The Lead Cames from Glastonbury Abbey

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Introduction and Methods statement

The came was divided first by context and, where large assemblages were concerned, the integrity of the contexts was maintained. Within contexts, the cames were sorted visually into milled and unmilled lead. Medieval cames were cast in wooden moulds, giving a distinctive H-section, although some moulds produced a triangular-shaped profile to the flange and often a slightly protruding moulding flash (Knight 1986). This flash was often cut off, leaving a flat facet on the flange. They may also have been planed off in a more regular fashion (Marks 1993, 36). Vices for hand-milling cames between two wheels seem to have been invented in the first half of the 16th century (Knight 1986; Egan, Hanna and Knight 1986, 303). According to Knight (1986, 31), milled lead does not appear to have been found in Dissolution-period debris from any monastic site, yet there has been no cast came recovered from the shore defences of the 1540s. In 1547 the Glaziers Company of London ordered the confiscation of lead mills being used by foreign glaziers in the city, and milled lead 'seems to have been used exclusively from this time onwards' (Knight 1986, 31). At first the mills were without teeth on the wheels and left no distinctive mark on the web of the came but the most commonly found leads of the 16th-17th century have closely spaced reeding marks on the web caused by toothed wheels. Knight (1986) found that the wider the spacing of the reeding marks, the later in the 17th century the cames were produced. The profile of milled flanges also changed, becoming longer, and thinner, and with a distinctive edge. All material was examined for any further marks, e.g. makers' names (see Egan, Hanna and Knight 1986); and for any contribution to our understanding of the post-installation and dismantling history of the cames.

Within the unmilled category of lead cames from Glastonbury, the pieces were sorted by shape, insofar as any information about the glass they may have contained is concerned (i.e. roundels; diamond quarry panes, etc.); by the presence of soldered joints; and then the remainder was sorted visually by form. This sorting was done according to the shape of the flange (triangular-profile flange, i.e. uncut casting flash, or cut/planed flange), and by the width and depth of the web into which the glass would be placed. As dimensions may help in the categorization of lead cames, but as medieval cast cames in particular could be extremely varied within one glazing campaign, it was decided that it would be worth taking measurements for future reference. Since one fragment of a came 130mm long could represent more actual lead than three fragments of less than 30mm length, weight was added as an attribute that allows relative quantity to be assessed.

Medieval window cames

One roundel of lead came, diameter: 27.22mm externally; outer came width: 5.68mm; flange: 3.85mm; inner web width: 4.22mm; inner web depth: <2mm; weight: 9.06g. Would hold a piece of glass of diameter c.22.41mm or an area of c.3.5cm^2. The flanges are exceptionally thin, and very shallow where they meet the web, and appear to have been sheared or planed almost completely flat. It is very difficult to see the profile of the section where the flange meets the web. There is one broken joint in the circle, and the remains of some solder, but no indication that other pieces of lead were soldered onto this piece. Medieval, possibly 15th-/early 16th-century due to insertion technique, but context implies centre of ventilation panel (see *Discussion*). [GLSGA 1988/625 L16]

One roundel of lead came retaining its glass roundel, diameter: c.29.58mm externally; outer came

width: 8.02-7.77mm; flange: 4.30-3.11mm; inner web width: 4.28mm; inner web depth: c.1.75mm; weight: 15.56g. The external profile of the flange is very rounded, although cut facets for the removal of flashing visible, might be described as multi-faceted. Web very thin, and splitting. There is one joint which completes the roundel, but there are also at least two, possibly three places where solder is attached, implying that there were other cames attached to the roundel. It also retains some white, possibly calcium-based filler or fixative or accretion.

The glass itself is entirely opaque, with one large weathering pit, now cracked into a hole on the each face. The inner face is painted with three more-or-less equally-sized beads arranged in a ?triangle, in reserve from the matt paint, although the individual circles of paint surrounding the spaces are visible. The condition and thickness of the glass, as well as the paintwork, implies a late 12th-/13th- to early 14th-century design. Context: implies centre of ventilation panel. [GLSGA 1988/626 L17]

The largest assemblage of lead came and other lead fragments came from context GLSGA 1988/628 L19. These can be broken down into the following categories:

A) Shapes

Ai Rectangles:

Three fragments which have been soldered into partial small rectangles of a similar size.

1) Four cames, c.12.82x25.46mm complete; outer came width: 6.46-6.06mm; flange: 3.33mm; web width: 4.09mm; web depth <2mm; weight: 12.88g. Cut facets visible where the casting flash has been cut off, and triangular section where flange meets the web. Solder at all the joints. Some of the flange splitting. Medieval, Knight's (1986) Type B.

2) Three cames, c.16.51x43.51+mm, incomplete; outer came width: 6.55mm; flange: 4.21mm; web width: 3.37mm; web depth: <2mm; weight: 16.36g. Almost completely flat cut or planed flange, but triangular section where flange meets the web. Solder at all the joints. Some splitting of the leaves of the shorter came. Medieval, Knight's (1986) Type C.

3) Three cames, c.12.69x33.91mm, incomplete; there appear to be at least two different sizes of came: one with outer came width: 8.32mm but this is with solder; flange: 4.47mm; web width: 4.31mm; web depth: <3mm; the other with outer came width: 6.95mm; flange: 4.16mm; web width: 3.85mm; web depth: c.2mm; weight 14.07g. All have almost completely flat cut flanges, but triangular sections are visible where all the flanges meet their respective webs. Medieval, Knight's (1986) Type C.

4) One fragment consisting of two cames which gives the impression of being a larger partial rectangle, but is probably just a bent came soldered to another at right angles: outer came width: 7.66mm; flange: 4.19; web width: 4.22mm; web depth: c.2.03mm; weight: 25.42g. Cames with clear cut facets where the flash has been cut. Would, however, make a right-angled join for a square or rectangular glass pane. Medieval, Knight's (1986) Type B.

Aii Roundels:

One fragment of a rather flattened roundel, complete with solder joint, outer came width: c.4.78mm; flange: 2.40mm; web width: 2.81mm; web depth: c.1.07mm; weight: 4.10g. Flange cut straight across, no facet visible as such. No milled reeding on web. Medieval, Knight's (1986) Type C, and probably 15th-/early 16th-century due to insertion technique (see

Discussion). Remains of some solder on the one joint of the roundel, but no indication that other pieces of lead were soldered onto this piece. Some decomposed potash glass retained within the roundel adhering to the bed, with opaque and silver iridescent weathering. Circumference of lead 57mm, which would hold a small glass roundel of diameter c.18.14mm, or c.2.5cm^2 in area.

B) Pieces with soldered joints

Bi Pieces with cames at right angles

Two cames soldered together at right angles. Both with clear, cut facets on the flanges. Outer came width: 5.28mm, but variable and mostly irretrievable due to present state; flange 3.52-3.98mm; width and depth of web irretrievable due to present condition; weight: 16.21g. One came split entirely along its web. Solder at the join. Medieval, Knight's (1986) Type B.

Bii Pieces with cames soldered at c.45 degree angles

Two cames soldered together at c.45 degrees. Both with what appear to be cut facets on the flanges. Long came: outer came width: 5.66mm; flange 3.88-2.76mm; web width: 3.40mm; web depth: <2mm; weight: 11.63g. Short came at c.45 degree angle: outer came width: 5.55mm; flange: 2.67-2.53mm; inner web width: 3.45mm; inner web depth: <2mm. Very little solder, but long came about to break. Medieval, Knight's (1986) Type B.

Biii Pieces with different forms of came soldered together

One very twisted piece, with a joint and large amount of solder where perhaps four cames have been broken off. There are at least two distinct types of came attached. One with a distinctive triangular-shaped flange with its casting flash intact: outer came width: 8.40mm; 3.33mm; flange: 4.15mm; web width: 4.26mm; web depth: c.1.65mm. Medieval, Knight's (1986) Type A. One with its casting flash cut off: outer came width: 6.20mm; flange: 4.03mm; web width: 3.79mm; web depth: <2mm; total weight of fused/soldered fragments: 18.95g. The second fragment is either medieval, Knight's (1986) Type C; or 16th-century, Knight's Type D (see *Discussion*). As the wider, triangular-flanged came lies across the top of the soldered joint, it is possible that this is a Dissolution-period, post-dismantling accident, by which heat has attached these two. On the other hand, it could be evidence of two periods of medieval leading, i.e. a medieval repair.

One very twisted piece, with what appears to be two cames twisted and partially fused together post-dismantlement. One of outer came width: 6.50mm; 3.45mm; web width: c.3.54; web depth: <1.50mm. Appears to have facets cut on the flange, but not conclusive. Could be medieval, Knight's (1986) Type B; or post-medieval Type D. Second came outer came width: 6.09mm; flange: >2.81mm; web width: irretrievable in present condition; web depth: irretrievable in present condition; combined weight 15.78g. Appears to be a multi-faceted flange. Neither came has milled reeding on the web.

C) Pieces twisted into loops

One fragment of a came that has been split or torn up the web, and the ends twisted together to form a loop, maximum length currently 35.81mm, with a pronounced diamond-sectioned flange with its casting flash still intact, flange: 4.43mm; weight: 8.56g. Medieval, Knight's (1986) Type A. The small size of the loop may imply that this was a split came used to attach a leaded panel to iron saddle bars, but there is no sign of soldering on the outer face of the looped portion. It may simply be a Dissolution-period *ad hoc* use of the scrap.

D) Different categories of came

Di Cames with triangular-shaped flanges, with casting flash intact

1) Wide cames with narrow, deep, webs. Two well-preserved fragments with flanges of diamond-section, with a prominent casting flash. A dark-metalled fragment, outer came width: 9.13mm; flange: 4.87mm; web width: 2.76mm; web depth: c.2.06mm. Some heat stress marks. A fragment of whiter metal: 9.57mm; flange: 5.21mm; web width: 2.79mm; inner web depth: 2.49mm. Some calcium-type substance in the web; flattened at one end. Total weight: 28.98g. Medieval, Knight's (1986) Type A.

276.54g further of Type A.

Dii Cames with cut or planed flanges

396.38g of Knight's (1986) Type B.

Diii Cames with rounded, or multi-faceted flanges

Six fragments of varying length, typically outer came width: 7.95mm; flange: 3.38mm; inner web width: 3.70mm; inner web depth: <2mm; total weight: 63.33g. One long piece of what appears to be this category has been twisted almost into a loop (weight: 38.35g).

80g further of this type.

E) Other Lead fragments

Three fragments of lead strip, with one rounded, one flat surface. No marks indicating that these were ever lead cames. One circular lead disc, 30.41mm in outer diameter; c.27.02mm in inner diameter, although there is a joint at one side, and a smooth curve out of the inner diameter of the other side, with a surface that looks rubbed smooth. Brooch? One piece of melted lead, partially circular, with an apparent chamfer, as if melted into a vessel? (Total weight: 55.35g). [GLSGA 1988/628 L19]

One fragment of window came, slightly twisted and rather flattened. The flanges have a diamond-shaped section, with prominent casting flash. Outer came width: 7.95mm; flange: 3.68mm; web width: 3.90mm; web depth: >2.04mm; weight: 10.63g. Possible solder at one end, or melted. Medieval, Knight's Type A. [GLSGA 1991/184]

Two fragments of window came twisted round each other, very white metal. One came has a broad web, and flanges of a diamond-shaped section, with prominent casting flash. Outer came width: 7.63mm; flange: 3.73mm; web width: 3.79mm; web depth: c.1.73mm, no milled reeding on web. Medieval, Knight's (1986) Type A. The second came also has a broad web, but one flange is multi-faceted in section, whilst the other, on the same came, has a single definite cut facet. Outer came width: 6.94mm; flange: c.3.89mm; web width: 4.04mm; web depth. Total combined weight: 25.44g. Medieval, one flange resembling Knight's (1986) Type B. The forceful application of some sort of tool has left a shallow, round-ended impression cutting through the single-faceted flange, too small to have been made by an archaeologist's trowel, although a worn leaf-trowel is possible. Could this be a Dissolution-period workman's tool impression? Two fragments of lead strip or off-cut (weight: 4.35g). [GLSGA 1991/248 L36]

One length of what appears to be the flange and uncut casting flash of a came, split or torn up the middle of the web as a strip. Flange: 3.65mm; weight: 4.43g. Medieval, Knight's (1986) Type

A. [GLSGA 1991/72/8 L55]

One length of lead strip, looks like one flange that has been torn from its web. Length 77mm; width: 6mm at widest point; weight: 4.59g. No milled reeding on the web, or rounded edges to the flanges visible, but the flange looks very smooth. Possibly medieval. [GLSGA 1998/3/51 L59]

One fragment of lead came, twisted end, rounded or multi-faceted profile to the flanges, which are splitting – is this corrosion or evidence of double leaves (see Pizano 2000)? Outer came width: 7.46mm; flange: 3.72mm; web width: 3.50mm; web depth: 1.84mm; weight: 7.50g. No milled reeding on the web. Medieval. [GLSGA 1998/3/172 L60 ?26]

Three fragments. One is a twisted set of at least three cames, soldered together, folded and contorted. Appears to be two different types of came soldered together. One has a broad web, and reasonably long flanges, but with the diamond-shaped profile of the casting flash intact and uncut. There are no traces of milled reeding on the web. The second type has perhaps a slightly thinner web, the flanges have no casting flash, but a cut facet is only visible at one point, the rest of the flange looks very smooth. There are no traces of milled reeding on the web. The third came has been so twisted and squashed it is difficult to tell but there appears to be a diamond-profiled flange with uncut casting flash as with the first example in this group. A lump of solder joins the three, and another at the end of the squashed came. Total combined weight: 39.42g. Medieval, possibly of two periods - Knight's (1986) Type A and B? Two fragments of came flange one still with an uncut diamond-profiled flange and casting flash (flange: 4.39mm; weight: 9.23g). Medieval, Knight's (1986) Type A. The other either a flattened cast and planed flange (4.07mm; weight: 3.38g). Medieval, Knight's (1986) Type C or an untoothed milled post-medieval Type D. [GLSGA 1991/177]

One fragment of lead came, maintaining the diamond-profiled flange and casting flash uncut. Outer came width: 8.93mm; flange: 3.83mm; web width: 4.22mm; web depth: <2mm; weight: 10.63g. Medieval. Knight's (1986) Type A. [GLSGA 1991/184]

Three coiled lengths of lead strip, each of a similar thickness, two of a similar width (max width: 12.22mm, 10.47mm and 7.95mm respectively; total weight: 135.70g). The latter two each have partial strips cut from them, and this may explain the characteristic flat surfaces on each edge. Possibly medieval, but not window came. [GLSGA 1991/186]

Two fragments of lead came, twisted together, one with diamond-section flange and prominent casting flash (outer came width: 7.75mm; flange: 3.79mm+; web width: 3.78mm; web depth: c.1.54mm); one with cut marks visible where the casting flash and part of the flanges cut away (outer came width: 7.04mm; flange: 3.94mm; web width: 3.72mm; web depth: 1.14mm. Total weight: 17.93g. No reeded milling on the web. Medieval, Knight's (1986) Type A, and Type B. Two small strips of lead that do not appear to have been cut or torn from a came (length: 44mm and 32mm; weight: 4.35g). Find context: east of west cloister trench, 955, robbery of bell tower. [GLSGA 1991/248 L36]

Three fragments of lead came, very white metal, two partially split along the web. These examples are all relatively broad in the web, and with relatively short flanges, which are also still diamond-shaped in section, retaining their casting flashes. These flanges could not have overlapped the glass to any great extent. Outer came width: c.8.78mm; flange: c.3.05mm; web width: 6.62-4.12mm; web depth: <1.5mm; total weight: 16.44g. No reeded milling on the web. Medieval, Knight's (1986) Type A. Context: 1964 ?Abbot's Hall. [GLSGA 1991/597 L54]

Indeterminate period: medieval or early post-medieval

There were 605.01g of cames, all from GLSGA 1988/628 L19, for which it was not possible to determine beyond doubt if they were manufactured by means of a toothless mill, and therefore probably mid-late 16th-century in date - Knight's (1986) Type D, or cast medieval but with the flanges cut or planed remarkably flat – Knight's (1986) Type C. Most of these fragments were too twisted, crushed, corroded or otherwise obscured where the flanges meet the web to be able to tell if there is a residual triangular-section which might indicate casting, or a narrower joint, indicating milling.

However, of this group, 441.24g have been interpreted as most likely to have been milled from a toothless mill due to the consistent light weight of the material, the consistently thin and rectilinear profiles of the H section, and due to a frequently occurring line about one third of the way up one flange which may be the result of a flaw in the mill producing a consistent mark on the lead. Typically very thin, very lightweight, outer came width: 5.38mm; flange: varies between c.5-3mm; web width: c.4.10mm; web depth <2mm. When compared with Knight's (1986) Type D, albeit that there must still be allowances for variation from place to place and that this can not be considered prescriptive, the measurements are of a similar order (outer came width: 6mm; flange: 5mm; web width: 5mm). This category includes at least 290.79g with secondary cames soldered to create a triangle, i.e. perhaps from the edges of diamond-quarry lead lattices. [GLSGA 1988/628 L19]

182.14g could not be placed in any date range or category due to the degree of melting the fragments had undergone, or to loss of diagnostic features. [GLSGA 1988/628/L19]

Post-medieval window cames

Came attached to soldered joint forming a cross shape. The flanges are fairly smooth, but there is no evidence of milled reeding on the web. Outer came width: 6.22mm; flange: 4.95mm; web width: c.3.55mm; web depth: <3mm. Extremely twisted and folded back on itself. The angles of the joining cames suggest that this is from a diamond-quarry lead lattice. One loose came of this type, total weight: 16.93g. Possibly Knight's (1986) Type C or D. A large spread of solder at a cross join, all but one fragment of came torn away, this has broadly-spaced milled reeding (13/20mm; weight: 4.25g), and slightly rounded edges to the flanges. According to Knight's (1986) categorization, possibly 16th- to mid-17th-century (between Types E and G) . Post-medieval. Three fragments of milled came, with rounded edges to the flanges. No webs visible as the leaves are squashed together, total weight: 8.22g. Post-medieval. [GLSGA 1991/72/8 L55]

Six fragments. Three curled pieces of lead strip with rounded profile on one side, and cut face on the other (weight: 20.22g). Possibly medieval? One, possibly two fragments of milled lead came with rounded edges to the leaves, outer came width: irretrievable in current state; flange: 7.59mm; web width: 2.35+mm; web depth: irretrievable in present state; and with milled reeding on the web (11/20mm); total came weight: 5.44g. Squashed flat. According to Knight's (1986) categorization, possibly 16th- to mid-17th-century (between Types E and G). Context: pre-1951. [GLSGA 1991/44/4 L58]

The post-medieval cames from context GLSGA 1988/628 L19 can be sorted into two groups:

Five fragments of a very white coloured metal with a distinctive small rounded edge to the flanges. Outer came width: irretrievable in present state; flange: 5.93mm; web width: 2.11mm; web depth: 2.99+mm, and with milled reeding on the web (both sides 19/20mm); weight: 31.23g. Closest to Knight's (1986) Type E, 16th-early 17th-century.

Seven fragments of a darker metal with a very wide flange, and with a more pronounced rounded edge. Outer came width: >12.47mm; flange: irretrievable in present state; web width: 2.23mm; web depth: 6.90mm, and with milled reeding on the web (4/20mm); weight: 60.18g. Closest to Knight's (1986) Type G, late 17th-century.

Pieces of came twisted into loops:

One fragment, currently c.64mm long, (weight: 13.62g) consisting of what looks like a window came that has had all the flanges pushed and rolled to make the piece as void of hollows as possible, then twisted at the ends to secure a tight knot. Where the flange is broken, some milled reeding is evident, fairly closely spaced, but could not be counted. According to Knight's (1986) categorization, possibly 16th-to mid-17th-century. Could have been used for tying or securing something. Possibly a Dissolution-period *ad hoc* use or later?

Came Type	A	B	A+B	Multi-faceted	C	A + C/D	C/D	B/D + Multi-faceted	E	Between E and G	G	Other post-med	Unclass-ifiable	Non-Came lead
Weight	365.44	462.52	82.79	204.74	34.53	18.95	634.38	15.78	31.23	23.35	60.18	8.22	186.73	215.62
%	17.2	21.7	3.9	9.6	1.6	0.9	29.8	0.7	1.5	1.1	2.8	0.4	8.8	

Table 1. Quantity of window cames by weight, sorted by Type (according to Knight's 1986 typology); all contexts and unstratified. Percentages are rounded up and do not include the non-came lead.

Discussion

There were c.2344g of lead overall in this assemblage, 2128.44g of which were, or had been, window cames. There are two small roundels of came which give no indication that another lead came was soldered onto them [GLSGA 1988;625 L16 and GLSGA 1988/628 L19 Aii]. This integrity and implied isolation suggests that they may have been used as discrete inserts, sometimes referred to as 'jewels', meaning that a hole would have been drilled in the piece of host glass into which it was set without having to have a supporting lead network. This technique took a great deal of skill, both in drilling the host glass without breaking it, and in leading the insert securely (Marks 1993, 38). Consequently this technique is usually an indication of virtuosity in artisanship, and expensive, high status commissions. The earliest known appearances of this technique are in the prophet windows of Augsburg cathedral, Germany, dating to between the late 11th century and c.1120. However, this first known appearance in English glass is in the early 15th century, for example at Tong, Shropshire (Marks 1993, 39). 'During the second half of the fifteenth and early sixteenth centuries figural windows with leaded 'jewelled' inserts became fashionable with patrons who could afford this expensive technique and examples can be found throughout the country, with a particular concentration between the Thames and the Trent' (Marks 1993, 39). Marks (1993, 389) has postulated that the technique was made popular by the glass-painters who carried out some

costly commissions for the king c.1400, but none of which survive. The most lavish extant use made of this technique is in the robes of St Thomas Becket and other figures in the windows of the Beauchamp Chapel, in St Mary's church in Warwick. These were made by the King's Glazier, John Prudde, in 1447-64. Since the Glastonbury examples were made from different sizes of came they need not have been used in the same period, or at least in the same glazing episode. Having said that, they both, despite their differing sizes of flange, have the shared characteristic of the flash having been sheared or planed right across, leaving no distinct cut facet. The context for each, however, suggests that they were found in the centre of lead ventilation panels. In this case, the lead may have been inserted tightly rather than soldered.

The medieval cast lead cames could be divided into four categories. The first have a diamond-section to the flange that had not had the casting ridge cut off (Knight's 1986 Type A; 17.2% of the whole). The second have flanges on which facets from paring of the casting flash could be seen (Knight's 1986 Type B; 21.7% of the whole). On some cames there were uneven cuts, implying perhaps the use of a knife. On some, however, the cut was far more extensive and consistent: it is suggested that the casting flash on these had been planed off. The third category which may be medieval consists of the multi-faceted flanges, which may have been subject to controlled paring or planning (9.6% of the whole). These were definitely not round in profile. The came surrounding the 13th-/early 14th-century painted roundel is of this multi-faceted type, although it cannot be known if this is the original lead, or a later medieval replacement. The fineness of the flanges of some of the cut or planed cames implies that the processing of these was a highly skilled task. The flanges on both of the void came roundels are of this type, and this perhaps reinforces the implications of the lack of ancillary lead cames that these at least represent artisanship of the highest calibre. These would appear to fit Knight's (1986) Type C (1.6% of the whole).

That different types of window lead occur within the assemblage identified as medieval is perhaps unsurprising, given that different periods of glazing are represented in the window glass assemblage. Some of the variations with the categories may be due to variations used within any one period, rather than being equated with discrete glazing campaigns. The possibility that at least one soldered group may indicate either the joint of two periods of glazing, or a repair, is interesting, especially when viewed in the light of the evidence for regrozing amongst the glass. This sort of activity was widespread, but is seldom manifested, or at least commented on, in archaeological reports. What is more surprising, perhaps, is the width of some of the came beds, and the shallowness of the lead flange overlap. Given that very little of the retrieved glazing was especially thick, and indeed, that much of it was quite thin, there is an issue about the means by which the glass was secured in the cames. Putty cement was a relatively late innovation, but calcium-based fillers/fixatives are known (Marks 1993, 36).

There are no pieces that may be identified incontrovertibly as having been used as means by which the leaded panels were attached to the saddle bars and ferramenta. Only one fragment was twisted into a suitable loop, but it had no solder attached.

In terms of the implications for Dissolution-period activity, almost every single fragment of came has been twisted, torn or pushed together in some way. However, there are no roughly folded balls of window came, as found at St Mary Merton, Surrey (Miller and Saxby 2007, 160), but then the Merton site had a discrete area identified as a Dissolution-period demolition yard (OA11), containing large amounts of window lead and glass not found elsewhere, presumably collected for recycling (Miller and Saxby 2007, 160). At Hulton Abbey, Staffordshire, 12,195kg of melted lead were found from Dissolution contexts, of which 168g were still recognizable as came (Boothroyd in Klemperer and Boothroyd 2004, 166). The Glastonbury cames most identifiable as medieval weighed 1168.97g or 54.9% of the whole. The problem occurs with those cames which could not

be assigned with certainty to either side of the 1540s.

These cames may have been cast, in which case the cutting or planing of the flanges was extremely controlled, leaving the flanges very thin (Knight's 1986 Type C); or they may have been produced in a mill or vice, the wheels of which had no teeth (Knight's 1986 Type D). It is acknowledged that it is very hard to distinguish between Types C and D (e.g. Strobl 2002, Fig.1 based on Knight's observations). This indeterminate category (total 634.38g, or 29.8% of the whole), if it does represent leads from toothless mills and therefore probably of the second to third quarters of the 16th century, may be the lead cames which held the fine, olive-green tinted glass with characteristic orange corrosion which seems to be potash metal, but is definitely not medieval. Both the evidence on the glass itself (shape and lead ghosting) and the quantity of triangular soldered joins (270.79g or 42.7% of the Type C/D category), suggest diamond-quarry lattice windows such as may have been used in either very late medieval, or most probably early modern windows of the mid- to late 16th-century. The presence of these later categories of came amidst the medieval cames that were presumably culled for melting down and sale at the Dissolution, is confusing, however. As well as melted material, a great many of the cames had evidence of heat-damage or stress, a stage prior to full melting.

There were post-medieval cames of at least two periods present: one group of the 16th to early 17th century, and one group of the later 17th century. Using Knight's (1986) assessment of milling marks, a third group may date to the period between, i.e. to between the late 16th and mid-17th century. There were 122.98.g of incontrovertibly post-medieval type overall (5.8% of the whole). There was no evidence for makers' names or other inscriptions on any of the visible areas of milled reeding on these cames (cf. Egan, Hanna and Knight 1986). However, these cames may have held some of the categories of exceedingly transparent white glass found on the site. It is notable, however, that no incontrovertibly post-medieval cames were found soldered or heat-fused to an incontrovertibly medieval came.

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