A MICROSCOPIC USEWEAR ANALYSIS OF GLASS FRAGMENTS RECOVERED FROM THE LEVI JORDAN PLANTATION, BRAZORIA COUNTY, TEXAS

A Thesis

Presented to

The Faculty of the Department

of Comparative Cultural Studies

University of Houston

In Partial Fulfillment

of the Requirements for the Degree of

Master of Arts

By

Nile F. Walker

May, 2016

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Abstract

The Levi Jordan Plantation Quarters Area was occupied by enslaved people and later tenant farmers and sharecroppers between approximately 1848 and 1887. Glass fragments recovered from three cabins were selected as a sample and observed microscopically for evidence of use as tools, focusing on striation and microfracture as usewear evidence. Observations were compared with previous research and an experimental set constructed for this study for identification. The purpose of the analysis is to determine if glass tool were employed by members of the Quarters Area community and to compare any evidence of use found with previous interpretations of activities within two cabins and propose an activity or activities taking place in the third. Findings are limited, but glass tools were identified, and observed usewear supports previous interpretations. No glass tools were identified in the third cabin, so no activities could be proposed for the location.

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Chapter I

Background on Lithic Analysis in Plantation Archaeology

The plantation in North America remains a powerful symbol within the culture of the United States. These estates simultaneously represent the grand architecture of the antebellum south—imposing mansions replete with stately columns—as well as the inequitable institution of enslavement that enabled the construction and maintenance of plantations. Too often, the focus of the public rests on the more aesthetically pleasing and less uncomfortable aspects of plantation life, resulting in the omission from public attention of the enslaved, and later, tenant farmer and sharecropper, populations living and working within the estates. In short, there has been an unfortunate tendency by the American public to ignore the immense contributions and unique culture of the Africans and African Americans who played a major role in building our collective history (Ferguson 1996; McDavid 1997; Ogundiran and Falola 2007).

This thesis is an archaeological study focused on the Quarters Area of the Levi Jordan Plantation in Brazoria County, Texas, which was occupied by Africans and African Americans from approximately 1848 to 1887. Fragments of glass recovered from the Quarters Area of the plantation were viewed under digital microscopes to identify evidence left by use of the artifacts as tools (usewear). This was done to test previously established or proposed activities that took place on site during occupation (see Brown 2013; Garcia-Herreros 1998; Harris 1999 for full discussions of these activities). The aim of the current research is to reveal uses for glass tools in a plantation context through the direct observation of physical evidence and to test whether glass artifacts that macroscopically resemble tools

contain evidence of use. If identification of glass tools is successful, the current research will supplement the existing conclusions regarding the means and lifeways of the Quarters occupants as well as support the analysis of glass tools as an avenue of research for any site where glass artifacts are suspected of having been used as tools.

Academic attempts to study the human past, including this one, are typically the domain of two disciplines: history and archaeology. Generally speaking, written documents are the domain of history, and artifacts and their contexts belong to archaeology. Within a plantation setting, the vast majority of written documents are authored by those outside of the enslaved, tenant farmer, or sharecropper populations, meaning these accounts are unlikely to include details regarding the lifeways or beliefs of these groups (Blassingame 1979; Fairbanks 1972; McFarlane 1975; Otto 1984).

There are, however, several 'slave narratives' given by those formerly enslaved and recorded by the Works Progress Administration in the 1930s (Mellon 1990) as well as accounts, often self-published, depicting life under enslavement by those who lived through it (Ball 1859; Bibb 1849; Douglass 1845; Jacobs 1861; S. Mintz 2004; Northup 1855; Thompson 1856). While useful for understanding the past, these accounts may have sizable omissions or be unrepresentative of enslavement as a whole (Harris 1999). Specifically, the 'slave narratives' were recorded roughly 65 years after emancipation, meaning the recollections represent individuals who were mostly children during the last years of enslavement. This raises questions regarding how completely and accurately the information about respondents' early lives was retained and reported (Otto 1984:6–7). Moreover, the people gathering these reports were often not members of the communities they were visiting to collect this information, and African Americans were widely discriminated against and

still legally segregated in the United States in the 1930s. Therefore, relationships between those giving and those receiving the accounts were likely defined by the social climate of the times and probably not characterized by closeness and trust. Accordingly, even intact recollections about specific beliefs and lifeways from the period of enslavement may not have been freely shared due to the personal nature of these accounts. For these and other reasons, the slave narratives must be understood to provide only limited information regarding life in the United States under enslavement rather than a full account of the culture(s) of enslaved people.

As well, the personal memoirs published regarding slavery likely fail to represent universal experiences throughout the American South within the 19th century (Ball 1859; Bibb 1849; Douglass 1845; Jacobs 1861; Mintz 2004; Northup 1855; J. Thompson 1856). Often, the enslaved people who escaped to the North lived in northern slaveholding states and tended to be skilled craftsmen rather than field hands from the Deep South—the group which comprised the majority of enslaved people (Harris 1999:4; Otto 1984:6–7). There may be a great deal of insider information, such as religious beliefs or practices, deemed unacceptable or unnecessary for wide publication. These accounts hold numerous details and are informative documents regarding life under enslavement but are still imperfect for understanding how people across the United States lived within and under these conditions. Any additional means of gathering the details of how Africans and African Americans adapted to and existed in the context of enslavement should be used to refine and redefine the existing historical understanding.

Historical archaeology offers another avenue of inquiry into facets of the past that remain omitted or misrepresented within historical documentation alone (Deagan 1991;

Deetz 2010; Ferguson 1977; Fish 1978; Harrington 1978). While archaeologists and historians both attempt to understand the past, historical archaeologists utilize the material record left by previous cultures in conjunction with historical documentation rather than solely the interpretation of historical documents. To use the material record for understanding the past, archeologists must find and identify patterns in these remains and match them with similar or analogous patterns from known sources. Often, the recovered material is compared with ethnographic models or historically known patterns to determine the actions that produced the material record. In cases in which there are numerous and distinct similarities between known behavior and archaeologically found evidence, archeologists can conclude that a similar set of actions produced the resemblance in patterns. Alternatively, distinct differences between the known pattern and recovered materials imply that a different set of behaviors produced those materials. This procedure, often referred to as hypothesis testing, has been widely used and accepted in processual archaeology since the 1960s (Binford 1977; 1989; Johnson 2010; Schiffer et al. 2010; Trigger 2006).

Researchers have applied this reasoning to questions within the African Diaspora and plantation archaeology to determine if various activities were transported from African groups as Africans were imported into new locations, including North America, as well as if these activities were retained and adapted through time (Adams 1980; Armstrong 2009; Brown 1994; 2001; 2008; Brown and Cole 2012; Brown and Cooper 1990; Fennell 2000; Ferguson 1992; Harris 1999; Garcia-Herreros 1998; Leone and Fry 1999; McFarlane 1975; Mintz 2004; S. W. Mintz and Price 1976; Ogundiran and Falola 2007; Russell 1997; Singleton 1999; Vlach 1980; Wilkie 2000). Numerous ethnographies of African and African American groups have been published that contain invaluable sources toward which

archaeologists can and have turned to understand the function of material remains recovered while studying the African Diaspora (Arnoldi and Hardin 1996; Beoku-Betts 1994; Creel 1988; Guthrie 1996; Herbert 1994; McNaughton 1993; Rasmussen 1992; 1995). These ethnographic works on closely related groups allow researchers to search for continuity in material culture and symbolism representing traditions that have been retained and adapted throughout the African Diaspora.

The application of historical archaeological methods enables the researcher to apply the historical accounts, related documents, and ethnographically based considerations of the material record to construct a more complete and nuanced understanding of past lives (Binford 1977; Deagan 1991; Orser 2004). In the case of a historically known but largely illiterate population—such as the African and African American enslaved and, later, tenant farmer and sharecropper population—primary historical sources are insufficient for understanding life from their perspective. Research into the African Diaspora and plantation archaeology (outside of simply considering the lives of the planters and their peers) requires historical archaeologists to cleverly and carefully excavate and analyze the material record with the aid of historical documentation.

The archaeological work of Charles Fairbanks in the late 1960s is typically seen as the beginning of the structured attempt to understand plantation life with a focus on the African and African American population (Cole 2013:5; Fairbanks 1972; Miller 2004:12; Ogundiran and Falola 2007; Singleton and Bograd 1995). Prior to his investigations, archaeology conducted on plantations primarily focused on White Europeans and Euro-Americans known to United States history, meaning the main house was the dominant axis for understanding plantation life (Caywood 1957; Cole 2013; Vlach 1980). Singleton and

Bograd (1995) identify two cultural shifts in the United States that enabled shifting attention to the African and African American populations within a plantation setting: the American Civil Rights Movement and the passage of the National Historic Preservation Act (NHPA). These events taken together meant more attention and structured protection and conservation for historical sites and a specific increase to the attention given to Africans and African Americans in the history and culture of the United States.

Since the late 1960s, the African Diaspora and plantation archaeology have received considerable attention within historical archaeology (Adams 1980; Ahlman, Braly, and Schroedl 2014; Armstrong 2009; Barnes 2011; Brown 1994; 2001; 2008; Brown and Cole 2012; Brown and Cooper 1990; Cole 2013; Ferguson 1992; Handler, Lange, and Riordan 1978; Hudson 1994; McFarlane 1975; Michie 1990; Miller 2004; Mrozowski 2010; Ogundiran and Falola 2007; Orser 1992; Otto 1984; Russell 1997; Singleton 1999; Singleton and Bograd 1995; Thomas 1998; Wilkie 1996; 2000; as well as many others). The low level of English literacy within the African and African American populations during enslavement and in the decades that followed is a particularly limiting factor for the understanding that past researchers can glean from historical record alone. In fact, Deagan (1991) identifies historical archaeology as unique in its ability to understand people who had been previously disempowered, as African and African Americans within the United States have.

Although there has been considerable attention given to Africans and African Americans of the United States, many questions remain. One such question is whether Africans who were forcefully transported to the Americas retained African beliefs and culture once overseas, and if so, how much of their original culture remained. One pervasive line of reasoning is that the upheaval caused by forceful transport, relocation, and

enslavement essentially eradicated any cultural holdovers from Africa, forcing the enslaved people to accept or construct an entirely new culture (Frazier 1939; 1949). Under this line of reasoning, African American culture was not based on cultural beliefs and practices retained from Africa or adapted based on these retentions. Instead, African American culture is seen as a result of integration or assimilation of Euro-American culture. However, anthropologists such as Herskovits (1941) and Hurston (1935) reject this explanation. Herskovits (1941) posits that the unique culture of African Americans is the product of African heritage, complete with "Africanisms"—cultural traits evidencing the link between African American and West African cultural groups. The indication is that Africans took their existing beliefs and ideas with them across the Atlantic Ocean during the slave trade and were able to retain them in the face of their forced relocation and exploitation.

Current archaeological researchers dealing with the African Diaspora have a more nuanced view of African retention and the development of African American culture (Brown 2001; Fennell 2000; Mrozowski 2010; Orser 1994; Wilkie 1995). Africa, even West Africa, is a large and culturally diverse location, and enslaved people were not imported from solely one cultural group into a single plantation in the New World (Posnansky 1999). This mixing, as well as the selection of certain segments of the African population for enslavement and the taxing and often fatal ordeal of transportation from Africa, is believed to have had powerful and deleterious effects on what materiality and lifeways were retained through the process of enslavement (Cole 2013; S. W. Mintz and Price 1976; Theresa A. Singleton 1999). The effects of enslavement, then, do not appear to be either the wholesale loss or retention of African traditions and worldviews, but instead resulted in a culture or cultures constituted from the retained similarities between a multitude of Africans thrown together in a new

environment. Indeed, many details from any individual African culture were likely to be lost in the process of enslavement, and commonalities between cultures could be built upon by members of previously foreign groups now forced to coexist and adapt to an entirely new way of life in an unfamiliar setting (Brown 1994; 2001; Brown and Cooper 1990). If this position is correct, efforts made by researchers attempting to find direct links to specific African practices or beliefs will likely come away with little evidence of completely intact cultural retentions (DeCorse 1999). For example, the "Bakongo cosmogram" identified by Ferguson (1992:110–116) as cultural retentions from Africa are found on bowls in at least three different forms, although he concludes none clearly include all details depicted in the Bakongo sign of the cosmos. Rather than a clear example of a Bakongo cosmogram as a direct retention, some might conclude that the designs (apparently a simple cross or "X" within a circular frame or field, such as the form of the bowl) exemplifies a new form, possibly derived from the Bakongo symbol. The appearance of a new, varied form similar to the Bakongo comogram can be explained through the adaptation of a previous design by people developing their own unique culture (for an example of various cosmogram forms archaeologically identified, see Brown 2001). Emerson (1999) also identified a number of apparent African retentions found on clay pipes recovered in the Chesapeake. Although some of the similarities between examples of various motifs present on African objects and those found on the clay pipes are striking, Emerson does not explore the new uses for these decorations (on pipes rather than beer vessels, for example) or modifications apparent between African and New World artifacts. While these motifs appear to be African in origin, this seems insufficient to meaningfully describe the beliefs behind their creation or the culture of their producers. Identifying links to Africa in the material record left by Africans

and African Americans in the New World can be informative in a general sense but fails to offer details regarding a group's specific beliefs or behaviors. Rather than attempting to establish direct links with specific African cultures utilizing specific artifact types or decorations, Cole (2013) presents alternative research questions to pursue in the effort to understanding African American culture:

> "'How did African Americans create culture within the diverse and repressive environment of slavery?' 'How were the enslaved and later free African Americans utilizing the home space?' 'How were objects and features used to construct meaningful places in African American homes and yards?' And, 'How did emancipation and reconstruction effect the construction and maintenance of this emerging culture?'" (Cole 2013:8)

Her research goals allow a deeper understanding of the reality of African American life than that enabled by the search for African retentions alone. Nuanced research of this type is paramount in recognizing the African American past in terms of the conditions affecting Africans and African Americans during enslavement and in the decades following emancipation.

In terms of specific types of African American material culture, lithics, including worked or utilized glass, have been recovered from various plantation contexts over decades (Ahlman, Braly, and Schroedl 2014; Klingelhofer 1987; Patten 1992; Russell 1997; Wilkie 1996). Unfortunately, lithic artifacts found on plantation sites are often given only cursory analysis and summarily left to the innominate future researchers to more fully understand. As Klingelhofer laments in one such report on African American material culture, "Archaeologists tend to classify unidentified items according to their contexts: on prehistoric sites, as ritual objects; on historic sites, as gaming pieces," indicating a lack of depth to the analysis of artifacts that seem out of place or not easily explained (1987:115). This complaint

is also apt in the case of lithic artifacts specifically found within plantation contexts—even if their form is quite often easily identifiable, the function and purpose of these implements still regularly elude archaeologists. Klingelhofer, rather than placing the glass and gunflint tools he describes from Garrison Plantation, Maryland, into one of the two categories mentioned previously, avoids the issue as a whole and simply asserts that the artifacts do not stem from a Native American tradition of lithic use because "the sites in Virginia and in Maryland [where these tools were recovered] postdate the elimination of the Indian as significant factor in the Tidewater and Piedmont areas of the mid-Atlantic region" (Klingelhofer 1987:115). Further efforts to discern the role of the apparent lithic production in African American culture are absent from his report.

Wilkie (1995; 1996; 2000) also deals with lithic artifacts in an African American context. She focuses specifically on glass tools recovered from the Oakley Plantation, Louisiana, and makes an effort to explain possible reasons why African Americans may have been producing and utilizing them (1996). Within this analysis, Wilkie (1996) applies the kind of analyses more often seen in considerations of prehistoric lithic assemblages (see Andrefsky 2001; 2005; Odell 2004; Rots, Van Peer, and Vermeersch 2011; Seeman et al. 2013; Swanson 1975; Wilmsen 1968), including the presence of retouching along edges and possible uses based on the angle of edges likely utilized. Wilkie (1996) employs the historically known application of glass tools by Africans during the middle passage in the use of cutting "traditional designs in their hair" or other use as a razor (Mintz and Price 1976; Ferguson 1995, both cited in Wilkie 1996) as well as glass tool use in the modification of wooden handles of various tools (Hulbert 1992 cited in Wilkie 1996). With both uses, the glass tools are described as serving similar purposes to razor blades, leading Wilkie (1996) to

assign a probable use for the recovered glass implements. As well, she posits that the decreasing price of razors over time explains the apparent lessening of glass tool use throughout the archaeological record at the Oakley Plantation; glass was used for these purposes less often as razors became more affordable (Wilkie 1996). Due to the presence of glass interpreted as intentionally chipped at other known African American sites, Wilkie (1996) suggests that chipped-glass tools of this type may be a distinctly African American phenomenon, ostensibly implying that chipped-glass tools could be used by archaeologists to assign ethnicity to groups that have produced artifact assemblages containing these tools. By the end of her conclusion, however, it becomes clear that she believes further analysis of contemporary Euro-American sites is necessary to be certain that glass tools cannot be found in those contexts as well.

Sources were available at the time of publication identifying problems inherent in identifying intentional retouch on glass tools (e.g., Allen and Jones 1980; Beaumont 1961) and are not discussed in the text—surprising considering how much attention retouch receives throughout the study (Wilkie 1996). Further, Wilkie (1996:42) identifies all retouch as unifacial and occurring along latitudinal edges of bottle, jar, or tumbler glass (although a table included on the same page appears to present retouch as occurring on only longitudinal edges). According to the text (Wilkie 1996:41–42), latitudinal means the edge would be essentially vertical if the fragment was still part of a standing bottle (however an included figure appears to show ‘latitudinal’ as horizontal). Assuming the text is correct in both cases, incidental trample rather than intentional selection may explain the perfect adherence of the sample to the observed pattern. Specifically, the curved nature of bottles, jars, and tumblers makes the edges identified as latitudinal extend away from the body of the tool (inwardly

compared with the original vessel, similar to ventrally in lithic terms) along what was once the circumference of the original bottle. When the fragment sits horizontally, as it would on a floor or other surface, the 'inward' protrusion of latitudinal edges results in them being either higher or lower than the rest of the fragment depending on its orientation. This results in latitudinal edges and the exterior (similar to dorsal surface in lithic terms) of the fragment's body contacting surfaces when trampled (e.g., between a floor and the bottom of a shoe). Therefore, if trampled, a single facet of the latitudinal edges (typically what used to be the interior or the vessel, depending on the edge angle) would bear the weight of the trampler, likely resulting in small unifacial reductions along specifically latitudinal edges rather than longitudinal edges as pressure caused the glass to flake. Not surprisingly, trample is known to produce patterns that can appear as intentional modification in glass artifacts (Allen and Jones 1980; Beaumont 1961; Conte and Romero 2008). Therefore, incidental damage—rather than intentional tool modification and use—may explain the perfect pattern of perceived retouch identified by Wilkie (1996).

As well, Wilkie (1996:43–44) notes that all retouched tools have edge angles greater than 35°. This pattern, similar to the presence of retouch along only latitudinal edges, could also be the result of the same damaging incidents such as trampling that can cause apparent retouch. It may be that comparable angles of force between similarly curved glass fragments and a relatively flat surface during these events caused the cluster of steep edges rather than intentional modification. As well, none of the apparently utilized longitudinal edges (all less than 35°) show retouch, even though they were reportedly used by people who commonly knapped glass. If the observed retouch along latitudinal edges of curved glass resulted from incidental damage, it would also explain the lack of retouch observed along longitudinal

edges . Specifically, the longitudinal edges would not have had the same forces exerted on them during trampling events, for example, and may not have experienced negative scarring as frequently as latitudinal edges.

Wilkie (1996) describes the presence of retouch as one of the criteria used when identifying glass fragments as tools. Because damage appearing as retouch can result from unintentional sources (Allen and Jones 1980; Beaumont 1961; Conte and Romero 2008), Wilkie's (1996) assessment of what fragments constitute tools may be flawed. No specific criteria for identifying a fragment as a tool are given within the study, and a description of wear types on retouched edges appears absent, implying retouch may have been the sole determinant for identifying these glass fragments as tools (Wilkie 1996). Wilkie (1996) describes wear patterns along unretouched utilized edges, which more conclusively supports the idea that these fragments, at least, were utilized as tools. She states that microwear analysis could give more information about the specific functions of the identified tools and only offers shaving hair and shaping wood handles as speculative uses, as mentioned above. Altogether, more attention to sources published before Wilkie's (1996) work (such as Allen and Jones 1980; Beaumont 1961; Runnels 1975; 1976) could have offered more insight into the specifics of working with glass artifacts suspected of being tools. Attention to previous works could have steered Wilkie's (1996) study toward focusing on the distinct wear types she reports on unretouched tools rather than macroscopic examinations of retouch on suspected scrapers. If Wilkie (1996) tested the ethnographic examples she offers for use, the study could have been less speculative and offered details regarding activities taking place during occupation.

In Tennessee, archaeological excavations at the Hermitage revealed a collection of "whole and fragmentary chert projectile points…, a large amount of debitage, several ground stone tools, and a very small amount of prehistoric ceramic" (Russell 1997:72). Russell acknowledges the possibility that the clearly Native American "projectile points" and associated debitage may be included in the African American occupation of the site due to bioturbation rather than actual collection and/or use by the 19th century inhabitants but does not conclusively establish whether this was the case. He calls for "more research" into this specific problem so that it may be sorted out by future researchers (Russell 1997:73). Given that these artifacts may very well have been used by African Americans within the historic period, Russell offers brief explanations of how the projectile points and other artifacts listed may have functioned, although he fails to offer in-depth tests any of these hypotheses within his report. Russel (1997) reports debitage within the material record; if this inclusion is not the result of bioturbation, it would indicate the manufacture or curation of stone tools by the occupants, although Russel (1997) does not mention this point. Additionally, no glass tools were reported within the assemblage, the presence of which could have supported the idea that chert tools were used and manufactured within the site as well. Russel's (1997) explanations offered for the projectile points include a vague ritualistic function, a utilitarian role as fire starters, or simply objects collected by children—the last explanation receiving the least attention and seemingly offered off-hand. A systematic analysis of the lithic tools could have provided evidence supporting functions tied to these tools, but this was apparently not conducted. Small, smooth chert nodules were also recovered from the site, and Russell (1997) offers similar explanations for these as he did the projectile points, with an additional comment that these may have served as game pieces or as gravel for a pathway.

Ahlman, Braly, and Schroedl (2014) present their analysis of stone and glass tools from enslaved African contexts found on St. Kitts. The authors focus on technology and function in their analysis and avoid speculation on deeper symbolic meanings behind these tools. The glass tool assemblage consists of eight tools that fall into only two functional categories based on form: scraper ("tool with a retouched edge that has an angle of 60 to 90 degrees") and spokeshave ("tool that typically has unifacial usewear in a lenticular or semi-circular concave pattern") (Ahlman, Braly, and Schroedl 2014, 10). One glass artifact is classified as a dedicated spokeshave, one is identified as a combination spokeshave and scraper, and the remaining six are categorized as scrapers. The authors state the glass tool assemblage likely represents largely expedient tools—tools of opportunity requiring "little or no effort in their production" that can vary greatly in form and function (Andrefsky 2005:31 as quoted in Ahlman, Braly, and Schroedl 2014:17). Usewear analysis indicates the glass tools were used to "plane wood and work soft materials" (wood is considered a soft material) (Ahlman, Braly, and Schroedl 2014:22). These findings coincide with Wilkie's (1996) suggested use of glass tools in wood-shaping activities.

Ahlman, Braly, and Schroedl (2014) also report on chert tools recovered from sites on St. Kitts. These tools vary in geographic location, form, and function more than the glass tool assemblage. The authors identify the likely primary uses for the chert tools as "cutting or planning soft woods, or cutting leaves, fronds, or reeds" and that "some served as fire flints" (Ahlman, Braly, and Schroedl 2014:19). As well, the manufacturing process of these tools implies a "lack of stone tool manufacturing knowledge" (Ahlman, Braly, and Schroedl 2014:19). Rather than assigning a ritual or symbolic significance to the chert tools found, the authors offer an economic reason for the production of fire flints in this context—tool

producers could have traded these objects in small-scale markets for other necessary goods (Ahlman, Braly, and Schroedl 2014).

The assessments of Klingelhofer (1987), Wilkie (1996), Russell (1997), and Ahlman, Braly, and Schroedl (2014) offer differing amounts of attention and information collected from stone and glass tools in a plantation context. Wilkie (1996) and Ahlman, Braly, and Schroedl (2014) give a more thorough analyses of lithics in an African American context compared with either Klingelhofer (1987) or Russel (1997). Wilkie (1996) specifically pays attention to contextual ethnographic connections, although her actual analysis of the glass seems flawed. Ahlman, Braly, and Schroedl (2014) give ample description of how the lithics discovered may have been included in the economy of St. Kitts, offering historical details to support their claims. These two studies, however, specifically focused on stone or glass tools, so a greater attempt to explain their presence and functions is necessary. Analyses of specific artifact types, such as glass tools recovered from plantation contexts, have the capacity to augment understanding of the particular lifeways of a site's previous occupants. With each additional study, analyses can be considered within the larger context of plantation life, possibly identifying patterns of use in the context of the African Diaspora. Analyses, however, that explain lithic tools as vaguely ritual do not meaningfully engage questions about the African American past and offer no information pertaining to how Africans and African Americans adapted to life in a plantation setting. Explanations of the economic factors as well as the ethnographic and historical connections behind stone and glass tools are useful to researchers for understanding why these tools are present at a site and even how they could have been included in occupants' lifeways. Additional efforts to establish specific uses for recovered tools, such as microwear analysis, could yield direct evidence to support

suppositions like Wilkie's (1996). Indeed, these tools can aid in the determination of activity areas—wear patterns on lithic tools can be considered against materials found within an area, supporting or refuting hypotheses identifying the activities taking place within a given structure. When considered within a larger context, artifact types of many kinds can be used to create data that inform a more complete view of the lives of Africans and African Americans in our past.

Chapter II

History and Research into the Levi Jordan Plantation Quarters Community

General Background

The Levi Jordan Plantation is located roughly 15 miles from the Gulf of Mexico and 60 miles from Houston, Texas, on the Gulf Coastal Plains of Brazoria County. The plantation was founded in 1848 on 2,222 acres of land (Brown and Cooper 1990). The area containing the main house and quarters is currently parkland under the care of Texas Historical Commission (THC). The area around the main house is well maintained, but the Quarters Area had become significantly overgrown on last inspection (June 2013), and the site was clearly being negatively impacted by flora and fauna. The quarters were constructed from brick in four "blocks," containing 26 "cabins" total, and are no longer standing. They encompassed an area of roughly 320 feet ×100 feet, approximately 400 feet northwest of the main house, which remains largely intact and is currently maintained (Brown and Cooper 1990). The structures in the Quarters were similar to 'dog-trot houses' constructed of brick, meaning there was a passageway through the center of the small complex that allowed access to rooms on either side (Figure 1). The quarters were occupied from 1848, when their construction began, to roughly 1887, when archaeological evidence shows they were abandoned (Brown 2013; Cooper 1989). Members of the Quarters Community appear to have left large amounts of their personal property behind when they vacated, resulting in an archaeological deposit unlike those encountered on other archaeologically known plantation quarters sites throughout the United States. This "abandonment deposit" offers the

opportunity for researchers to collect data to answer questions about the African American past that would not be possible at other known sites (Brown 2013; Brown and Cooper 1990; Cooper 1989).

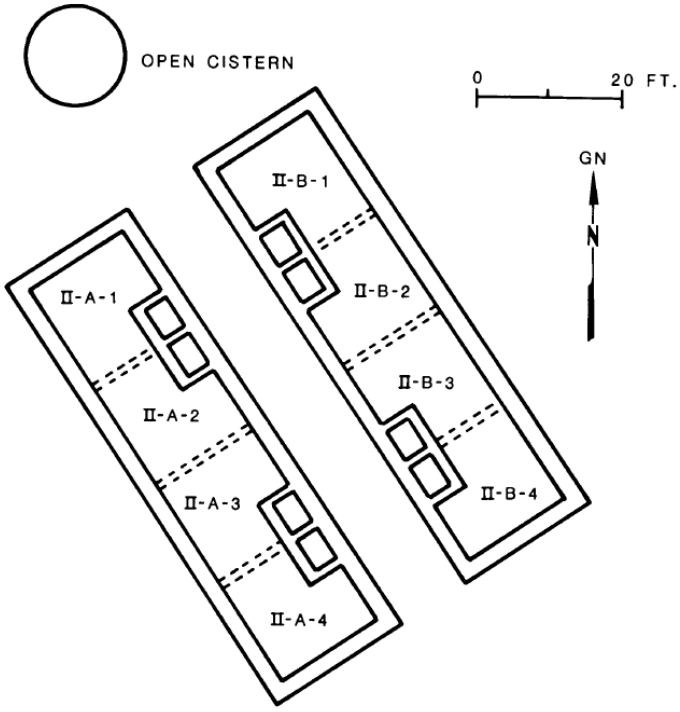

Figure 1: Example of Quarters layout, Block II. Eight rooms (four on each side) accessible from a central walkway, possibly with a single roof (taken from Brown and Cooper 1990).

The Levi Jordan Plantation is located along the Gulf Coastal Plains of Brazoria County, Texas. Numerous bayous, rivers, and sloughs run through the generally flat coastal area, which contains many wetland swamps (Brown 2013). The plantation lies along a shallow slough that is currently impeded by a number of earthen dams but was reportedly navigable to the San Bernard River, and from there, to the Gulf of Mexico, into at least the late 1800s (Daigle 1996).

The site is located in a region marked by marsh and salt grasses as well as various hardwood trees. The mean annual temperature is 70° Fahrenheit with a typical warm season of 275 days. Frosts are not common in the area but usually fall between December 1 and March 1 when experienced. Mean annual precipitation is 48 inches of rain, and humidity is high throughout the year due to the area's proximity to the coast (Arbingast et al. 1976; Brown 2013).

USDA Soil Conservation Service map 91 (1981) shows the soil of the Quarters Area to be within the Asa-Norwood soil complex. The soil is identified as Asa silty clay loam: a nearly level, nonsaline soil with slopes averaging about 0.3 percent. Although identified as rarely flooded, the soil has slow surface runoff with moderate permeability and is described as having only medium application for urban uses due to flooding hazards. However, the potential for agricultural and pastoral uses is determined to be high (USDA 1981:10–11).

Hurricanes along the Gulf Coast are a common occurrence, affecting the site both during occupation and after the abandonment of the quarters. These storms are known to have impacted agricultural yields in the region and likely accelerated the deterioration of the unoccupied structures. Flooding has also been a factor during and after occupation. Records indicate widespread flooding within Brazoria County in 1913, likely explaining deposition of the silty loam soil encountered atop the occupational deposits during excavations carried out by Dr. Kenneth Brown from the University of Houston. Brown determined this alluvium was deposited after abandonment of the quarters during the period of structural disintegration, sealing the occupational deposits and protecting them from various disruptive forces such as cattle ranching, which occurred on the site after the abandonment of the quarters. This seal

allowed much of the archaeological record to remain more intact than it would have otherwise (Brown 2013).

Native plant species have returned to the Quarters Area, a portion of which was used as a cattle corral after its use as dwellings and before its current use as parkland. As well, many native animal species were encountered during excavation of the site (Brown 2013). Evidence of negative impacts of both plant and animal species in the area was readily observable upon my visitation to the site in June of 2014. Saplings growing throughout the Quarters area as well as impressions left by wildlife were observed, meaning the integrity of the abandonment deposit and the Quarters Area deposit as a whole were currently being affected. The apparent state of neglect is very likely compromising the information this site could potentially yield in future investigations. Artifacts under analysis in the current thesis were recovered during the 1986–2002 excavations described in Brown's report (2013) when floral growth and faunal activity were reportedly less severe, so the current research is not affected by more recent floral or faunal activity. Extensive microscopic surface damage was, however, found on many of the glass artifacts upon microscopic observation. Cattle in the area may have caused at least some of the encountered damage by compressing the soil surrounding these artifacts, resulting in friction between the soil matrix or other objects and glass artifacts. This issue is discussed further in the Analysis section of this thesis.

History

The Levi Jordan Plantation in Brazoria County, Texas, was founded in 1848. Construction of the quarters likely began in the same year and may have been fully

completed in 1854 or earlier. They appear to have been abandoned around 1887, meaning the quarters area was occupied for at least 33 years, which includes slavery and early tenancy (Brown 2013; Brown and Cooper 1990). As well, three additional cabins have been identified in the proximity of the main house (Brown 2013). Before emancipation, historical records indicate the number of legally documented enslaved people on the plantation reached 144. This labor force was organized through a gang labor system, where small groups of laborers would work under close supervision by a driver or overseer. Through gang labor, the enslaved population was responsible for the production of cash crops such as sugar cane and cotton as well as the majority of food consumed by the total inhabitants of the plantation (Brown 2013). It has also been suggested that Levi Jordan may have augmented his income by "raising slaves for sale" and possibly illegally importing enslaved people with the intent to sell a number of them (Brown 1994).

Federal Census data from 1870 shows that the post-emancipation population of the Quarters community declined to roughly 100 individuals, with a majority of these people having been previously enslaved on the plantation (Brown 1994). From 1870 through the late 1880s, the resident population increased to an estimated 120 people. Census data and death certificates indicate that at least three Quarters residents claimed birth in Africa: George Holmes, Illa Lemons, and Maholy Grace (Brown 2013). In the post-emancipation period, most of the Quarters community members worked as tenants and for wages, with a smaller number working as sharecroppers (Brown 2013).

When Levi Jordan died in 1872, the plantation was divided among his surviving grandsons, Calvin, Charles Philip, and William Archibald Campbell McNeill (Brown 2013). Jordan's granddaughter, Ann McNeill, married Robert Martin and had four children, Calvin

Earl, Royal Furniss, McWillie, and Charles Earnest Martin. In 1884, the half of the plantation upon which the Quarters stood was sold to the Martin brothers. Following the possession of the land by the Martins, Royal and McWillie Martin were charged with one count of first-degree murder and at least two counts of assault with intent to murder in 1887 (Justice's Docket [criminal] Case #s 460, 472, 1904 cited in Brown 2013). The plaintiffs as well as witnesses appeared to be African American members of the Quarters community, and the cases were dismissed by the Court in Brazoria County. If these charges represent violence toward people in the Quarters community, those acts would at least partially explain sudden abandonment of the quarters. As well, it appears members of the Martin family were attempting to repurpose the plantation property toward the breeding of race horses, making a large tenant and sharecropper labor force largely obsolete—another possible reason for the abandonment of the Quarters community (Brown 2013).

If the members of the Quarters Community vacated their homes around 1887, as Brown argues, most would assume their personal property would be taken with them. The abandonment deposit, however, is defined by the presence of many household objects found where they were left before the structures collapsed on top of them. The seemingly odd act of leaving behind one's personal property when vacating the quarters has been explained through the economic stipulations included in chattel mortgage contracts commonly agreed upon by tenants and sharecroppers within Brazoria County. These mortgages were taken out to lease land from the plantation owners on which tenants and sharecroppers would grow crops. As collateral, African Americans were required to put up any crops that would be cultivated as well as all their personal property. This means that any chattel mortgage holders who wanted to leave while still in debt would be legally required to relinquish their own

personal property or face serious consequences. Research indicates that many of the families within the Quarters community at the time of abandonment carried chattel mortgages (some of which were even held by the Martin brothers), explaining why it would be necessary for the community members to vacate the quarters without their personal property, resulting in the abandonment layer encountered during excavation (Barnes 1999; Brown 2013).

Previous Research and Excavation

Brown's excavation of the Levi Jordan main house and Quarters Area was carried out from 1986 to 2002. The initial historical research necessary for this work involved the search of various government documents (deeds, tax records, federal censuses, and court records) as well as extensive use of documents and oral history provided by Dorothy Cotton and Ginny Raska, both descendants of Levi and Sarah Jordan, the original owners of the Levi Jordan Plantation. Genealogies were pieced together for members of the Quarters community through various government documents (Federal Census data from 1870 through 1920; Brazoria County marriage, death, deed, tax, chattel mortgage, and probate records). Additionally, oral testimony along with ledgers, letters, and a diary were employed in piecing together kinship networks and the extended families of those dwelling in the Quarters Area (Brown 2013). This information was used to find descendants of Quarters Community members who would be willing to share information regarding their ancestors and their ways of life (Wright 1994). The success of these efforts was somewhat limited by various social concerns and is identified by Brown (2013) as one of the unfortunate shortcomings of this stage of the project.

Ethnographic accounts were also heavily employed in interpreting archaeological findings as the project progressed. Research on the Gullah and Geechee of the Lowcountry of South Carolina and Georgia, cultures of African descent in the Caribbean, and various West African cultures were used in constructing models through which material related to subjects such as religious practices and beliefs could be interpreted by Brown and his students (Brown 2013).

As stated above, the structures comprising the quarters have been referred to as dog-trot houses and are no longer standing. Historical or oral records depicting the appearance of the quarters have not been recovered. Archaeological remains identify the structures as having brick exterior walls, chimneys and hearths. There were four "blocks" of "cabins," each consisting of two barracks-like structures made from brick, likely sharing a single roof, and with a walkway between them. Blocks were numbered from 'I' to 'IV' west to east, and each brick structure in the back was assigned 'A' on the west and 'B' on the east. Within each of the brick structures, three to four cabins were sectioned off with entrances opening into the middle walkway. Cabins were number with '1' at the north end of the block and ascending numbers assigned for each cabin to the south, resulting in designations for specific cabins such as 'II-B-2'. Blocks I, III, and IV each held six cabins while Block II contained eight cabins (Brown 2013; Brown and Cooper 1990).

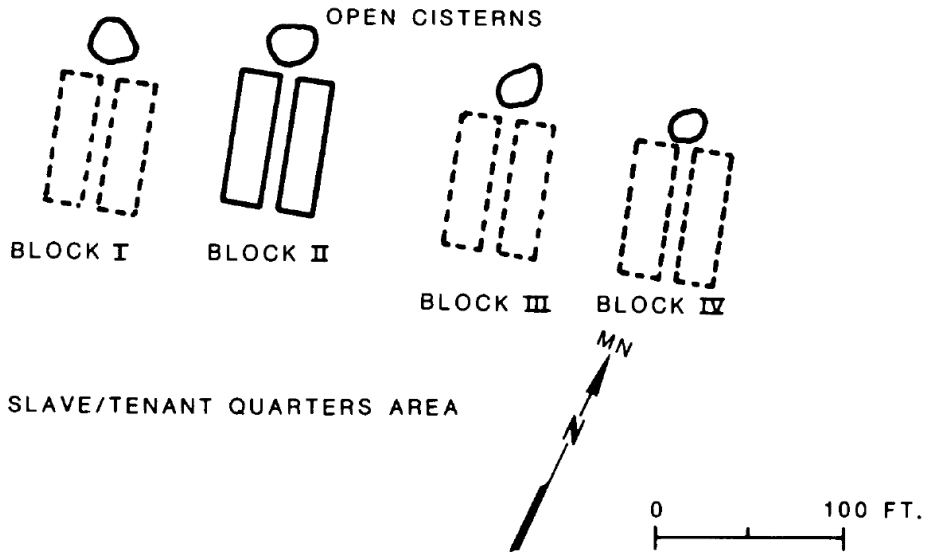

Figure 2: Map of Quarters Area, Levi Jordan Plantation (adapted from Brown 2013).

Large depressions were also observed less than 10 feet to the northwest of each cabin block. These depressions were around 15 to 20 feet in diameter and up to 6 feet deep. These depressions were likely caused by the construction of cisterns or open wells as water sources for the Quarters community. There is also archaeological evidence that these were partially filled at some point after abandonment. Additionally, aerial photography from 1930 shows a structure built on top of one of these cisterns/open wells (the one associated with Block II of the quarters structures) that is also no longer standing, speculatively referred to as an "ice house" and possibly serving as a storage facility for meat or other goods (Brown 2013).

Various activities in the area have had a negative impact on the integrity of portions of the site. A corral with a squeeze chute had been constructed across portions of Blocks I and II. At least some of the material used in its construction was salvaged from previous structures, and portions may have come from the quarters structures after their abandonment. The corral was reported by descendants of plantation owners as having been constructed in

the 1920s and used until the1970s, but aerial photography from 1930 did not show that the corral had been constructed. It is, however, present in aerial photographs from 1939, showing that its construction took place sometime within the 1930s. Map 91 of the USDA Soil Survey maps from 1981 also depicts the corral. The corral and squeeze chute were present and in decent repair at the beginning of archeological investigation in 1986, although the only use of the area was for occasional cattle grazing (Brown 2013).

Impact on the archaeological deposits associated with the occupation of the quarters by activity within and around the corral (e.g., the presence and movement of cattle) was reportedly minimal. The collapsed bricks from the structures, alluvium apparently deposited in flood events, and cattle feces all created a layer that seems to have protected the archaeological remains from cattle-related disturbance. However, an area located directly north of the squeeze chute of roughly 3 feet × 6 feet within Structure A of Block I had been significantly disturbed. This disturbance is likely related to the use of the chute, resulting in concentrated movement of cattle in the area on soil that may have been moistened or otherwise affected by grooming and care of the cattle. As well, the construction of the corral itself impacted limited portions of the archaeological remains (e.g., placing posts into the ground) (Brown 2013).

The construction of a natural gas pipeline by Dow Chemical in the 1960s also significantly impacted Block IV of the Quarters Area. It was determined that the pipeline ran diagonally through Block IV, heavily impacting the two cabins on the east and west corners of that block as well as partially impacting those next to them. The cabins at the northern- and southernmost corners appeared largely undisturbed by pipeline construction. Excavation was necessarily limited within Block IV due to concerns for the safety of excavators (and the

possible impact on the pipeline itself), but excavation was carried out to explore the architectural characteristics of this block mentioned above.

Portions of the information regarding artifacts recovered from the Quarters Area is not available as the material and documentation related to it was taken by Texas Parks and Wildlife Department (TPWD) (now ostensibly fully transferred to the Texas Historical Commission) before full classification and analysis could be completed at the University of Houston (Brown 2013). It is estimated that more than 600,000 artifacts were recovered from the 1986–2002 excavations of the Levi Jordan Plantation. The vast majority of these artifacts come from excavations within the Quarters Area. In total, upwards of 27,000 provenience lots were excavated within 236 5-foot × 5-foot units and 266 1-foot × 1-foot test units through the entire project, with 18,837 of those yielding artifacts. The accession catalog used by Brown is based primarily on the material class of artifacts rather than separating them by fundamental function. The following list of artifact types reflects that accession system. Artifacts recovered from the Quarters Area include ceramic, glass (and jewelry), metal, rubber, lithic, and ecological materials.

Ceramic artifacts include a large amount of brick (included in this category because they are clay-based and require heat in their production) as well as fragments of bowls, plates, cups, tobacco pipes, and parts of dolls. Ceramic ware types recovered from the cabins include ironstone, pearlware, whiteware, porcelain, rockingham ware, and stoneware. Ceramic "toys" were also recovered from the Quarters Area, representing dolls, toy vessels, a tiny piano, and ceramic marbles. A total of 276 fragments of ceramic tobacco pipes were recovered from the Jordan Quarters as well and were primarily made from stoneware. Most were plain, but some were decorated. Of the brick encountered, two pieces of one brick and

three pieces of another had been intentionally marked. In at least one case, the marking likely holds spiritual importance (Brown 2013).

Glass artifacts include bottle fragments, tableware and kitchenware vessel fragments, stoppers, lantern chimney fragments, beads (including a complete necklace), buttons, tools, toys, eyeglass lenses, mirror fragments, and sherds of possible window glass (Brown 2013).

Metal artifacts recovered include small hand tools, hardware, sewing equipment, farm equipment, munitions, clothing fasteners, jewelry, and coins (Brown 2013).

Additionally, 156 rubber artifacts were recovered during the Jordan project. The majority of these were classified as "hair accessories" (primarily combs and their teeth). As well, six vulcanized-rubber clothing buttons were recovered (Brown 2013).

Lithic materials encountered include limestone, flint/chert, slate, and caulk. A total of 24 chipped stone artifacts were recovered, a possible gun flint fragment, 35 agate marbles, 53 fragments of slate board, 21 pencils, 45 caulk fragments, 27 small rocks and water-worn pebbles, and 9 ferrous concretions (Brown 2013). Of the chipped stone artifacts, 21 were recovered from the Quarters area, and 3 were recovered from the yard space surrounding the main house. Brown (2013) reports that distribution of the lithic tools identified in the yard area does not indicate Native American presence in the vicinity of the main house and Quarters area. Many of these tools were found in association with tools and activity areas identified within the Quarters Area, implying possible use by the occupants. A preliminary examination of chipped stone artifacts revealed clusters of edge angles by cabin; I-B-3 had edge angles between 50° and 60°, and II-B-2 had edge angles between 30° and 40° with one small bit measured at 64°. Two stone tools were recovered in association with Cabin I-B-1,

identified as a circular tool and a blade with edge angles of 45°–70° and 72°–80°, respectively (Brown 2013).

Ecological remains consist primarily of mammal bone and eggshell. Reptile and fish bones were also recovered, but analysis suggests that small- to medium-sized land mammals comprise the majority of bones recovered. Chicken remains (bones and eggshells) were also recovered in fairly high frequencies. Saltwater and freshwater shells were recovered as well, with many examples perforated, likely for suspension. Notable ecological artifacts include a "fly whisk" made from as-yet-unidentified animal bone (seemingly the only such artifact recovered in a plantation context within the United States), a number of shell buttons that may have been modified on the Levi Jordan Plantation, and fragments of toothbrushes and possible hairpins (Brown 2013).

Numerous features were encountered, including apparent purposeful deposits or caches or artifacts beneath some of the cabins. These contained an array of artifacts from plaster "sculptures" to chicken remains. A number of these deposits very likely held spiritual significance within the Quarters Community. Less surprisingly, hearths and postholes were discovered in the cabins as well (Brown 2013).

Distribution of artifact types varied from cabin to cabin and throughout the floor and exterior spaces of each cabin. This varied frequency of artifacts has enabled the determination of activities within some of the cabins that were excavated. For example, Cabin I-A-1 was determined to be the "praise house" or church facility for the community based on a lower variation and frequency of artifacts within the cabin, as well as the apparent removal and relocation of the hearth of of this cabin, an enlargement of this cabin, and types of subfloor features not encountered in other cabins (Barnes 1999; Brown 2013).

Occupational specialties were also revealed through the presence of variation in artifact distribution between cabins. For example, the presence of unfinished carved items and carving tools were instrumental in identifying the location within the community where the production of various carved object were produced, Cabin I-B-3, referred to as the "Carver's Cabin" (Harris 1999). Specifically, an unfinished shell cameo was recovered within the cabin with no evidence that it had been set into any sort of frame or jewelry. Several tools were also recovered in association with the unfinished cameo, including a saw blade, knives (folding and kitchen), metal files, metal pins, a square nail mounted in a shell handle, and the proximal end of a porcine rib that showed wear and had microscopic shell fragments embedded in its end (Brown 2013). These tools possibly represent a toolkit used in the process of carving the cameo left behind, along with the unfinished product, during the abandonment event (Harris 1999). Raw materials were recovered from within the cabin area as well, including whole shells that could represent materials collected for future modification and left when the cabin was vacated. Partially modified shells were also found (some perforated and others in rectangular or other shapes) apparently in various stages of modification. Fragmentary shell and bone were also identified, possibly representing debitage resulting from the carving process. Moreover, carved items were recovered throughout the Quarters Area, including an artifact identified as a fly whisk carved from bone and several clothing buttons likely produced or modified on site (Harris 1999). According to Harris (1999), the enumerated evidence conclusively establishes that carving was taking place within Cabin I-B-3.

Analysis of Cabin II-B-2, referred to as the "Munition Maker's Cabin," also yielded evidence of craft specialization. Faunal remains and artifacts recovered, including shot,

fishing hooks, and weapon fragment, have allowed the identification of this cabin as the location of munition manufacture and the dwelling of at least one individual conducting munition manufacture and hunting activities (Garcia-Herreros 1998). Specific evidence of munition manufacture includes shell casings, percussion caps, bullets, a bullet mold, balls of lead shot, melted lead, and lithic debitage possibly representing gunflints. Melted lead represented the largest number of these artifacts, which conforms to the hypothesis that munitions were being manufactured within the cabin. Much of the lead was found in the area surrounding the hearth present in the cabin, and several tools were recovered from Cabin II-B-2, including hand drills, folding knives, shot molds, part of a screwdriver, a saw blade, a wedge, and files (two modified to have chisel-like blades) that may have been used in the production of munitions. Fishing hooks were also recovered from the cabin as well as lead shot that appeared to have been modified for use as weights used to catch fish, another suggested activity carried out by the occupant of the cabin (Garcia-Herreros 1998). As well, a Yarbrough projectile point was recovered from within the cabin area; however, its use in munition making or hunting activities by the occupant of the quarters has not been established. Shell casings were also recovered from the Quarters Area that had been modified into a sort of rattle (one from Cabin II-B-2 and one from the next room to the northwest) by joining two casings with objects within, establishing that munition-related artifacts were modified for purposes outside of their original design, although the site of this modification was not established as Cabin II-B-2 (Garcia-Herreros 1998). The evidence of munition manufacture or modification, fishing equipment, and faunal remains within the cabin suggest that the occupant of this cabin was involved in the procurement of various animals through hunting and fishing (Garcia-Herreros 1998).

Notably, the spacial distribution of artifact-containing features beneath the "Conjurer/Midwife's cabin" has been interpreted as representing a Bakongo cosmogram with Yoruba elements (see Brown 2013 for an explanation of these terms and their significance), directly relating the beliefs of Quarters Community members to adapted West African traditions.

Vertical distribution of artifacts also revealed the presence of the "abandonment" zone in many cabins directly beneath a layer of brick deposited during the collapse of the structures. Soil type alone would not have been sufficient in identifying this layer, as there was no clear distinction between the soil containing the material left by the abandonment event and the surrounding soil. Identification of this zone was based on the tight vertical clustering of artifacts, many mapped in situ (Brown 2013; Cooper 1989).

Current Research

This thesis is based on the examination and use of existing research combined with new analysis of glass recovered from the plantation. Testing of previous conclusions about the lifeways and activities present at the Levi Jordan Plantation circa 1854–1887 is possible through microscopic analysis of glass artifacts to determine if these artifacts had any use as tools and the material types tools used to modify. Moreover, this research will contribute to a greater understanding of the African and African American past in the United States through additional information regarding tool use and activities undertaken within a domestic setting.

The current research developed in response to unanswered questions about the possible roles of chert tools and chipped glass artifacts recovered from the Quarters Area

(Brown 2013; Garcia-Herreros 1998). Specifically, the original goal of this research was to discover physical evidence that could explain the role of the chert tools and possible glass tools recovered from the site. Early on, the project was envisioned as a comparison of edge angles between the chert tools and glass fragments macroscopically appearing as tools with differences in grouping between cabins, suggesting different activities. During literature review, it became clear that glass artifacts can and do macroscopically resemble tools due to incidental forces (see Beaumont 1961 for a clear and concise discussion of this). Therefore, different methodology was necessary to limit the possibility of false positives, and the general framework of an experimental microscopic usewear analysis (based on previous studies such as Conte and Romero 2008; Hay 1978; Martindale and Jurakic 2006) was adopted to satisfy this goal. Glass was selected as the subject of microscopic analysis rather than chert in part due to the apparent impossibility of discerning any difference between usewear resulting from use by the Quarters Area inhabitants or by Native Americans who likely produced at least some of these artifacts (if these stone tools had been collected by the inhabitants of the Quarters Area long after their production and use, for example). The goal of uncovering the role of these tools within the plantation required that observed usewear necessarily resulted from activities within the Quarters Area. As well, microscopic analysis of glass requires no special preparation of the sample or specialized microscopes, making glass the more logistically feasible option (Conte and Romero 2008; Hay 1978; Martindale and Jurakic 2006). Discussion of the specific methods employed and the kinds of evidence anticipated follow in the next chapter.

A set of four related hypotheses were developed with the goal of determining the role of these tools within the Quarters Area. The first hypothesis is if recovered fragments of glass

were used as tools during the occupation of the Levi Jordan Plantation Quarters Area, then evidence of this use should be observable through microscopic observation. A positive result in this test is necessary for each of the following hypotheses, as they depend on glass artifacts having served as tools within the Quarters Area sample.

Cabin I-B-3 was identified by Harris (1999) as the "Carver's Cabin," where an occupant carved various goods that were distributed through the Quarters community. Therefore, the next hypothesis is that, if glass tools were used in the carving process and not all of them were discarded outside of the cabin, then glass fragments recovered from this area will show evidence of use in carving. The evidence observed on these glass tools should relate to carving or shaping resistant materials such as wood, bone, or shell. If glass tools are observed with these patterns of wear, the hypothesis previously tested by Harris (1999)—that the cabin was used for carving objects—will be further supported, and it will be discovered that glass tools played a role in that process.

Garcia-Herreros (1998) concluded that Cabin II-B-2 ("Munition Maker's Cabin") was used in the manufacture of munitions and proposed that an individual using this cabin conducted hunting and fishing. The next hypothesis is that, if the occupant of this cabin used glass tools to prepare munitions or munition-related artifacts and did not dispose of all glass tools outside of the cabin, then glass tools recovered from this area will show evidence of their use. Garcia-Herreros (1998) proposes that the occupant used a musket or flintlock, which would require him or her to carry the materials necessary to load and fire it on hunting expeditions. Therefore, evidence expected to support this hypothesis would be glass fragments recovered from the cabin with observable usewear resulting from modifying soft

materials such as hide, leather, or cloth, which may have been used to carry supplies, such as ammunition or powder, during hunting trips.

An additional cabin, I-B-1, has not had an activity area associated with it to date, although it has been suggested that leather or animal hides could have been processed there (Brown 2013). Another hypothesis, then, is that, if this cabin was the site of activities where glass tools were used and all of them were not discarded outside of the cabin, then glass fragments recovered from this cabin will contain evidence of the motion of use and material they were used to modify. This would enable an activity or activities to be proposed for Cabin I-B-1.

The discovery and identification of glass tools can also imply that chert tools previously mentioned may have served an economic purpose during the occupation of the Quarters Area. As will be discussed subsequently, stone tools share a number of similarities to glass ones, so the use or production of glass tools may indicate that the occupants possessed the skills and desire to produce or at least use chert as tools. An exploratory examination of edge angles between glass and chert tools found in associations with Cabins I-B-1, I-B-3, and II-B-2 will describe any observed similarities or differences between the tool types. Patterns identified between the glass and chert tools would imply that these could be similarities in their uses. Any conclusions reached in this regard will be speculative as no direct physical evidence of use (usewear) will be observed on the stone tools; however, they could inform future analysis of the chert artifacts recovered from the Levi Jordan Plantation and propose directions for such research.

Taken together, the testing of these hypotheses will supplement the current understanding of life in the Levi Jordan Plantation Quarters community by further exploring

how areas were utilized and the uses of glass tools in those activities. Additionally, the larger question regarding the presence of glass tools recovered from the site is pertinent to ongoing research regarding possible glass tools found on African American and other historic sites. The positive identification of glass tools in this case would support the importance of microscopic analysis of fragmentary glass in the identification of activities carried out on other historic sites, allowing for a more informed interpretation of economic activity.

Chapter III

Methodology

Basis for Lithic Analysis of Glass Tools

Lithic analysis was developed to gain useful information from the study of stone tools, thereby yielding information about the people who produced and used them; for one of the first systemic analyses, see the work of William H. Holmes (1894). The current research is concerned with using physical evidence to determine if fragments of glass have been used as tools, and if so, the functions they might have had. In the 1930s, Semenov (1964) developed one of the earliest bases of functional lithic research by using low-powered microscopy to examine the utilized edge of stone tools to discern the presence and type of patterned damage (wear) resulting from the use of tools on various materials. He recorded polish, microscarring, and scratches with varying location, direction, and intensity. By recognizing the types of damage the tool incurred during its use (i.e., usewear), Semenov (1964) was able to reach conclusions about the material the tools were used on and the types of motions carried out by the tool user.

Many other researchers have adapted and refined the basic techniques of functional lithic analysis in the time since the translation and publication Semenov's work (Andrefsky 2005; Holmes 1894; Keeley 1980; Odell 2004; Swanson 1975). As well, specific lithic materials such as obsidian (naturally occurring volcanic glass) have also been subjected to usewear analysis by various researchers since the popularization of lithic analysis, giving rise

to a robust set of methods and conclusions (Beyin 2010; Hay 1978; Hurcombe 1992; Kononenko 2011; Nunziante Cesaro and Lemorini 2012; Spear 1986). Although this thesis focuses on tools made of manufactured glass rather than stone artifacts, the methods developed for the analysis of stone tools can be utilized in the study of nonvolcanic glass artifacts. The analysis of obsidian is readily adaptable to the study of manufactured glass, as obsidian is nearly identical in physical structure to manufactured glass as both are noncrystalline and typically around 72%–75% silicon dioxide, meaning both materials react in the same way during tool manufacture and use (Beyin 2010; Martindale and Jurakic 2006). In fact, many scholars have successfully adapted long-used lithic analysis techniques to the study of tools made from manufactured glass found in widely varied geographical areas (Ahlman, Braly, and Schroedl 2014; Allen and Jones 1980; Clark 1981; Conte and Romero 2008; Cooper and Bowdler 1998; Martindale and Jurakic 2006; Runnels 1976). The existing body of research on glass tools provides a strong methodological framework on which the current research is based.

Physical Properties of Glass

Glass is classified as both a brittle and elastic solid with properties of moderate plasticity, meaning the physical structure of glass will deform under forces until a threshold is reached. Once that force threshold is reached, glass no longer retains its plasticity and fractures in multiple directions dependent on the direction and intensity of applied force. As well, glass contains surface flaws and low tensile strength, which cause it to fracture easily when compressed (Luedtke 1992; Martindale and Jurakic 2006). These properties enable

glass to be shaped into a wide array of forms similar to other workable materials such as chert or flint (Deal and Hayden 1987; Gallagher 1977; Harrison 2000). When compared with other lithic materials, however, glass is far more prone to fracture and wear and accrues edge damage far more quickly (Martindale and Jurakic 2006). The fragile nature of glass compared with other common lithic media can result in complications during lithic analysis. Incidental damage to glass fragments resulting from trampling or dragging can appear as retouch or edge damage from use as a tool, rendering macroscopic identification of these traits inconclusive for determining the use of glass as tools (Clark 1981; Conte and Romero 2008; Runnels 1976). Unfortunately, common macroscopic techniques used to identify tools, such as the identification of edge scars or retouch, have been established as ineffectual when tested against microscopic verification of usewear patterning due to these complications (Conte and Romero 2008). As well, the forces present within glass during fracture can often produce shapes that correspond to "pseudotool shards," which could be classified as intentional shaping if found within the archaeological record (Martindale and Jurakic 2006). Therefore, microscopic observations of any suspected glass tool is a necessity for establishing not only specific types of use but also to reasonably establish the artifact as a tool at all.

Due to the softer, more brittle nature of glass compared with chert or flint, as well as a different surface texture, microscopic analysis of glass is more easily accessible. Semenov (1964) used time-consuming surface treatments for tools during his microscopic analyses, which could prove prohibitively difficult for researchers hoping to process large samples of tools. Fortunately, microscopic analyses of glass tools have established that usewear patterns can be discerned without special preparations. Moreover, microscopic examination of

possible glass tools is relatively accessible, as details of wear and damage on glass tools can be differentiated at microscopic magnifications below 200× and even as low as 10–40× (Beyin 2010; Hay 1978; Martindale and Jurakic 2006).

Usewear Identifiers

The application of lithic analysis to understand the behavior of people in the past requires observation and recording of the damage types present on recovered tools. The basic types of patterned damage categorized by Seminov (1964) are still largely in use today. The types of technological wear discussed in this thesis will generally fall into the categories of striations, microfractures, and polish. Striations are linear scratches or impressions resulting from a tool moving across hard particles within or on a material. When a tool is used to modify a material, the general hardness and types of particles present in that material directly affect width and depth of striations (Hay 1978; Keeley 1980; Beyin 2010). The direction of striations is also distinctly indicative of the motion used on the tool during the process of modification of materials, indicating a general motion or action determined by the angle between striations and the working edge of the tool (Hay 1978; Keeley 1980). This type of wear occurs more quickly and is more easily identifiable on glass tools compared with other lithic media such as chert, making striation a useful and important factor in the analysis of glass tools (Beyin 2010; Hay 1978).

Another category of wear referred to generally as edge damage describes scarring composed of various sizes of chips along the used edge of a tool (Keeley 1980; Odell 1981; Semenov 1964; Beyin 2010). In this research, the more specific term “microfractures,”

including microflakes, will be used when discussing scars formed on the working edge of a tool by the forces present in the process of material modification. This damage can often be observed both macroscopically and microscopically, although sole reliance on macroscopic inspection of microfracture is likely to result in false positives when testing glass artifacts for tool use (Beaumont 1961; Conte and Romero 2008). In fact, macroscopic damage that is visually similar to human trimming or retouch can result from trample caused by humans, cattle, or even automotive vehicles (Beaumont 1961). Like striation, edge fracture results according to the angle of motion during tool use and nature of material modified (Odell 1981). The link between microfracture and technological use has aided lithic analysis by allowing researchers to correlate types of damage with experimental and proposed activities and so will be recorded and applied in the current research (Beyin 2010; Martindale and Jurakic 2006).

Polish is a general term that describes the relative attributes of worn surface areas on a tool when compared with the surrounding lithic material. Polish is characterized by terms including brightness or dullness, and roughness or smoothness, and often refers to "the presence or absence of topographical features, like pits, undulations, and so forth" (Keeley 1980, 22–23). Some researchers claim polish is one of the most dependable signs of use material in lithic analysis (Hurcombe 1992; Keeley 1980; Vaughan 1985). Others, however, reject polish as a reliable signifier, especially when studying glass tools (Beyin 2010; Hay 1978). Hay (1978) reports difficulties in identifying polish on the surface of volcanic glass tools due to the natural reflectiveness of the volcanic glass and therefore relies on other indicators of material worked. Beyin's (2010) criticism questions the general usefulness and reliability of polish and quotes Grace (1996) as stating that polish analysis relies on

descriptions that are too subjective, making polish unsuitable for systematic use. However, various efforts have been made to quantify polish types to minimize the subjectivity of polish analysis (González-Urquijo and Ibáñez-Estévez 2003; Grace 1989; Keeley 1980). Results are mixed as some researchers deemed polish quantification unreliable for differentiation between various work materials because data showed overlap between materials or inconsistent measurements for polish resulting from the same worked material on different tools (Keeley 1980; Grace 1989). Even when quantification of polish for determination of use material has been reported as successful, dissimilar materials like bone and hide have been shown to produce similar polish data, even when subjected to complex, multivariate analysis (González-Urquijo and Ibáñez-Estévez 2003). Additionally, corrosive effects (e.g., patination) will likely obscure aspects of polish such as reflectiveness or texture, thereby further reducing the utility of polish observations for differentiation of worked material. Striations, as discussed above, develop quickly on glass tools, are readily identifiable, indicate worked material, and also distinctly show direction of use motion (Beyin 2010; Hay 1978). Therefore, the focus of the current analysis will be primarily the identification of striation and microfracture that have been established as effective for determining the function of glass tools. Instances of polish will not be considered conclusive in the current research for determinations of use material.

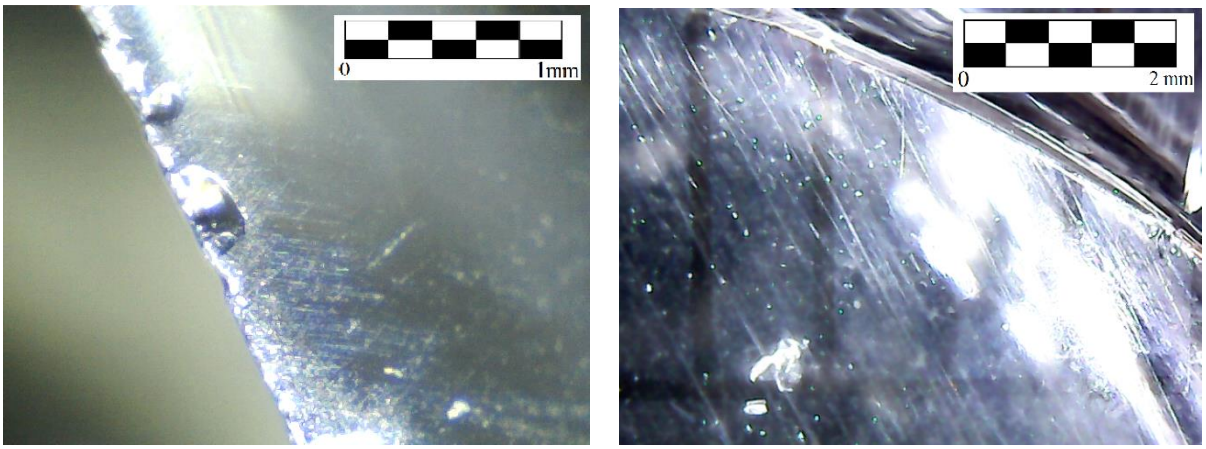

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Figure 3: Examples of microscopic usewear evidence: (a) microchipping and striations resulting from scraping wood; (b) long striations caused by cutting beef.

Possible Confounding Factors in Identification of Usewear on Glass

Although it has been established that the use of a glass tool can leave direct physical evidence of this activity, there are a number of influences that can cause difficulty in the detection of that evidence or even prevent observation of usewear altogether. Alteration to the tool after it has been used to modify a material can obfuscate or obliterate evidence of its use. Predepositional, post-depositional, or even excavational physical forces can remove portions of the artifact, particularly along edges where shearing can easily occur. When fragments of glass are separated from an edge of the larger artifact, usewear also occurring along that edge—such as microfracture or striations—can become separated and remain on fragments small enough to become irretrievable through common archaeological techniques. As an edge becomes fractured or altered after the artifact has been used as a tool, the evidence of its intentional use becomes lost and is replaced with new information about the more recent forces acting on the artifact. In cases in which used edges remain partially intact,

the portions still containing usewear can be observed and identified. Conversely, in cases of extreme physical damage, a tool could be reduced to a point where evidence of use could be unobservable.

Additionally, the same properties of glass that enable the movement between glass and other materials to leave physical evidence of tool use will affect glass artifacts any time they experience relative motion and force against many other substances. Abrasion tracks occur frequently through this mechanism when particles of a material harder than glass move across the artifact and appear similarly to striations, although, typically, abrasion tracks are longer, wider, and deeper than striations and do not often originate from the utilized edge of an artifact (Hayden 1979). A large amount of abrasion can cause tracks to be superimposed over previously created wear patterns. This creates only a minor annoyance when abrasion tracks are sparse as usewear remains detectable underneath the larger gouges. If, however, a glass artifact has accrued abrasion tracks that have stripped a large percentage of the original surface away, the smaller striations can be rendered largely obliterated and therefore undetectable.

Patination, the opalescent discoloration often encountered on glass artifacts, is an example of a macroscopically observable form of corrosion (Kendrick 1971; Munsey 1970). Like any form of corrosion, patination develops over time and, over especially long periods, can even render glass artifacts unrecognizable, although it is estimated to take thousands of years in most environments (Kendrick 1971). Patination rates are inconsistent—even within glass artifacts recovered from the same context—as the process seems to depend heavily on the amounts of soda or lime present in the glass object in conjunction with numerous environmental factors, such as water presence and soil chemistry (Munsey 1977).

Unfortunately, this means that glass patination cannot be reliably used by archaeologists as even a relative dating technique. However, in the current research, the presence or absence of patination on different areas of a single glass fragment can be used to infer a very general time order for observed damage. Specifically, an unpatinated fracture on an otherwise fully patinated glass artifact implies excavational or post-depositional damage, as any damage resulting in a new surface that occurred before deposition would have accrued a similar level of patina compared with the rest of the artifact. In this way, patination could actually aid in the characterization of edge damage found on a glass artifact rather than hinder it.

Materials and Methods

Experimental Set

A small experimental set of glass tools was also assembled and microscopically observed to aid in the recognition and identification of usewear types and to compare observations with previously recorded usewear experimentation with glass tools. Previous research describing the production of experimental glass tool sets was used to guide the current methods (Conte and Romero 2008; Martindale and Jurakic 2006; Runnels 1976). Modern glass bottles were chosen to construct the set due to the ease of procurement compared with whole glass objects dating back to the site's occupation. It was decided that modern glass would not meaningfully affect usewear formation because glass from this period to the present is "mineralogically identical to earlier materials" (Martindale and Jurakic 2006:417). Although some aspects of general form may differ, the chemical equality

of modern glass to older forms of glass means that the same physical forces work in the same ways to produce damage to the material of the tools dependent upon motion and modified material. Glass objects were selected to provide variation in thickness, color, and shape of object to provide a diverse set of used tools for microscopic viewing. The objects selected were four wine bottles of assorted shape, thickness, and shades of green; four clear glass bottles of different form; two brown glass bottles; two amber glass bottles; one small sheet of flat clear glass; two clear glass tumblers; and one amber glass plate. The intent of this selection was to provide variations in color and form for the experimental set and to identify any possible complications in microscopic imaging that could be caused by difference in color, shape, or thickness of the glass fragments used as tools.

Fragmentation of the glass objects was achieved by dropping them from a height of approximately 5 feet onto a brick or cement surface or striking the object with a steel hammer. Fragments small enough to prohibit an effective or safe grip during tool use were omitted from selection for use as tools. Of those remaining, potential glass tools were selected to give a variety of shape, color, and edge angle for experimentation on each material type. The materials modified were hide (treated deer), shell (oyster), wood (native pecan), meat (chicken and beef), cloth (cotton), and human hair. These materials were selected to give a sample of different media involved in possible activities that could have been practiced in the Levi Jordan Plantation Quarters Area. The inclusion of both chicken and beef as meats was to determine if the difference in toughness or gristle content between meats would result in variations between usewear. The categories of motions used during material modification were cutting (applying force to the tool while moving it in one direction approximately parallel to the working edge), scraping/shaping (applying force to

the tool while moving it in one direction approximately perpendicular to the working edge), and sawing (applying force the tool while moving it bidirectionally approximately parallel to the working edge, typically against a resistant material). Examination of the prepared experimental set was conducted with a NEEWER 20–250× digital microscope, allowing for variable magnification and digital image capture.

Levi Jordan Plantation Quarters Area Sample

Artifacts under analysis were selected on material, location, and macroscopic appearance of a worked or usable edge. Glass objects were selected from the artifacts recovered from Cabins I-B-1, I-B-3, and II-B-2 within the Levi Jordan Plantation Quarters Area. Artifacts were selected from Cabins I-B-3 and II-B-2 to test previously proposed activities or uses for the cabins (Garcia-Herreros 1998; Harris 1999) and from Cabin I-B-1 to establish or suggest previously unknown uses for that area. As well, these cabins were chosen because chert tools were recovered in the Quarters Area from only these three cabins. Any glass tools identified could have edge angles compared with clusters identified in the collection of chert tools to explore possible similarities between glass and chert tool form and function (Brown 2013). Additionally, some artifacts recovered from the Quarters Area, including those recovered from Cabin II-B-1, the "Curer's Cabin" (Brown 2013), were undergoing reprocessing by Atkins Global at the behest of the THC at the time of artifact selection and analysis, thereby eliminating them from the selection process. Limiting sample selection to these cabins rather than the entire Quarters Area also resulted in a smaller sample size for microscopic analysis, necessitated by difficulties in access to the assemblage—

specifically, the location of the artifacts at the THC storage facility in Austin, Texas, and the author's residence and graduate program being located in Houston, Texas, made trips to Austin for microscopic analysis both necessary and frequent. By selecting artifacts from three cabins instead of the entire Quarters Area, it was hoped that the total number of trips could be limited to a temporally and economically manageable level.

These criteria for selection resulted in a total of 222 glass artifacts separated from the collection for microscopic study. Previous excavations on the site could not determine the location of a secondary refuse midden, so objects disposed of as secondary refuse have not been recovered for study, eliminating them from this selection process (Brown 2013). For this reason, only glass fragments deposited within the cabin areas could be used for testing or establishing activities carried out during the occupation of the cabins.

Microscopic analysis of the sample was conducted using a Dino-Lite AM3111T 10–50× ~ 230× digital microscope at the THC artifact storage facility in Austin. This microscope allowed for variable magnifications and lighting as well as the instant capture of digital images for documentation and review. During analysis, vinyl gloves were worn to limit any possible effects contamination of glass artifacts could have on microscopic imaging.

Chapter IV

Analysis

Experimental Set

Preliminary Observations During Experimental Set Construction

Several general observations about the use of glass tools were made during the construction of the experimental set. As may be assumed, edge angle impacted the ease of modification of various materials depending the motion used. Edges less than 30° required less force when cutting, and edges greater than 50° seemed easier to control while applying scraping forces. Smoothing small slivers off of wood with a scraping motion, however, was easily achieved with edges below 50°, which seemed less suitable for meaningful modification to the overall shape of wood. It was also determined that an edge angle greater than 60° is entirely unsuitable for shaving human hair, resulting in far more skin irritation than hair removal.

Additionally, shaving or removing human hair from the body with any glass tools is not recommended due to discomfort and relatively quick dulling of the working edge. The process is, however, possible, although certain factors—likely edge dulling and uneven edges—prohibited the even or effective removal of shorter facial hairs (approximately 3 mm in length). The removal of body hair, which was significantly thinner and longer than facial hair, was considerably more successful but still unpleasant and inefficient. The author is

unaware of any other experimental glass tools used to shave human hair in previous publications, so this may be an uncomfortable first in experimental archaeology.

Edge dulling was a factor in modifying other materials as well. In particular, cutting cotton cloth became far more difficult after only a minute of consistent use, requiring significantly more force as time went on and resulting in rough edges and tearing as the edge dulled. With the exception of cutting meat, edge dulling eventually impeded the ease of modification of materials. Edges less than 30° cut through both chicken and beef with a very small amount of effort, even after 10 minutes of consistent use.

The modification of shell, however, proved difficult with glass tools. All three motion types were used on oyster shells and, in each case, the main results were extensive damage to the glass tool and nearly invisible microflakes scattered around the activity area. Sawing with considerable downward pressure and an edge below ~40° quickly produced a noticeable groove in the exterior of the shell. Just as quickly, however, the edge was crushed and rendered dull. Similar to shaving, modifying oyster shell with glass tools is not recommended if other tools are available.

Microscopic Observation of Experimental Set

Observation of the experimental set largely supported previously published results from similar experiments (Conte and Romero 2008; Hay 1978; Martindale and Jurakic 2006). This supports the established principle that use of glass tools results in observable patterns of evidence correlated with worked material type and motion of use. Instances and

types of microfracture and striations were recorded to aid in the analysis of the Levi Jordan Plantation Quarters Area glass artifacts.

Microscopic observation of glass tools used to scrape hide showed microfracturing primarily along the leading face of the tool as well as striations on both faces running approximately perpendicularly from the working edge. The microfracture was characterized by microchips and scars not typically larger than 5 mm covering the edge along the leading face where the tool contacted the hide. Though some microchipping appeared on the edge of the trailing face, the vast majority appeared on the leading face. Striations appear to follow the direction of motion, resulting in largely perpendicular alignment to the working edge. Some striations extended from the edge at angles other than 90°; however, the overwhelming pattern appears perpendicular when viewing the orientation of large numbers of striations. The measured length of striations was typically between 1 and 2 mm, with a few outliers extending much farther along the surface of the tool. Edge rounding also developed during hide scraping, often altering previously formed microchips. In some cases, grooves formed within areas of rounding, possibly where fibers were repeatedly following the same path.

Wood (pecan) scraping resulted in striations approximately perpendicular to the working edge on both the leading and trailing faces. The striations observed on tools used for wood scraping differ from those found on those resulting from hide scraping both in size and orientation. The striations caused by wood scraping are generally no more than 1 mm long, although a small minority of striations continue much farther. These striations occur within a nearly perpendicular orientation to the working edge, although striations on portions of worked edges are often up to 10° away from being truly perpendicular. Striations on the trailing face were generally longer and appeared deeper than those on the leading face, but

the patterns on both share the attributes listed above. Therefore, striations from wood scraping appear shorter and more regular than those resulting from hide scraping, enabling differentiation between material types through microscopic analysis. As well, microfracture along the edge of a tool used for scraping wood can also be differentiated from microfracture resulting from hide scraping. In the case of wood scraping, varied shapes of microchipping were observed along the working edge, with common step fractures characterizing the microfracture pattern. This microfracture can appear similar to patterns observed on glass tools used in hide scraping, but step fractures occurred more frequently, and there appeared to be a wider variety of shapes produced in microfracture due to wood scraping. Significant rounding was also present along the contact edge, often resulting in rounded terminations of some step fractures or larger scars. The rounding due to wood scraping was more uniform than that observed on glass tools used for hide scraping.

A scraping motion was also used in the removal of human hair. This motion and material produced a distinct pattern of microfracture characterized by microchips along the contact areas of the working edge. These chips were not observed to be larger than 0.5 mm. In cases in which a large area was shaved (e.g., more than 9 square inches), microchipping covered almost the entirety of the contact area on the working edge of the leading face. The microchips observed were either semicircular or elongated. Additionally, microchipping was shallow, and no step fractures were observed. At the magnifications available (up to 250×), no striations were detectable on glass tools used for removing hair. This may be partially due to a relatively small amount of material being removed and worked compared ith wood or hide scraping. As well, significantly less force was used in the preparation of shaving tools compared with the rest of the experimental set. Additionally, no rounding of the working

edge was observed. The evidence of wear resulting from shaving varies greatly from those observed on tools used for scraping both hide and wood, likely because glass tools used for shaving only had an incredibly small portion of the edge surrounded by a substrate (hair) during use compared with wood or hide, resulting in a much less severe transference of forces to and from the glass tool.

Microscopic observation of glass tools used for cutting cotton cloth revealed usewear patterns distinct from those observed resulting from scraping motions. Microfracture was produced on both faces rather than very heavily appearing on one, as was observed in scraping wood and hide. Contact surfaces used in cutting cotton cloth accumulated semicircular or oblong (oriented along the blade) microchips rarely more than 0.5 mm across. Edges appeared to have only a very slight rounding, if any. Striations were observed much farther from the edge of glass tools used to cut cotton cloth than those resulting from hide or wood scraping, even regularly appearing centimeters away from the edge of the tool. Striations observed on the glass tools used to cut cotton were often longer than 4 mm and mostly oriented approximately 30° from the working edge of the tool, although variations of up to 50° from that alignment were observed in lower concentrations. Striations were sparse compared with those observed in scraping wood and hide, and some of them clearly curved over the course of one or more millimeters, crossing each other regularly.

Although pieces of both chicken and beef contained bones, this use of experimental glass tools was focused on cutting the actual flesh rather than making contact with or separating pieces of bone. Compared with most other use materials, cutting meat resulted in a relatively light amount of usewear. Microfracture typically consisted of oblong microchips oriented along the edge on both faces and were often separated by small areas where the

tool's edge appeared undamaged. Microchips were smaller than those caused by wood or hide scraping (often less than 0.2 mm) and not nearly as frequent as those resulting from cutting cotton cloth or shaving hair, although extended use of the tool results in a higher concentration of microchips. Much like microfracture, striations were also less pronounced in cutting meat than cotton cloth, especially when cutting chicken. Compared with cotton cloth, cutting meat produced a low number of striations that were even more widely separated and appeared to be shallower. Striations also had less variation in orientation and curving than those resulting from cutting cotton cloth, though intersections were still common. No edge rounding resulting from cutting meat was observed on these tools, likely due to the more pliable nature of meat versus other tested materials. Cutting chicken and beef resulted in the same overall pattern of wear, but beef produced striations far more quickly and at a higher frequency. The observed variation in the speed at which striations developed is likely due to the higher amount of gristle encountered and tougher general matrix of beef compared with chicken, resulting in more resistance during tool use. Differentiation between these two use materials from usewear alone seems unlikely because extended chicken cutting results in wear that appears the same as that encountered from a more limited episode of cutting beef.

The modification of shell very quickly produced extensive microfracture along the working edge. The type of motion affected the microchips separated from the glass tool; cutting and sawing motions removed flakes from the tool along both faces of the edge, whereas scraping produced flakes that primarily originated from the leading face and reduced the trailing face (monofacial). Scraping resulted in shallower, heavily overlapping scars, and cutting and sawing produced large gouges into the blade as chips were removed of various thickness, often larger than those produced by scraping, and sometimes giving the edge a

crushed appearance. In sawing and cutting, the working edge was rendered dull and unusable before significant progress was made in shaping the shell, although limited shaping did occur. Scraping was inefficient and resulted in only small reductions to the surface of the shell. Sawing produced bifacial grooves (heavily concentrated striations where material has been removed from the same space repeatedly) parallel to the edge with overlapping instances of pitting along them within as little as a minute depending on the force applied (more force leading to quicker damage). Grooves also appeared while cutting but at a slower rate. No grooves or pitting were observed in the case of scraping, likely due to microchips of glass being removed from the tool along the edge before these types of wear could build up. Indeed, the scraping motion was essentially pressure flaking millimeter-wide or larger chips from the trailing face at all times.

In each of the above tested uses, a distinct patterning of usewear was identified. This microscopic analysis of the experimental glass tools supports claims by many others that working with various materials through different motions can cause distinct and observable pattering on tools. Further, these observations largely resemble previous classifications of usewear recorded by other researchers (e.g. Conte and Romero 2008; Hay 1978; Martindale and Jurakic 2006), allowing wear types outside of the current experimental set to be identified if observed within the Levi Jordan Plantation Quarters Area glass artifacts. Hay's (1978) research, in particular, established guidelines for identification of motions used on various material types, which can inform general use of glass tools when specific patterns are encountered that have not been established in an experimental set.

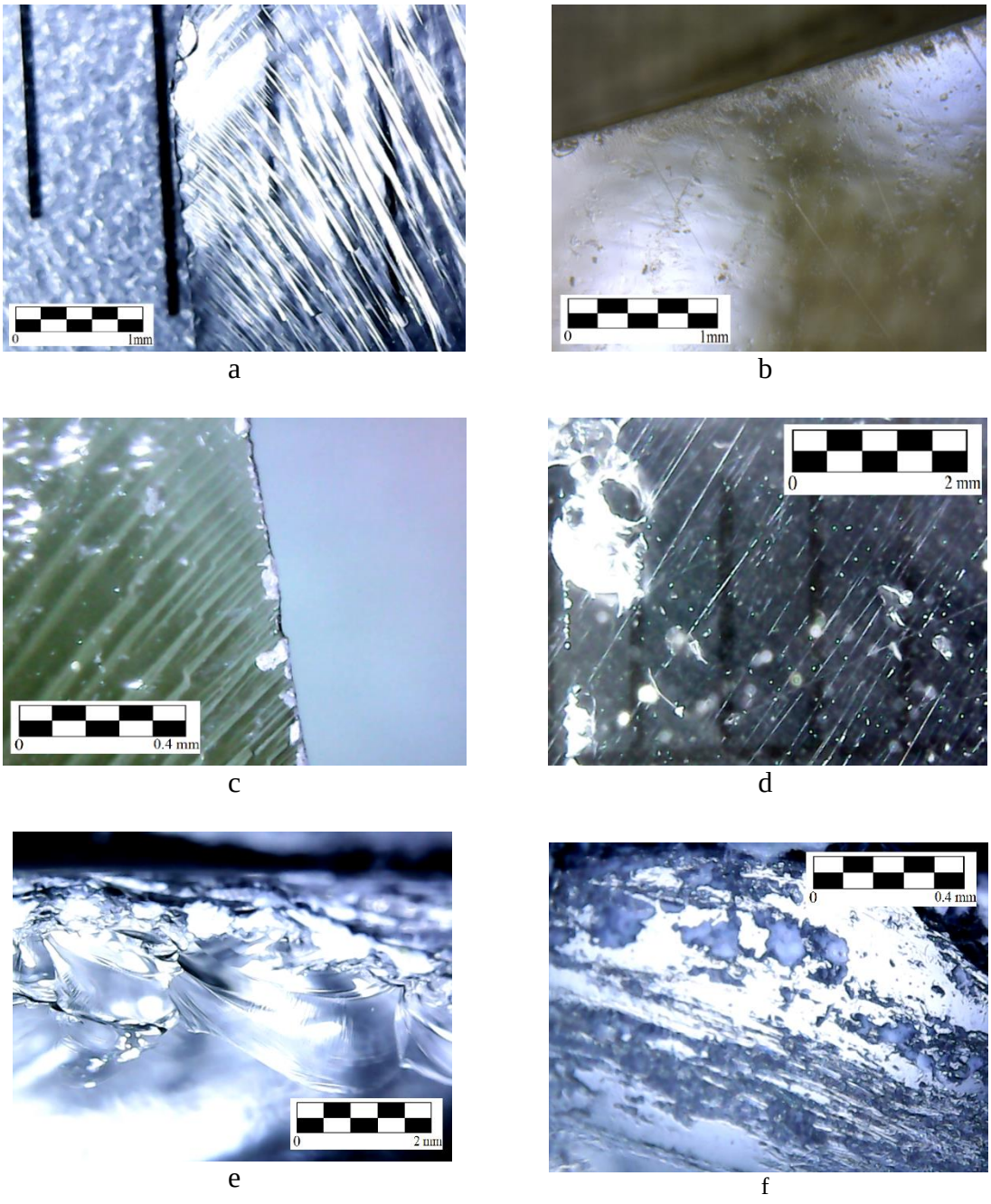

Figure 4: Microscopic photographs of experimentally produced usewear: (a) characteristic microchipping resulting from cutting of cotton cloth with unrelated hackles clearly visible; (b) microfracture, edge rounding, and short striations from scraping wood; (c) shallow, small microchipping resulting from shaving facial hair; (d) long, occasionally intersecting striations across exterior surface of tool produced by cutting beef; (e) view from leading face along trailing face of microscarring resulting from scraping oyster shell; (f) grooves and pitting visible from sawing oyster shell.

Levi Jordan Plantation Quarters Area Sample

Once subjected to microscopic analysis, it became clear that the sample of glass fragments from the Levi Jordan Plantation Quarters Area was either largely unused or had any possible evidence of usewear obliterated through a number of forces. Every glass artifact observed had evidence of damage likely resulting from trample or other nonuse-related friction (e.g., excavational damage). This evidence includes large abrasion tracks (wider and deeper than any given usewear striation and without similar patterning) present across multiple different areas of the artifact or unpatterned chipping or crushing along edges (Martindale and Jurakic 2006; Conte and Romero 2008). In many cases, every surface of an artifact would be covered in abrasion tracks, sometimes to the point that, even if evidence of use had been present before the abrasion, it would have been rendered unrecognizable beneath the considerable abrasion damage. As well, extensive nonuse-related damage to various edges—such as crushing and chipping from trample or pressure—was observed that may have eliminated patterned microfracture or rounding if it had been previously present. Moreover, extensive pitting of artifact surfaces was encountered (possibly due to fire or other environmental or cultural forces) that, in some cases, could have obscured or obliterated any usewear if it was present. Taken together, the encountered types and severity of damage to the Levi Jordan Plantation Quarters Area sample means that many of the glass fragments no longer contain evidence to either support or refute their use as tools.

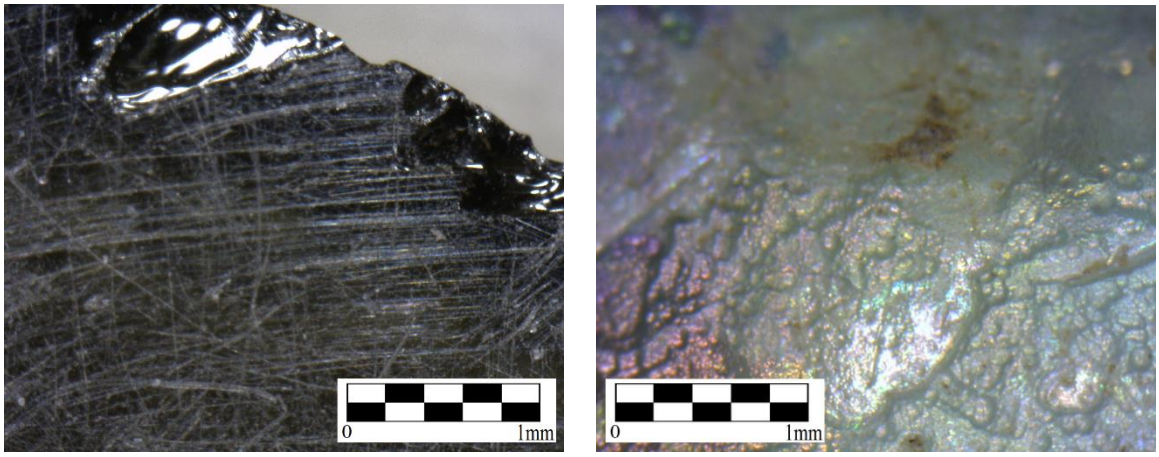

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Figure 5: Microscopic photographs of incidental modifications to glass artifacts: (a) unpatinated chipping on edge characteristic of excavational damage and severe abrasion tracks covering entire surface of artifact; (b) example of pitting covering surface of glass artifact.

Even with the state of the sample, it was determined that of the 222 artifacts selected for microscopic analysis, two fragments (0.9%) showed evidence of use as tools, one fragment (0.5%) contained evidence strongly suggesting use as a tool, and one glass artifact (0.5%) had been intentionally modified into a kind of disc (although it was not a tool). Because such a small number of artifacts were found to have evidence of use or modification, the specific evidence encountered on each artifact will be described presently.

Microscopic observation of a glass fragment (Lot 06495, Figure 6a) recovered from an area previously identified as the "Carver's Cabin" (Harris 1999) revealed probable striations (mostly greater than 2 mm in length) extending almost perpendicularly from one of the artifact's edges (working edge angle of 50°–60°). However, a fair amount of pitting and some apparent smoothing or dissolution of the surface of the artifact was superimposed over this pattern and across the artifact as a whole. It is unclear how much of the fragment's

surface has been lost to the forces causing the widespread pitting; for this reason, the observed pattern of markings perpendicular to one edge of the artifact could not be conclusively identified as striations resulting from use as a tool. Many other glass artifacts under analysis showed abrasion tracks that sometimes grouped into perpendicular or semiperpendicular orientations intersecting an edge. These other artifacts were not considered possible tools because the abrasion tracks were deeper and wider than striations resulting from tool use and extended to and from various portions of the fragments (as opposed to originating from utilized edges). The surface of the glass fragment from Lot 06495 had been altered (possibly affected by fire or environmental factors), so it is plausible that the apparent striations encountered on this artifact could be abrasion tracks after their depth and width were altered to appear less severe and more like striations. Further, the pattern of possible striations was observed in limited coverage along the edge, only extending across one face for approximately 1 cm. As well, shallower striations may have been obliterated by the same factors, further limiting possible usewear evidence. However, steep microchipping and more minute microfractures were observed on the edge portion containing the possible striations, suggestive of use; however, the edge did not show pronounced rounding.

Although partially obscured, the observed combination of probable striations and microfracture along the artifact's edge is characteristic of usewear produced by scraping or planing a resistant material (Hay 1978). The evidence of wood (pecan) scraping observed in the experimental set previously described had patterned striations that were too short and edge rounding too pronounced to account for the possible wear encountered on this artifact. However, the wear resulting from wood scraping described by Martindale and Juracik (2006)

seems to agree with the pattern identified on this artifact, implying that variations between these patterns may be due to specific wood types or small differences in use motion. Indeed, softer materials tend to produce longer striations (Hay 1978), so a softer wood may have produced the observed patterns. Although loss of detail on the artifact's surface precludes definitive identification of this artifact as a tool, the observed pattern does suggest it was used to scrape or plane wood or another resistant material.

A glass fragment (Lot 02538, Figure 6b) recovered from the area identified as the "Munition Maker's Cabin" (Garcia-Herreros 1998) showed more promising evidence of limited use as tool. It was found to have slightly curved striations sparsely oriented 30°–40° unidirectionally from a rounded and lightly microfractured convex edge (angle of 40°–45°). The surface of the glass fragment was in better condition than most of the sample and had only light patination and moderate abrasion tracks present. Striations were observed only along one edge of the tool, and generally measured from under 1mm to 3mm. The orientation of these striations implies a cutting motion, however microfracture along the working edge does not match with the pattern from cutting cotton cloth documented in the experimental observations. One possible explanation for this wear type is the cutting of material similar to hide or leather. The observed striations are less closely clustered than those depicted in the experimental set of Martindale and Jurakic (2006) developed during cutting goat suede, and edge damage appears less severe on the Levi Jordan artifact. These differences can be explained by relatively light use of this artifact compared with those prepared by Martindale and Jurakic (2006), as usewear increases in severity as a tool is used over time. The usewear pattern on this artifact of rounded edge and striations at an oblique angle to the edge more closely reflects a description given by Hay (1978) of usewear resulting from cutting soft

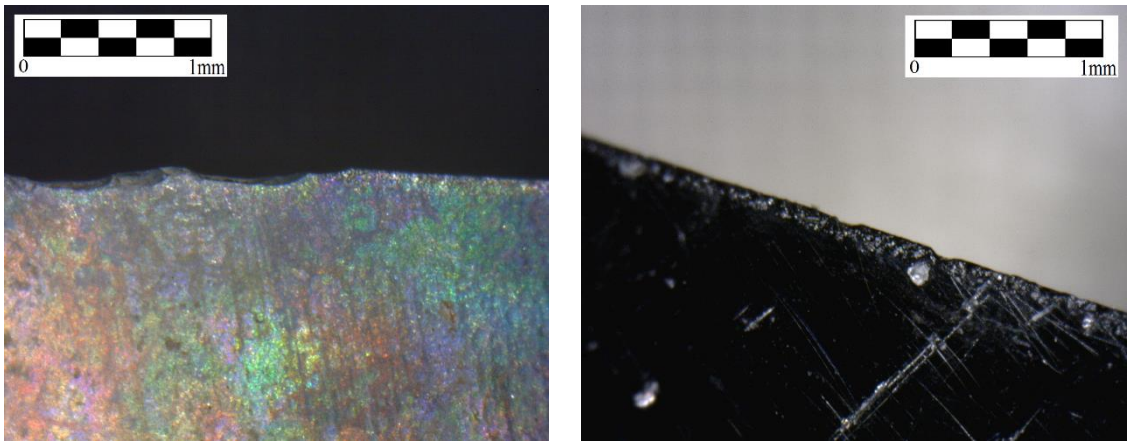
materials, such as leather, with the exception that striations on this artifacts appeared unidirectional rather than bidirectional. This difference likely results from a single direction of force being applied during use in the case of the artifact from the Levi Jordan Plantation Quarters Area and two distinct directions of motion in Hay's experimentation (1978).

Another artifact (Lot 02703, Figure 6c) found in association with the Munition Maker's Cabin showed a similar, albeit bidirectional, wear pattern. Severe abrasion tracks obscure large portions of the surface of the fragment, but striations were observable along one edge (angle of 20°). The orientation of striations is 20°–30°, and striations were similar in length and less curved than the striations on the previous artifact. As well, edge rounding and microfracture were also more pronounced in this case. The acute angle and bidirectional patterning of striations suggest that this tool was used in a cutting motion in two directions to modify a material rather than a single direction used for cutting as described for the previous artifact. Similar to the previous artifact described, the length and angle of striation—combined with observed edge rounding and microfracture—indicate that a soft use material, such as leather, was likely modified by this fragment as well. The increased severity of rounding and microfracture in this case indicate this artifact was used over a longer period compared with the previous fragment.

This artifact was recovered from a unit excavated 10 feet north of the one containing the previously described glass fragment, partially within the area described as the "Munition Maker's Cabin". Horizontal provenience on the artifact is not fine enough to determine if the artifact was deposited to the northwest or southeast of a proposed dividing wall between areas—division of this unit into subunits was not carried out until Level 4, after this artifact had been excavated, due to higher elevations consisting of fill above the cabin identifiable

deposits (Garcia-Herreros 1998). Because of this, it is not certain if this artifact was recovered from the Munition Maker's Cabin or the room directly to the northwest and therefore cannot be used to conclusively propose or test activities of the Munition Maker's Cabin, although the similarity in patterning and proximity suggest that the two artifacts may have originated from the same area.

One example of intentionally modified glass was recovered from the area identified as the Munition Maker's Cabin. The artifact is a flat disc of clear glass (Lot 01206, Figure 6d), 4 cm in diameter, with a small triangular point protruding from the edge and a notch missing from the circumference. Microscopic inspection revealed that the disc had been fashioned from a larger piece of glass by scoring along the circumference of the circle with a pointed tool, possibly a nail or tack. Fracture patterns indicate that the sharp instrument was likely held in place perpendicular to a single face of the glass artifact as percussive force was applied to cause a continuous ring of chips to be removed from the disc. The artifact appears unfinished, as the triangular point attached was scored but never separated. It may be that the notch missing from the disc was accidentally removed during the production of the artifact, and modification of the artifact was discontinued as a result. Because it seems unlikely that an unfinished glass disc was discarded in this cabin or transported into this area before completion, the artifact suggests that someone in the quarters area—possibly the munition maker—possessed the skill and knowledge to modify a piece of glass into a desired shape.



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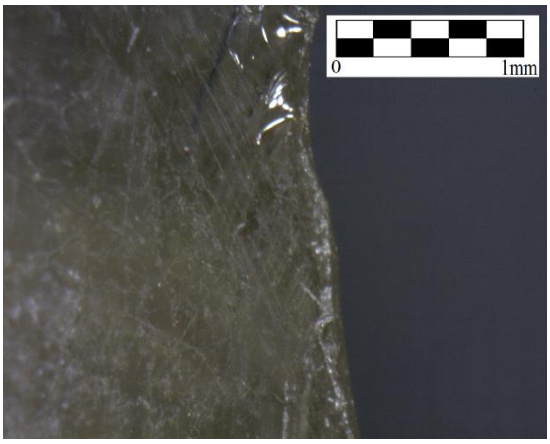
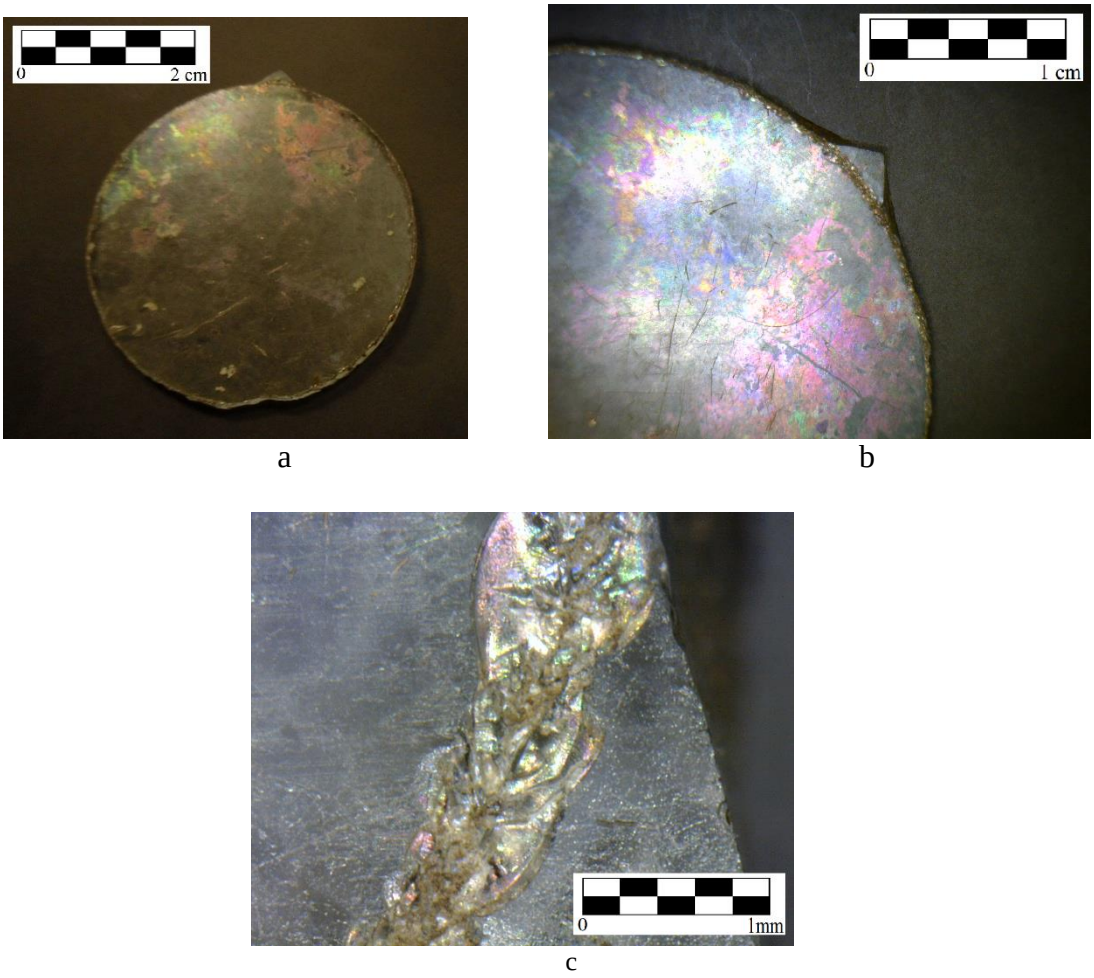


c

Figure 6: Microscopic photographs of usewear observed on glass tools: (a) striations almost perpendicular to microfractured, rounded edge, possibly indicative of use of artifact to plane or scrape resistant material; an unknown process has caused modifications to the general surface of artifact such as pitting; (b) rounded, microfractured edge with unidirectional striations ~30°, indicative of cutting soft material, such as leather; abrasion track can be seen running perpendicular to striations; (c) rounded, microfractured edge with bidirectional striations ~20°, also indicative of cutting soft material; random abrasion tracks cover much of the rest of the artifact.

Lot	Wear Type	Angle of used edge	Location
06495 (Figure 6a)	Scraping or planing resistant material	50°–60°	Cabin I-B-3 (“Carver’s Cabin”)
02538 (Figure 6b)	Cutting soft material (unidirectional)	40°–45°	Cabin II-B-2 (“Munition Maker’s Cabin”)
02703 (Figure 6c)	Cutting soft material (bidirectional)	20°	Cabin II-B-2 or just to northwest (in or near Munition Maker’s Cabin)

Table 1: Glass artifacts with evidence of use as tools.



a b c

Figure 7: Photographs of glass disc: (a) glass disc with point at top and notch at bottom; (b) closer view of point; (c) scored and unbroken perimeter between glass disc and triangular point.

Chapter V

Conclusions

Hypothesis Testing

Presence of Glass Tools in Levi Jordan Plantation Quarters Area

Although the vast majority of glass subjected to microscopic analysis did not yield evidence of use as tools, one glass fragment (Lot 06495) contained evidence suggesting possible use to scrape or plane resistant material, and two glass artifacts (Lots 02538 and 02703) showed evidence likely resulting from cutting a soft material such as leather. This evidence suggests that glass was used in the Levi Jordan Plantation Quarters Area as tools, even if only rarely. No glass fragments that showed macroscopic instances resembling retouch demonstrated evidence of having been used to modify materials, implying that glass tools were not curated at the site but rather were tools of convenience and expedience and likely quickly discarded rather than maintained.

Testing interpretation of Cabin I-B-3, "Carver's Cabin"

The current analysis did not yield sufficient evidence to conclusively test whether carving of resistant materials with glass tools took place within Cabin I-B-3 during occupation; however, the observed evidence does align with the previously proposed use of this space (Harris 1999). The previously described glass fragment (Lot 06495) containing

possible wear resulting from scraping or planing resistant materials was recovered from this cabin, but the poor state of the artifact precludes certainty in the interpretation of the possible usewear identified during analysis of the fragment. Experimentation with glass tools revealed that glass has limited utility in modification of materials as resistant as shell, and glass tools were more likely utilized when the occupant was modifying softer materials such as wood. Indeed, the observed patterning on the probable glass tool from this cabin matches the expected wear from working a resistant material such as relatively soft wood.

Additionally, the other tools recovered from the cabin and discussed by Brown (2013) and Harris (1999) include a saw blade, knives (folding and kitchen), metal files, metal pins, a square nail mounted in a shell handle, and the proximal end of a porcine rib that showed wear and had microscopic shell fragments embedded in its end. The modified square nail and bone tool included in this cabin show that the occupant had a specialized toolkit including objects adapted to new purposes. The use of glass fragments would make sense, considering these other objects that were apparently utilized in carving, as glass can also be used in novel applications after a bottle has been broken.

The occupant of the cabin appears to have regularly modified shell, as evidenced by debitage and partially modified shell 'blanks' recovered from the cabin (Harris 1999). Production of the experimental glass toolset showed that glass has very limited utility for modifying shell; it appears shell was commonly carved within the cabin (Harris 1999), but the occupant may have selected metal tools rather than glass fragments for these purposes. This, in conjunction with the possible disposal of exhausted glass tools possibly used for modifying other materials into an undiscovered refuse midden (Brown 2013) and the poor

state of the sample caused by environmental or cultural effects discussed previously, may explain the absence of other glass tools recovered from this cabin.

Testing interpretation of Cabin II-B-2, "Munition Maker's Cabin"

Usewear patterns discovered through microscopic analysis of the glass artifacts recovered from in or around Cabin II-B-2 (Lots 02538 and 02703) likely indicate the modification of hide or leather on the premises during occupation. One of the glass tools (Lot 02703) was recovered during excavation of a unit (25E/90N in Garcia-Herreros 1998) divided by an interior wall, and provenience data do not specify on which side it was found. Therefore, this tool does not directly support the processing of hide or leather within Cabin II-B-2, although it does contain usewear patterning congruent with the cutting of those materials. The other glass tool (Lot 02538) associated with this cabin, however, was recovered with provenience placing it certainly within Cabin II-B-3 and contains evidence of similar use, suggesting that hide or leather was modified here.

One of the proposed roles of the munitions maker was hunting using a musket or flintlock (Garcia-Herreros 1998). Evidence of tools used in the possible modification of hide supports this claim, although indirectly. It has been previously established that munitions were manufactured within the cabin due to shot molds and melted lead found within it. Additionally, opened casings were discovered, implying powder and lead were likely removed for the purpose of supplying the occupant (Garcia-Herreros 1998). Producing pouches in the same area would complement the manufacture of shot and apparent extraction of gunpowder taking place, enabling the munition maker to store and carry these items—a

necessity on a hunting trip with a musket or flintlock. The glass tools discovered may have been used in the production of such containers.

Tools from Cabin II-B-2 described by Garcia-Herreros (1998) include metal files, two shot molds, an axe head, part of a screwdriver, a saw blade, hand drills, and folding knives. Two of the files recovered were modified to provide cutting edges resembling chisels (Figure 8). The modified chisels show that the occupant or someone else in the Quarters was creatively modifying objects around them to suit specific purposes as tools. This implies that glass tools may have been selected or even produced for use in certain tasks. It remains unclear why cutting leather involved glass implements, as knives were recovered from the cabin and would likely have been easier to handle and maintain. Regardless, a soft material, likely hide or leather, does appear to have been cut with two glass tools found in or around this area. Similar to the Carver's Cabin, the extremely low number of glass tools identified in this cabin may result from the possible disposal of exhausted glass tools into a secondary refuse midden, which has not been identified (Brown 2013), and the previously discussed surface alterations found on the sample caused by environmental or cultural effects.

Figure 8: Modified file with chisel-like blade recovered from Cabin II-B-2 (Brown 2013).

Proposed activities for Cabin I-B-1

No activities could be established for Cabin I-B-1 through analysis of glass artifacts recovered from that area because no usewear patterns were discovered on those artifacts.

Discussion

Comparison to Chert Artifacts Recovered from Quarters Area

As previously stated, chipped stone artifacts were recovered from the Levi Jordan Plantation Quarters Area, and clusters of edge angles were identified by cabin (Brown 2013). The angles of chipped stone artifacts recovered in association with Cabin I-B-3 (Carver's Cabin) fell between 50° and 60°, and those found in association with Cabin II-B-2 (Munition Maker's Cabin) were between 30° and 40° with one small bit measuring 64°. The glass artifact recovered from I-B-3 (Lot 06495) shows probable usewear along an edge with edge angles from 50° to 60° depending on where measurements were taken along the worn edge, appearing to match exactly with the range of angles recorded for lithic tools within the cabin. The two glass tools recovered from in or around II-B-2 do not match as closely with the previously defined clustering of edge angles on lithic tools but are within 10° of the minimum and maximum of that range. The first glass tool (Lot 02538) has angles from 40° to 45° at various points along the used edge, and the second (Lot 02703) has an angle of 20°.

The closeness of the edge angles on glass tools to the stone artifacts suggests that these stone tools may also have been used for similar purposes. In fact, significant

microscopic damage along the edges of the chert tools supports the position that these artifacts were utilized at some point during their existence (Brown 2013). Definitive uses for the stone tools would require examination for usewear under a petrographic microscope, and it seems doubtful whether this evidence could be conclusively linked to use by the Quarters Area occupants rather than from Native Americans, who possibly manufactured these tools. Even so, previous explanation for lithic tools on African American sites as vaguely ritual (see Russell 1997) appear unlikely in this case, especially because no stone tools were identified within the cabins identified as having ritual significance within the Quarters Community (Brown 2013). Because many of these stone tools were found in association with activity areas and known tools, the most likely explanation for the presence stone tools in the Quarters Area is as tools in craft production rather than ritual objects.

Factors Limiting the Current Research

As stated previously, conditions at the site appear to have negatively impacted the preservation of glass artifacts. A large portion of the damage is in the form of widespread pitting covering the surfaces of many glass artifacts. The damage to the surface of these artifacts may have been cause by fire, possibly after abandonment. Although some glass fragments recovered from the Quarters Area showed macroscopic evidence of deformation from high heat, the fragments selected in the sample did not show macroscopic evidence of this kind. Once observed through the microscope, however, it became evident that something had altered the surface of glass fragments throughout the three cabins selected for analysis. Perplexingly, other researchers (Brown 2013; Garcia-Herreros 1998; Harris 1999) do not

appear to report widespread damage to artifacts resulting from fire, so other environmental or cultural forces may be responsible for these surface alterations.

Another widely encountered modification to the surface of glass artifacts was the accumulation of severe abrasion tracks, sometimes in concentration that could obscure or obliterate possible usewear. The severity of abrasion tracks in this sample seems to far exceed similar damage encountered in other studies of historic glass fragments (Conte and Romero 2008; Martindale and Jurakic 2006). One explanation for the apparent ubiquity of severe abrasion damage on the Levi Jordan Plantation Quarters Area sample may be the use of a portion of the area for the care of cattle for a time after occupation (Brown 2013). While cattle may not have directly trampled every glass artifact, their considerable weight may have compressed the soil substrate surrounding artifacts, causing intense friction between soil particles and the surface of the glass, resulting in abrasions. A portion of the abrasions may also be explained by excavational damage—the field methods employed during excavation require arbitrary levels of 0.1 inch to be hand-troweled in 1-foot × 1-foot subunits, possibly resulting in trowels contacting the glass artifacts repeatedly, causing unexpected damage. This explanation cannot account for the totality of abrasion tracks, however, as unpatinated, excavational edge damage was not encountered at the exceptional rate seen in abrasions. Additionally, numerous abrasion tracks were observed beneath subsequent corrosion and patination, meaning that the abrasion episodes predated those effects. Regardless of the causes, these incidental modifications had the capacity to mask or destroy usewear evidence if it had been previously present.

Recovery of glass tools may also have been impacted by the lack of a trash midden discovered on site (Brown 2013). No glass fragments with evidence of both retouch and

usewear were discovered in the sample, so glass tools may not have been curated and would quickly dull. In this case, glass tools would end up being discarded promptly as sharp, usable edges dulled. Moreover, glass shards would likely require fairly quick disposal after their utility was exhausted because glass can prove to be an unpleasant or dangerous piece of refuse to leave in activity areas. If glass tools were often relegated to an undiscovered refuse midden, that would partially explain the very low number of tools encountered in the sample.

Interpretation of Glass Tools Found in the Quarters Area

A large number of nonglass tools, discussed above, have been used to support hypotheses regarding various activities conducted in the Quarters Area (Brown 2013; Garcia-Herreros 1998; Harris 1999). Considering this, it may be the case that glass tools did not offer much in the way of utility for many of the day-to-day tasks taking place there and were not very common as a result. Even though iron and steel tools were recovered from the Quarters Area, accounts do exist of groups with access to steel tools selecting and using glass for specific tasks (Clark 1981; Conte and Romero 2008). The small number of glass tools recovered from the site, even if rare, suggests that glass implements were used, possibly in concert with metal ones capable of performing the same tasks. It may be the case that glass implements were easier to use in some cases or had a desired effect on a given material, similar to glass tool use for smoothing wooden tool handles (Mintz and Price 1976; Ferguson 1995, both cited in Wilkie 1996). Given the low number of glass tools recovered, no pattern for glass tool usage by activity can be established, so the intention behind the use of glass tools at the site is impossible to discern. The activities evidenced by usewear present on the

tools does fit with the previously established activities proposed for Cabins I-B-3 and II-B-2, which implies that these tools were supplementary to a set of multiple curated tools used in these activities rather than the primary means of material modification.

Recommendations for Future Research

Although direct findings in the current research regarding the use of glass within the Levi Jordan Plantation have been limited, this thesis has shown that usewear analysis of objects believed to be glass tools is readily accessible. In fact, the previously included photographs of the experimental set were captured using a digital microscope purchased online for roughly USD 30. Personal experience in breaking glass as well as the reports of other researchers have shown that glass will often incidentally fracture into shapes which macroscopically appear intentionally shaped, retouched, or even trimmed (Beaumont 1961; Conte and Romero 2008). Usewear analysis of tool-like glass artifacts is not only necessary for discerning the use of the object but also for establishing that the artifact was actually a tool at all. Moreover, microscopic analysis of glass tools offers direct evidence of the types of materials modified in an area and the motions used in that modification. The time investment necessary for this type of analysis is significant, but on sites where glass is suspected as serving as tools, a wealth of information could be available. Archaeologists hoping to glean more information from a site regarding economic activities or domestic lifeways would do well to commit some of their time (or that of a graduate student) to viewing the most promising tool-like glass fragments under a microscope to identify usewear patterns.

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