 m long timber passage; narrower (passageway: 3.7 m wide).

Ph.3) early Late Iron Age: drystone re-facing; narrowing the passage further (2.7 m wide). Double-gates (2.0 m wide gateway; postholes 0.55 m wide with a 0.30 m diameter centre-stop). *In situ* gate-mechanism presumed to be of this phase.[21]

A new sequence for Eddisbury hillfort

Having resolved the sequences at both entrances, and resolved the date of the *developed hillfort* via Bayesian modelling, a revised sequence for Eddisbury hillfort can now be offered (Figure 10). This is quite different to that envisaged by Varley (1950, fig. 10), as revised by Cotton (1954, 61–62) – interpretations that went on to be retained by Avery (1993). Varley (1950, 29, 1964) considered the eastern earthworks to be earlier than the western – somewhat understandably, due to the discovery of late features at the north-west entrance. We now accept that whilst the *final stage* of the north-west entrance is indeed late, the earthworks in this area seemingly had 'Iron Age A' origins: as indicated by ceramic in associated hearths.[22] It is the late-phase north-west entrance that confused Varley's Eddisbury sequence. Similarly Cotton (1954) was mostly concerned with seeing Varley's timber-lacing as early – and thus evidence against his claims of *murus gallicus* (see Prtak 2019) – and whilst this did work to recognise a univallate 'extension' (our *developed* phase) it continued to see development of the enclosure from east to west rather than, as now proposed, from west to east. This rethinking of the sequence is only something that has made possible, however, through further excavation and radiocarbon dating of the eastern earthworks.

Settlement on the hilltop begins with a small Late Bronze Age palisaded settlement on Merrick's Hill to the east, succeeded by an Early Iron Age univallate enclosure at the west. IA A ceramics from hearths associated with the inner vallum at the north-west entrance suggest this as the location of an original Early Iron Age univallate enclosure (est. 1.3 ha).[23] At around 400 cal. BC, in line with changes further south, a developed hillfort (3.7 ha) begins to be constructed across the whole hilltop – and down the

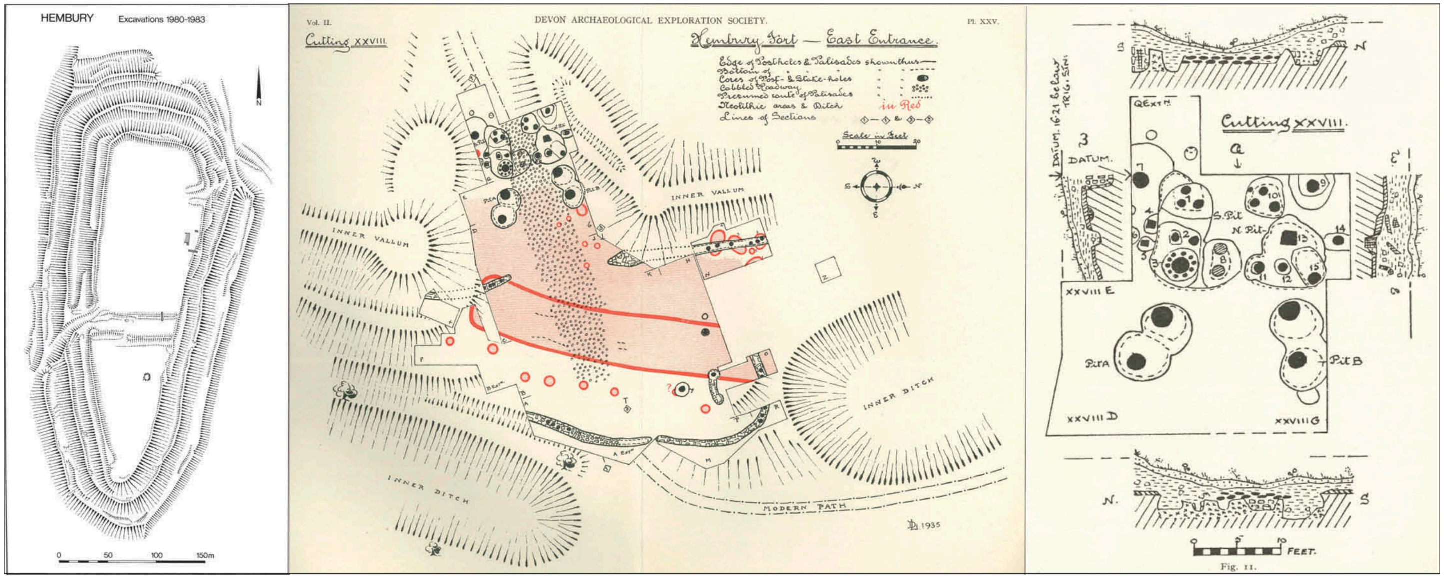

Figure 11. Hembury hillfort (after Todd 2002, fig. 1); and Dorothy Liddell's 1934-35 excavations at the north-east entrance (Liddell 1935, plate 25 and fig. 11).

contours at the south-east, to again incorporate Merrick's Hill – with as many as five, or perhaps even six, entrances (Figure 10). Associated architectural parallels (e.g. C-shaped recesses) are currently considered Early Iron Age in date, so architecturally, we see this as of ultimate Early Iron Age tradition – the social change, however, is that of the start of the Middle Iron Age. After three generations, the timbers at the eastern entrance passage were repaired, with a new recti-linear recess pair, and drystone facing (final fourth–early third century BC). Finally, at broadly the same time that Eddisbury's counterscarp-bank was beginning to form (early third century BC) a new, deliberately narrowed, eastern gateway was built (*c.* 275–250 BC) as the northern hillfort entrance was formally abandoned. Within two generations, the eastern entrance too was abandoned (early second century BC). The lack of multivallation at Eddisbury suggests a decline in activity towards the end of the Middle Iron Age, with regional cessation of hillforts noted more generally for the north-west during the second century BC (Rule 2018).[24] Meanwhile at Eddisbury, the largest hillfort in the region, occupation continued with a focus now on the north-west entrance, continuing down to perhaps as late as 80 BC. The fact that the construction sequence at Eddisbury (Cheshire) seems to mirror that typical of central southern England, rather than west to North Wales is particularly interesting, and perhaps linked to a similarity in land use in this lower-lying region.

In summary, the date of the *in situ* iron gate-mechanism of Eddisbury East seems most likely linked to Phase 3 of the entrance sequence (i.e. early third century BC). This because the packing stones for the gate-post were built into the Ph.3 drystone facing (Garner 2016, 159) and there is no stratigraphic evidence for further repair to that

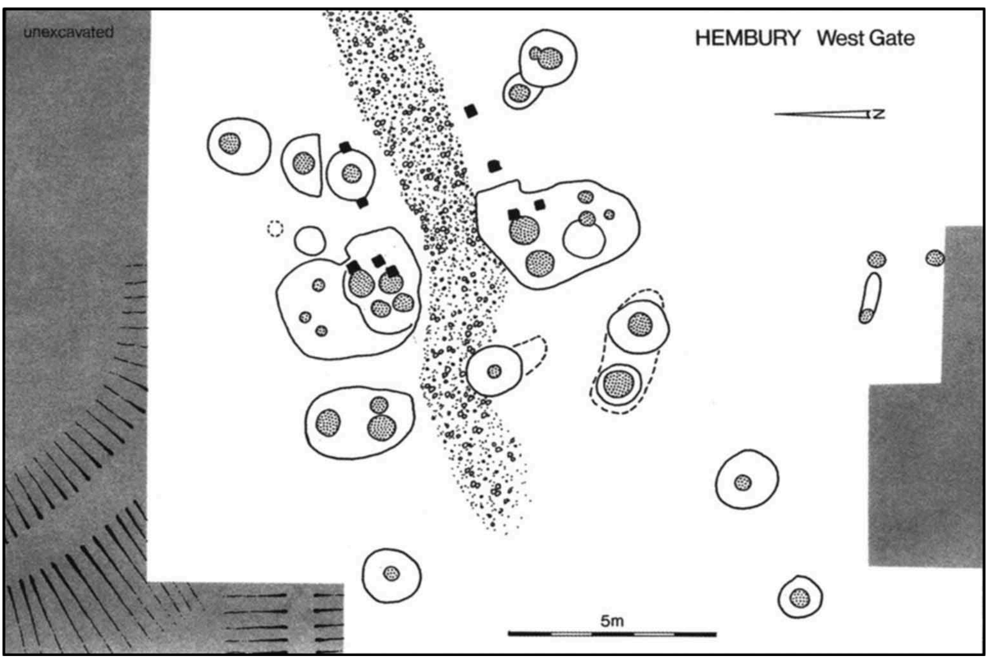

Figure 12. Early Roman gate at Hembury's west entrance - squared Roman stakes in black (Todd 2007).

posthole after this time. The architectural evidence seems to suggest that the mechanism remained *in situ* until abandonment of the eastern entrance in perhaps the early second century BC, the exterior gate seemingly having already been decommissioned. As such, the Eddisbury East gate mechanisms (Type A, early third century BC) are the earliest known example of this object class. The fact that we see development of the Type A mechanism even within Postholes 3 and 4, suggests time-depth – evidence for gate-mechanism replacement over time; with Type A then developing further into Type B (at the north-west entrance) by the early first century BC.

Recontextualising a parallel from Late Iron Age Hembury

Our first parallel for the Eddisbury gate-mechanisms originates from Dorothy Liddell's 1930–35 excavations of the small (2.1 ha) multivallate hillfort of Hembury (Devon) (Figure 11), archived at the Royal Albert Memorial Museum (Exeter). The Hembury example was found at the hillfort's north-east entrance. Liddell considered the eastern entrance to be broadly contemporary with the western entrance – an understanding verified by the present study (i.e. one entrance did not replace the other). The pivot was found in Posthole 12 – part of a palimpsest of entrance settings, including multi-post pits packed with 'stiff clay' that had solidified into a 'rock-hard' substance, harder even than the ground (Liddell 1935, 144–148) thus providing a very solid foundation for the entrance furniture. The gate-pivot was described by Liddell as 'the iron shoe of the gate post' fit for a post 0.11 m in diameter (Liddell 1935, 156–157, 164). Providing a date for the Hembury pivot required a full contextual re-analysis of the hillfort sequence; involving re-assessment of Liddell's reports (1930, 1931, 1932, 1935) coupled with the

Table 3. Hembury's 'tranverse-banks': Ceramic and slingstones from Liddell's (1930) excavations. Liddell ceramic types (after Cunliffe 2005, 106) are: a) ?EIA coarse-tempered; b) undecorated, incl. saucepan pots (end of fourth century BC by analogy with Danebury); c) Glastonbury ware (?second century BC); d) burnished Glastonbury-Blaise Castle Hill type (third-first centuries BC). Northern transverse-bank: dark grey = Ph.1 (second century BC); light grey = Ph.2 (Late Iron Age) – with Ph.2 contemporary with single-phase southern transverse-bank.

	Southern transverse-bank										Northern transverse-bank			
	Cutting 3		Cutting 5a		Cutting 5b		Cutting 2a, d		Cutting 2b		Cutting 2f		Cutting 2g	
	(western ditch)		(western ditch)		(eastern ditch)		(eastern ditch)		(eastern bank)		(ditch)		(bank)	
Layer	Ceramic	SSs	Ceramic	SSs	Ceramic	SSs	Ceramic	SSs	Ceramic	SSs	Ceramic	SSs	Ceramic	SSs
1	None	93*	None	1	type c	8	None	7	-	-	None	32	None	25
2	None	14	None	3	type b	2	None	8	type a, c	15	type c, d	105	type b, c	14
3	None	3	None	11	type d**	8	type b	5	type a, b	17	type c, d	31	type c	30
4	None	1	None	1	type b	1	type a***	2	type a, b, c	11	type b, d	3	type b, c****	47
5	-	-	-	-	-	-	-	-	-	-	None	3	type a, b, c	207
6	-	-	-	-	-	-	-	-	-	-	-	-	None	14

*Hoard of 50 slingstones [text (1930, 53) says Layer 2, but table suggests Layer 1].
** Text adds in type D (1930, 57); LIA vessels include MC war-cemetery type bowls (P.11, P.34), pedestal base (P.26), wheel-thrown jar (P.27).
*** Text adds in La Tene II ceramic (MIA).
**** probably the hearth deposit mentioned in text (1930, 52).

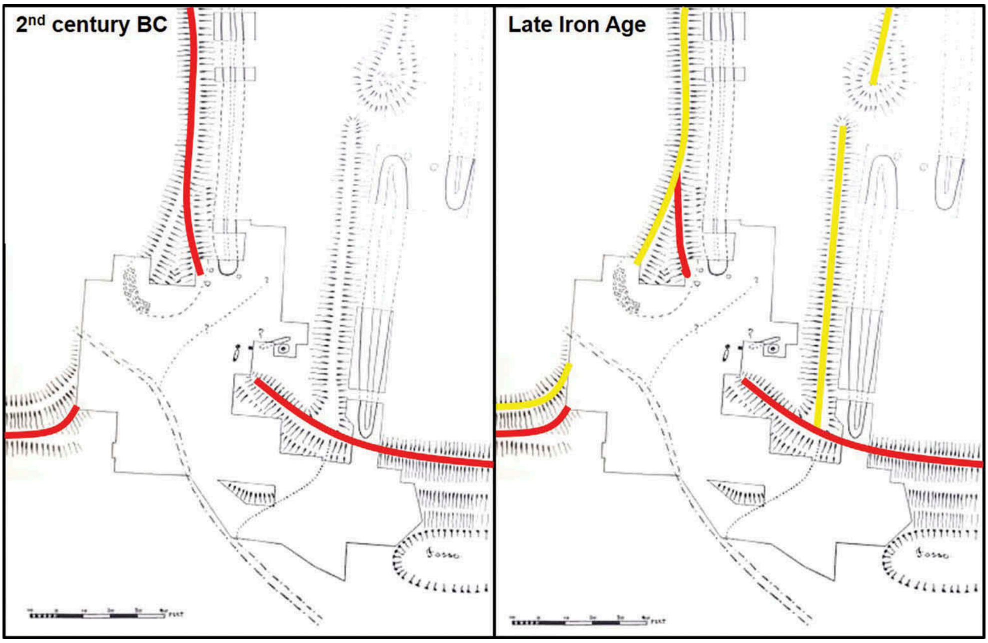

Figure 13. Phasing Hembury's interior earthworks: a) second century BC; b) Late Iron Age (after Liddell 1932).

integration of RAMM (1935), Todd (1984a, 1984b, 2002, 2007), and Avery (1993). This work on the stratigraphy and architecture works in advance of a re-assessment of the ceramics and primary archive by Eileen Wilkes (University of Bournemouth). In order to help resolve the hillfort sequence at Hembury, and ensure that we have all the information necessary to help us date the north-east gate-mechanism, we begin first by re-considering Liddell's western entrance sequence, as debated by Malcolm Todd in the 1980s.

Hembury's western entrance sequence

Akin to Varley at Eddisbury, Liddell (1932) identified just two phases at the western entrance – largely in separating out the 'transverse banks' as Belgic (i.e. Late Iron Age) rather than La Tène II. In addition, subsequent study by Avery (1993, fig. 55) and Todd (1984a; Todd 2007) drew out an additional early Roman phase (comprising squared 0.26 m stakes; Figure 12) on a 3 m square plan by analogy with the north-west gate of the Conquest-period Roman fort at Hod Hill (Richmond 1968, fig. 42A).[25] Now, following full consideration of Liddell's stratigraphy, and related subsequent literature, we now believe we have resolved the phasing and dating of the 'transverse banks' as two separate phases, originating in the second century BC and becoming consolidated during the Late Iron Age (Table 3; Figure 13) – i.e. largely in agreement with Liddell.[26] The term 'transverse bank' itself is erroneous, however, as these features across the middle of the hillfort (see Figure 11(a)), actually form part of more extensive interior enclosure earthworks (below). Adding this to a consideration of the

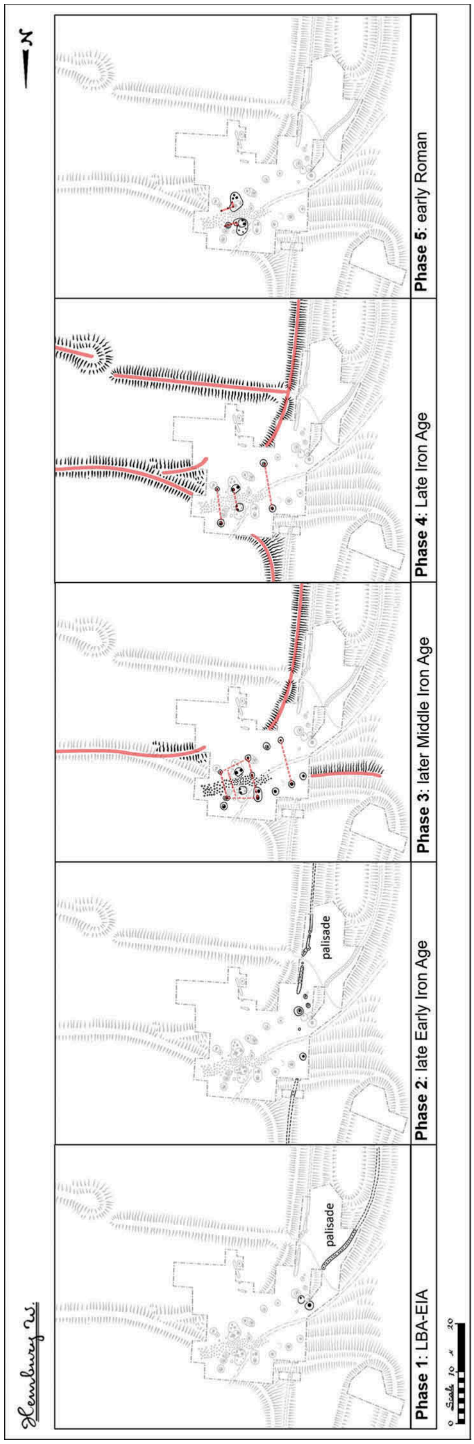

Figure 14. Phasing of Hembury's western entrance architecture.

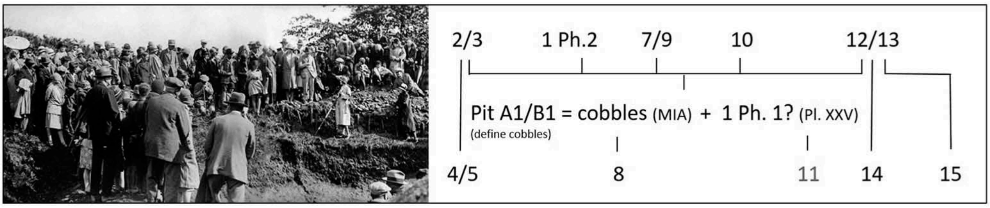

Figure 15. Dorothy Liddell speaking to the Devon Archaeological Exploration Society on site in 1930 (Source: hemburyhillfort.co.uk); Reconstruction of Liddell's (1935) matrix for the north-east entrance features (only 11 seems not as she had it).

architectural layout of all features found at the entrance, we can now identify five distinct architectural phases at Hembury's western entrance (Figure 14):

(1) **Late Bronze Age-Early Iron Age**: outer palisade
(2) **Late Early Iron Age**: inner palisade and potential dual-portal entrance
(3) **Late Middle Iron Age**: trapezoidal design, dual-portal entrance, southern interior enclosure (second century BC)
(4) **Late Iron Age**: linear design, metalling with cart tracks, around still-extant MIA dual-portal entrance, northern interior enclosure, redesign of southern enclosure
(5) **Early Roman**: squared and rounded stakes, refurbishment/narrowing of LIA gateway

Thus the western entrance – considered here the 'animal' entrance (below) – seems, at its earliest inception, to have represented the earliest/original entrance to the site (during the Late Bronze Age). What we also find is a greater degree of continuity and respect between architectural elements during the first three phases, indicating limited time-depth between the second palisaded enclosure and the first phase of the hillfort.[27] We find a real distinction between the western and northern entrances. Whilst the northern entrance receives a pivoted gate, the western appears to reveal more the architecture of animal movement: a funnelling approach, development of a hollow-way, offset entrances, and ultimately a separate enclosure. The proximity of the western entrance to the river may be important, perhaps suggesting cattle. A persistent theme across time seems to be directing animals into the south of the site. As such, the subsequent division between a larger northern interior and a smaller southern enclosure (accessed from the east and west respectively) during the second century BC seems to have been there, in design terms, right from the beginning of the site. What was a much earlier use of space then became increasingly formalised in the late Middle Iron Age, as animals were progressively separated-off, physically, from the northern area of the enclosure. This division between north and south, sees remodelling again in the Late Iron Age, further formalizing separation, and re-structuring animal movement from the west. In the early Roman period, it is this western (animal) entrance however that becomes the area of most focus, which Todd (2007) attributes to proximity to river access. Revealing a disjuncture between Iron Age and Roman use of the site.

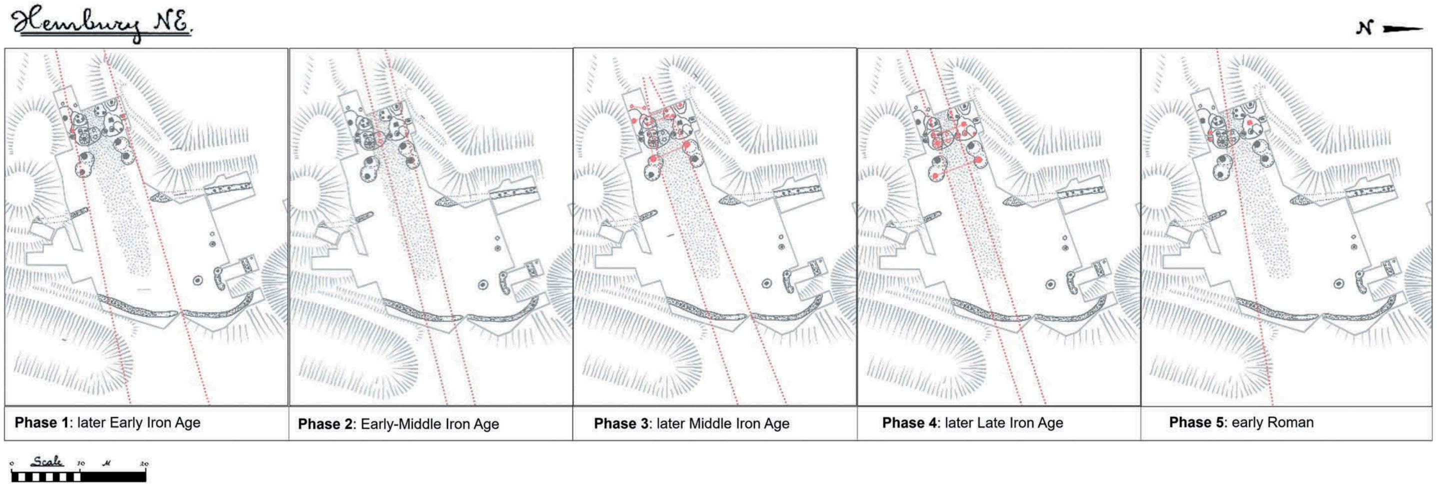

Figure 16. Phasing of Hembury's north-east entrance architecture.

Hembury's north-east entrance sequence

It is at Hembury's north-eastern entrance that we find our Iron Age gate-pivot. Liddell (1935) recorded three phases in the stratigraphy (Figure 15), with Hogg (1975) suggesting at least four.[28] Following a comprehensive analysis of previous work (Liddell 1930, 1931, 1932, 1935; Avery 1993; Todd 1984a; Todd 2007), here we accept five phases at this entrance (Figure 16). An outer palisade, is replaced by inner palisade (Ph.1), and of the stratigraphically-early entrance features, Postholes 4 and 14 are aligned on this inner palisade gap. Whilst this seems to be of simple entrance type, the potential for a dual-portal design (later Early Iron Age) exists, but with detail/information potentially lost to truncation by later features. Distance of the features from the inner vallum might suggest a late Early Iron Age date. Other stratigraphically-early features (e.g. Posthole 8) witness a new shift in axis through the ditch, with less respect for the palisade than the Early-Middle Iron Age inner vallum (Ph.2) – the length of the inturns suggesting perhaps an early Middle Iron Age date. A much more developed entranceway is apparent by Ph.3 – elucidated via a consideration of the available stratigraphic information and the principles of architectural design/layout.[29]

By the later Middle Iron Age (Ph.3), a short (4.4 m deep) trapezoidal entrance passage (although perhaps as long as 6.0 m – below) defines a cobbled path – with Glastonbury ware on its surface, giving a Middle Iron Age date (Liddell 1935, 156, 171). In its developed state, passage length suggests a later Middle Iron Age date. The entrance had an interior gate (with gate-post pair inside the line of the passage, and a small lone post on the interior right).[30] For the gates themselves, wood identification from the smaller postholes, perhaps most likely those of this Middle Iron Age gateway, gave ash (Liddell 1935, 160) – a wood known for twin properties of strength and flexibility (as also found at LIA Eddisbury). Liddell (1935) also records carbonised hazel from the same features – suggesting, perhaps, a woven hazel gate. The Middle Iron Age gateway spans the carriageway at just 1.7 m – only 20 cm wider than the average roundhouse doorway at 1.5 m (Pope 2008); perhaps swinging from ash gate-posts via leather/withy hinges. Alternatively, the lone interior stake to the right might suggest a non-pivoting, shutter-style gate design. Hembury's paired three-post arrangement is also found at Crickley Hill Pd 2 (Early Iron Age), where it seems to denote a wooden thresh (Dixon 1976, fig. 4). Regarding Ph.3 gateway height, from Plate XXIX we can reconstruct the depth of Post-Pit 1 as *c.* 0.50 m – if we accept that 25% of the gate-post was sunk, this indicates gate height in the region of 1.5 m (4' 11"). This is shorter than calculated for Middle Iron Age Eddisbury (above), and suggests that the taller of those people entering would have had to bow their heads slightly.

The passage architecture of Middle Iron Age Hembury is free-standing – unlike at Eddisbury, where it works to revet the earthwork in paired-posts. Whilst the passage is relatively short in hillfort terms, the approach is lengthened by the journey through inner ditch, and inner palisade, to 40 m. Humans and animals approaching the gate are noticeably *funnelled*: moving first through the 18 m gap in the inner ditch; narrowing to an 11 m gap through the inner vallum;[31] down to 4.4–4.9 m at the 'porch'; and just 1.7 m at the gate – what Forde-Johnston (1976) called a 'constriction of access'. Whilst the entrances of Eddisbury East and Cadbury SW also splay, this *funnelling* is even more pronounced at Hembury hillfort. For humans, this is a journey that shifts scale: at first the view is onto the massive communal-level architecture of the earthworks; moving to a scale more associated with the individual, as one rides/walks along the narrowing passage; and then finally, towards gates more evocative really of house architecture; welcoming. Traditionally, it has been considered that this 'funnelling' is designed around defence. However, this design feature is perhaps most reminiscent of prehistoric architectures related to the driving of animals. This is supported by the formation of a hollow-way at Hembury's western entrance, and wear at the north-east that necessitated the laying of a cobbled path; and by the formal sub-division of interior space in the second century BC – creating a southern enclosure separate to the main interior to the north – most probably separating humans and animals (perhaps as a result of hollow-way formation) and according well with the 'reorganization' of Maiden Castle's interior at this time – something perhaps linked to a growing popularity of sheep.

In design terms, multi-vallation – construction of the outermost earthworks – seems to sit more comfortably at the end of the Middle Iron Age, rather than during the Late Iron Age. Multivallation repeats the design elements of Middle Iron Age 'bi-vallation' activity – consisting largely of an encircling earthwork, perhaps acting as a counterscarp for the Ph.IV hillfort ditch. There is a possibility that multivallation is contemporary with the interior earthwork of Ph.VI – but the design of these two elements seems sufficiently different to phase them separately; something that can only be further resolved via excavation. By the Late Iron Age, at Hembury's north-east entrance (Ph.4), a distinct set of features, now on a recti-linear (rather than trapezoidal) design, can be extrapolated. This cuts the Middle Iron Age cobbles, and is contemporary with the northern inturn. An external, unsheltered 'porch' of two well-grown matured oak tree trunks (0.73 m wide post-pipes in post-pits 0.91 m deep; Liddell 1935, 160) is provided, on this same recti-linear ground-plan, building outwards from those of Ph.3.[32] The broad retention of the Ph.3 entrance axis, the fact that the Ph.3 and Ph.4 uprights respect one another, and the extension/repetition of the porch feature (albeit on a slightly different axis) suggest limited time-depth between this Late Iron Age phase and that of the preceding later Middle Iron Age – suggesting Ph.4 as Late Iron Age, rather than early Roman.[33] Although the design has changed, there is a continuing respect for what had gone before.

Whilst the Late Iron Age porch splays, relating still perhaps to the scale-shift in architecture or the funnelling of animals, the gate arrangement itself appears much more functional in design: constructed on a square plan, allowing for the possibility of some form of superstructure – most likely supporting a bridge across the gateway.[34] The carriageway no longer feels typically open, with a piece-gate in the style of Avery (1993) and a 0.5 m wide pivoting gate to the right, as at South Cadbury (below). Wood identification again gives an ash post – as at Eddisbury's Late Iron Age north-west entrance (above). Hembury's iron furniture suggests a jointed, wooden gate operating on what is by then a relatively slight 0.11 m diameter gate-post (from collar diameter – see Appendix 1), pivoting in a sunken timber setting (0.46 m deep, with a 0.37 m diameter post-pipe) (Liddell 1935, 148) – i.e. a development from Eddisbury's full sunken-pivot mechanism, to more of a sunken sill-setting. If we again accept that 25% of the gate-post was sunk, feature depth would indicate a Late Iron Age gate height of 1.38 m (4' 6").[35] Despite a fairly limited time-depth, the design of this Late Iron Age entrance – as associated with the internal earthwork, piece-gate, and iron furniture – is very different in style from Hembury's previous entrance/gateway designs. Following this, Early Roman squared posts (Ph.5) – which indicate only minor repair (Avery 1993) – see a major shift in entrance axis. What we see by the early Roman period is a move away from what had been an 'inviting' Middle Iron Age gateway, enabling access for more people/animals; to a more functional and apparently less 'open' Late Iron Age hillfort phase.

The Hembury-type mechanism (Type C) [late Late Iron Age]

During preparation of this report, the Hembury pivot was not available for study, and remains unidentified in the Royal Albert Memorial Museum collection (T. Cadbury pers. comm.). Discussion here is based solely on Liddell's description (1935, 156–7); a flat, circular disc (13–25 mm thick), which shod the bottom of a gate-post, attached to the upright by four vertical iron straps (each 110 mm high, 51 mm wide, 13 mm thick). These were most likely two straps – bent under the base to provide four vertical supports; the inner diameter allows for a 0.11 m diameter post-end (1935). An associated 'large iron nail' – presumably longer than the 3"/7.6 cm given by Liddell (1935) given for normal-sized nails, may have been in effect acting as a spike. An associated (7.6 cm long) 'iron pin or rivet' perhaps worked to secure the vertical straps at the centre of the post-end base. All objects were found in the post-pipe of Posthole 12, and seem again to have been set into a sunken-timber socket.

Hembury's iron gate-mechanism is considered here to be late Late Iron Age in date, somewhat akin to that from Cadbury (below). Only a full re-assessment of the ceramics can now refine the Hembury chronology further – to resolve the lingering issue of a post- (Avery/Todd) versus pre-Conquest (Liddell) date. We accept a Late Iron Age date for the gate-mechanism (on the basis of the structural sequence at the eastern entrance, the northern 'transverse-bank' ceramics, and Internal Earthwork parallels as Late Iron Age at Cadbury and Maiden Castle). We also consider the date as late in the Late Iron Age on the basis of the ceramics and the degree of continuity between the eastern entrance phases – i.e. Avery (1993) suggests only limited early Roman repair of an essentially sound Late Iron Age gateway, which is accepted here. The typological difference between the ultimate Iron Age-Roman 'collar-type' furniture of South Cadbury and Silchester also suggest a slightly earlier date for Hembury's furniture (as a spike with proto-collar).

In summary, the Hembury Type C gate-mechanism represents a typological development from Type B (Eddisbury North, early Late Iron Age) – and is transitional between this latter and the (ultimate Iron Age) Cadbury-types (Type D). This move is associated with a continued reduction in post-end diameter – the vertical straps being employed as a proto-Type D collar to prevent post-end splitting in these by now smaller gate-posts. At Hembury, it is notable that a pivoting gate was found at what appears to be the more 'human-focused' gateway, whilst such a gate-mechanism was not found at the more 'animal-focused' western entrance.

Table 4. Re-phasing Hembury hillfort.

Ph.	Period	Enclosure	W ent.	NE ent.	Evidence
I	LBA-EIA	Outer palisade (**PE1**)	Focus on south of site	Unrelated to PE2	The outer palisade is demonstrably earlier than the inner palisade at the NE entrance, having been modified with the addition of 2.1 m of rammed earth over the feature; the axis of this latter best respects the later inner palisade (contra. Cunliffe 2005, fig. 15.2; contra. Liddell 1935, 141).
II	EIA	Addition of inner palisade (**PE2**)	Continuity from PE1; northern focus established; gate into southern area retained	More formal, simple entrance established	Architectural continuity at western entrance (suggesting limited time-depth from Ph.1) with new gated entrance into south of the site, as main entrance now leads north. Meanwhile at the north-eastern entrance, there is little architectural link with the outer palisade; entrance is wholly redesigned; stratigraphically early post-pits (4 and 14) show a respect instead for the inner rampart (accepted by Liddell and Avery) – however this notably disrespects the axis through the ditch, suggesting it as a distinct, earlier phase – with, as Cunliffe (2005, 349) accepts, a relatively limited time-depth between this and the construction of the inner rampart of Ph.III, perhaps even having been used to aid its revetment).[36]
III	Later EIA	Inner vallum and inner ditch (**UV**)	-	Remodelled, simple	UV, box rampart (Todd 1984a); suggesting a 5th/4th century BC date, after Cunliffe 2005; ditch contemporaneity from complimentary north-eastern angle of approach through inner ditch and vallum at NE entrance) forming a uni-vallate enclosure (3.2 ha).[37] Continuity of simply entrance at west. Remodelling of simple entrance at north-east – with Posthole 8 bringing the axis through inner vallum/ditch. EIA postholes are beneath later cobbles and inturn.
IV	MIA (E-MIA origins)	Inner vallum rebuilt; southern interior enclosure built; addition of outer ditch and banks (**BV**)	Trapezoidal; 12 m gateway passage, built back from EIA features; continuity in design; dual-portal entrance. BV = longer approach, now from SW; hollow-way; gate into southern area remodelled	Trapezoidal; shorter (4.4 m) gateway passage; cobbled path laid; BV = more open, movement less channelled than at W	Inner Vallum rebuilt as dump rampart with assoc. decorated-Glastonbury ware (Cunliffe 2005: ?2nd century BC; aligning broadly with MC sequence). Entrances: new trapezoidal design. The short NE entrance passage might suggest earlier (EIA) origins; the dual-portal arrangement of the W entrance also suggests E-MIA origins, whilst the 12 m passage provides a MIA date by analogy (Pope and Swogger forthcoming). Following the development of a hollow-way at the W entrance, a cobbled path (with associated Glastonbury ware) is also laid at the NE (further east of the initial axis through the earthworks). Ph.1 of the 'northern transverse bank' is also of this phase, creating a southern interior enclosure (0.7 ha) now formally separated from the 1.1 ha northern area (see Figures 13 and 17).[38] It is also towards the end of this period, that we most likely see the addition of the outer ditch and banks (as suggested by Liddell, but unexcavated), i.e. BV.[39]

(*Continued*)

Table 4. (Continued).

Ph.	Period	Enclosure	W ent.	NE ent.	Evidence
V	?final MIA	Multi-vallation (**MV**)	Continuity of design elements from Ph.IV		Addition of banks to north, and off-set western entrance, indicate occupation into the final Middle Iron Age, comprising focus on the outer earthworks. Less construction energy is expended than in Ph.IV.
VI	LIA	Internal earthwork (**IE**);	New linear design; further formalization and separation of N/S interior space	New recti-linear design; NE as main gate; piece gate design	New linear passage design at entrances (with associated iron gate furniture at NE). NE entrance features respect the northern inturn of the *internal earthwork* (posts in fact set into the base of it) suggesting contemporaneity.[40] The lack of iron gate furniture at W entrance suggests that it was the NE entrance that provided the main gate to the hillfort at this time. Re-organization of interior: northern area revitalised with an internal earthwork, immediately inside the inner vallum, to create a more bounded northern enclosure. This utilises the northern stretch of the MIA southern enclosure, which is replaced by the southern 'transverse bank' to form a slightly smaller, gated southern enclosure. What this creates from the western entrance is access to three spaces – a more formalised northern enclosure, and a central space, leading in to the southern enclosure; these latter two presumably linked to animal management. Analogy with Maiden Castle places a similar interior earthwork as post-multivallation. The interior earthworks are integral to the NE entrance inturns, the southern 'tranverse bank' and Ph.2 of the 'northern transverse bank' – creating a slightly smaller recti-linear northern (*c.* 1 ha) and triangular southern enclosure (0.6 ha) (see Figures 13 and 17).
VII	e. Roman military occupation	SW main gate	Design focus here	Repair of gateway only	Rebuilding of the western entrance (on basis of squared stakes and square layout); squared stakes (4/5) at NE entrance which Avery (1993, 176) sees as providing only a new gate, imply that the Late Iron Age entrance was still largely functional (i.e. limited time depth); also that the W entrance was the main gate for the Romans. Interior recti-linear buildings give occupation over a decade or slightly more (*c.* **AD 55–68**); after which deliberate deconstruction, with ramparts perhaps slighted (Liddell 1935, 164; Todd 1984a; Todd 2007).

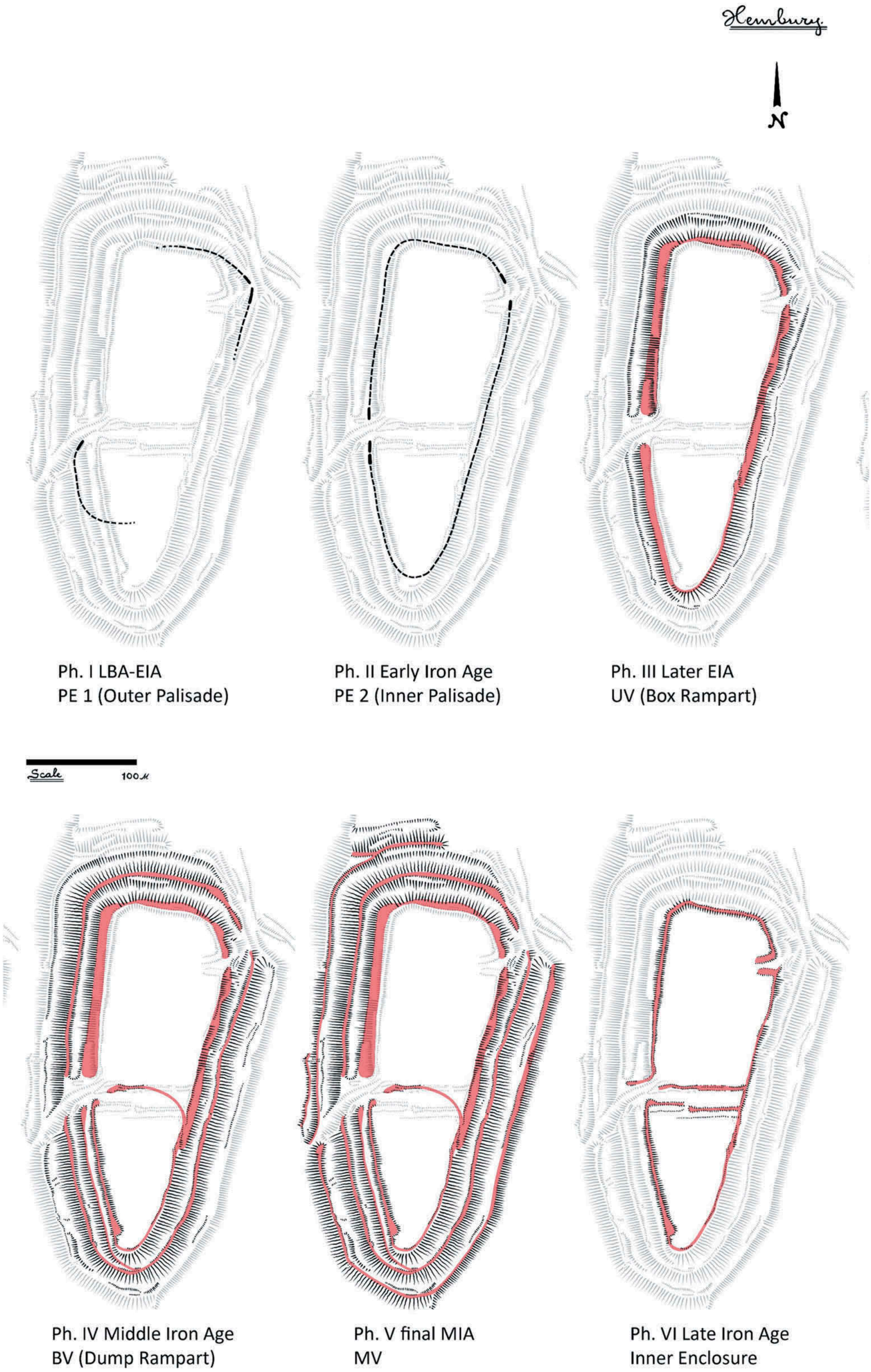

Figure 17. New Hembury hillfort sequence.

Figure 18. LiDAR data showing the late re-fashioning of the inner vallum at Hembury (courtesy of Rouven Meidlinger; data: data.gov.uk).

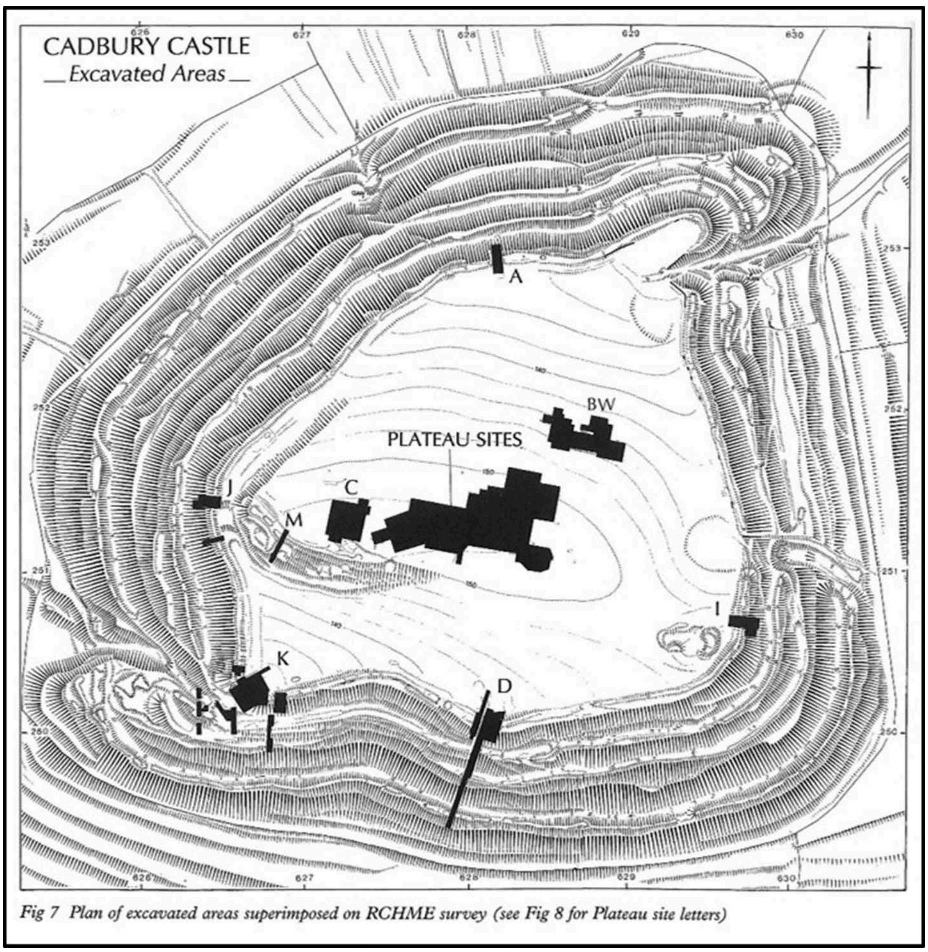

Figure 19. The Cadbury earthworks (after Barrett et al. 2000, 16).

Table 5. SW entrance sequence at South Cadbury (after Barrett, Freeman, and Woodward 2000).

Episode	Period	Date	Bank	Features	Gateway	Passage	Recesses
III	LBA	-	-	Soil bank		-	-
IV	E-MIA	6th/5th-4thCs BC	B	Drystone-reveted stone bank, 4.4 m wide	4.4 m wide	-	-
V	MIA	→ 250 BC		Modification	5.4 m, shifts axis SW	-	-
VI		250 BC →		Extended	Axis remains same	7–8 m long	N recess K15A
VII		3rd/2ndCs BC	C1/C2	Earth and palisade/ stone wall with pavement	New double-leaved gateway: 2.6 m wide. R: 0.70 wide; L: 1.4 m. Stone centre-stop.	12 m, hollow-way	N remodelled; S (K14A) built
VIII	M-LIA	250 BC-AD 43		Instability = backward extension	Continuation of gate* large stone ?to separate traffic; sill-beam and pivot (ultimate Iron Age)	At least 12 m; hollow-way now 2.3 m below Ep. VI recess floor; narrows passage to 2.2–2.8 m wide; cobbles laid; repaired near gate	N decommissioned; S made smaller
IX	Conquest period	Late 40s AD**		Interior: shrine; closing down landscape	Massacre deposit	-	-
X	Early Roman	*c.* AD 50/60		-	Burning of gate	-	Some construction activity in recesses
XI			D1***	Interior: recti-linear buildings (AD 60)	Cobbled road	Drystone walling	S recess blocked off; N faced in drystone
		later 1stC AD →	D2****	?temple complex (2ndC AD)	-	-	-
XIV	mid-Roman	2nd-3rdCs AD	-	-	Drystone walling burnt	-	-

** Avery (1993, 323) records Durotrigian-early Roman ceramic, weaponry (including some Roman parallels), and brooches dated by analogy to Hod Hill as late 40s AD.
*** This can no longer be considered pre-Conquest, as it is higher up the excavated sequence.
**** TPQ of AD 37–68 (Neronian Samian); later first century AD ceramic.

Dating/phasing Hembury hillfort

After four seasons of excavation, Dorothy Liddell (1935, 163–164) considered Hembury hillfort to have three major Iron Age phases:

Ph.1) Iron Age B (Middle Iron Age): second century BC – inner vallum, two palisades

Ph.2) Iron Age C (Belgic): first century AD (pre-Conquest) – transverse-banks

Ph.3) ?Conquest Period: construction of ditches and outer ramparts

After reviewing the evidence, we now offer a revised sequence: six phases, involving near-continuous occupation from the Late Bronze Age to the early Roman period (Table 4; Figure 17). There are two, distinct phases of palisaded enclosure – the second (inner palisade) being closely linked to construction of the inner vallum (box rampart) and ditch – a phase that seems later Early Iron Age in date, by analogy with earthwork type and entrance length (cf. Cunliffe 2005). Increasingly formal entrances are then built, which develop passages – shorter at the north-east entrance, with movement less proscribed, but longer at the western: a dual-portal entrance, with developing hollow-way, and a requirement for formal division of animal and human space. By the second century BC, the inner vallum had been remodelled as a dump rampart, with a new ditch dug to re-fashion the counterscarp bank (bivallation), followed by multivallation in the late Middle Iron Age. As at South Cadbury and Maiden Castle, the Late Iron Age period saw less intensive occupation, and brought new design – a re-fortification almost, with the inner vallum re-fashioned as a new internal earthwork with pronounced inturns – creating a recti-linear northern enclosure, further divided from the animal enclosure to the south (Figure 18). This is when we find our iron gate-furniture in association with a piece-gate at the north-east entrance – a transitional type between Eddisbury and Cadbury. Previous work saw Iron Age abandonment prior to early Roman military occupation (AD 55–68), as the site seemed not to have been taken by force (Todd 1984b). Roman military occupation is considered similar to Hod Hill – although there immediately post-Conquest (Cunliffe 2005, 222) – and Maiden Castle (Sharples 1991a, 101); whilst the closest analogy for date of occupation rests with South Cadbury (AD 50–60 – see below).

A parallel from ultimate Iron Age Cadbury

Our final Iron Age gate-mechanism comes from Leslie Alcock's 1970 excavations of the south-western entrance of 10.9 ha South Cadbury (Figure 19).[41] The hillfort has a potential Late Bronze Age pre-cursor; late Early Iron Age origins; and an overall density of Later Iron Age occupation, following expansion during the Middle Iron Age (Barrett, Freeman, and Woodward 2000). At Cadbury, unlike at Maiden Castle and Hembury, the interior earthwork is soundly dated to the late Saxon period (Barrett, Freeman, and Woodward 2000). For the Iron Age, a broad, 4–5 m wide Early-Middle Iron Age entrance (with recesses) restricts down to 2.6 m at around 250/200 BC (Table 5) – broadly in line with a phase of major interior reorganization at Maiden Castle. In addition, the degree of multi-vallation activity suggests continuity of

Table 6. C-14 dates from South Cadbury's south-west gateway (recalibrated, Oxcal v.4.3; samples GU-646–648 excluded due to old wood principle).

ID	Context		Description	Sample type	Date	68.2%
Episode X						
GU-649	K659	v	W recess	Grain	1949 ± 26 BP	AD 22–78
Episode XIV						
GU-645	K659	i	W recess	Twig	1814 ± 31 BP	AD 138–239
SRR-693				Twig	1845 ± 45 BP	AD 125–234
GU-651	K747		Passage	Charcoal	1825 ± 48 BP	AD 127–246
late 3rd-mid-4th century AD						
SRR-691	K659	v	W recess	Grain	1776 ± 50 BP	AD 170–335
GU-650		vi		Grain	1765 ± 47 BP	AD 214–344
SRR-692				Grain	1666 ± 50 BP	AD 260–427

occupation into the late Middle Iron Age-Late Iron Age period. As suggested for Hembury, a decline towards intermittent occupation seems to occur prior to the start of the first century AD (Cunliffe 2005, 401, 222). At Maiden Castle's eastern gate, occupation had broken down with a focus instead on first century BC ironworking and creation of a long-lived Late Iron Age burial ground (Salter 1991; Sharples 1991b, 124–125; Smith 2017, 151–156; Stewart and Russell 2017, 159–162). At South Cadbury, by the mid-first century AD, activity was ritualised (gateway deposit and central shrine) alongside a proposed 'deliberate closing down' of the agricultural landscape, with mass animal slaughter perhaps temporally associated – closing deposits on a grand scale; a 'social dislocation' ahead of Rome (see Jones and Randall 2010). There is then early Roman military occupation – mid-first century AD recti-linear buildings, an oven (AD 40–70), military equipment (AD 43–138), and a purported second century AD 'temple complex' (Barrett, Freeman, and Woodward 2000, 173–178, 323) – tallying with early Roman activity at the south-west entrance (below).

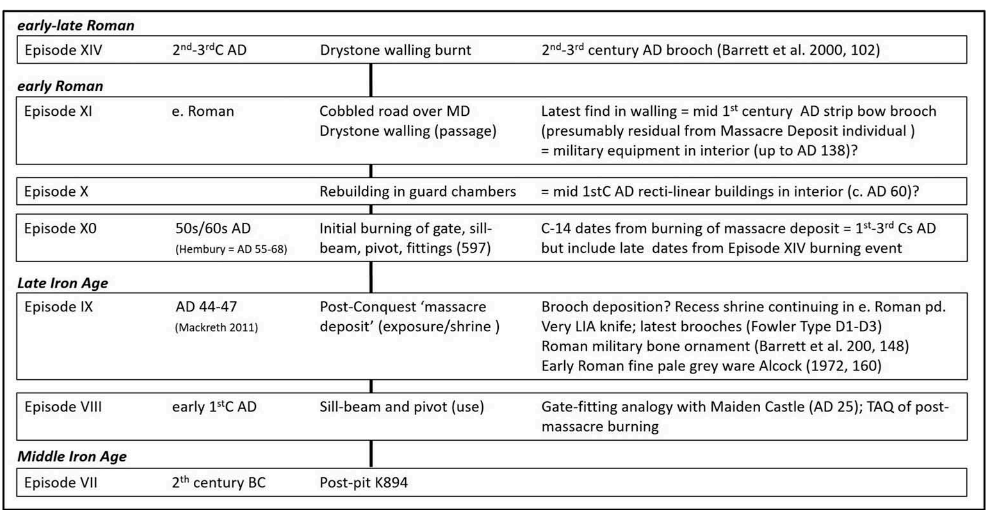

Figure 20. Revised later prehistoric sequence for Eddisbury hillfort.

Massacre deposit

Previous work on Cadbury's south-west entrance has often focussed on the 'massacre deposit' – the remains of at least 22 people (men, women, and children) behind the gate and in the western recess. Osteological and taphonomic reanalysis concluded that this was not simply an event linked to Roman assault (as first thought) but was instead a closing deposit, by Iron Age people, involving the ordering of disarticulated human remains (Jones and Randall 2010, 177, 179–180); as the western recess became a shrine (with grain, iron reaping hook, bronze face-plaque). Spindlewhorls and tools, items usually found as grave goods, were associated, as well as a disproportionate number of brooches (150) – which are then seen as tokens of commemoration. This might also explain the bending/folding/breaking of some weapons. However, the 60 cases of sharp weapon trauma – with some evidence for scalping, beheading, face-smashing – does reveal that prior to final acts of deposition, there was a traumatic event, as evidenced too by the association of 37 spearheads,[42] and catapult bolt-heads, suggesting the gateway as the location of the combat event – at around the time of the Roman invasion.[43] The lack of perinates, infants under one, and elders over 50 reveals the absence of babies, pregnant women and the elderly from the group.[44] After Jones and Randall (2010) then, the gateway deposit now also reveals a slightly later event (AD 44–47 from the brooches – Mackreth 2011, App. 3) involving a reordering of the human remains, personal artefact deposition, and establishment of a shrine in the south-west entrance recess, involving the killing of weapons, and with burnt grain deposits up to 0.15 m deep. Beyond

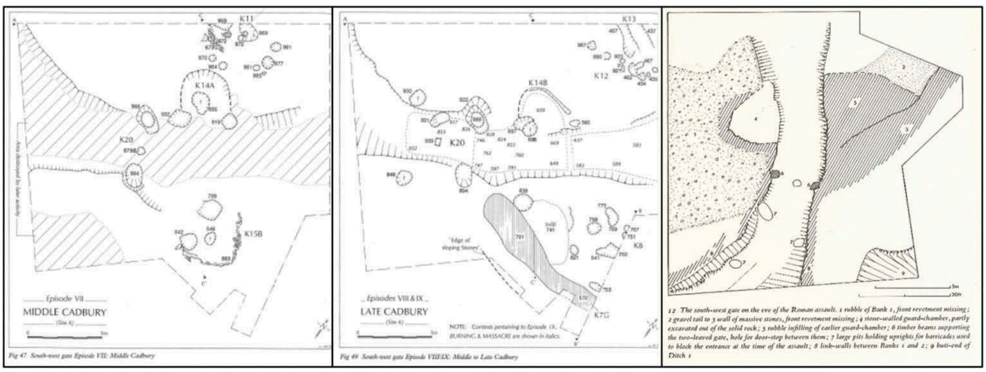

Figure 21. Episodes VII-IX at Cadbury (after Barrett et al. 2000; Alcock 1972).

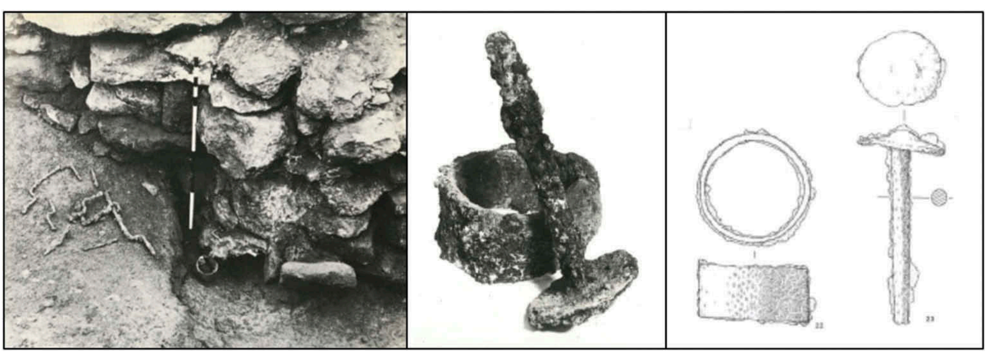

Figure 22. The Cadbury pivot as excavated, next to ranging rod (after Alcock 1972; Barrett et al. 2000).

this, the military toggle, and Romano-Celtic plaque indicate continuation of the shrine into the Roman period.

Resolving the mid-late Cadbury sequence

By the time of our iron gate-furniture, the original Early Iron Age hillfort entrance had already seen three major re-modelling episodes (Alcock 1971, 4; Woodward and James 2000, 90ff; Table 5). A challenge in understanding the pivot date results from long-term issues with the mid-late Cadbury sequence, with C-14 dates not conforming to the historical Conquest narrative (Woodward 2000, 106–7). This hinges on conflation, on interpretation, of the 'massacre' deposit; an intense burning event at the outer gate; and a later burning event – despite their being separated in time (Alcock 1971, 4, 1972, 106, 171; Jones and Randall 2010, 174). Woodward (2000) identified conflation of the Episode X0 and XIV burning events in the dates.[45] All but one date came from the recess shrine (Table 6); which finds suggest remained active into the Roman period – Jones and Randall (2010, 172) also report a rubble layer sealing only the bones outside the gate. If we use a matrix to separate out the events, the sequence begins to make sense (Figure 20). The first post-shrine burning event then seems most likely as preparation for early Roman construction, contemporary with 'barracks blocks' in the interior at *c.* AD 60 (Avery 1993, 324). We know that the gateway timbers were still extant at the time of burning – being burnt to a void, due to more intense burning as a result of the wooden gate – which puts us into the AD 50s/60s; contemporary with the Roman military occupation at Hembury.[46] As such, it is this early Roman occupation of hillforts in the south-west that seems contemporary with Boudicca; not the massacre, which is instead consistent with the AD 43 conquest; with early Roman construction represented by GU-649 (AD 22–78); Episode XIV burning event marking the end of early Roman occupation (*c.* AD 170–235); and a third event in the recess involving grain (*c.* AD 270–350).[47]

The Cadbury gate-mechanism: archaeological context

These matters resolved, we find a dual-portal south-west entrance, with an off-centre stone gate-stop, leading Alcock (1972) to see a double-leaved gate. Woodward and James (2000) argue for a second, interior gate (697 and 838) – something not seen by Alcock, nor accepted here (Figure 21). On entering, the right side was narrower (1.2 m), for people, and the left wider (1.8 m) for animals or vehicles. Only the narrower gate is furnished with a pivot-mechanism. Rather than double-gates then, this seems more likely to be a narrow pivoting-gate and associated piece-gate (akin to Hembury). Alcock

Table 7. Cadbury south-west entrance: gate fittings (after Macdonald 2000, Table 9).

Context	Draw-bar fittings	Latch-lifters	Lifts	Keys	Handles	Nails	Other	Total
Outside gate	1 (unillustrated)	-	3 (59.2, 59.3)	-	-	7	-	11
Behind gate	5 (60.24–26, 60.29, 1 unillustrated)	2 (60.27–28); ?1 unillustrated	-	3	-	1	Double-spiked loop (59.21)	12
Recess	1 (63.59)	-	-	-	3 (63.58, 63.61, 1 unillustrated)	10	2 clamps	16
Total	7	3	3	3	3	18 (29)	2	**37**

recorded the iron-pivot as towards the base of a rock-cut slot for a solid timber setting, running partly across the passage and partly beneath the later drystone walling (Alcock 1972, 89). For Woodward and James (2000), the pivot was associated with post-pit 894 – dug in the second century BC, and as such apparently continuing in use for two centuries, which seems unlikely (Figure 21). Alcock's timber-setting seems less a 'sill-beam' as he described it, more a sub-square timber-setting for the pivot, set in the top of earlier post-pit 894 (essentially a sunken block of wood; see Alcock 1972, fig. 12) – the dome of the pivot base confirms such a timber setting, as provided by Alcock's description: 'The upright stile of the actual wooden door had a massive iron spike driven into it, and was then bound with an iron collar to prevent splitting. The spike had a slightly domed head, which turned on a solid timber sill-beam' (Alcock 1972, 89; Figure 22). In summary, the Cadbury pivot seems rather as Alcock had it: ultimate Late Iron Age in date, preserved by the Conquest itself, with its form/technology transitional between late Late Iron Age Hembury and early Roman Silchester.

Cadbury-type mechanism (Type D) [ultimate Iron Age to Roman]

Type D gate-mechanisms/pivots are characterised by a hollow domed-headed spike (shoe) with collar. The ultimate Iron Age example from Cadbury may represent the earliest known example of this type. This comprised a circular-sectioned 179 mm long spike (tip missing),

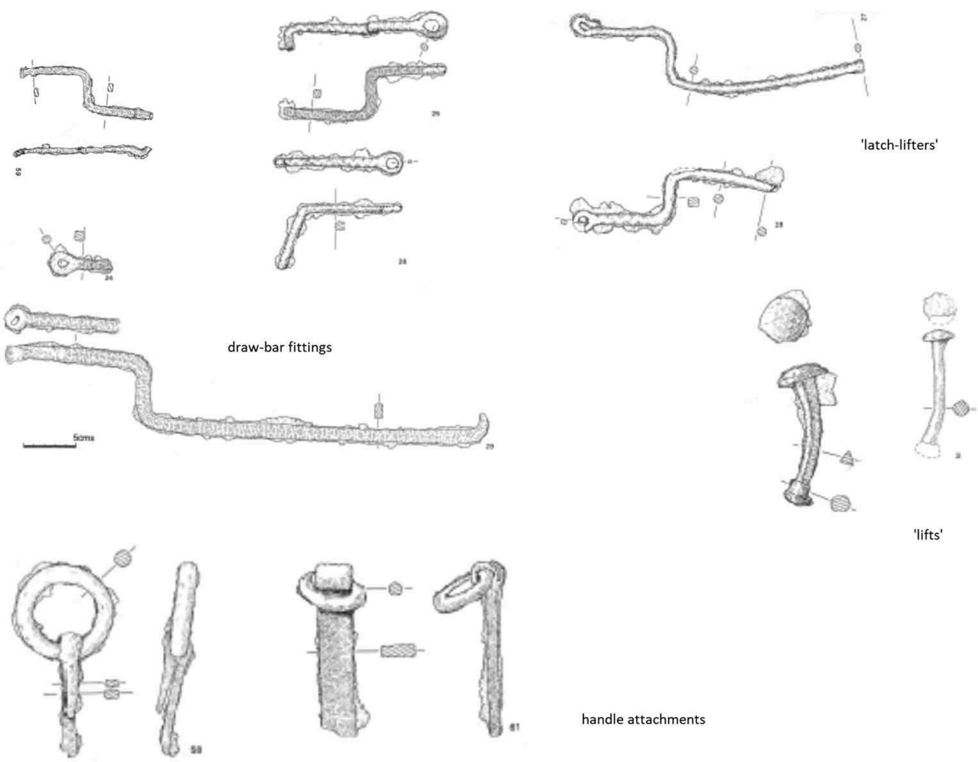

Figure 23. Gate fittings from Ultimate Late Iron Age Cadbury (after Macdonald 2000).

with a circular, domed head (75 mm diameter), presumably a composite object. The shoe was found in its original position together with an iron collar (50 mm high, 90 mm internal diameter) over the upright spike. Crucially, this example suggests that the entire typological development of the object type is pre-Roman in date.

The reduction in post diameter recorded from Type B (Eddisbury North) to Type C (Hembury) continues, with the Cadbury collar providing an accurate post diameter of just 0.09 m; the introduction of a collar evidently to prevent this much slighter gate-post from splitting. The collar must have been fitted to the post-end first and presumably whilst at a high furnace temperature; the spike then driven into the end, combined with the cooling of the collar would result in an extremely tight fit. Evidence from Cadbury suggests that this type was initially used within timber sill beams (Macdonald 2000, 125), and by the Roman period was commonly operating in stone sockets, as also in roundhouses (see Pope 2003). Development of the type throughout the Roman period sees further narrowing of the post, with a minimum diameter of 0.045 m seen at the late third to early fourth century AD Via Gabina 10 site, Rome (Jackson 2002). The frequency of sites producing only collars (below) suggests that the shoe component was gradually abandoned, following the adoption of above-ground (stone) sockets. A Type D variant was found amongst the Inchtuthil hoard: a 58 mm high collar with an internal post diameter of 0.46 m, and an integral 280 mm long horizontal plate, from which a door could be suspended (Manning 1985b, 298).

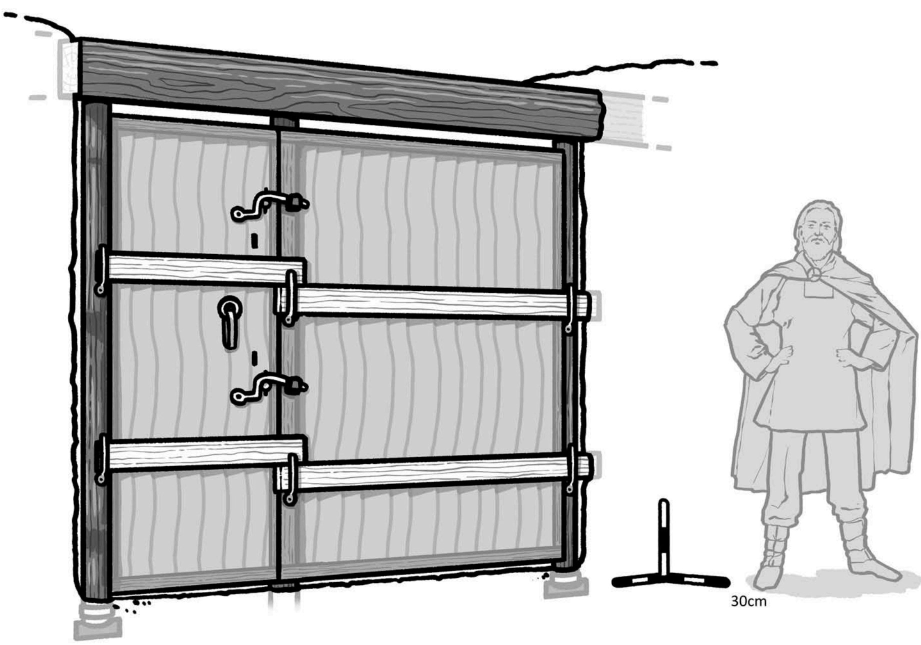

Figure 24. Reconstruction of the Ultimate Iron Age gate at South Cadbury (drawn by John Swogger).

Cadbury's piece-gate fittings

Most recently interpreted as a 'hoard of flight' (Woodward and Hill 2000, 115), the iron fittings discovered in Cadbury's south-west entrance seem in fact to be those of the hillfort gates. Interpreted by Macdonald (2000) as eight latch-lifters, four L-shaped lift-keys, three bolts, and four variously described loops-and-rings; they seem instead more likely to constitute six timber-bar fittings, three latch-lifters/lifts, three handle attachments, and three keys (Table 7). Identification of the timber-bar fittings is on the basis of both the orientation of the hole (horizontal) and their cross-section (square); their peculiar shape relating to their holding a timber bar. Whilst 63.59 is given as an 'lift-key' by Macdonald (2000) it is less convincing than those from Maiden Castle and Hod Hill (Wheeler 1943, fig. 94; Brailsford 1962, 18; Plate XII) and more akin to these apparent timber-bar fittings.[48] As such, we may have seven timber-bar fittings – one a much longer example (60.29) which seems to have been located on the central post to hold two timber-bar ends (Figure 23). The distribution of the timber-bar fittings is mostly immediately behind the gate (overlying the fill of posthole 894) i.e. in their primary location, with eight nails also found in close proximity (see Macdonald 2000). Two 'clamps' from the recess also have a rectangular section and may be related. These objects seem to constitute fittings for horizontal timber-bars to secure a piece-gate. The wider (1.8 m) left-hand element of the Cadbury gate (non-pivoting) seems then somewhat akin to Avery's (1993) ideas around piece-gate design.

Pivot-gate fittings

As well as the pivot itself, the narrower (1.2 m wide) right-hand pivoting gate seems to have housed two latch-lifters, two handles, and two keyholes. Unlike the timber-bar fittings, latch-lifters have a hole facing sideways and a more rounded profile (see Brailsford 1962, 18; Plate XII). At Cadbury, two 'latch-lifters' are illustrated, with potential for a third – these are in fact the latches (Figure 23). Macdonald's (2000) 'bolts' (at 10–12 cm long) may instead perform the 'lift' function – especially given their more 'rivet-like' form; working as a fulcrum/lift for the latches, presumably operating through a small hole in the gate – akin to the two small oblong holes found in the preserved wooden gate from Altenburg bei Neidenstein *oppidum* in Hessen (Ralston

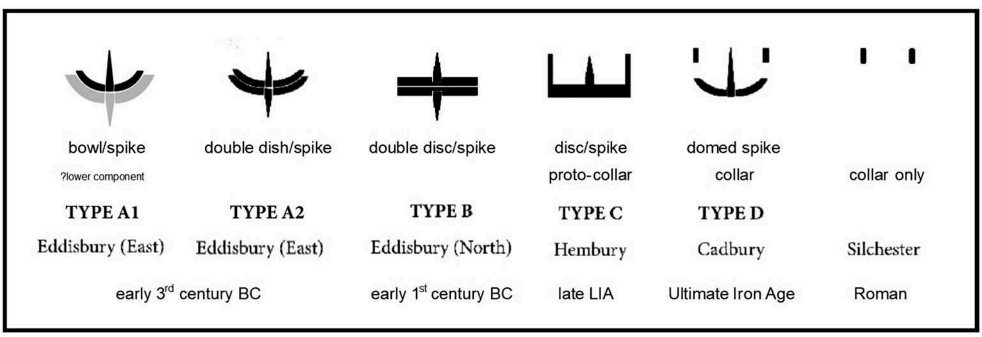

Figure 25. Evolution of Middle Iron Age-early Roman gate-posts.

2006, fig. 36). The latch-lifters were presumably located on the inside of the pivoting gate (with perhaps a third for a recess door). All three 'lifts' were found *beyond* the gate, which may reveal where the gate eventually fell. Macdonald's (2000) 'loop-and-rings' seem to be handle attachments, most likely functioning via addition of a leather strap-handle. A much nicer, and more complete, example comes from Maiden Castle's eastern entrance (Wheeler 1943, fig. 94.2).[49] Again, three examples might suggest one on either side of the pivoting gate, and one for a door to the recess. There does seem to have been some small-scale movement of some fittings, activity perhaps akin to the contemporary moving of body parts to the recess. With 29 nails found in total (Macdonald 2000, 123; Table 9), if six nails were required for the timber-bar fittings and one each for the three latch-lifters (9 nails), the additional 19 nails were perhaps for the gate/frame itself, and recess door/frame. On the basis of this understanding, we can now reconstruct Cadbury's ultimate Iron Age hillfort gate (Figure 24).

Understanding hillfort gate-mechanisms

Iron gate-pivots remain rare in the archaeological record (Avery 1993, 80). Having undertaken this study we can now suggest that this was because, the typical engineering feat required could usually be achieved via a timber ball-and-socket. The suggestion here is that the invention of iron gate-pivots in the south and west of Britain during the earlier Middle Iron Age was a result of the new, larger pastoralist communities associated with *developed hillforts*, and the need as a result to manoeuvre larger gates (i.e. Eddisbury). It seems then a combination of both pastoralist strategies and hillfort size (i.e. livestock numbers) that led to the invention of iron gate-pivots. It may be that such a mechanism was also required for the contemporary 'great gate' at The Trundle, Sussex – although extraction of the gateposts in antiquity means that this did not survive for study. Iron gate-pivots were not the norm – their invention a direct response to the grand, communal thinking of the fourth/third centuries BC.

We are very fortunate then, that from the last century of exploration, we have had five excavated Iron Age examples recorded/available to us for study. Resolution of the object types, function, and detailed analysis of the associated archaeological contexts at the hillforts of Eddisbury, Hembury, and South Cadbury, has allowed us to elucidate an object typology – utilizing all known Iron Age examples, plus a sample of Roman period examples for comparative study (Table 2; Figure 25). This shows the evolution of gate-mechanisms – revealing a shift across time: from grand Middle Iron Age gates – for large *developed hillfort* communities and their animals – to the much more modest gates required during the much less communal Late Iron Age and Roman periods. Iron hillfort gate-mechanisms first date to the Middle Iron Age period in Britain (early third century BC, *c.* 275–250 BC) – a technological development in iron, of what we suspect was an earlier, sunken gate-mechanism in wood.

At Eddisbury East, the pivots belong to the Ph.3 gateway, with the existence of two (Type A) sub-types suggesting a degree of time-depth/development of the object type, across even one gateway, during the early third century BC. Importantly, metallurgical analysis revealed that the (?Type A1, upper) Eddisbury East gate-mechanism (Object 2) saw mechanical failure, leading perhaps to the subsequent use in Posthole 3 of Type A2.

Table 8. Known prehistoric gate-furniture parallels, with a representative sample of Roman types for comparison.

Site	Site type	Quantity	Description	Dimensions (mm)	Post diam. (m)	Date	References
Type A (2nd century BC; Middle Iron Age)							
Eddisbury, east entrance (Cheshire)	Hillfort	2	'Shoe and dish' pivot	Av. diam. 130 mm Height > 10 mm	0.55 m (oak)	e. 3rd century BC (TAQ) [MIA]	Varley et al. (1937, 447); Varley (1950)
? Lyson Collection (Gloucestershire)	Unknown	1	Slightly dished circular plate	Diam. 104 mm	-	-	Manning (1985a, 127–8)
? Pech Maho, nr Perpignan (south of France)	Oppidum	1	'domed spike'	-	-	-	Ralston (2006, 72)
Type B (1st century BC; early Late Iron Age)							
Eddisbury, NW entrance (Cheshire)	Hillfort	1	Disc and spike	Av. diam. 130 mm	est. 0.40 m (? ash)	e.1st century BC [LIA]	Varley et al. (1937, 447); Varley (1950)
Type C (early 1st century AD; late Late Iron Age)							
Hembury, NE entrance (Devon)	Hillfort	1	Disc and vertical straps	Diam. ?110 mm Strap height 110 mm	Setting: 0.36 m Post: 0.11 m	Late LIA	Liddell (1935, 156–7)
Type D (final Iron Age-Roman)							
Cadbury, SW entrance (Somerset)	Hillfort	1	Domed spike and collar	Pivot diam. 75 mm Pivot height > 179 mm Collar height 50 mm Collar int diam. 90 mm Collar ext diam. 100 mm	0.09 m	Ultimate IA	Alcock (1972, 89); (Macdonald 2000, 125)
Hod Hill (Dorset)	Military fort	3	Collar only	Diam. 53 mm Diam. 53 mm Diam. 51 mm	-	Early Roman	Manning (1985a, 140)
Silchester, west postern gate (Hampshire)	Town	1	Collar only	Height 40 mm Int diam. 90 mm Ext diam. 110 mm	0.09 m	Early Roman	Fox and St John Hope (1890, 54–55)

(*Continued*)

Table 8. (Continued).

Site	Site type	Quantity	Description	Dimensions (mm)	Post diam. (m)	Date	References
Inchtuthil hoard (Perth and Kinross) [D variant]	Military fort	1	Collar with attached arm or plate	Collar height 58 mm Collar int diam. 46 mm Collar ext diam. 58 mm Arm length 280 mm	0.046 m	Post-AD 96	Manning (1985b)
Verulamium (St Albans, Hertfordshire)	Town	1	Collar only	Height 60 mm Int diam. 60 mm Collar ext diam. 69 mm	0.054 m	AD 155–160	Manning (1972)
Via Gabina 10 (Rome)	Urban settlement	1	Domed spike and collar	Pivot diam. 61 mm Pivot height 88 mm Collar height 48 mm Collar int diam. 45 mm Collar ext diam. 56 mm	0.045 m	l.3rd to e.4th century	Jackson (2002)
Isurium Brigantum (Aldborough, North Yorkshire)	Town	2	Collar only	Height 27 mm Int diam. 52 mm Ext diam. 60 mm Height 49 mm Int diam. 48 mm Ext diam. 56 mm	0.060 m 0.056 m	Roman	Bishop (1996, 83)

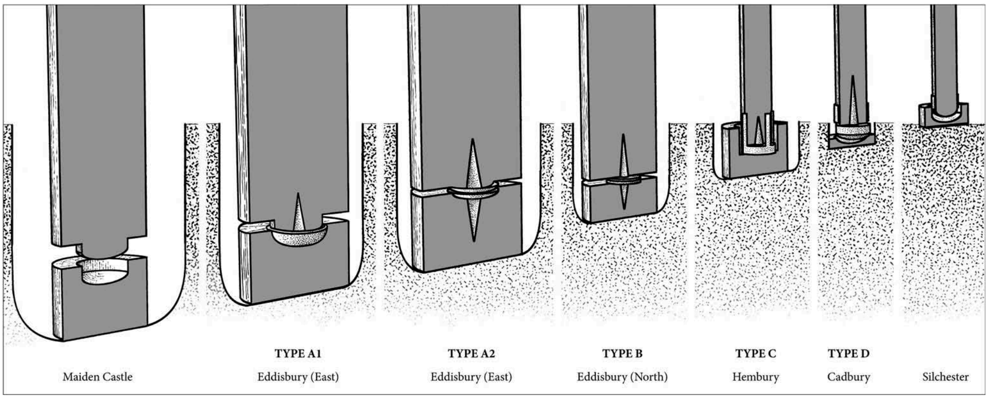

Figure 26. Typology of Middle Iron Age-early Roman gate-mechanisms through time.

Ultimately, the engineering task of steering this grand gate, with its large-diameter oak uprights, was too much, and the failed Posthole 4 mechanism was left *in situ* until entrance abandonment (early second century BC). The lack of an iron-pivot in the new, smaller interior gateway – broadly contemporary with, but most likely slightly after the outer-gate repair, and subsequent failure – suggests that by that point the technology was perhaps less trusted. When we find it again, a few generations later, at the north-west entrance (early first century BC) its design had changed significantly.

Iron Age gate-mechanisms evolve from this initial Middle Iron Age sunken-timber pivot-socket at Eddisbury, to what might be called a 'sill-block' at pre-Conquest South Cadbury. Over time, as the diameter of gate-posts decreases – in line with decreasing gate width over time (see Pope and Swogger forthcoming) – the object type is less concerned with working to pivot large-diameter oak gate-posts, and instead evolves to work against the splitting of much slighter ash gateposts. We find the early first century AD Hembury (Type C) vertical 'strap' device as a transitional type – comprising elements of both the Eddisbury sunken-socket mechanism (early third–early first centuries BC) and the later Cadbury (Type D) sill-block, with collared post-shoe (ultimate Iron Age, mid-first century AD).[50]

During the early Roman period, we see retention of the ultimate Iron Age Cadbury-type, with remarkably little innovation (Table 8). During the Roman period, socket stones are also utilised (e.g. Maiden Castle) for what had by then become a far less-demanding engineering feat than that for a late Middle Iron Age hillfort. It seems likely that for this reason, the post-shoe element was abandoned, with continued use of the collar only. Overall, iron gate-furniture is known from fourteen Roman sites; the only innovation being the introduction of an arm-plate to stabilise the gate. Further Roman period parallels (Type D, or variants of) are also known from Brecon Gaer, Arbeia, Vindobala, Venta Silurum, Trimontium, with two further continental examples at Feldberg and Rheingonheim (Manning 1985a, 140, 1988, 17–19). By the late Roman phase at the entrance to Maiden Castle, a pivot stone was utilised (Wheeler 1943).

What we find then is that for iron gate-mechanisms, the trend is from composite, heavy-duty Middle Iron Age-Late Iron Age objects (Eddisbury, Hembury) to an integral, much less-demanding ultimate Iron Age type (Cadbury). Initially designed perhaps from an earlier, fully-timber pre-cursor (e.g. at Maiden Castle) – which presumably helps to explain the initial sunken-mechanism (Figure 26). The concern initially – the reason for the invention of an iron pivot-mechanism – was a need to turn Eddisbury's very heavy, oak gate-posts at the main east entrance to this large *developed hillfort*. This grand Middle Iron Age gate, as well as the operation of the sunken-mechanism, helps to explain the very large dimensions of Eddisbury East's entranceway postholes.

New light on the Iron Age

Fourth century BC

For the fourth century BC, this work has provided new insights into the start of the Middle Iron Age period. At 400/380 BC, Eddisbury became a *developed hillfort* – almost tripling its enclosed space (from 1.3 to 3.7 ha) – revealing rapid growth in the human/animal population. This newly-enlarged enclosure may have had as many as five or six different entrances (see Figure 10) – an unusually high number, suggesting that people (and animals) were travelling from a variety of landscape locations to convene at this communal site (Brück 2007, 28–29). The southern entrances arguably more 'animal' in design than the more 'human' northern entrances. At Hembury's western entrance, we also find design around animals: a dual-portal entrance, with – as also at Eddisbury East and Cadbury's south-western entrance – the formation of a well-defined hollow-way. Each of the entranceways also worked to *funnel* movement – a feature redolent of animal management, and particularly so for Hembury West, where the gateway itself funnels; in contrast to Hembury's north-east entrance, which led into the northern 'human' enclosure. What we find is the real importance of animals to the design of hillfort entrances; Hembury West's proximity to the river revealing the importance of access to water, suggestive perhaps of cattle. Middle Iron Age Hembury and Eddisbury reveal gates 1.50–1.65 m (4' 11"-5' 5½") high respectively.[51] The enormous entranceway posts at Eddisbury – an 'over-building' if ever there was one – was perhaps seeking to work against the impact of animal traffic. The suggestion is a booming fourth century BC pastoralist community – as reflected also in contemporary arable innovation (spelt and rotary quern adoption), and the notable increase in settlements at this time across Britain (Pope and Haselgrove 2007, 8).

Third century BC

In the early third century BC, the development of a new, iron gate-turning technology was needed for the large gates at Eddisbury's eastern entrance. This Type A pivot mechanism (above) is considered here a development from a timber type (as perhaps at Maiden Castle, Dorset) becoming necessary due to the greater engineering feat indicated by Eddisbury's small-oak tree-trunk (0.55 m diameter) gate-posts.[52] The large gates themselves seem a product both of the inherited architectural-scale of this Middle Iron Age developed hillfort entranceway. Mechanical failure of the Type A pivot, at point of disc/spike weld, might suggest that earlier architectural project as somewhat overly ambitious at the gate; an inherent design flaw in a fourth century BC culture of open-ness. In the third century BC, we find reduction of gateway width at Eddisbury – in line with a broader *c*. 300 BC trend (Pope and Swogger forthcoming).

At Eddisbury, the hillfort ditches are then dug clear of silt, a process during which the community close down the northern entrance, indicating either a shift in the character of the community or a move away from traditional grazing lands. At Hembury West, the new design, around what becomes bi-vallation, increasingly channels movement/flow; and, similar to changes at Eddisbury, the focus becomes one of travel in from the southern landscape, rather than from land to the west. Again, either the people and/or the land had shifted. By contrast, movement at Hembury's north-east entrance – into the human, northern enclosure alone, remained much less-proscribed, with the entrance approached from a variety of directions. The implication from Hembury is that, after a century, or a few generations, there had been sufficient social change – most likely shifts in the location of wider settlement/grazing – that modifications were required on re-design of the hillfort entrance, occurring alongside the operation of digging the ditch clear of silt. What remains an unknown is the distance that groups were travelling to the site. At Eddisbury, the closing down of the northern entrance could be seen as indicating the loss of one element of the community.

Second century BC

By about 180 BC, after *c.* 220 years of use – having already decommissioned the northern entrance – the community at Eddisbury also closed down their eastern entrance. A 'heap' of slingstones at the doorway to the southern recess (Varley 1950, 33) suggests a degree of conflict – certainly people were no longer travelling in from the eastern landscape. Perhaps related is that Object 4 in our assemblage (Type A2) reveals evidence for burning (Appendix 1). Meanwhile at Hembury, a formal separation of human and animal space occurs, alongside continued funnelling of movement from even further south (amidst multivallation).[53] What we seem to be seeing is the decline of collective social forms towards the end of the Middle Iron Age, as well as a greater segregation of animals from humans, and perhaps some of our first evidence for conflict at a hillfort site.

First century BC

By the early first century BC at Eddisbury, we see production of the new, flatter Type B pivot – designed for a smaller (*c.* 0.40 m diameter) ash post. Analysis revealed continuity of local production – reminiscent of workshops producing utilitarian items – alongside evidence for deliberate removal of slag, to minimise risk of failure, and produce an increasingly strong/tough artefact (Appendix 2).[54] Despite this evidence for continuity in metalworking, we find Late Iron Age design at hillforts as different. Hembury's internal earthwork is much more about enclosing now than about welcoming in; the operation itself requiring fewer people. The gateway now recti-linear, perhaps with a smaller gate height, the architecture seems less about animals than humans, as the segregation of human and animal space becomes even more formalised, with the gate-pivot mechanism reserved only for the northern (human) entrance. This Late Iron Age architecture is more about inside than out. It may be laying claim to a Middle Iron Age past, but socially it seems very different. By the late first century BC, the later transitional Hembury-type C gate-mechanism is a response to a further reduction in the size/effort of the task, with a proto-collar developed to prevent post-end splitting in the now much smaller (11 cm diam.) gate-post, again potentially of ash. At Eddisbury, with the whole of the eastern landscape now closed down, the final form of the north-west entrance provides an uncomfortably long (19 m) passage; Hembury's north-east inturns are of a similar length. At Eddisbury, the addition of thick drystone-facing, narrowing it from 3.7 m wide to just 2.7 m. This is now an architecture of intimidation.

Conquest period

The first century BC then had seen decline in activity at hillfort sites, with smaller communities – following evidence for growing tensions during the second century BC. This late Middle-Late Iron Age society was very far removed from the swelling communities of the early Middle Iron Age, with their large, outward-looking architecture; welcoming others in. At South Cadbury too, there had again been a reduction in the scale of activity, alongside a 'deliberate closing down' of the wider agricultural landscape, including animal slaughter – what Jones and Randall (2010) refer to as a 'social dislocation' ahead of Rome. Reflecting these wider social trends, as we approach the Conquest period at Cadbury, the Type D gate-furniture is again smaller, for a 9 cm diam. gate-post, a sill-block replacing the need for a sunken-mechanism, and a collar working against post-end splitting of increasingly slight gate-posts (eventually becoming just 5–6 cm in diameter – Table 8). We have also learned a little more about the Roman occupation of south-west England. The Roman focus on Hembury's western (animal) entrance, because of its proximity to river access, seems to reveal a disjuncture in site use. We now see the South Cadbury massacre and Hod Hill occupation as apparently contemporary with the Roman Conquest, as Iron Age activity at Cadbury began to focus on ritual deposition practices at shrines in the hillfort interior and entrance recess. Meanwhile the Roman occupations at Hembury and Cadbury seem now contemporary with the Boudican revolt. Regarding gate-furniture technology, what is perhaps telling is the early Roman taking of a Late Iron Age technology, with little onward innovation – quite the opposite of what one might expect.

Conclusions

Returning to Barrett (1987) – we find that it *is* possible to reinterpret the work of earlier excavators, if we are both fastidious in our method and transparent in our process – something that takes real time. This article has demonstrated that reinterpreting site reports (and archives) is as much a practice of contextual archaeological method as is excavation; that both tasks require common archaeological principles – in the methodical reconstruction of past practice. At each of the three sites discussed, we consistently found the contribution of the original excavators (Liddell, Varley, Alcock) to be more reliable than reinterpretation by subsequent authors, itself often accompanied by unnecessarily negative comment – something that is itself of interest. Patient application of this new contextual approach to past work, at the level of the site, has provided the opportunity to develop a more detailed chronological narrative.

This work has also enabled recognition of a temporal depth to hillfort entrance architecture, through the application of contextual method; a recognition that hillforts represent *slow* architecture (McFadyen 2006) – generational. At Hembury, regular entrance redesign shows every few generations re-working the site; at Eddisbury we witness site growth, followed by a gradual closing down of entrances, and development of an intimidating Late Iron Age architecture; whilst Cadbury closes down access, followed by the onset of ritual traditions. Through these examples, this work demonstrates how we can combine a contextual grasp of stratigraphy, with a structural understanding of architecture, to improve our work on phasing, and thus our temporal understanding of prehistoric monuments. Something that in turn improves our knowledge of the composition and development of prehistoric communities.

Most significantly, this work uses Bayesian modelling to date the construction of *developed hillforts* to 400/380 BC – a date that sits comfortably with Cunliffe's (2005) 400 BC start-date for the type, and with change in the British settlement record more generally (Pope and Haselgrove 2007). It has also provided insight into Iron Age design principles – including the real importance of animals in relation to hillfort architecture. Design changes at entrances seem to reflect an open, pastoralist, socially-booming early Middle Iron Age: an interpretation that runs counter to previous explanations, which instead saw expansion at hillforts as reflecting ideologies of competition, dominance and control (e.g. Sharples 1991a; see Hill 1996) in a narrative that continued to focus on the primacy of defence (Cunliffe 1983, 2011; Harding 2012). From the architecture, we find that this Middle Iron Age society had begun to close down by the second century BC, before changing radically in the Late Iron Age. Decline in hillfort communities then, had very little to do with direct Roman contact.

We have also learned about hillfort gates – those of the Middle Iron Age requiring heavier mechanisms than at any time before or after. This was a bold design solution, borne out of the big architecture of an expansive early Middle Iron Age. The result was 'grand' gates – an ambitious undertaking that ultimately failed, reducing radically in scale by the Late Iron Age. Alongside elucidation of Iron Age design principles, we found that hillfort entrances also have the potential to reveal shifting patterns of movement in the wider hillfort landscape – something that now deserves testing/exploring in a larger data set. Finally, we hope to have revealed that the slow construction of understanding from archaeological evidence is ultimately far more rewarding than the forcing of a romantic narrative, built around traditional ideas of dominance and defence.

Notes

1. A recognition too that very large cut features seem to be the result of long-term remodelling, and as such, may typically represent those earlier in a given sequence (e.g. Blewburton Hill – innermost; Eddisbury East – outermost).
2. Due to poor preservation/fragmentation, samples of mineralised wood were taken for Scanning Electron Microscopy via scalpel under magnification, and mounted on sample stubs with Araldite. These recorded in detail with a JEOL JSM-6490LV Scanning Electron Microscope, and the images generated examined by Steve Allen (YAT).
3. The 1937 description was compiled by J.G.D. Clark et al. for the Prehistoric Society's 'Notes on Excavations' and it is perhaps possible that some contextual accuracy may have been lost in compiling these notes with the 'collaboration of excavators'.
4. Or alternatively it had a lower iron component, now lost to archive (see above).
5. It seems worth stating here that there are so many problems with Avery's (1993, App. A, 146 ff.) understanding of Varley's work that it is in some ways safer simply not to consult Avery.

6. The 15 m long passage indicates a later Middle Iron Age date by analogy (Cunliffe 2005; Pope and Swogger forthcoming, Table 2) and suggests that the eastern entrance ceases development, and goes out of use before the longer 19 m north-western entrance passage.
7. For a discussion of axial symmetry in domestic architecture see Pope (2003).
8. We know that the replacement of Pair 4 is in line with the re-modelling of the recesses. Garner (2016) suggests that re. the southern recess: 'Varley had wrongly identified the eastern return wall, which he shows running between postholes (450) and (451). On Garner's reinvestigation, a wall ran between (451) and (413)'. In fact Varley was correct, and had elucidated a Ph.2 recti-linear recess, with Garner (2016) instead identifying the eastern wall of an earlier, larger C-shaped Ph.1 predecessor – the western wall of which was to remain unexcavated in 2016 beneath the Ph.2 walling.
9. An alternative is that the westernmost posthole for the southern chamber/recess is actually on Posthole 9 – although this seems not to have a corresponding post in this phase. A further possibility is that the westernmost recess-posthole lies *between* the proposed '7a' and Posthole 9 – corresponding with the northernmost cut of Posthole 10, which would certainly lead to a more symmetrical chamber/recess shape. Without removal of the Ph.2 drystone wall we cannot know for certain, and only future detailed study on C-shaped chambers/recesses might now take this further. On the basis of the current evidence, there seems not to have been a paired northern C-shaped recess (on Postholes 4/8), however again as the site was not excavated to natural beyond the Ph.2 drystone walling (Garner 2016), it is difficult to know for certain whether this was the case.
10. An objective of this drystone re-facing was apparently to continue to allow access to the timber uprights, presumably to aid future repair. In the case of the gateposts, this would additionally allow access to the iron gate-mechanism, as sunk in a timber-block, packed in the lower half of the post-pit (see above) for repair/replacement. As such, we are relatively confident that the gate pivot-mechanism dates to the last phase of gate use, prior to abandonment.
11. Varley (1950) believed a square depression to the south of Posthole 10 marked the position of a strut to support the gate, although re-excavation (Garner 2016) considered this natural.
12. Note the variance between the line of the western wall of the southern recess in Varley's Figure 11 and Garner's fig. 10.24.
13. This is frustrating, as dates SUERC-59215 (destruction layer prior to inner vallum construction – Mason & Pope) and NZA-36656 (hearth sweepings on the inner vallum tail – Garner) seemed potentially to provide a *TPQ* and *TAQ* sandwich (respectively) for construction of the developed phase. The latter date seemed initially to be providing an important end-date for construction of *c*. 390 BC (assuming some time-depth between cessation of construction and the dumping of the 'hearth sweepings' – although no turfline was recorded). This had seemed to indicate construction of the developed phase of Eddisbury hillfort near to the beginning of the fourth century BC.
14. C-14 dated activity ended in *360–110 cal. BC* (*95% probability*; Fig. RC-1; *end: Eddisbury*), and probably in *355–220 cal. BC* (*68% probability*).
15. Garner (2016, 162–3) dismisses Varley's Ph.2 recess wall (between Postholes 5/15) and believes instead that the Ph.1 wall he subsequently finds is the 'correct' Ph.2 wall. As a result, he equates the burning layer he finds underneath the Ph.2 wall to Varley's burning inside the Ph.2 chamber, when it is in fact that of an earlier phase. Garner subsequently phases the two Ph.2 recesses differently due to the new, non-recti-linear shape that he made and accepted as 'correct' – failing to address the recognised typology of recesses, or understand the phasing implications.
16. With the discussion around C-14 date NZA-36656 potentially remaining important for future work.
17. Whilst it might be argued that we should accept the unproven Maiden Castle date and assume a geographical time-lag of 2–3 generations between Dorset and Cheshire, this is not consistent with the more usual near-contemporaneity of settlement trends across Iron

Age Britain. Such notions, of ideas taking time to ‘reach’ those in a more ‘peripheral’ North, belong firmly in the last century.

18. On the basis of this date, Garner (2016) suggests outer rampart construction as fourth to later third centuries BC, although this is partly on the basis of misunderstanding the southern recess sequence.
19. A drop in the level of occupation at the site at this point in time might also be confirmed by the lack of multivallation.
20. There are problems with this drawing’s scale, as well as some artistic licence in this reconstructed schematic.
21. Avery (1993, App. A, 152) thinks this Saxon, but the architecture fits well with a Late Iron Age date.
22. And as fitting with a now well-recognised ‘early hillfort’ type (Cunliffe 2005, fig. 15.25).
23. The returning earthwork perhaps lying somewhere between Garner Trenches 12 and 13 – the latter, testing Varley’s alternative sequence, did identify a bank (3.5 m wide, 1 m high) which was considered modern.
24. The hillfort seems not to have seen early Roman occupation, although the southern recess and passage were backfilled with stone containing a second century AD *mortarium* fragment (Varley 1950, 33; J. Dunn pers. comm.).
25. Todd (1984a, 264) incorrectly had the pivot at the base of a squared timber, and erroneously suggested it had no Iron Age parallel. Avery’s (1993) phasing would have assigned the pivot a Middle Iron Age date; however he dismissed it altogether, due to it not having been illustrated in the original report, and his inability to find it in Exeter Museum (1993, 176, FN 23).
26. From Liddell (1930), Ph.2 of the ‘northern transverse bank’ is post-La Tène II with b-d ceramics (MIA-LIA) in the second fill of the ditch (presumably representing a re-cut contemporary with the Ph.2 construction of the bank, i.e. Late Iron Age). Ph.2 of the northern bank (post-LT II ceramic) seems contemporary with the construction of the single-phase southern bank, which is later than LT II ceramic (Liddell 1930, 50–52). A hoard of slingstones in the top fills of the ‘northern transverse bank’ ditch confirms an Iron Age (rather than Roman or later) date. The tentative suggestion by Todd (1984b) that the northern earthwork represented ‘a relatively recent work’, and subsequently that the earthwork dated to the seventeenth century AD (Todd 2002, 2007) is problematic. Even if all Liddell’s ceramic were proven to be residual, her caches of slingstones in the upper fills appear to actively contradict Todd’s interpretation. His abiding principle was that the ‘odd’ ‘transverse banks’ were not Roman – based on their ‘unmilitary planning’ and the absence of an opening in the northern bank (1984a, 262) – meaning that he was initially happy to accept them as Late Iron Age, on the basis of Liddell’s ceramics. He subsequently considered it a ‘strong possibility’ that the earthworks might be Roman, with the northern a ‘relatively recent’ work (1984b). Despite his 2002 article containing a more modern survey of the monument, Todd persists with the interpretation earthworks as ‘transverse banks’, *sensu* Liddell; rather than recognizing them as associated with interior enclosures. Michael Avery’s (1993) assertion of Liddell’s ceramics as post-Conquest, in line with Todd’s phase of early Roman occupation, sees Todd (2007) accepting all Liddell’s ceramic as residual, with his section-drawing apparently demonstrating that the northern interior earthwork was in fact post-Medieval in date (2002, Figure 2). Having performed a thorough analysis of all the published evidence, we conclude here that the conclusions of Todd (2002) simply cannot be correct. Our concern is that his 1980s excavation of the northern ‘transverse bank’ inadvertently re-excavated Liddell’s Cutting 2g; something that might explain Iron Age sherds just below the surface, sitting above post-Medieval ceramics, and Todd’s comment regarding the notably ‘loose’ nature of the bank material. Meanwhile, Avery (1993) had the southern bank as post-Conquest, on the basis of the ceramics. However – awaiting further analysis by a period ceramics specialist – the ceramic does seem to the authors to be Late Iron Age in date. In addition, the southern earthwork is of single-phase construction, above a turfline, on top of which was found

a sherd of LT II ceramic, providing a *TPQ* (Liddell 1930, 50). The argument hinges on the ceramics from the base of the southern earthwork ditch (Cutting 5b). Liddell (1930) has P.27 as an 'apparently' Claudian-Nero black wheel-thrown *olla* (AD14–68) and RAMM (1935, 11) suggest P.34 as a Belgic bowl (end of first century BC/start of first century AD-AD 60). In fact, P.27 seems a typical Late Iron Age black wheel-thrown jar. Avery (1993, 177), however, suggests the ceramics from the ditch as AD 50–75 (post-Conquest), but this seems on the basis of two Maiden Castle war cemetery bowls (P.11, P.34), a pedestal base (P.26), and black wheel-thrown jar (P.27), which again seem Late Iron Age in date (Cunliffe 2005, 647; Sharples 1991a, 261, 1991b, 124). Crucial here, however, is that Cutting 3 and 5a – in close proximity to the Roman western entrance – produced no Roman ceramic (suggesting perhaps that the features here had already silted up/been backfilled by the early Roman period). Interestingly, Avery (1993, 177, 17) accepts the ceramic from the western entrance as pre-Conquest. Liddell (1930, 14) records the 'transverse earthworks' as including caches of slingstones in the top fill(s) of the ditch (Cutting 3b); which again suggests a pre-Conquest date for their origin; whilst the off-set entrance of the southern earthwork is arguably akin to that of the outermost western entrance earthwork. In conclusion, the evidence suggests both the southern 'transverse bank' and Ph.2 of the northern earthwork as Late Iron Age in date; as Liddell (1935) had it. The remaining issue was that Liddell (1932) recorded the northern earthwork as stratigraphically later than the south-west entrance features (Liddell 1932, 168). We suggest the stone terminal represents an early Roman stone kerbing and remodelling of the Late Iron Age interior earthwork – of contemporary build with the early Roman squared stakes at the entrance (Liddell 1932, 168; Plates II-III) which then explains the stratigraphic relationship noted by Liddell.

27. Something that we have also recently resolved in the sequencing of Penycloddiau hillfort.
28. Liddell recorded that Posthole 8 was deliberately filled with stone, had no surviving wood, and that the cobbled road running between Postholes 1 and 10, ran over it. The cobbled path is later in the sequence (its angle no longer respecting that of the original north-eastern approach through the earthworks). This reveals Posthole 8 as associated with an original Ph.1 entrance – having been deliberately back-filled on the laying of the cobbled path. Upright 14 too appears to be solidly underneath the northern in-turn.
29. Liddell's eastern entrance sequence seems fundamentally sound and is accepted for all but Posthole 11, which is seen here as associated with a Ph.3 entrance. Liddell (1935) describes Posthole 11 as having the cobbling only 'well over the rim of the hole' which indicates an earlier phase to the post-pit, as she suggests. However this also reveals the cobbling as not entirely covering the feature, as with Posthole 8 – suggesting instead that the final post-pipe was at least contemporary with the cobbling, if not later than it; similarly it was not intentionally back-filled like the earlier Posthole 8. Avery (1993, 175, FN 11) accepts it may cut the cobbles. Posthole 11 also lies clearly inside the line of the cobbling and fits the ground-plan of a later recti-linear phase. Liddell's early stratigraphy for post-pits 4/5 is accepted, yet the latest square stakes in the pits, are considered early Roman by parallel with those at the western entrance, as identified by Todd (2007).
30. It may be that the entrance arrangement continues further west, however this area remained unexcavated. The two small postholes on the southern interior does suggest however that we do have the complete arrangement.
31. Whilst the inner palisade is positioned parallel with the inner vallum, Liddell's Figure 11 does indicate that it ran beneath the rampart – the degree of respect does, however, indicate a limited time-depth between the two architectural events (as accepted by Cunliffe 2005, 349). The complimentary angle of the entrance approach through the inner ditch and inner vallum reveals the two features as contemporary.
32. Although similar to the porch area at Eddisbury, the Hembury community do not appear to have provided a roofed structure (on an A-frame) – with the outer posts instead placed more as an outward extension of the Ph.3 gateway arrangement. In both phases the area in front of the hillfort gate is open.

33. Akin to Eddisbury, the large post-pits indicate re-cutting activity over time, and it may be that the outermost 'porch' postholes had an earlier, unrecognised, Middle Iron Age (Ph.3) phase. This would extend the Ph.3 passage depth to 5.8 m, still giving us an Early Iron Age start-date by analogy (Cunliffe 2005).
34. Liddell saw a turret and gallery (founded on Postholes 7, 4, 5, 9, 14) – which the current writer does not accept, structurally; in addition this is rejected because Postholes 4, 5 and 14 are stratigraphically earlier.
35. i.e. just below the current author's collarbone – although the transitional proto-sill mechanism, as well as the much slighter gate-post, may mean that the 25% calculation works less well in calculating height in this case.
36. See Avery (1993, 175, FN 6 and 7). Something that also explains the arrangement noted in the middle rampart. As such, Avery's (1993) interpretation of the evidence is supported here. Three stone spindlewhorls and Glastonbury ware were associated with the inner palisade trench (Avery 1993, 160, 171).
37. Avery (1993, 175) suggests potential contemporaneity of the inner ditch and middle rampart (i.e. becoming bi-vallate) although this is far from clear.
38. The first phase of the 'northern transverse bank' contains Liddell a-c ceramics (EIA-second century BC) sealed by a turfline, within which was a hearth, with La Tène II ceramic on its surface (Liddell 1930, 51–52). From Liddell's (1930) ceramics, construction of the Ph.1 'northern transverse bank' would be second century BC (Table 1).
39. The fact that the northern inturn at the north-eastern entrance does not respect the Ph.3 entrance features suggests the inturn feature as later than this phase.
40. The argument for Ph.4 of the NE entrance as Late Iron Age rather than Roman is also due to continuity of the Middle Iron Age axis, and repetition of the porch feature (porch timbers in Pit A2/B2 not aligned to Ph.3 but to Ph.4), as well as iron gate-furniture parallels with Late Iron Age Eddisbury North.
41. This is larger than the area typically given, which seems to refer to the central plateau, rather than the area defined by the inner earthwork. All values are calculated using ArchGIS, by Karl Smith (University of Oxford).
42. An item not usually found deposited with bodies, unless as part of a ritual spearing of the corpse.
43. Jones and Randall (2010) argue that disarticulation was a result of normal funerary traditions surrounding the curation and disparate deposition of bones – which is accepted, but which does not preclude Roman assault.
44. Whilst neonates and elder males have been identified in the remains discovered by the South Cadbury Environs Project (Jones and Randall 2010, 177).
45. C-14 dates from the 1973 excavations did not work, rather spectacularly (Alcock 1980, Table 2) – and given the above, one wonders if this was a result of sampling methodology.
46. A piece of gate furniture (K597) seems to overlie the burnt drystone walling – as seen (in Alcock 1972, Plate 36). However, this does not work with *any* of the recorded material culture associations, and we can only put forward the idea that it was placed here during excavation.
47. This seems the most likely context for the Romano-Celtic plaque.
48. The three remaining 'lift-keys' do appear more convincing from their descriptions.
49. Without a hole for a nail, the Maiden Castle gate-handle seems, like the Cadbury latch lifts, to have been held in place via a hole in the gate. The direction of the ring relative to the iron strip suggests that these objects did not operate as latch-handles.
50. Hembury (early first century AD) is reconstructed here as a sill-block mechanism, as only one disc seems to reveal that it is evolving out of the earlier fully sunken-socket mechanism).
51. These seem designed not for riding in on horseback/carts – more for people, having already dismounted, walking in on foot with animals/carts. The average height (hoof to shoulder) of an Iron Age horse being between 13.2–14.0 hh (1.4 m, 4' 6"-4' 8") (R.

Maguire pers. comm.). Varley (1964, 92) talks of wheel ruts at Maiden Castle, Bickerton and Eddisbury (Cheshire); as also identified at Maiden Castle, Dorset (Wheeler 1943).

52. The large size of the gateway features is not only about large-scale architecture. It is also in part about achieving the necessary depth to house a sunken pivot-mechanism. The ultimate size of the post-pits also strongly suggests a degree of maintenance/repair and associated re-cutting activity; alongside a 20° bend in Object 2's spike (Appendix 1) which may indicate post-failure and/or forced removal.
53. Multivallation is considered here more a feature of the late Middle Iron Age – its design a continuation of earlier design traditions – different from distinct Late Iron Age design at Hembury, and absent at Late Iron Age Eddisbury.
54. Analysis revealed a local ore source – with no major changes apparent between that and indications available from the second century BC objects. Of note was the similarity of microstructure to other utilitarian items of Middle and Late Iron Age date, aligning nicely with both the C-14 dates, and the architectural analysis.

Acknowledgments

The authors would like to thank Kath Buxton (Historic England) for agreeing to fund this project; Steve Allen and Ian Panter (York Archaeological Trust) for identification of mineralised organics and information on object conservation; Matthew Ponting (University of Liverpool) for advice on scientific analysis; Rouven Meidlinger for permission to reproduce his work with the Hembury LiDAR data, Karl Smith (University of Oxford) for calculating hillfort areas; and J.R. Petersen (University of Liverpool) for photographing the assemblage for archive. Grateful thanks also to members of the Hillfort Study Group (HFSG), to Eleni Asouti and Doug Baird (University of Liverpool) and to the Journal's anonymous reviewers, for supportive and helpful comments.

Funding

This work was supported by Historic England's National Heritage Protection Plan (NHPP) Heritage at Risk grant scheme.

References

Alcock, L. 1971. "Excavations at South Cadbury Castle, 1970: Summary Report." *Antiquaries Journal* 51: 1–7. doi:10.1017/S0003581500019119.

Alcock, L. 1972. *By South Cadbury, Is that Camelot … ' Excavations at Cadbury Castle 1966–70*. London: Thames and Hudson.

Alcock, L. 1980. "The Cadbury Castle Sequence in the First Millennium BC." *Bulletin of the Board of Celtic Studies* 28: 656–718.

Avery, M. 1993. *Hillfort Defences of Southern Britain*. BAR (British Series) 231. Oxford: Archaeopress.

Baird, J. A., and L. McFayden. 2014. "Towards an Archaeology of Archaeological Archives." *Archaeological Review from Cambridge* 29 (2): 14–32.

Barrett, J. C. 1987. "The Glastonbury Lake Village: Models and Source Criticism." *Archaeological Journal* 144 (1): 409–423. doi:10.1080/00665983.1987.11021208.

Barrett, J. C., P. W. M. Freeman, and A. Woodward. 2000. *Cadbury Castle Somerset: The Later Prehistoric and Historic Archaeology*. London: English Heritage.

Bayley, J., D. Crossley, and M. Ponting. 2008. *Metals and Metalworking: A Research Framework for Archaeometallurgy*. Historic Metallurgy Society Occasional Publication No. 6. London: Historic Metallurgy Society.

Bayliss, A., C. Bronk Ramsey, J. van der Plicht, and A. Whittle. 2007. "Bradshaw and Bayes: Towards a Timetable for the Neolithic." *Cambridge Archaeological Journal* 17 (S1): 1–28. doi:10.1017/S0959774307000145.

Bishop, M. C. 1996. "Finds from Roman Aldborough: A catalogue of small finds from the Romano-British Town of Isurium Brigantum." Oxbow Monograph No 65. Oxford. Oxbow Books.

Brailsford, J. W. 1962. *Hod Hill: Antiquities from Hod Hill in the Durden Collection*. London: British Museum.

Bronk Ramsey, C. 2009. "Bayesian Analysis of Radiocarbon Dates." *Radiocarbon* 51 (1): 337–360. doi:10.1017/S0033822200033865.

Brück, J. 2007. "The Character of Late Bronze Age settlement in Southern Britain." In *The Earlier Iron Age in Britain and the Continent,* edited by C. Haselgrove and R. Pope, 24–38. Oxford: Oxbow.

Cotton, M. A. 1954. "British Camps with Timber-laced Ramparts." *Archaeological Journal* 111 (1): 26–105. doi:10.1080/00665983.1954.10854076.

Cunliffe, B. W. 1983. *Danebury: Anatomy of a Hillfort*. 1st ed. Stroud: Tempus.

Cunliffe, B. W. 2005. *Iron Age Communities in Britain*. 4th ed. London: Routledge.

Cunliffe, B. W. 2011. *Danebury Hillfort*. 3rd ed. Stroud: Tempus.

Dixon, P. 1976. "Crickley Hill, 1969-1972". In *Hillforts, Later Prehistoric Earthworks in Britain and Ireland*, edited by D. W. Harding, 162–175. London: Academic Press.

Drury, P. J. 1982. "Structural reconstruction: Approaches to the interpretation of the excavated remains of buildings." BAR (British Series) 110. Oxford: Archaeopress.

Ehrenreich, R. M. 1994. "Ironworking in Iron Age Wessex." In *Iron Age in Wessex: Recent Work*, edited by A. P. Fitzpatrick and E. L. Morris, 16–18. Dorchester: Wessex Archaeology.

Fell, V. 2003. "The Condition and Metallographic Examination of the Ironwork." In *Fiskerton: An Iron Age Timber Causeway, with Iron Age and Roman Votive Offerings*, edited by N. Field and M. Parker Pearson, 74–85. Oxford: Oxbow Books.

Forde-Johnston, J. 1976. *Hillforts of the Iron Age in England and Wales: A Survey of the Surface Evidence*. Liverpool: Liverpool University Press.

Fox, G., and W. H. St John Hope. 1890. "Excavations on the Site of the Roman City at Silchester, Hants." *Archaeologia* 52 (2): 733–758. doi:10.1017/S0261340900007682.

Garner, D. 2016. "Excavations at Eddisbury Hillfort." In *Hillforts of the Cheshire Ridge: Investigations Undertaken by the Habitats and Hillforts Landscape Partnership Scheme 2009–2012*, edited by D. Garner, 139–200. Oxford: Archaeopress.

Hamilton, D., and J. Kenney. 2015. "Multiple Bayesian Modelling Approaches to a Suite of Radiocarbon Dates from Ovens Excavated at Ysgol Yr Hendre, Caernarfon, North Wales." *Quaternary Geochronology* 25: 72–82. doi:10.1016/j.quageo.2014.10.001.

Hamilton, W. D., and C. Haselgrove. 2019. "Exploring Settlement Dynamics through Radiocarbon Dating." In *Enclosing Space, Opening New Ground. Iron Age Studies from Scotland to Mainland Europe*, edited by T. Romankieewicz, M. Fernández-Götz, G. Lock, and O. Büchsenschütz. Oxford: Oxbow.

Harding, D. W. 2012. *Iron Age Hillforts in Britain and Beyond*. Oxford: Oxford University Press.

Haselgrove, C., D. Hamilton, C. Gosden, L. Brown, and C. Poole. forthcoming. *Iron Age Settlement and Society in Central Southern Britain: A New Chronological Perspective*. Oxford: OUSA monographs.

Hill, J. D. 1996. "Hill-forts and the Iron Age of Wessex." In *The Iron Age in Britain and Ireland: Recent Trends*, edited by T. C. Champion and J. R. Collis, 95–116. Sheffield: Collis.

Hogg, A. H. A. 1975. *Hill-forts of Britain*. London: Hart-Davis and MacGibbon.

Hughes, G. 1994. "Old Oswestry Hillfort: Excavations by W J Varley 1939–40." *Archaeologia Cambrensis* 143: 46–91.

Jackson, R. 2002. "The via Gabina Villas Sites 10, 11 and 13: The Metalwork." Walter Widrig and Rice University. Accessed 15 August 2017. http://viagabina.rice.edu/metal/index.html

Jones, S., and C. Randall 2010. "Death, Destruction and the End of an Era: The End of the Iron Age at Cadbury Castle, Somerset." In *In Search of the Iron Age: Proceedings of the Iron Age*

Research Seminar 2008, University of Leicester, edited by M. Sterry, A. Tullett, and N. Ray, 165–183. Leicester: Leicester Archaeology. doi:10.1177/1753193410390761.

Knight, M., and L. McFadyen. 2019. "'At Any Given Moment': Duration in Archaeology and Photography." In *Archaeology and Photography: Time, Objectivity and Archive*, edited by L. McFadyen and D. Hicks. London: Bloomsbury.

Liddell, D. 1930. "Report on the Excavations at Hembury Fort, Devon, 1930." *Proceedings of the Devon Archaeological Society* 1 (2): 40–63.

Liddell, D. 1931. "Report on the Excavations at Hembury Fort, Devon: Second Season, 1931." *Proceedings of the Devon Archaeological Exploration Society* 1 (3): 90–120.

Liddell, D. 1932. "Report on the Excavations at Hembury Fort, Third Season, 1932." *Proceedings of the Devon Archaeological Exploration Society* 1 (4): 162–190.

Liddell, D. 1935. "Report on the Excavations at Hembury Fort, 1934–35." *Proceedings of the Devon Archaeological Exploration Society* 2 (3): 135–175.

Macdonald, P. 2000. "The Ironwork (Excluding Brooches)." In *Cadbury Castle, Somerset: The Later Prehistoric and Early Historic Archaeology*, edited by J. Barrett, P. Freeman, and A. Woodward, 122–132. London: English Heritage.

Mackreth, D. F. 2011. *Brooches in Late Iron Age and Roman Britain*. Oxford: Oxbow.

Manning, W. H. 1972. "The Iron Objects." In *Verulamium Excavations*, edited by S. Frere, 163–195. Vol. 1. Oxford: Society of Antiquaries London.

Manning, W. H. 1985a. *Catalogue of the Romano-British Iron Tools, Fittings and Weapons in the British Museum*. Dorchester: British Museum Publications Limited.

Manning, W. H. 1985b. "The Iron Objects." In *Inchtuthil, the Roman Legionary Fortress Excavations 1952–65*, edited by L. F. Pitts and J. K. St. Joseph, 289–299. London: Society for the Promotion of Roman Studies.

Manning, W. H. 1988. "A Note on the Iron Fittings from Gateways." In *Portae Cum Turribus: Studies of Roman Fort Gates*, BAR (BS) 206, edited by P. Bidwell, R. Miket, and B. Ford, 17–21.

Mason, R. G. S., and R. E. Pope. 2016a. "The Lost Archive of Eddisbury: Rediscovering Finds and Records from the 1936–38 Varley Excavations." In *Hillforts of the Cheshire Ridge: Investigations Undertaken by the Habitats and Hillforts Landscape Partnership Scheme 2009–2012*, edited by D. Garner, 29–36. Oxford: Archaeopress.

Mason, R. G. S., and R. E. Pope. 2016b. "Rescuing a Scheduled Monument: Recent Work at Merrick's Hill, Eddisbury Hillfort." In *Hillforts of the Cheshire Ridge: Investigations Undertaken by the Habitats and Hillforts Landscape Partnership Scheme 2009–2012*, edited by D. Garner, 201–216. Oxford: Archaeopress.

McFadyen, L. 2006. "Building Technologies: Quick and Slow Architectures and Early Neolithic Long Barrow Sites in Southern Britain." *Archaeological Review from Cambridge* 21: 70–81.

McFadyen, L. 2011. "Practice, Drawing, Writing and Object." In *Redrawing Anthropology*, edited by T. Ingold, 33–43. London: Ashgate.

Paynter, S. 2006. "Regional Variations in Bloomery Smelting Slag of the Iron Age and Romano-British Periods." *Archaeometry* 48 (2): 271–292. doi:10.1111/arch.2006.48.issue-2.

Pope, R., and C. Haselgrove. 2007. "Characterising the Iron Age." In *The Earlier Iron Age in Britain and the near Continent*, edited by C. C. Haselgrove and R. E. Pope, 1–23. Oxford: Oxbow.

Pope, R. E. 2003. "Circular Structures in North and Central Britain C. 2500 BC-AD 500." Unpublished PhD thesis, University of Durham.

Pope, R. E. 2008. "Roundhouses: 3,000 Years of Prehistoric Design." *Current Archaeology* 222: 14–21.

Pope, R. E., and J. G. Swogger. forthcoming. "Reconstructing Hillfort entrances.".

Prtak, E. 2019. "Writing 'Herstory' from the molly cotton archive: How women's careers impacted mid-twentieth century iron age studies." Unpublished MRes thesis, University of Liverpool.

Ralston, I. B. M. 2006. *Celtic Fortifications*. Stroud: Tempus.

RAMM (Royal Albert Memorial Museum). 1935. *Hembury Fort: Exhibition of Objects Discovered during the Excavations (1930–5), and of Comparative Material from Other Sites*. Exeter: Wheaton.

Richmond, I. 1968. *Hod Hill: Excavations Carried Out between 1951 and 1958, Volume II*. London: British Museum.

Rule, E. 2018. “Here Be Dragons: A Contextual Analysis of the Evidence for Society and Culture in Iron Age Central Western Britain.” Unpublished PhD thesis, University of Liverpool.
Salter, C., and R. Ehrenreich 1984. “Iron Age Iron Metallurgy in Central Southern Britain”. In *Aspects of the Iron Age in Central Southern Britain*, edited by B. Cunliffe and D. Miles, 146–161. Oxford: University of Oxford, Committee for Archaeology.
Salter, C. J. 1991. “The Ferrous Metalworking Evidence.” In *Maiden Castle: Excavations and Field Survey 1985–6*, edited by N. Sharples, 165–170. London: English Heritage.
Scott, B. G. 1990. “Early Irish ironworking.” Ulster Museum Publication No. 266, Ulster Museum.
Sharples, N., ed. 1991a. *Maiden Castle: Excavations and Field Survey 1985–6*. London: English Heritage.
Sharples, N. 1991b. *Maiden Castle*. London: Batsford.
Smith, M. 2017. *Mortal Wounds: The Human Skeleton as Evidence for Conflict in the Past*. Barnsley: Pen and Sword.
Stewart, D., and M. Russell. 2017. *Hillforts and the Durotriges*. Oxford: Archaeopress.
Todd, M. 1984a. “Excavations at Hembury (Devon), 1980–83: A Summary Report.” *Antiquaries Journal* 64 (2): 251–268. doi:10.1017/S0003581500080409.
Todd, M. 1984b. “Hembury (Devon): Roman Troops in a Hillfort.” *Antiquity* 58 (224): 171–173. doi:10.1017/S0003598X00056222.
Todd, M. 2002. “The Cross-dykes at Hembury.” *Proceedings of the Devon Archaeological Exploration Society* 60: 207–210.
Todd, M. 2007. “Roman Military Occupation at Hembury (Devon).” *Britannia* 38: 107–123. doi:10.3815/000000007784016511.
Tylecote, R. F. 1986. *The Prehistory of Metallurgy in the British Isles*. London: Institute of Metals.
Varley, W. J. 1950. “Excavations of the Castle Ditch, Eddisbury 1935–1938.” *Transactions of the Historical Society of Lancashire and Cheshire* 102: 1–68.
Varley, W. J. 1964. *Cheshire before the Romans*. Chester: Cheshire Community Council.
Varley, W. J., J. G. D. Clark, H. G. Leask, E. Estyn Evans, V. G. Childe, and W. F. Grimes 1936. “Excavations at the Castle Ditch, Eddisbury, Cheshire.” *Proceedings of the Prehistoric Society*. Vol. 2, 210–219.
Varley, W. J., J. G. D. Clark, H. G. Leask, E. Estyn Evans, V. G. Childe, and W. F. Grimes 1937. “Excavations at the Castle Ditch, Eddisbury, Cheshire.” *Proceedings of the Prehistoric Society*. Vol. 3, 447–448.
Varley, W. J., and J. W. Jackson. 1940. *Prehistoric Cheshire*. Chester: Cheshire Community Council.
Wheeler, R. E. M. 1943. “Maiden Castle, Dorset.” Research Report of the Society of Antiquaries of London 12. Oxford.
Whittle, A., F. Healy, and A. Bayliss. 2011. *Gathering Time: Dating the Early Neolithic Enclosures of Southern Britain and Ireland*. Oxford: Oxbow.
Woodward, A., and J. D. Hill. 2000. “Synthesis.” In *Cadbury Castle, Somerset: The Later Prehistoric and Early Historic Archaeology*, edited by J. Barrett, P. Freeman, and A. Woodward, 114. London: English Heritage.
Woodward, A. 2000. “The Massacre Levels: A Contextual Analysis.” In *Cadbury Castle, Somerset: The Later Prehistoric and Early Historic Archaeology*, edited by J. Barrett, P. Freeman, and A. Woodward, 105–116. London: English Heritage.
Woodward, A., and H. James. 2000. “The South-western Gate Sequence.” In *Cadbury Castle, Somerset: The Later Prehistoric and Early Historic Archaeology*, edited by J. Barrett, P. Freeman, and A. Woodward, 84–102. London: English Heritage.

Appendix 1. Eddisbury object catalogue

Type A

(1) **A2 upper:** Incomplete composite iron disc with remains of upright iron spike (Fig. 4.1). Slightly concave, heavily laminated upper surface to disc, convex base, no original outer edges. Central square perforation to disc, and remains of upright spike (25 mm high), with surviving rectangular section – originally square 18 × 15 mm – narrowing to a laminated broken end. Upstanding round lump of iron on upper surface adjacent to upright spike (SEM sample no. EDY-040), appears non-functional, probably a production defect. Context unknown – believed eastern entrance, probably Posthole 3. Accession ref: MANCH:2014.2.1 (Manchester Museum).

(2) **?A1 upper:** Incomplete upright iron spike, with remains of a composite iron disc (Fig. 4.2). Square section to upright spike tapering from 23 × 17 mm at base to 11 × 9 mm at broken end, overall height 84 mm. Distortion of the spike (*c.* 20°) probably associated with mechanical failure of the object during original use. Post-excavation repair (unidentified filler/adhesive). Mineralised preserved organics (MPO) – wood remains of an unidentifiable non-porous hardwood – were present on all four faces of the upright spike. Remains of composite iron disc with square perforation for upright spike, with possible concave upper surface and convex base, both laminated (SEM sample no. EDY-050). Metallurgical analysis revealed mechanical failure (see Appendix 2). Context unknown – believed eastern entrance, probably Posthole 4. Accession ref: MANCH:2014.2.2.

(3) **A2 lower:** Incomplete composite iron disc with incomplete upright iron spike (Fig. 4.3). Slightly convex upper surface with concreted mud remains, concave underside, partly missing. Incomplete outer edge, but originally slightly oval-shaped in plan (135 x 120 mm). MPOs on both sides of disc including wood, charcoal and grass/reed-like strands. Central square perforation with incomplete upright spike surviving 50 mm high above the disc (SEM sample no. EDY-021-022). Square section to spike tapering from 20 × 20 mm at base of upper surface, to 10 × 8 mm at broken end. Overall height 100 mm. Context unknown – believed eastern entrance, probably Posthole 3. Accession ref: MANCH:2014.2.3.

(4) **A2:** Outer edge fragment from a circular iron disc, refitted from two fragments (Fig. 4.4). Convex upper surface (similar profile to No. 5), heavily corroded and laminated, with concave underside. Layer of brick-red haematite directly over the original upper surface indicative of burning. Overall height 35 mm, disc thickness 15 mm, approx. diameter 129 mm. Context unknown – believed eastern entrance, probably Posthole 3. Accession ref: MANCH:2014.2.4.

(5) **A1:** Incomplete circular iron disc, refitted from three outer edge fragments (Fig. 4.5). Pronounced convex upper surface, heavily laminated, with concave underside (SEM sample no. EDY-090). Overall height 28 mm, approx. diameter 129 mm. Context unknown – believed eastern entrance, probably Posthole 4. Accession ref: MANCH:2014.2.5.

(6) **A1:** Laminated fragment from an ?iron disc (Fig. 4.6). Convex upper surface, concave underside, no original edges. Overall height 21 mm. Context unknown – believed eastern entrance, probably Posthole 4. Accession ref: MANCH:2014.2.6.

(7) **?A1:** Possible disc fragment with pronounced convex upper surface and concave underside (Fig. 4.7). Overall height 24 mm. Context unknown – believed eastern, probably Posthole 4. Accession ref: MANCH:2014.2.7.

Upright spike fragments

(8) Fragment of upright iron spike (Fig. 4.8), broken at either end. Square section tapering from 20 × 18 mm to 15 × 13 mm. MPO wood remains of an unidentifiable non-porous hardwood. Overall height 50 mm. Context unknown. Accession ref: MANCH:2014.2.8.

(9) Fragment of upright iron spike (Fig. 4.9), broken at the lower end, masked by corrosion at the other. Square section tapering from 15 × 14 mm to approximately 9 × 9 mm. MPO wood remains of an unidentifiable non-porous hardwood. Overall height 77 mm. Context unknown. Accession ref: MANCH:2014.2.9.

Type B

(10) **B:** Largely complete circular iron disc, with remains of composite upright iron spike (Fig. 4.10). Vertical outer edge to disc with a slightly laminated flat upper surface, and heavily laminated, slightly dished underside (SEM sample no. EDY-010). Overall height 30 mm, diameter 120 mm. Central square socket with remains of square sectioned (12 x 12 mm) upright spike, preserved only within. Crack running from one corner of the central square socket to the outer edge. Context unknown – believed north-west entrance. Accession ref: MANCH:2014.2.10.

(11) **B:** Incomplete broadly circular iron disc refitted from six fragments, with remains of perforation for composite upright spike (Fig. 4.11). Flat but uneven ?upper surface with slag-like appearance, remains of concreted mud. MPO wood remains – fragments of the tangential section of ring-porous hardwood, possibly *Fraxinus excelsior* L. (ash). ?Flat underside, heavily laminated. Approximate diameter 124 mm. Remains of a square perforation (*c.* 16 × 15 mm) off-centre. Context unknown – believed north-west entrance. Accession ref: MANCH:2014.2.11.

Table 9. Sample reference numbers and description.

Accession No.	X-ray No.	Sample description	Sample No.
MANCH:2014.2.10	X8512/K12/2	Disc section	EDY-010
MANCH:2014.2.3	X8513/K12/1	Upright section	EDY-020
MANCH:2014.2.3	X8513/K12/1	Disc section	EDY-021
MANCH:2014.2.3	X8513/K12/1	Disc section	EDY-022
MANCH:2014.2.1	X8514/K12/3	Upright section	EDY-040
MANCH:2014.2.2	X8512/K12/1	Disc/base of upright section	EDY-050
MANCH:2014.2.5	X8514	Disc section	EDY-080
MANCH:2014.2.5	X8514	Disc section	EDY-090

Other fragments

A further nine small fragments of iron (MANCH:2014.2.12-20) were found amongst the pivot assemblage. Attempts to refit these with objects 1–11 were extensively explored, but no further matches were identified.

Appendix 2. Metallographic and compositional analysis of ferrous gate-furniture from Eddisbury Hillfort, Cheshire

Edward Rule

Eight samples were taken from six of the ferrous gate-furniture objects to determine details about iron production, structure and composition. These were then subjected to investigation by the current author, using metallographic techniques and scanning electron microscopy energy dispersive spectroscopy. Information on production, structure and composition was then used to evaluate the significance of these objects in terms of Iron Age pyro-technology, contact and exchange networks, and to provide a reference for interpreting future discoveries of this object type.

Aims/objectives

The aim of this scientific study was to develop a better understanding of metalwork and pyro-technology in Iron Age north-west England. In order to achieve this, a number of research objectives were identified:

(1) To prepare metallographic sections of object samples for investigation and future study.
(2) To conduct metallographic analysis, and determine microstructure and phase composition.
(3) To carry out Vickers microhardness testing to determine microhardness values for these samples.
(4) To use scanning electron microscopy energy dispersive spectroscopy to determine major, minor and trace-element composition of the bulk sample and slag inclusions, attempting identification of geological complexes from which the iron ore may have originated.

Table 10. Standards used in SEM-EDS calibration.

Element	Material	Chemical formula
Al	Jadeite	$NaAl(Si_2O_6)$
Ca	Wollastonite	$CaSiOs_3$
Co	Pure	Co
Fe	Pyrite	FeS_2
K	Orthoclase	$KAlSi_3O_8$
Mg	Periclase	MgO
Mn	Pure	Mn
Na	Jadeite	$NaAl(Si_2O_6)$
Ni	Pure	Ni
P	Apatite	$CaS(F.Cl)(PO_4)_3$
S	Pyrite	FeS_2
Si	Jadeite	$NaAl(Si_2O_6)$
Ti	Rutile	TiO_2

(5) To utilise this information to suggest a production and use history for these objects.

Sampling and sample preparation

Prior to cleaning and conservation, the iron objects were subjected to X-radiography to investigate the object structure and determine their viability for further analysis (Figure 3). Six objects were considered suitable for sampling and further investigation. Object selection was based on unique form and the likelihood of obtaining viable samples (those with a high constituent of un-corroded ferrous material). Objects were sampled by Kate Kenwood and Margrethe Felter (York Archaeological Trust), and were obtained by cutting small wedge-shaped sections into areas of potentially surviving iron, as indicated by the X-radiographs, which were reinstated with micro-balloons, and painted using acrylic pigment. Seven sections were taken from the concave/convex disc components and one from an upright base (Table 9). Samples were then prepared and analysed at the University of Liverpool Professor Elizabeth Slater Archaeological Research Laboratories.

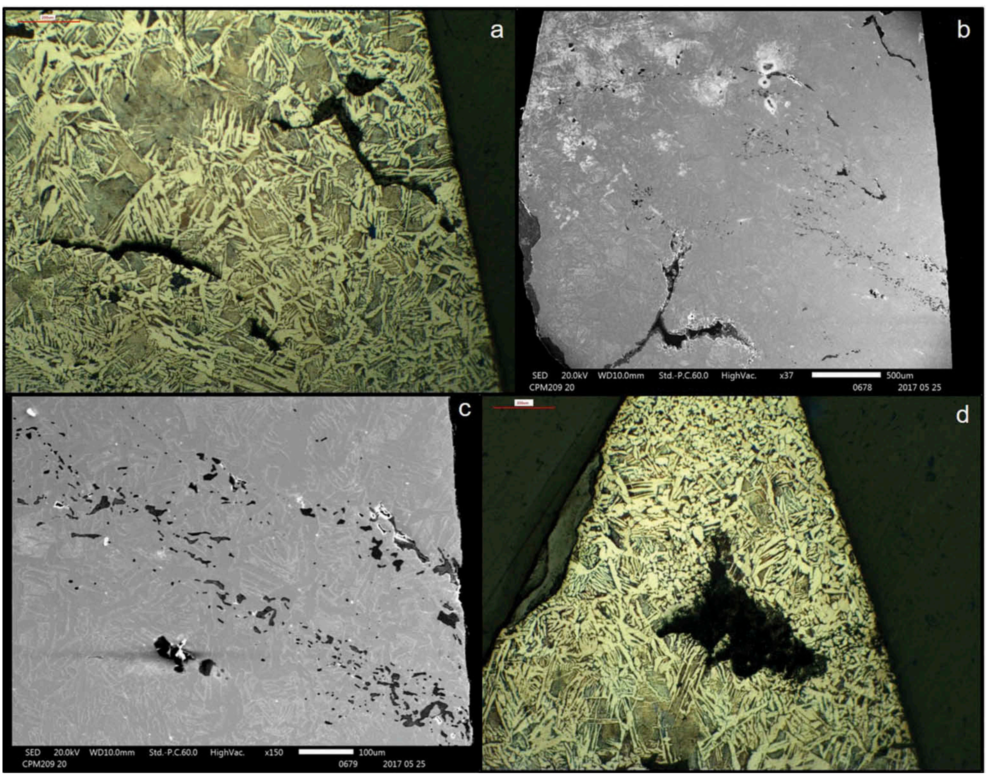

Figure 27. SEM images showing a) Alignment of voids in EDY-010 (N.B. the denser concentration of ferrite (white/grey) grains around the two voids, suggesting a lower carbon area; X5); b) Sample EDY-010: alignment of voids; c) EDY-010: enlargement of area of void alignment; d) Carbon gradient in sample EDY-010, outer edge of sample on the left, X5

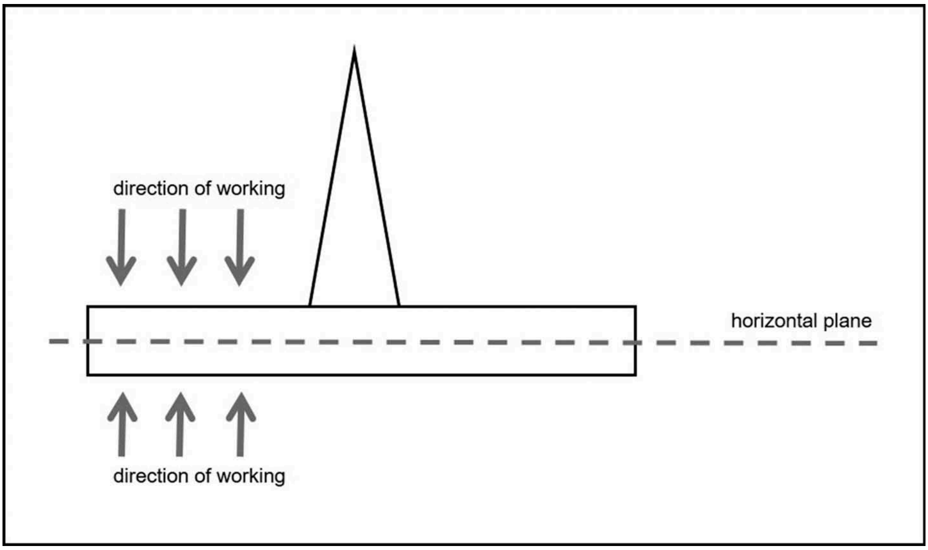

Figure 28. Schematic diagram illustrating the direction of working of the disc (EDY-010; not to scale).

Samples were mounted using cold cure epoxy resin, in 30 mm diameter discs. Samples were mounted individually with the exception of EDY-021–022 which were mounted together due to their small size and same source derivation. Once the resin had cured, the discs faces were ground and polished to present a clear, flat sample section – using a Presi Mecapol 320 grinding machine and three grades of abrasive silicon carbide cloth. Initial grinding was conducted using a P320 cloth, then progressively finer cloths (P600, then P1200). Following each stage of grinding the samples were examined using a reflected light optical microscope, to monitor their progress and then washed with ethanol and immersed in an ultra-sonic bath to remove any residual particles of the grinding medium, prior to the next stage of grinding.

Following grinding and washing, the samples were polished – using an Omegapol T 300 polishing machine, and a 6µm diamond paste as the polishing medium. Following each stage of polishing, the samples were examined using a reflected light optical microscope, then washed off with ethanol and immersed in an ultra-sonic bath to remove any residual particles of the polishing medium. This process then continued with successively finer diamond paste as the polishing medium (first 3µm, then 1µm and finally 0.25µm). After polishing was complete the samples were examined using a reflected light optical microscope at a variety of different magnifications. The samples were then etched using 1% nital, washed with ethanol and analysed under reflected light optical microscopy at increasing magnifications. Images of the samples were taken.

EDY-010 was then subjected to Vickers hardness testing, using a Mitutoyo Micro Vickers HM200A Series hardness tester, with a 30 gf load. All samples were then carbon-coated using a Quorum Q150R ES sputter coater, in preparation for scanning electron microscopy. The samples were analysed using a JEOL JSM-IT300 scanning electron microscope (SEM) and were subjected to energy dispersive X-ray spectroscopy (EDS) – utilizing a Thermo-Scientific NORAN system 7 X-ray Spectral Microanalysis System. The SEM was operated at an

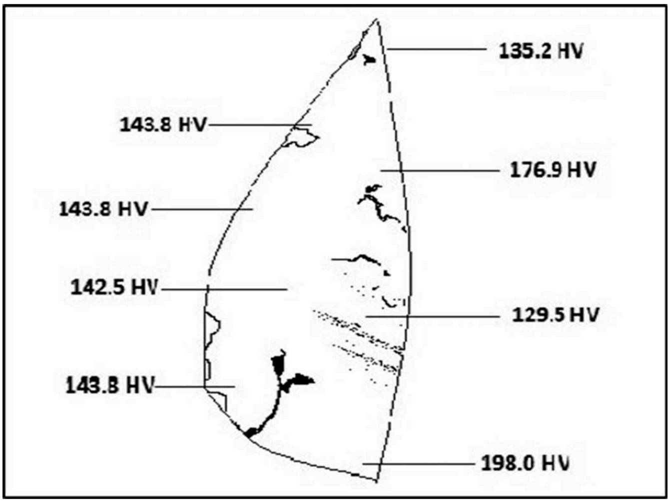

Figure 29. Schematic diagram showing the location and value of microhardness measurements on sample EDY-010; X10.

accelerator voltage of 20 kV and a beam current of 90 nA (with a detection limit of 0.1% wt). Standards used for calibration during the EDS analysis are listed in Table 10.

Analysis

Initial metallographic analysis of the samples showed only EDY-010 as substantially uncorroded, with the remaining seven completely given over to corrosion products, including silicic inclusions derived from surrounding sediment, post deposition. Microscopic analysis was carried out to identify any surviving relict structures, but the level of corrosion limited the information obtainable from these samples.

Sample EDY-010 (Type B.10; early Late Iron Age Fig. 4.10)

This sample constitutes a hypoeutectoid, low-carbon (≤ 0.4% wt) piece of ironwork. The sample comprises ferrite (α), Widmanstätten ferrite (α_w) and pearlite (*P*) (Figure 27 (a)). The carbon constituent of the sample is derived from primary carburization of the

Table 11. Elemental composition values (% wt.) for sample EDY-010: nd = not detected, tr. = trace.

Al	Ca	Co	Fe	K	Mg	Mn	Na	Ni	P	S	Si	T
n.d	0.19	n.d	93.59	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.56	n.d
n.d	0.17	n.d	94.26	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.37	n.d
n.d	n.d	n.d	93.95	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.40	n.d
n.d	n.d	n.d	92.53	n.d	n.d	n.d	tr.	n.d	n.d	n.d	n.d	n.d
tr.	0.44	n.d	89.08	0.38	n.d	n.d	n.d	n.d	n.d	n.d	1.42	n.d
n.d	0.15	n.d	94.87	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
n.d	0.18	n.d	93.25	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.72	n.d
n.d	0.21	n.d	93.78	0.14	n.d	n.d	n.d	n.d	n.d	n.d	0.70	n.d
n.d	0.31	n.d	88.77	0.27	n.d	n.d	n.d	n.d	n.d	n.d	1.27	n.d

Table 12. Mean elemental composition values (% wt.) for sample EDY-010 and published analyses of selected Iron Age ferrous artefacts (Tylecote 1986) (n.d = not detected; pres. = present; tr. = trace).

	Eddisbury, Cheshire (gate-furniture)	Llyn Cerrig Bach, Anglesey (slave chain)	Llyn Cerrig Bach, Anglesey (tyre)	Lough Mourne, Co. Antrim (socketed axe)	Gretton, Northants. (currency bar)	Beckford, Worcs. (currency bar)
Al	tr.	-	-	-	-	-
Ca	0.18	-	-	pres.	-	-
Co	n.d	-	-	-	-	-
Fe	92.7	-	-	-	-	-
K	0.09	-	-	-	-	-
Mg	n.d	-	-	pres.	-	-
Mn	n.d	tr.	<0.05	0.20	0.04	<0.01
Na	tr.	-	-	-	-	-
Ni	n.d	-	-	0.01	0.014–0.10	<0.003–0.006
P	n.d	0.15	0.03	0.01	0.39	0.0.29
S	n.d	tr.	0.01	-	0.03	0.03
Si	0.6	-	<0.05	pres.	0.31	-
T	n.d	-	-	-	-	-

bloom, under reducing conditions in the furnace. This indicates a level of control over furnace conditions, in particular control over air flow. The sample contains a number of voids (comprising approximately 6% of the total section). Some voids may be the result of lost inclusions, but the majority were probably formed during consolidation of the original iron bloom. Most of the voids show a preferred alignment along the horizontal plane of the disc (Figure 27(a–c)), which indicates a working direction perpendicular to this plane (Figure 28). Figure 28 also shows a possible band of chemical enrichment in the section. The section showed no entrapped slag inclusions, which is unusual for wrought iron of this period, and suggests a high degree of processing of the bloom.

The sample shows inter-granular cracks. The sample also shows a carbon gradient (Figure 27(d)), with a move from predominantly ferritic structure at the edge of the sample (mostly lost to corrosion) to a ferritic structure with interstitial pearlite, and then a more developed ferritic/pearlitic structure in the core of the sample. This is indicative of decarburization of the object during forging, as the object was exposed to an oxygenating atmosphere at austenitic temperatures. This may suggest a lack of skill in comparison with the careful atmospheric control of the smelting process, which may support Ehrenreich's (1994, 18) view that smelting was a more 'professional' operation than smithing. However, without understanding the purpose behind the use of certain processes in the production of archaeological objects, it would be unwise to attempt to compare levels of skill between two different production spheres.

The presence of Widmanstätten ferrite indicates that the object was cooled at a moderate rate – though not quickly enough to harden it – for which air-cooling is most likely. The absence of Neumann lines shows that the object was not cold-worked; following cooling there was no effort to finish-off the object. The object's Vickers micro-hardness values are consistent with low carbon ironwork, giving a mean value of 151.7 HV (Figure 29). There is no evidence for a hardness profile or any attempt to deliberately modify the hardness of any part of the structure. There are two regions of increased hardness within the sample, in proximity to a series of voids. It is possible that the presence of the voids aided in the diffusion of carbon in this region, creating an area of lower carbon with a lower hardness, and an area surrounding this with a greater carbon content and slightly increased hardness. The outer edge of the sample has remarkably consistent micro-hardness values, so much so that several measurements from different parts of this region were identical. This consistency is likely an incidental by-product of the decarburization of the edge.

Compositional data for the sample was obtained using SEM-EDS. Sadly, the lack of slag inclusions in the sample limits the available information on minor and trace element composition of the ore source, as minor and trace element components of iron ore are mostly preserved within entrapped slag inclusions (cf. Paynter 2006). In the absence of slag inclusions, compositional analysis was carried out on the bulk material of the sample. The data obtained is sufficient to make some broad generalizations about ore source (Table 11). The absence of phosphorus from the sample makes it possible to rule out the phosphorus-rich iron ore sources of the Mid-Jurassic Ridge, as well as south-eastern and southern sources, such as the Tertiary sand deposits in Kent, Sussex and Hampshire (Bayley, Crossley, and Ponting 2008; Paynter 2006; Salter and Ehrenreich 1984). A more local source seems likely, though the characterization of the composition of the object does not closely match any currently known sources (Table 12).

Table 12 presents the mean values of compositional data from published analyses of other Iron Age ferrous objects from different regions of Britain, and different ore sources, for comparative purposes. The Llyn Cerrig Bach examples were selected as they represent a well-known ironwork hoard from the same broad period as the Eddisbury gate-furniture, and from a comparatively close geographical region. The tyre represents a piled structure of high-carbon steel (0.74–0.96%), whilst the slave chain is a more common low-carbon iron. The Beckford currency bar is an example of 'stock iron' from a source in the Forest of Dean area, whilst the Gretton currency bar was probably originally derived from the Mid-Jurassic Ridge. The socketed axe from Lough Mourne was included as it has a similar microstructure to EDY-010 and in light of the connections between Ireland and the Cheshire during the Iron Age (Rule 2018).

Whilst the EDY-010 compositional data does not closely match any of the examples in Table 4 – or indeed any other analyses of Iron Age ferrous metalwork that the author is aware of – this is not surprising. Iron ore is comparatively common in Britain (Bayliss et al. 2007) and local industries would produce compositional ranges that could vary considerably even within a few kilometres. Microstructurally, the sample

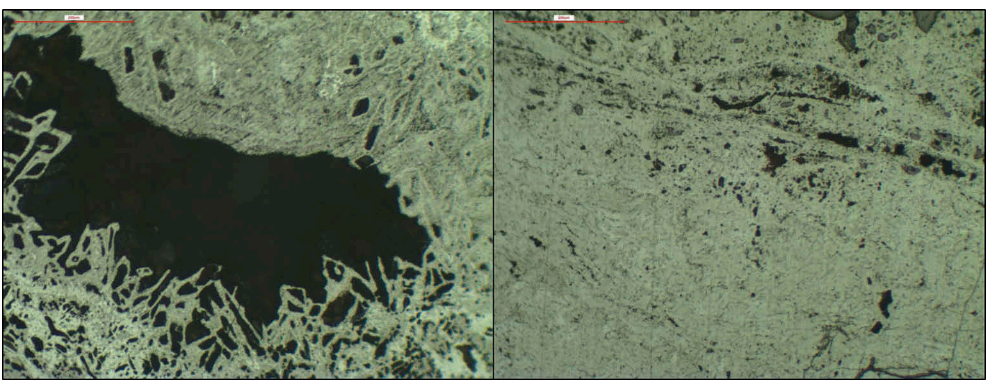

Figure 30. SEM images showing a) relict ferrite grains against a void in EDY-080; b) relict structure preserved in corrosion of EDY-021 (ferrite: light grey; pearlite: darker grey, X10).

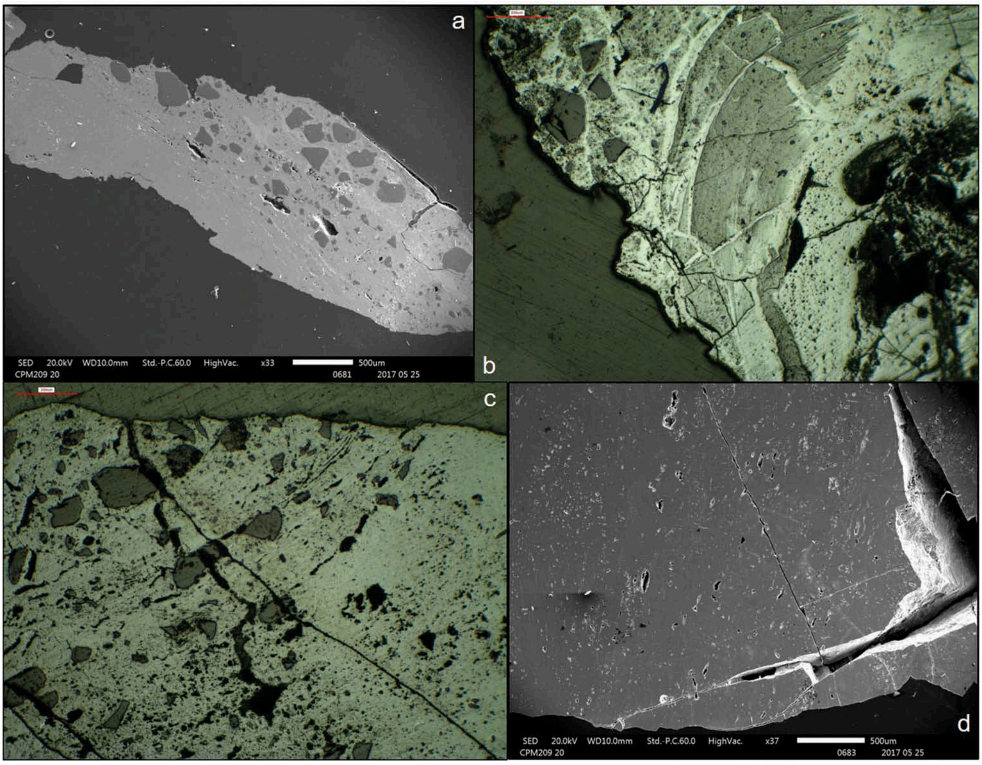

Figure 31. SEM images showing a) Silicic inclusions in corrosion product in EDY-021; b) Layering within corrosion products in sample EDY-090, possibly along the line of the former decarburised surface layer, X5; c) EDY-020: Curved alignment of voids; several silicic inclusions have also aligned on these planes; a large inter-granular crack runs down the centre of the image, and to the right a mechanical fatigue crack, X5; d) Mechanical fatigue crack in EDY-050.

closely resembles the microstructures of a number of Iron Age tools, particularly axes – e.g. at Fiskerton, Lincolnshire (Fell 2003); Lough Mourne, Co. Antrim and Kilbeg, Co. Westmeath (Scott 1990). The microstructure is also similar to a pair of shears from Carbury, Co. Kildare (Scott 1990) and a currency bar from Beckford, Worcs. (Tylecote 1986, 148). With the possible exception of the Lough Mourne axe – believed to be fifth-third centuries BC – all of these objects are considered third century BC-first century AD in date. A range that also fits with the early first century BC date given here for Eddisbury's northern entrance.

The type of micro-structure evident in these objects is ideally suited to their purpose: artefacts that are required to be strong and tough, but do not require extreme hardness. The Eddisbury gate-furniture certainly required strength, but additional hardness would have made it brittle and subject to mechanical failure. The concern with the mechanical properties of the object may also explain the lack of slag inclusions. A small number of slag inclusions are generally considered a benefit in wrought iron, as they lend additional strength. However, in an iron object that would be subject to compressive and torsional stress, the presence of slag stringers may also lead to failure. It may be that this possibility was enough to justify the additional energy in processing the iron to remove virtually all slag. The techniques involved in production of objects of this type seem widely known and employed across Middle and Late Iron Age Britain, particularly in tool manufacture. The techniques employed in the creation of the Eddisbury gate-furniture (as given by EDY-010) are entirely consistent with the third-early first century BC dates given above for Eddisbury's entrance furniture.

Remaining samples

Beyond EDY-010, the level of corrosion rendered it impossible to ascertain any meaningful compositional or hardness data. Similarly, the corrosion products have obscured or distorted much of the structural detail. However, careful examination of corroded samples (EDY-020, EDY-021, EDY-022, EDY-040, EDY-050, EDY-080, EDY-090) do show some preserved relict structures; indicating that their microstructures were very similar to those of EDY-010 (Figure 30). As mentioned above, several of the corroded samples have incorporated silicic inclusions into the corrosion products from the surrounding sediments that these objects were buried in (Figure 31(a)). Several of the samples show banding in the corrosion layers – a result of changes in chemical equilibrium of the material during the corrosion process. For some of the samples, particularly EDY-090, this may also reflect the presence of the decarburised surface layer of the object (Figure 31(b)).

Unfortunately, the corroded samples also represent all of those taken from the gate-furniture uprights (EDY-020, EDY-040, EDY-050). Although EDY-040 is too corroded to provide further information, the remaining two did preserve some additional structures, which may provide further data on object production and use. EDY-020 shows an alignment of voids – as seen in EDY-010 – however in EDY-020 these alignments are curved (Figure 31(c)). This strongly indicates that production of the upright for this object (Accession no. 2) was completed in the round, and subsequently attached to the disc. The most likely form of attachment is a weld. This is particularly interesting as a weld line would represent a point of mechanical weakness in the object, and EDY-050 (Object 2, Pivot type A1, upper pivot; eastern entrance, early third century BC) – which was sampled from the base of the upright – shows evidence of mechanical fatigue cracking (Figure 31(d)). This sort of mechanical fatigue would have ultimately led to failure of the object, and this may be partly why we do not see the object-type adopted more widely.

Conclusions

This analysis has been partially successful in achieving its stated aims – the level of corrosion of the majority of samples precluded the originally intended level of analysis. Thorough investigation of sample EDY-010, however, has provided considerable information on object production. An absence of slag inclusions prevented investigation of parent ore source, through compositional analysis of minor and trace element constituents in entrapped slag. Consequently, it is not possible to suggest a geological complex as a potential source for the iron used in the manufacture of these objects. However, analysis of major-, minor- and bulk-element constituents of sample EDY-010 has allowed for several sources to be eliminated, and it seems likely that the ore source was locally-derived in western Britain. Sadly, without more precise information, it is not possible to draw any conclusions regarding ore sourcing and raw material exchange.

Microstructural analysis of EDY-010 was more successful. It is possible to say that the raw bloom was well-produced, with a degree of control over the atmospheric conditions inside the furnace, to ensure an optimum environment for carbon diffusion. The bloom was then extensively processed to remove slag inclusions, perhaps in order to prevent the introduction of structural weakness. This consolidation process did, however, introduce a number of voids to the metal. The iron was then heated to austenitic temperatures in a smithing hearth and worked into shape. The uprights were almost certainly produced separately, then welded to the finished discs. There is no evidence of piling. During the production process, the objects were exposed to oxygen whilst still at a high temperature, which resulted in decarburization of the edges, perhaps indicating a level of carelessness, though it should be noted that carbon content is not a significant factor in the functionality of these objects. In fact, having a layer of low-carbon metal around a higher carbon core would provide a 'buffer zone' around the object against stress and may be beneficial. As such, it cannot be ruled out that this decarburization was deliberate.

Following production, the objects were allowed to air cool, leading the austenite to form a ferritic/pearlitic structure; as consistent with the microhardness values. No attempt seems to have been made to otherwise increase object hardness or create a deliberate hardness profile. The little information available from the corroded samples corroborates this production method, and provides additional information that the uprights were probably worked in the round, prior to attachment. There is evidence from the uprights of mechanical fatigue cracking. Certainly any areas surrounding a weld would be mechanically weaker, and as part of a pivot, the upright would have borne a considerable amount of torsional stress. The mechanical fatigue cracking around the base of the uprights would have led to eventual failure, which may be why we do not see the artefact-type more widely. The objects are nonetheless well-made and well-suited to their role. They have a number of commonalities with other pieces of utilitarian ironwork from Later Iron Age Britain. Given the apparent similarity in construction methods, common membership of the same ironworking tradition seems likely, perhaps even the same workshop. If the Eddisbury objects date to the early third-early first centuries BC, as suggested here, this implies a reasonably constrained chronological range of perhaps six-eight generations.

The corrosion on most of the samples was unfortunate, but sadly unavoidable. It is possible that more productive samples may be acquired from the objects, but at this time any further sampling would be ill-conceived. Re-analysis of the South Cadbury parallel would be advisable, and may show some interesting parallels or contrasts that could better inform our understanding of the creation and use of these objects. Similarly, an increase in the analysis of ironwork from western and northern Britain, particularly north-west England, may help to establish a closer match for the major and minor elemental composition determined from the bulk of sample EDY-010, and lead to a tentative suggestion for the ore source and potential production area.