18. MAKING DO WITH BROKEN GLASS

Pieces of bottle glass served as toolmaking material, harking back to prehistoric craft skills. Locations of broken glass tools may tell us where people worked.

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When we first presented information on the Bloomsbury site at the 1997 Middle Atlantic Archeological Conference in Ocean City, Maryland, we were asked whether there were any indications, in the material culture of the site, which would confirm or support our conclusion that the occupants of the site may have been Indians. This question reflects a long term, and largely unsuccessful, effort on the part of American historical archaeologists to define "markers" that would make it possible to identify the ethnic background of a site's occupants.

At the time, we had just completed the classification of the artifacts from the site, and had isolated a group of bottle glass fragments that appeared to have been flaked in a manner similar to that used by American Indians prior to European contact. Thus, the answer would appear to be an emphatic "yes". On the other hand, Heite (1993) has shown that several artifact types (dugout canoes, stub-stemmed pipes and colono ceramics) that have been identified as either Native American or African in origin also have European antecedents. Thus, a careful examination of the flaked glass artifacts from the Bloomsbury site, and comparison with similar glass tools from throughout the world, was needed before a definitive statement could be made.

FLAKED GLASS ARTIFACTS FROM A WORLDWIDE PERSPECTIVE

There is a considerable body of both ethnographic and archaeological information on the use of flaked glass artifacts, particularly from areas that have been colonized by Western Europe, including Australia, South Africa, the Andaman Islands, Mexico, and the United States. Deal and Hayden (1987) provide the most comprehensive review of this literature, though it is by no means complete. These authors identify a variety of uses for glass tools, including (following Binford and Binford 1969) economic extractive activities, economic maintenance activities, ritual activities, and toiletry activities (Deal and Hayden 1987:271-73). This article is important here not only because of its review of the use of glass tools worldwide, but also because it provides a contemporary ethnographic study of glass-using activities among the Highland Maya, particularly the use of glass fragments as scrapers, that may parallel some of the activities that took place at Bloomsbury. Deal and Hayden (1987: 235) suggest that the use of glass as tools and ritual items represents an "extension of a lithic industry into modern times."

Deal and Hayden (1987:311) go on to suggest that the available information on glass tool manufacture and use indicates "four levels of technical complexity" which appear to be related to the degree of acculturation of the group in question. These levels of complexity can be defined as follows (Deal and Hayden 1987:312):

1. "The highest level of technical complexity concerns the production of sophisticated tool types using specialized modification techniques." This includes the production of bifacially flaked projectile points and ornaments, as well as other specialized tools.
2. "The second level of complexity concerns the intentional retouch (or resharpening) of percussion-flaked tools…. Glassworkers at this level lack such refined techniques as pressure flaking, serrating, and notching…." That is to say, glassworkers at this level of complexity are

producing intentionally shaped tools using the basic technique of percussion flaking, and resharpening those tools as needed.

3. "The third level of complexity…involves a minimum of intentional modification of selected pieces to serve specific functions. This includes removal of projections and edge-grinding to protect hands, but generally excludes resharpening." The techniques glassworkers use to shape glass fragments at this level of complexity can be characterized as controlled breakage.
4. "The lowest level of complexity is a complete ignorance of glassworking techniques. This includes the selection of usable pieces from chance finds of broken glass. The selected 'tool' is in no way intentionally modified before or during use, during which its effectiveness diminishes."

The first level of complexity as defined by Deal and Hayden is reflected in ethnographic reports from the nineteenth and early twentieth centuries of glass projectile point manufacture, primarily from Australia (Backhouse 1843:433, 546; Idriess 1937), South Africa (Clark 1959; Tobias 1978:47); South America (Lothrop 1928; Cooper 1963a, 1963b) and California (Kroeber 1976). Other sophisticated flaked objects have been reported from archaeological contexts in the eastern United States and the southern Plains. Griffin (1949:57) reports that C. B. Moore recovered an apparently flaked glass pendant from a mound in southern Florida. In the Middle Atlantic, at least five glass projectile points have been reported from Virginia, in contexts suggesting dates in the seventeenth century (McCary 1962; MacCord 1969, 1973). Shaeffer (1961: 276) indicates in an article devoted primarily to glass scrapers that collectors had reported glass projectile points from north central Oklahoma and from central Texas. For the most part artifacts at this level of complexity are associated with economic extractive activities such as hunting and butchering (Deal and Hayden 1987: 271), with the exception of the flaked glass pendant from Florida.

The second level of complexity is probably reflected in a variety of scrapers reported from a number of locations throughout the world. Such scrapers have been deliberately shaped using percussion flaking, and are later retouched to prolong the use-life of the tool. For the most part, they are associated with economic maintenance activities (Deal and Hayden 1987: 271). Deal and Hayden specifically cite the hide scrapers used by the Ethiopian Mafaed hideworkers and the assemblage of scrapers reported by McCarthy and Davison from the Hunter River area of New South Wales, Australia as examples of this level of complexity.

A variety of scrapers have been reported from sites across the United States that probably also reflect this level of technical complexity. Griffin (1949) reports a single glass scraper from the site of San Luis de Talimali, near Tallahassee, Florida, made from heavy dark green glass and which he suggests dates from the very late seventeenth century or the very early eighteenth century. Shaeffer (1961) reports similar tools from a variety of sites from Oklahoma, Arkansas, Kansas and North and South Dakota, which appear to date from the mid- to late- nineteenth century. In this context, I should also mention the recovery of flaked glass scrapers and spokeshaves from a trash dump at the United States Industrial Indian School at Phoenix, along with bifacially flaked ironstone plate fragments (Lindauer 1996:215-216; Figure 11.13).

Of particular importance to the current study are reports of a series of scrapers made on the bases of wine bottles with kick-ups. The working edges of these scrapers are generally on the outer wall of the bottle. The earliest reported examples are from the Middle Atlantic region, including the Parkway Gravel site in Delaware (Kellogg, Varisco, Grettler, and Custer In Press) and the West Water Street site in Lock Haven,

Pennsylvania (Custer, Watson and Bailey 1996). Both of these sites date from the mid-eighteenth century. Allen (1969; 1978:146) reports a series of glass scrapers made on bottle bases recovered from the site of Port Essington on the northern Australian coast. Some of these appear identical to the Delaware examples. The Port Essington site dates to the 1840's.

The contemporary Highland Maya glassworkers studied by Deal and Hayden (1987) are functioning at the third level of complexity. The glassworkers take some care in shaping the glass fragments to be used as tools to produce 90 degree breaks, remove projections and to grind edges to protect their hands, but there is no evidence that they know how to resharpen tools. Tools produced at this level of complexity will show use-wear, indicated, according to Deal and Hayden (1987:303), by "microfracturing that extends less than 1 mm back from the working edge," but not deliberate resharpening.

Deal and Hayden (1987:312) cite the use of glass fragments by Greek goatherders (Runnels 1976) as an example of the lowest level of complexity. They also cite other examples of glass use at this level elsewhere in Europe and Great Britain, primarily for smoothing wood handles. When we first reported the presence of glass artifacts at Bloomsbury, we received a number of anecdotal reports of recent glass use for this purpose in the Middle Atlantic as well.

FLAKED GLASS ARTIFACTS FROM THE MIDDLE ATLANTIC REGION

A dozen flaked glass artifacts have previously been reported from sites across the Middle Atlantic. For the most part, the published examples (McCary 1962, MacCord 1969, MacCord 1973, Reinhart 1993, Kellogg, Varisco, Grettler, and Custer In Press, Custer, Watson and Bailey 1996), bear a close resemblance to stone tools manufactured before European contact. In only a few cases, however, are full site reports available.

In one of the earliest published references to flaked glass tools, Ben McCary, who is best known for his studies of Virginia lithic sources and Paleo-Indian artifacts, reported six glass artifacts, three projectile points, and three scrapers (McCary 1962). One of the projectile points was recovered from Jamestown, and another from a site near the Pamunkey Reservation. The remaining four artifacts were recovered by Carl Manson from the historic Patawomeck site. McCary concluded that these tools dated to the first half of the seventeenth century, although this dating may be questioned. No other information is available regarding the associations of these artifacts. McCary also states that "In recent years, several states along the Atlantic seaboard have reported the recovery of arrowheads and scrapers of glass made by their Indians in the seventeenth century," although he gave no references for these reports.

In the mid-1960's, the Upper Rappahannock chapter of the Archeological Society of Virginia excavated the Camden site, occupied by an Indian family about 1680 (MacCord 1969). A silver medal suggests that the head of the household may have been the chief of the Matchotick. The Camden site is located on the banks of the Rappahannock River, not far from Port Royal. Although the vast majority of the artifacts were of Indian origin, there were enough European artifacts to provide a secure date for the occupation and to indicate that the occupants were living in a European style house without footers.

In other ways, however, the artifact assemblage was similar to those from sites dating before European contact. The most common artifacts were sherds of Potomac Creek Plain and Potomac Creek Cord-Marked, Indian ceramics dating to the late prehistoric and early historic periods. Also present were sherds of Camden Plain, a ware locally made using the same paste as the Potomac Creek wares and in shapes imitating English bowl forms. The food remains consisted of oyster and clamshells, crab

claws, and a variety of bones from wild animals, including deer, turkey, and snapping turtle, and lacked the remains of European domestic animals. Of particular importance to the present study, however, was the presence of a triangular projectile point flaked from a fragment of clear glass.

A few years after the publication of the Camden site report, Col. MacCord described another glass triangular projectile point made from a fragment of window glass or case bottle (MacCord 1973). This example was found at the site of the Indian town of Portobacko on Tobago Bay, Essex County, Virginia. The Portobacko community was in existence from about 1660 to about 1680, overlapping the occupation period of the Camden site.

Some two decades after the excavation of the Camden site, another poorly documented site was excavated by the College of William and Mary archaeological field school (Reinhart 1993), this time on the James River. At this site, excavators identified three small frame huts, two with root cellars of the eighteenth century. The artifact and faunal assemblage is largely European, although some use of wild foods is indicated. There is no documentary evidence of

the ethnic background of the inhabitants, who were clearly quite poor. However, the presence of a well-made glass endscraper, made on a fragment of a wine bottle kickup, raises the possibility that the occupants were Indians.

More recently, the University of Delaware Center for Archaeological Research (UDCAR), under contract to DelDOT, recovered an intentionally flaked eighteenth century wine bottle base from the Parkway Gravel site in New Castle County, Delaware, just south of the Chesapeake and Delaware Canal (Kellogg, Varisco, Grettler, and Custer In Press). Because a substantial portion of the site had been destroyed by the construction of present Route 13, and few artifacts were recovered in testing, no further excavations were conducted, and historical research was limited. The small sample of European ceramics from the site suggests, however, that it is contemporaneous with the James River site noted above. Again, the presence of a flaked glass tool suggests the possibility that the residents were Indians.

At the West Water Street site in Lock Haven, Pennsylvania, UDCAR recovered two glass tools from a Contact Period occupation of scattered households (Custer,

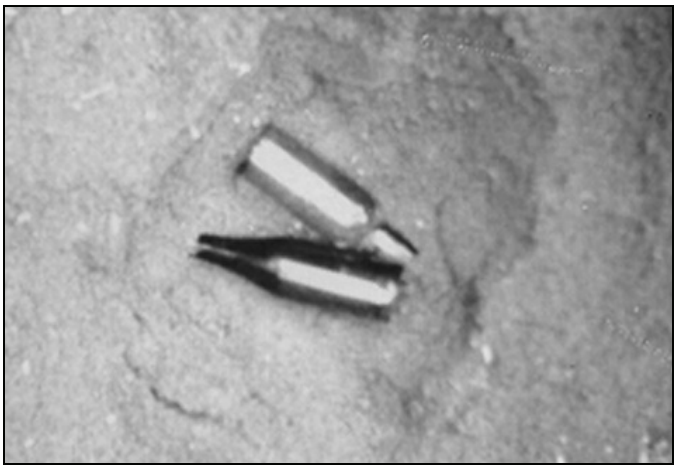

Figure 152

Two beer bottles, one Danish and one Irish, were buried and then broken by working the soil.

Watson, and Bailey 1996). One of these tools, recovered from a refuse pit containing both European and Indian artifacts, was a well-made scraper resembling stone tools made during prehistoric times. The other was a body sherd from a globular wine bottle that had been worked on two edges, recovered from a test unit. Many Indian groups lived for a time in Lock Haven during the eighteenth century, as they moved north and west from their homelands. There seems to be little doubt that the glass tools from this site were made by members of these groups.

Of the twelve glass artifacts described above, nine were found in Virginia sites. Eight of these, including all five projectile points, were recovered from contexts that suggest dates in the seventeenth century. The Virginia artifacts were recovered from six sites, four of which appear to be primarily Indian in material culture. Only one of the Virginia sites, the underclass site on the James, appears to date from the eighteenth century, and the artifact assemblage is essentially Euro-American.

Both of the non-Virginia sites date to the eighteenth century. The material culture of the Lock Haven site is predominantly Indian in character, despite the presence of Euro-American artifacts, while the eighteenth century component of the Parkway Gravel site appears to be exclusively Euro-American except for a single bottle glass scraper, and may have been similar to the James River eighteenth century site.

A comparison of these sites and the glass tools recovered from them suggests the gradual adoption of a Euro-American material culture by Indian families that chose to remain in the east, while retaining a limited connection with the material culture of their pre-European contact forbearers.

The manufacture of glass projectile points was apparently abandoned as European weapons became generally available. Only the use of flaked scraping and chopping tools survived, in glass instead of stone.

The Bloomsbury site most closely resembles the James River underclass site and the Parkway Gravel site, although it was occupied somewhat later in time. Bloomsbury is a Euro-American site, in terms of material culture, but it has been possible to establish through historical research that it was occupied from about 1760 to 1814 by families with ties of kinship and association to a community that even today identifies itself as Indian.

Analysis of documents contemporary with this occupation make it clear that the dominant Euro-American community regarded the people of Bloomsbury as separate both from themselves and from the African-American community, although the term “Indian” is never used. The glass tools recovered from the excavations at Bloomsbury represent the only material indication of the ethnic identity of the people who lived there in the late-eighteenth and early-nineteenth centuries. It is not yet clear that the presence of flaked glass tools in an otherwise Euro-American site can be assumed to indicate the presence of Indian people in the absence of corroborating historical evidence.

RECOGNIZING GLASS TOOLS

Because the Indian identity of the site occupants and their descendents has at times been debated, one goal of the analysis of these glass artifacts has been to examine the probability that they were in fact intentionally produced tools or that they were directly used in some activity which resulted in edge modification. When the first (and most obvious) flaked glass tool was identified late in the process of classifying the thousands of artifacts recovered from the site, the entire collection of bottle glass was re-examined in order to make sure that no tool fragments, or less obvious tools, were overlooked. As a result, a large number of

Figure 153

The beer bottles were retrieved from the hole with a standard archæological procedure, using quarter-inch screen.

Figure 155

Recovered glass from the experimental hole were remarkably similar to many of the items found on the site and labelled "tools" for study purposes.

fragments with edge modification have been identified in the Bloomsbury site artifact collection.

A total of 178 glass fragments with some form of edge modification by the removal of flakes were identified. Each fragment was assigned a "tool" number to facilitate record keeping, although most were later determined to have resulted from formation processes other than intentional tool use or production. A wide range of attributes that could possibly help to identify patterns of manufacture or creation were recorded for each, including vessel part, orientation of the fragment on the bottle, shape of modified edge, presence/absence of patina or bloom (Figure 154) on flake scars, and edge angle.

We first examined the possibility that the "tools" were produced unintentionally, as a result of some activity in which the glass fragments occurred incidentally. We reasoned that if we could identify accidental modifications resulting from such activities, we could isolate fragments in the Bloomsbury collection resulting from similar activities in the past, and focus more closely on glass fragments that appeared to have been modified in other ways. Because the only activity which had taken place on the site after 1814 was cultivation, we simulated the effects of plowing, disking, and later excavation by placing pieces of two broken beer bottles – one Irish and one Danish – in a soil bed from which all other artifacts had been removed by sifting the soil. The bed was then shoveled, hoed, and raked repeatedly over the course of several hours. Finally, the broken glass was removed by sifting.

Several fragments showed evidence of edge modification similar to the modification seen on fragments recovered from the Bloomsbury site. The flaking on these fragments produced an edge angle of approximately 90 degrees, was mostly restricted to the broken edge, and did not extend onto the bottle surface. Crushing occurred along the edge from which the flakes were struck. In one example, very flat flaking did extend across the bottle surface at a 90 degree angle to the broken edge, but in this case did not extend across the broken edge.

This experiment indicates that flaked edge modification can be produced on broken glass as a result of human activity other than use as a tool or modification for use as a tool, and that the modification is patterned and can be identified in the archaeological record. As a result, we concluded that any similar fragments from the Bloomsbury excavation were most likely *not* intentionally produced tools or even tools produced by use, but rather evidence of other activities which, while certainly cultural, did not include the deliberate use or modification of glass fragments.

Of the 178 edge-modified fragments included in the analysis, 170 proved to have modifications resembling the experimental fragments.

Our attention then turned to the eight edge-modified fragments that did *not* fit the description outlined above. All appeared to be tools produced by flaking in the same manner as flaked stone tools. All had bloom or patina on the flake scars, indicating that the flaking was not recent. In all cases, the edge angles were less than 90 degrees (actu-

ally, less than 75 degrees) Seven of the eight were made on bottle bases, one on a case bottle base, and six others on wine bottle bases. The eighth is a body fragment broken from the case bottle base, and bifacially modified after the break occurred.

The case bottle base tool (170, ER 209d) ws the first such tool identified in the course of artifact classification. It is the most readily recognizable as a flaked glass tool (Figure 134, page 226). It has three working edges. Two of the working edges use the upturned edge of the heel, where the body of the bottle broke away from the base The flakes originate on the inner edge of the break, suggesting this tool was used much in the manner of a drawknife. The third working edge is virtually identical to many of the larger, well-made cryptocrystalline side scrapers found in pre-contact sites, with the working edge on the exterior of the fragment.

Tool 177 (Figure 160) is a case bottle body fragment that was broken from Tool 170. This tool has two working edges. One is bifacial – the only bifacial tool identified in this collection. The other is unifacial, and resembles the long scraper edge on Tool 170, although this edge is much shorter.

Tool 133 (Figure 165), an olive green glass wine bottle base with a high mamelon-shaped kick-up, is the only one of these tools found in a feature, the presumed pump shaft that was abandoned soon after it was dug. There are two working edges on this tool. The large flakes and crushed edges of the larger of the working edges suggests that it was used as a chopper, while the smaller working edge may have been used as a scraper or drawknife. Both edges are formed on the heel of the bottle base.

Tool 21 (Figure 161) and Tool 51 (Figure 165) are joining fragments of the same heavy olive green wine bottle base with a rather low kick-up (vessel 5). In both cases, the working edge is formed on the heel of the bottle base. The larger of the two fragments displays crushing on the worked edge, suggesting use as a chopping tool. The smaller of the two (tool 51) has two working edges. On the longer of the two working edges, the flakes originate on the inside of the bottle, and display some crushing. The shorter working edge displays very fine flaking originating on the outside of the bottle. Differences in the degree of bloom on the flakes of these two working edges suggest that the glass fragment may have been curated for a time after the shorter, finer edge was created.

The modified edge of Tool 148 also uses the heel of the bottle base, but the flaking originates on the exterior of the bottle. No crushing is present.

Tool 85 has a finely flaked working edge similar to the shorter edge of Tool 21. However, the piece of bottle glass comes from the to of the kickup, rather than the heel of the base. Tool 146 also has a working edge formed on the top of the kick up, and appears to have been intended as a scraper.

These eight tools provide thirteen working edges for analysis. Only one of the working edges is bifacial, and was presumably intended to be used as a cutting tool. Four of the working edges display large flakes, hinge fractures, and crushed edges, suggesting that they were used as chopping tools. The remaining eight working edges appear to have been used as scrapers of one kind or another.

In summary, the glass fragments from the Bloomsbury site that showed edge modification can be divided into two groups on the basis of morphology. One group, comprising the majority of edge modified fragments, is characterized by small size, edge angles of 90 degrees or greater, with flaking occurring almost exclusively on the broken edge of the fragment. Bloom or patina may or may not be present, and the fragments are most frequently from the body or shoulder of the bottle. This group of edge-modified fragments were probably produced unintentionally as a result of cultivation and/or excavation. The second group is characterized by larger size, edge angles of less than 90 degrees, and the presence of bloom or patina on the flaked surfaces. Most are bottle bases. Edge modified glass fragments in this group were either produced intentionally as tools, or resulted from the use of unmodified fragments as tools. They are readily distinguished from fragments with accidental modification.

TOOL DISTRIBUTION

Little has been written about the function of glass tools in the artifact assemblages in which they are found. It is assumed that they were used in much the same manner as similar tools in pre-contact times, as scrapers or projectile points, but it has not been possible to examine the context in which they were discarded. As previously noted, in most cases only one tool is reported from any given site, with most being recovered from uncontrolled surface surveys.

Because we know the location of each of the glass tools in relation to other artifacts and to features within the site, the Bloomsbury site provides an opportunity to examine the function of glass tools in a family setting. Figure 157 shows the location of each of the flaked glass tools in relation to the projected location of the house or houses

near the burnt patch, and to the largest subsurface features, the three wells, all located at the south end of the excavated area. Four of the eight tools were found close to the presumed house site. One was found in the fill of well shaft that was abandoned soon after it was dug, and another (which cross mends with one found near the house) in the adjoining excavation unit. The last two tools were found on the east side of the site, near a group of shallow pit features that have been interpreted as lye processing pits, and not far from the house location.

The distribution of flaked glass tools coincides with the distribution of refined ceramics, which are most frequent in the area around the projected house location and somewhat less frequent in the area adjacent to the wells. They are not found along the west side of the site in areas interpreted as the locations of outbuildings and animal pens.

The tools found around the projected house location are most likely to indicate the activity area where the tools were used. The

tool found in the well-shaft was probably accidentally included in the fill when the shaft was closed. The tool found in the adjoining unit crossmends with one found near the house. It is likely that the flaked glass tools were used in activities engaged in around the house, which likely precludes excessively messy or smelly activities such as butchering, but which could include activities such as woodworking or basketmaking. Traditional oak splint basketmaker and artifact collector, Joe Hughes of Felton, Delaware, has suggested that many of the stone tools found on American Indian sites might have been used in basketmaking. Perhaps the glass tools were as well.

ACCIDENTALLY MODIFIED GLASS DISTRIBUTION

OCCUPATION RELATED EDGE MODIFICATION: Because accidental edge modification occurs as a secondary effect of cultural activity, it seems worthwhile to take a look at the distribution of these artifacts in relationship to the overall distribution of broken bottle glass and to other activities on the site. Sixty-five of the accidentally modified fragments had bloom or patina on the flake scars. Because both bloom and patina form over time (though through different processes), these fragments are most likely to have been modified at the time the site was occupied, and to reflect the activities of the residents.

If the intensity of the activities that resulted in edge modification is the same across the site, then the distribution of edge-modified fragments should mirror the distribution of all glass fragments. If the distribution of edge-modified fragments does not mirror the distribution of all glass fragments, then the conclusion must be that the activities that produced the edge were concentrated in specific areas.

Figure 154 shows the location of units in which edge modified glass fragments with patina on the flake surfaces were found. The circles on this figure indicate the locations of subsurface features. The filled circles represent the three wells. The filled square represents a burned place interpreted as a corner or end of the house or houses. Clearly, the majority of accidentally edge-modified fragments that are likely to date to the occupation period are also associated with the area within and immediately adjacent to the houses, a pattern similar to that displayed by the intentionally produced tools.

If we look at the distribution of case and wine bottle fragments separately (Figures 150 and 151), we find that case bottle fragments are indeed concentrated near the house. However, wine bottle fragments are concentrated at the southern end of the site, near the wells. Because the majority of bottle fragments as well as the majority of edge-modified fragments are wine bottle fragments, and the concentration of wine bottle fragments does not coincide with the distribution of edge modified fragments, we can conclude that the processes that produced accidental edge modification at or close to the period of occupation were *not* operating equally on all bottle glass fragments.

The concentration of the accidentally edge modified fragments near the house or houses indicates that whatever activity produced the modification was associated with the house, rather than with outbuildings or the wells and pit features located at the edges of the occupation area.

We have demonstrated that similar accidental edge modification can occur as a result of cultivation. However, in eighteenth and nineteenth century farmsteads, the area around the house was usually cleared. As discussed in an earlier chapter, the distribution of glass fragments suggests that this is the case at Bloomsbury.

This cleared space is the area where many household activities took place, from food preparation (such as shelling peas, snapping beans, or churning butter) to small-scale crafts. Perhaps people walking over glass fragments pressed into the hard-packed surface produced the accidental edge modification.

POST-OCCUPATION ACCIDENTAL EDGE MODIFICATION: Over 100 accidentally edge modified bottle glass fragments display no evidence of bloom or patina on the flaking. We have assumed, for purposes of elimination in our earlier analyses, that the modification on these fragments occurred after the farmstead was abandoned, most likely as a result of farming activities.

If this is the case, we would expect that the highest frequency of accidentally

modified fragments without bloom or patina on the flaking would occur in the same part of the site as the highest frequency of all bottle glass fragments. At Bloomsbury, this means there should be more accidentally edge modified bottle glass fragments at the southern end of the site, near the wells, than at the northern end, near the houses.

An examination of Figure 156, however, shows that this is not the case. Instead, the highest frequency of post-occupation edge modified fragments occurs in the same area as the highest frequency of occupation-related accidentally edge modified fragments. There are several possible explanations for this, two of which will be examined below.

The distribution of post-occupation edge modification is related to archaeological excavation, not cultivation. Our experiment demonstrated that the actions involved in archaeological excavation could produce edge damage similar to that noted on the bottle glass fragments that we have assumed to be modified after the period of occupation. If the damage was caused by excavation, we can expect that the greatest amount of damage will have occurred in units excavated during the winter or summer.

Some excavation at Bloomsbury took place during all four seasons, so that it is possible to examine this question with some reliability. In the winter, the ground was often frozen, so that it was necessary to chop the soil into blocks to remove it, and then each soil block was chopped into smaller blocks in the sifter in order to free the artifacts and push the soil through the screen. In the summer, similar treatment was necessary because the silt loam soil was baked hard. This treatment would be likely to produce more damage than excavation during the spring and fall, when the soil was softer and moist.

Figure 158 shows the season when each unit was excavated. A comparison with Figure 156 shows that the units with the highest frequency of edge modified bottle glass fragments were found primarily in units excavated in the spring. We thus conclude that the distribution of post-occupation edge modified glass is not a result of excavation practices.

The distribution of post-occupation edge modification on bottle glass is the result of occupation and post-occupation factors. As we discussed earlier in this chapter, there are indications that the space around the house was cleared of most debris so that it could be used as a workspace. Such spaces often become hard-packed over time. It might be expected that two centuries of plowing would obliterate this surface. However, most of the equipment used over this period would have ridden up over the harder surface, producing a shallower plow zone where the packing had occurred. On the other hand, shortly before our excavations began the landowner started using much heavier equipment, designed to penetrate into the subsoil. It is likely that the edge modification that does not have bloom or patina on the flaking is the result of recent cultivation on the site, but that the distribution of glass fragments modified in this way reflects the presence of a cleared yard at the time the site was occupied.

CONCLUSIONS

It should be clear from the discussion presented here that the transfer of pre-contact Indian lithic technology to glass, available only through European contact, was by no means rare in the generations of Indians living in the Middle Atlantic immediately following the arrival of the first Europeans. The Bloomsbury site is notable both for the number of such tools and for the late date at which they were apparently still being made. It must be pointed out, however, that such tools are not limited to the eastern United States, or even to North America. Two examples will suffice to indicate the potential for studying culture change among American Indians and other native peoples following contact with European settlers.

At the United States Industrial Indian School at Phoenix, flaked glass scrapers and spokeshaves were recovered from a trash dump along with bifacially flaked ironstone plate fragments (Lindauer 1996:215-216; Figure 11.13). Lindauer has suggested that using traditional Indian tools (or a close approximation in non-traditional materials) and practicing flaking techniques may have been a way to retain contact with the students' "home" identity in a setting where such expression was severely limited. At the Bloomsbury site, and at other post-contact Indian settlements, the use of flaked glass tools may have provided a means of retaining connection with an ethnic identity that was otherwise largely invisible.

In the late 1960's, an Australian archaeologist, Jim Allen, reported on the British settlement of Victoria in Port Essington, New South Wales, Australia (Allen 1969, 1978). Most of the analysis was focused on the history and material culture of the British military and civilian residents. However, there was a small settlement of native people associated with the site, and a number of scrapers made on wine bottle bases were recovered from the midden marking this settlement.

An examination of the illustrations accompanying Allen's 1978 summary of this research indicates that several of the tools closely resemble tools recovered at Bloomsbury. Allen points out that lithic material suitable for tool production was scarce in the Port Essington area, and suggests that bottle glass offered an easily accessible alternative. High quality lithic material was also not readily accessible over much of the Delmarva Peninsula and in Tidewater Virginia, where many of the sites with glass tools were found.

Understanding the significance of glass tools in the material culture of American Indians and other native peoples is clearly a complex issue. The continued use of flaked cryptocrystalline tools may indicate the survival of other technologies with more ephemeral products. The retention of this and other technologies of the past may also be an indication of efforts to maintain an identity that otherwise had no acceptable outward expression. Whatever the functional or symbolic role in the material culture of their makers, these tools are a signal that poorly understood processes were taking place.

THE MODIFIED GLASS INVENTORY

Tool No	ER	Vessel No	No. of Modified Edges	Heel or Base	Neck or Finish	Shoulder	Body	Length (mm.)	Width (mm.)	Thickness (mm.)	Bloom	Patina
1	41A		4	X				39	30	4		
2	47B		1				X	20	13	2		
3	47B		2				X	10	7	1.5		
4	47D		1				X	12	10	1.5		
5	49B	Bubbled	1				X	12	15	2.5		
6	49C	Bubbled	3	X				52	37	3 - 6		
7	49D		2	X				25	20	6		

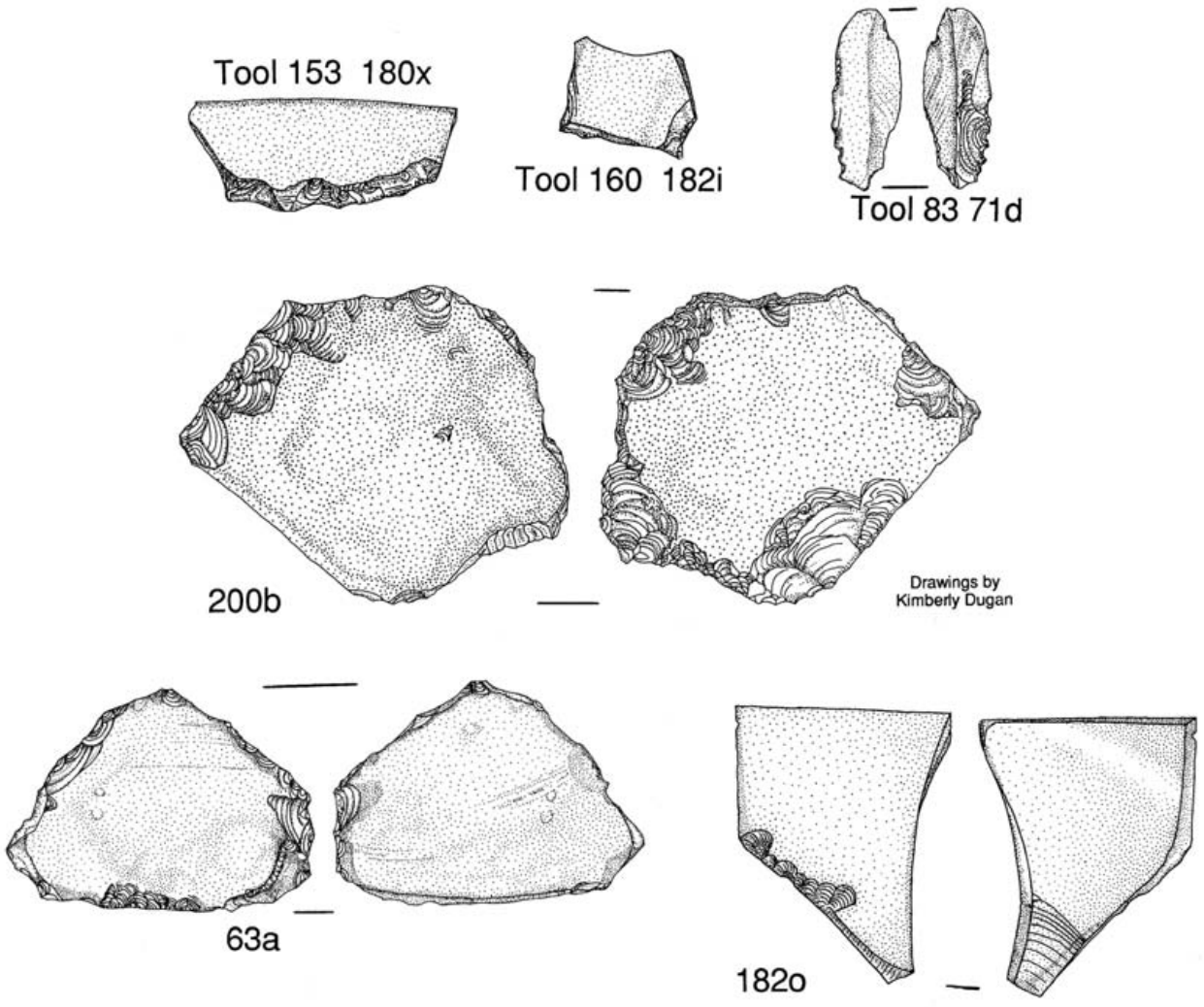

Figure 159
Modified edges

None of these pieces is obviously an intentionally modified tool, which illustrates the problem of trying to distinguish human intent from the form of a piece.

THE MODIFIED GLASS INVENTORY

Tool No	ER	Vessel No	No. of Modified Edges	Heel or Base	Neck or Finish	Shoulder	Body	Length (mm.)	Width (mm.)	Thickness (mm.)	Bloom	Patina
8	55A		1				X	18	13	2		
9	55A		1				X	12	10	1		
10	55B		3	X				30	15	5		
11	55C		4				X	27	12	2.5		
12	55C		5				X	20	12	3		
13	55D		4				X	17	15	4		
14	55D		2				X	17	11	2		
15	55D		5				X	21	12	2		
16	56C		2				X	18	10	1.5		
17	56D		5				X	29	25	3		
18	62C		3	X				39	11	2		
19	62C		1				X	20	11	2		
20	62C		2				X	16	14	1.5		
21	62D	4	3	X				67	60	12		
22	62D		1				X	23	14	4		
23	63A		3	X				38	27	4		
24	63A	Bubbled	2	X				23	20	6		
25	63B		1				X	11	9	1.5		

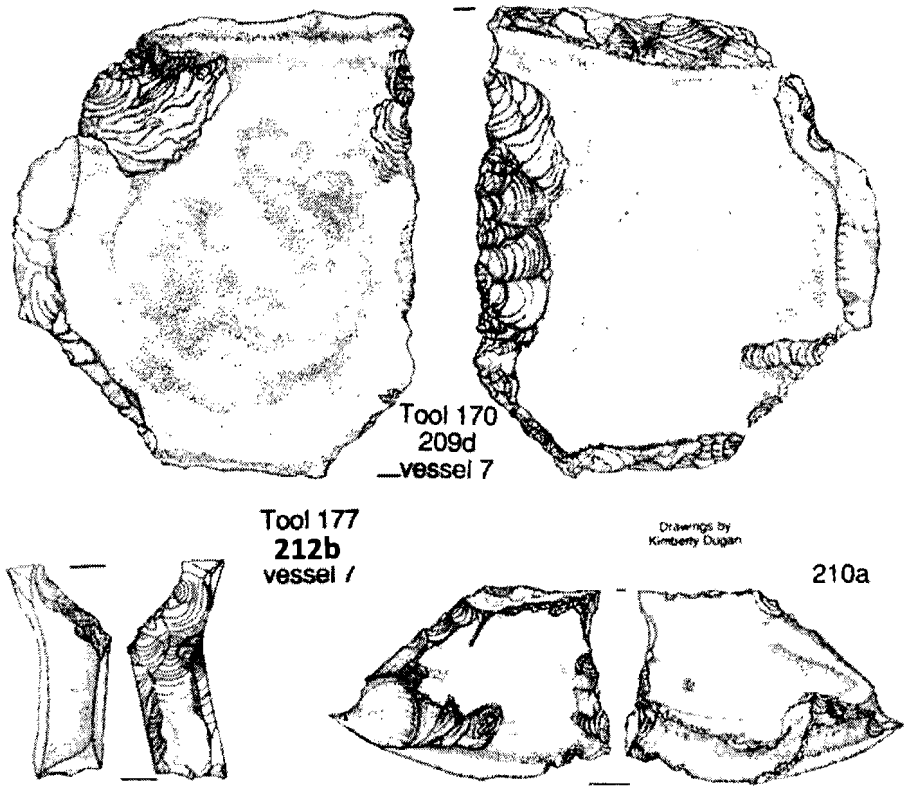

Figure 160
Edge-modified glass from the Bloomsbury site

Tool 170 was the first recognized. Tool 177 was a piece from the edge of it. The piece from 210a was not judged to be intentionally modified.

THE MODIFIED GLASS INVENTORY

Tool No	ER	Vessel No	No. of Modified Edges	Heel or Base	Neck or Finish	Shoulder	Body	Length (mm.)	Width (mm.)	Thickness (mm.)	Bloom	Patina
26	63B		2				X	12	8	2		
27	63B		2	X				31	14	11		
28	63B	Bubbled	1				X	14	8	2		
29	63B		3				X	21	15	5		
30	63D		1				X	12	9	1.5		
31	63D	Bubbled	1				X	18	18	4	X	
32	64A	6	1	X				45	29	8.5		
33	64F	Bubbled	2		X			20	11	2	X	
34	64F		1				X	18	15	2		
35	64F		1				X	15	15	1.5		
36	69A	Bubbled	1			X		21	10	2.5	X	
37	69A		1				X	17	13	2	X	
38	69B		1				X	16	12	1.5		
39	69B		1				X	16	13	3.5	X	
40	69B		2				X	25	9	2	X	
41	69C		2	X				23	14		X	
42	69C		2			X		45	24	5	X	
43	69C		1			X		28	12	4	X	X
44	69D	Bubbled	1		X			10	9	2	X	
45	69D		1				X	22	17	2		X
46	69D		1			X		26	12	2		X
47	69D		1				X	38	27	3		X
48	69D		3		X						X	
49	69D		2				X	34	14	3		X
50	69D		3	X				37	22	7		X

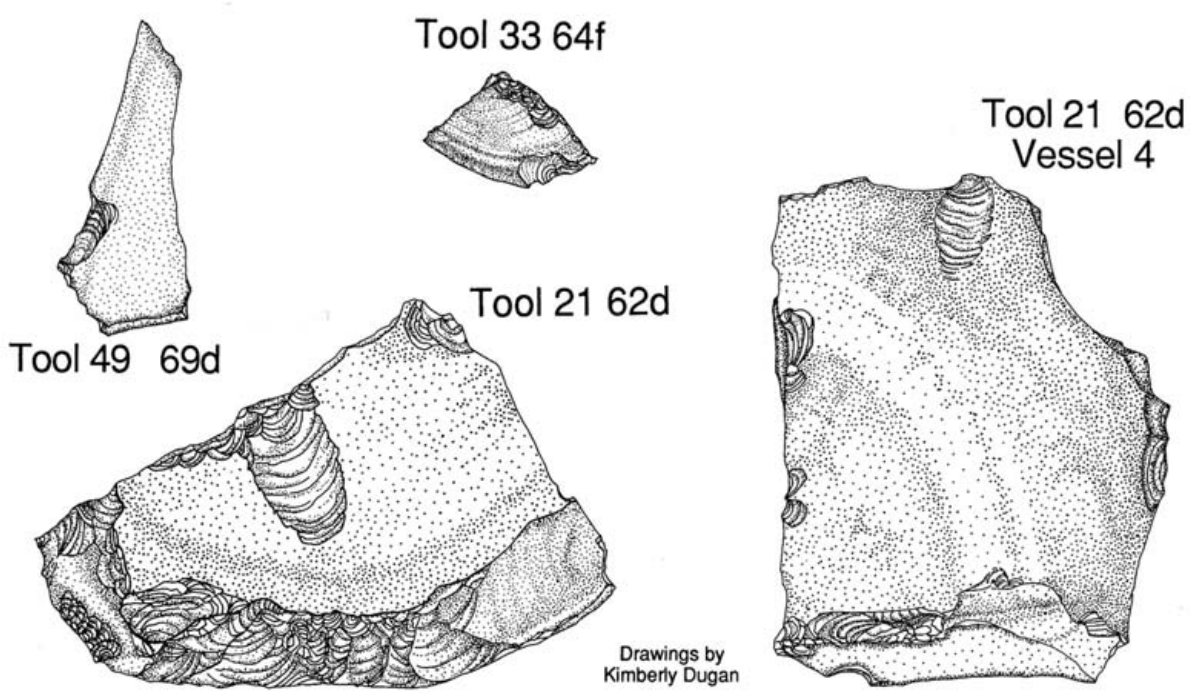

Figure 161
Modified bottle glass from the Bloomsbury site

The edge on tool 21 is considered to be a human product, but the other two tools' edges are not necessarily manmade.

THE MODIFIED GLASS INVENTORY

Tool No	ER	Vessel No	No. of Modified Edges	Heel or Base	Neck or Finish	Shoulder	Body	Length (mm.)	Width (mm.)	Thickness (mm.)	Bloom	Patina
51	69D	4	5	X				87	63	14	X	
52	70A		4				X	26	17	3		X
53	70A		4				X	30	25	2.5		X
54	70B		2		X			17	13	5	X	
55	70B		1				X	15	8	3		
56	70B		1				X	26	25	4		
57	70C		1				X	47	17	4		
58	70C	Bubbled	4	X				42	20	5	X	
59	70C		1				X	40	18	6	X	
60	70C		1			X		18	15	1.5	X	
61	70C		1				X	26	11	3		X
62	70C		2				X	15	13	2	X	
63	70C		1				X	33	15	3		X
64	70C		2				X	27	21	2		X
65	70C		1				X	23	15	2		X
66	70D		1			X		27	13	2	X	
67	70D	Bubbled	1				X	12	8	1	X	
68	70D		2				X	31	31	5.5		X
69	70D		1	? (flake)				22	16	4	X	
70	70D		1	X				17	14	2	X	
71	70D		1				X	18	11	4		X
72	71A		1				X	13	11	1.5		X
73	71A		3	X				25	20	6	X	
74	71A		1				X	20	10	3.5	X	

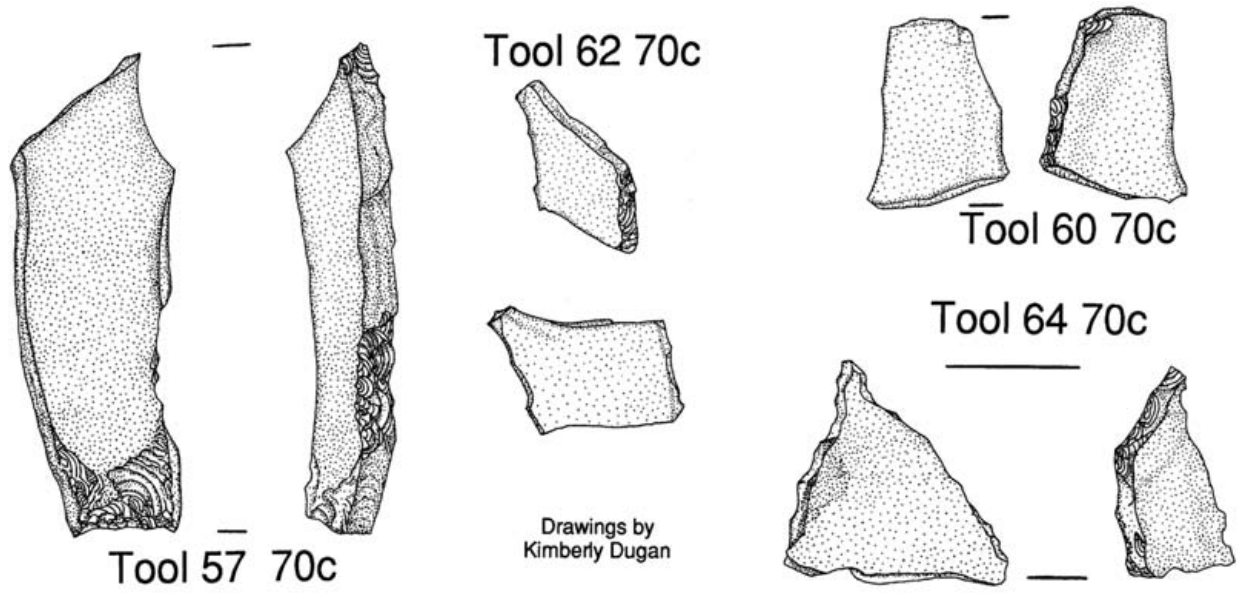

Figure 162
Accidentally modified glass from the Bloomsbury site

None of these “tools” proved to be unequivocally attributable to human modificaiton.

THE MODIFIED GLASS INVENTORY

Tool No	ER	Vessel No	No. of Modified Edges	Heel or Base	Neck or Finish	Shoulder	Body	Length (mm.)	Width (mm.)	Thickness (mm.)	Bloom	Patina
75	71A		2				X	19	8	1	X	
76	71A		1				X	18	10	1.5		X
77	71A		1				X	22	13	1		X
78	71A		2				X	18	12	2	X	
79	71B		1				X	22	19	1		X
80	71B		1				X	14	13	1		X
81	71B	Bubbled	1				X	11	6	1	X	
82	71D		2				X	39	14	5	X	
83	71D		1				X(flake)	22	8	3	X	
84	71D		1				X(flake)	12	10	1	X	
85	71E	12	1	X				64	52	10	X	
86	77B		1				X	15	11	1	X	
87	77B		2				X	27	15	2	X	
88	77B		2				X	17	15	2	X	
89	77B		3				X	17	10	2	X	
90	78A		2				X	26	15	3	X	
91	78A		4				X	31	15	3		X
92	78A		4				X	25	11	3	X	
93	78A		1				X	15	11	1	X	
94	78B		1				X	21	13	4	X	
95	78B	Bubbled	1				X	17	15	3	X	
96	78C	Bubbled	1				X	20	13	3	X	
97	80A		2		X			35	17	5	X	
98	81B		1				X	10	8	1	X	
99	82A		1			X		26	25	3	X	

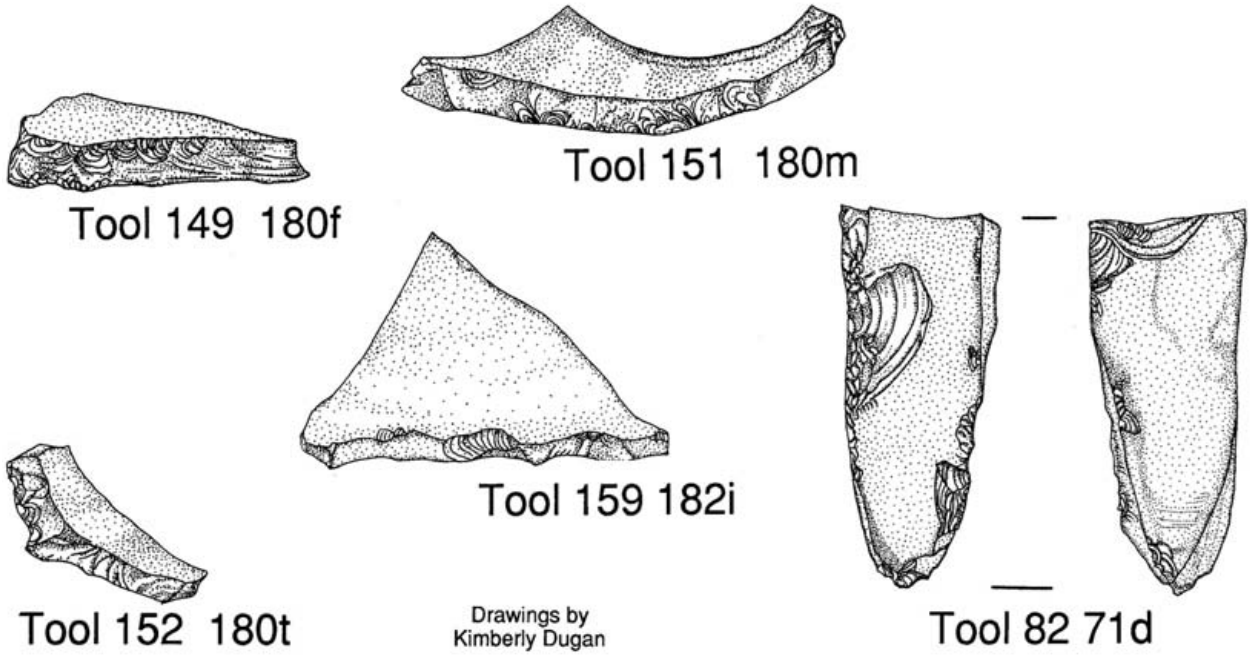

Figure 163
Modified glass from the Bloomsbury site, probably not intentional

THE MODIFIED GLASS INVENTORY

Tool No	ER	Vessel No	No. of Modified Edges	Heel or Base	Neck or Finish	Shoulder	Body	Length (mm.)	Width (mm.)	Thickness (mm.)	Bloom	Patina
100	82A		1				X	14	10	1.5	X	
101	82A		2		X			25	12	2	X	
102	82A		1	X				27	24	4	X	
103	82B		1				X	18	12	1	X	
104	82B		1				X	29	11	2		X
105	82B		2				X	27	17	2	X	
106	82B		1				X	10	10	3	X	
107	82C		2				X	25	15	3	X	
108	82C		1				X	10	8	1.5	X	
109	82D		3				X	35	26	4	X	
110	82D		1				X	15	8	2	X	
111	87A		1				X	36	13	1.5	X	
112	87B		1	X				30	28	9	X	
113	119A		2			X		60	25	2		
114	129B		2	X				34	25	11		X
115	129B		1				X	21	12	1	X	
116	129C		1				X	27	9	2.5	X	
117	129D		1	X				32	26	2	X	
118	129D		1				X	18	13	2	X	
119	130B		1				X	15	11	1	X	
120	130C		1				X	25	11	1-3	X	
121	130D		1				X	19	14	1.5		X
122	131		1				X	33	15	4	X	
123	131B		1				X	13	9	2	X	
124	131B		1				X	18	16	2	X	
125	131C		1				X	18	9		X	
126	131C		1				X	12	10	2	X	
127	131D		1				X	10	10	1	X	
128	136A		1	X				43	25	4		X
129	136D		1				X	23	15	1		X
130	137		1	X				29	11	4	X	
131	137B		1				X	30	18	2	X	
132	137B		2				X	30	23	5		
133	137E	1	2	X				75	65	15	X	
134	141A		1				X	13	8	1	X	
135	141A		1				X	34	14	3	X	
136	141B		1	X				32	28	3		X
137	141D		2	X				17	15	4	X	
138	145A		1				X	18	10	2	X	
139	145A		1	X				21	18	1.5	X	
140	145A		2				X	20	15	2		X
141	174C		2				X	15	11	3	X	
142	174C		1				X	17	14	2	X	
143	175B		2				X	35	24	6	X	
144	175B		1				X	26	23	4	X	
145	175B		1				X	23	12	2	X	
146	176B		1	X				62	37	8	X	
147	178A		1				X	19	12	2	X	
148	179D	8	1	X				40	40	7	X	
149	180F		1				X	38	11	4	X	
150	180H		1				X	42	35	3	X	
151	180M		1				X	42	21	4	X	
152	180T		1					18	12	3	X	
153	180X		3				X	32	19	3	X	

THE MODIFIED GLASS INVENTORY

Tool No	ER	Vessel No	No. of Modified Edges	Heel or Base	Neck or Finish	Shoulder	Body	Length (mm.)	Width (mm.)	Thickness (mm.)	Bloom	Patina
154	181B		1				X	32	21	4	X	
155	181D		1				X	17	9	1	X	
156	181E		1		X			21	15	4	X	
157	182G	Bubbled	2		X			20	15	2	X	
158	182H		1				X	27	25	4		X
159	182I		1				X	35	30	2	X	
160	182J		1				X	15	14	3	X	
161	182O		1				X	35	29	3	X	
162	182U											
163	200C		2	X				33	11	6	X	
164	200D		1				X	20	12	2	X	
165	200D		1	X				38	32	8	X	
166	201D		1				X	18	12	2		X
167	204D		1				X	13	11	1.5	X	
168	209C		1				X	15	14	1.5	X	
169	209C		1				?(flake)	19	15	3	X	
170	209D	7	3	X				77	65	6	X	
171	210A		1				X					
172	210C		1				X	21	18	2	X	
173	210C		2			X		25	15	3	X	
174	210C		2				X	17	12	1.5	X	
175	210D		1				X	27	12	2	X	
176	212A		1				X	12	12	1.5	X	
177	212B	7	1				X	36	31	4		X
178	212B		1			X		30	17	5	X	

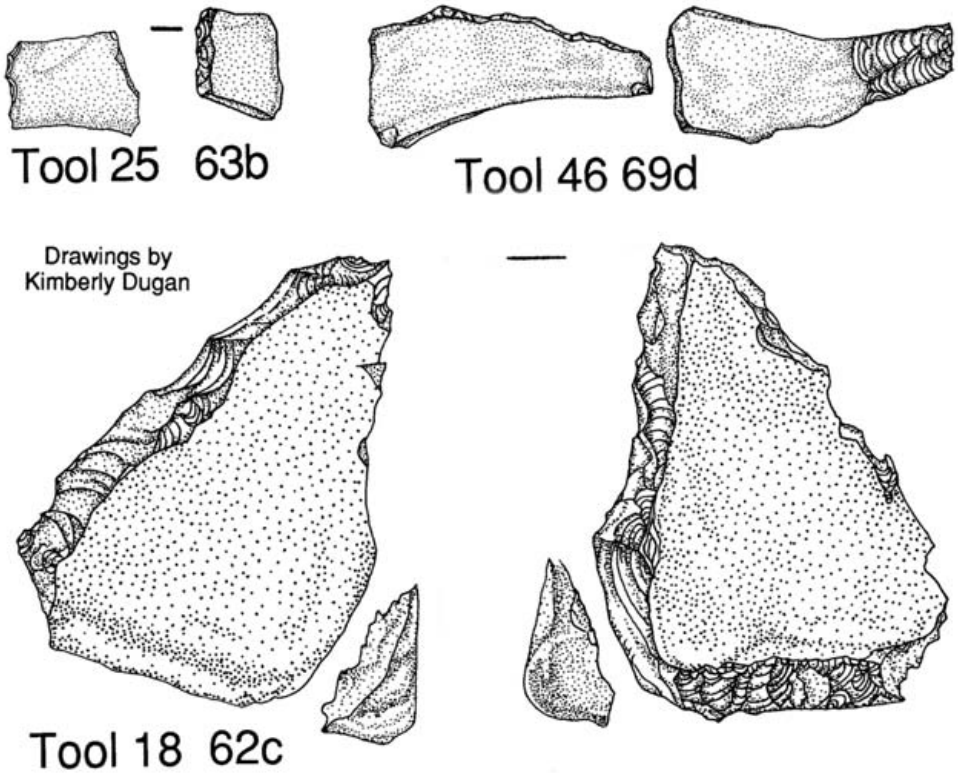

Figure 164

Modified glass from the Bloomsbury site, not human-modified

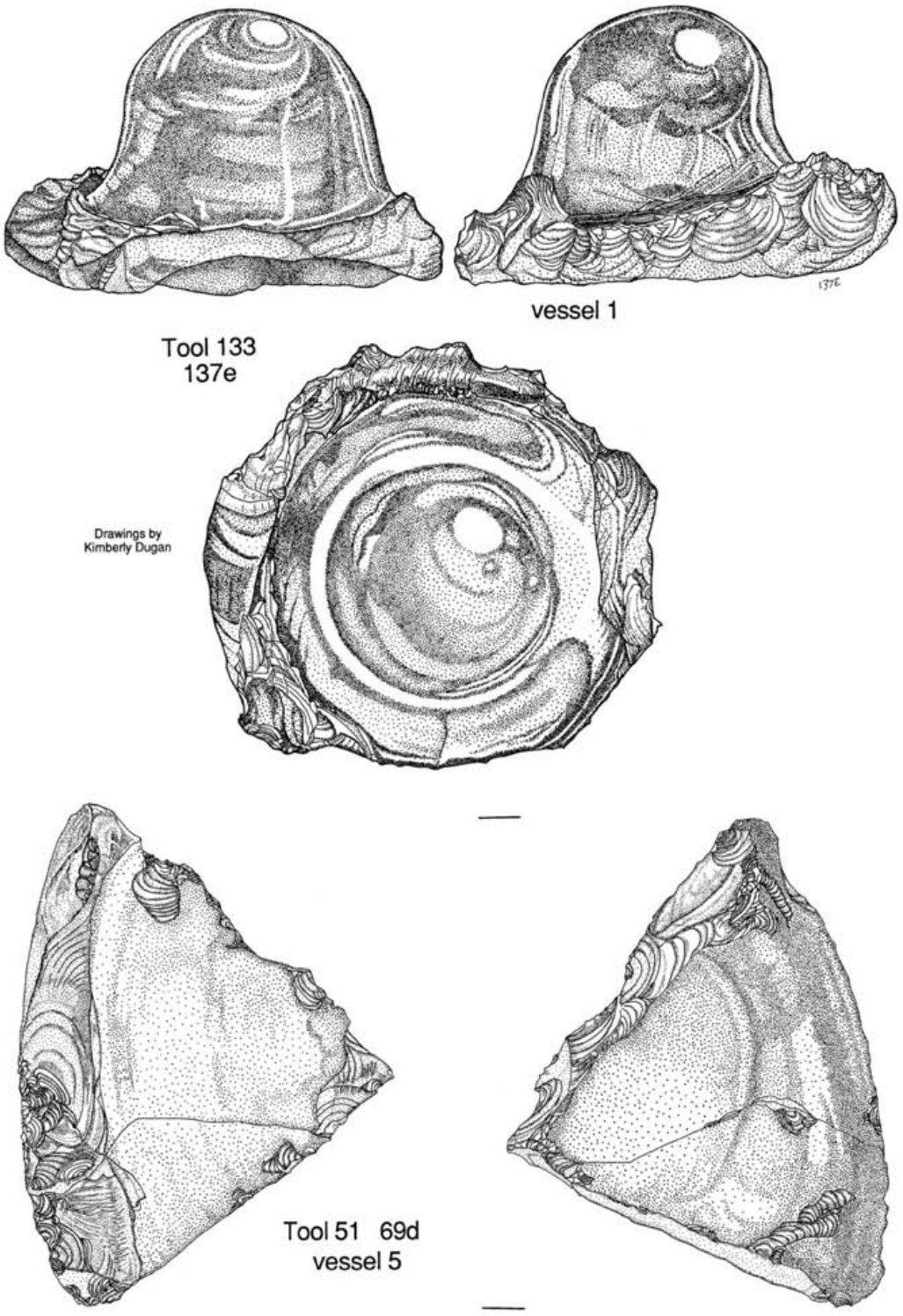

Figure 165
Worked glass from the Bloomsbury site

These two bottle bases are human-modified. Another piece of vessel 5 was also found with obvious human modification (Figure 161)