8 ARTICULATING WITH THE BROADER ECONOMY: CHERT PRESSURE BLADE TECHNOLOGY IN A CARACOL RESIDENTIAL GROUP

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Ancient Maya domestic economies were varied and complex systems that households depended on for material provisioning. At the site of Caracol, Belize during the Late Classic period (A.D. 550 A.D. – 900) crafters that performed domestic household activities provisioned both markets and households with stone tools and many crafted goods. A recent investigation of one of Caracol's household groups has shown that lithic blade tools, or "drills," were intensively produced for the crafting of non-lithic materials – probably shell and/or wood. These chert tools are similar to tools previously reported from Caracol; however, the reduction sequence to produce these tools resembles unidirectional and bidirectional pressure/indirect percussion core reduction used in the production of obsidian blades. We summarize the technological details of some 3,000 chert artifacts with specific attention to the ways in which the production of chert blade tools incorporated both pressure and percussion techniques. We conclude by discussing the implications of household domestic practices in lithic production that included obsidian blade production techniques.

Introduction

Ancient Maya domestic economies can be understood through analyses of household crafts, crafting techniques, the location of crafting households, and the distribution of finished tools and associated materials. More specifically, many archaeologists aim to reconstruct past domestic economic *social networks* through analyses of commonalities/differences in: (1) the exploited materials, their potential source locations, and exchange mechanisms and provisioning materials to sites/households (Hirth 1998 and 2008; Hutson et al. 2010; Masson and Freidel 2013); (2) shared/standardized production techniques, tool form, and context of production debitage deposition (Braswell 2010; Costin 1991 and 2001; Martindale Johnson 2014); and, (3) tool use and the composition of discarded objects (Aoyama 1999; Trachman 2002). At Caracol, with specific attention paid to the general lithic industry, a more comprehensive image is appearing that unsurprisingly shows domestic households used a diverse suite of raw materials for a variety of purposes that continues to support a largely economically integrated landscape.

Provided these broader issues, the aim of this report is to demonstrate that architecturally small and temporally ephemeral households can and do reveal unexpected evidence of the organization of household crafting knowledge. The term *knowledge* is used rather broadly in place of crafting organization, technique, practice, or other related terms because reconstructing what households *did* with certain materials and seeing broader commonalities at other residences serves as a proxy for how knowledgeable ancient households could interact and learn to craft to continually provision the broader economy in specific ways. This perspective is intended to operationalize a "communities of practice" approach to emphasize the ways in which residences at Caracol's households were active members of local neighborhoods and extra-household social domains, like those of crafting technicians and provisioners to a local market economy. A household can be a member of a "community of practice" if individuals learn and share through participation in physical and social activities in particular locations (Lave and Wenger 1991). These broader topics are beyond the scope of this report, but are briefly described here to help frame the overall discussion of how domestic economies might articulate with broader city economies.

Caracol's Lithics: Knowledge Produced from the Current Data and Continued Questions

Research on Caracol's lithic industries, both ground-stone and flaked-stone, has the potential to broaden our understanding of regional relationships of exchange between polities, as well as potentially leading to a more informed model of regional and local extraction of raw materials (Graham 1987; Shipley and

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Graham 1987). Currently, our understanding of Caracol's investigated households shows several things. (1) House groups throughout the site had access to a diverse range of both distant and local resources and that these materials were most likely provisioned *by households to households* through interactions at local Caracol markets (D. Chase and A. Chase 2014). For example, 88% of house group excavations contain obsidian, jadeite is not restricted to elite residences within the site's epicenter (being present in 54 of 118 archaeologically tested residential groups at the site; A. Chase et al. 2015), and other non-local resources - such as slates, granites, and basalts - are regularly recovered from household investigations throughout the site. It is likely that certain non-flaked stone resources (e.g., slate, granite, and basalt) could have been procured just beyond the karstic limestone Vaca Plateau to the north, east, and south of Caracol's residential settlement (Geology and Petroleum Department 2013; Graham 1987; Healy et al. 1995; Dixon 1956; Bateson and Hall 1977). (2) Systematic analysis at eleven domestic crafting contexts shows standardized techniques in tool production and use (Martindale Johnson 2008, 2014; Pope 1994; Pope Jones 1996). (3) Crafting or *multi-crafting* (Hirth 2009:21) was common among households in that flaked-stone tools were used as a contingent element of other crafting practices (e.g., drills perforated stone or shell objects for suspension or decoration). However, not all house groups practiced intensive lithic production and crafting; some appear to be consumers or users of tools rather than producers. In addition, workshops appear to be nested among non-producing households throughout sampled areas or located adjacent to monumental architecture (Martindale Johnson 2008; Pope 1994). Figure 1 shows the extent to which lithic crafting workshops were distributed across a sampled area. These interpretations are based on overall number of chert artifacts (>1,000), the presence of an entire reduction sequence, battered cobbles, pressure flakers, as well as unutilized and utilized tools associated with residential architecture. It is unclear at the present time if workshop producers nested among non-producers constitutes an alternative form of "attached specialization" or is simply evidence of typical diversity in household practices. Our working hypothesis is that the latter is probably more likely.

Given these broad understandings and preliminary interpretations, however, there remain areas for future research. Within which geographic settlement locations can we expect to see intensive chert workshops based on the current data? Does current data help to predict what we might find in unsampled areas in other parts of the site? Where are the most likely places to encounter material traces of intensive lithic crafting activities in a group selected for archaeological investigation? More specifically, are traces of these activities predictably found within or outside residential mounded structures? Are excavations behind and in between household mounds the best place to find residues of intensive lithic crafting activities? Is a full complement of reduction debris, including finished objects, necessary to make any determination? Once an abundance of flaked-stone debris is encountered through screening, what excavation techniques are efficient, yet effective, in excavating a potential lithic workshop to understand past discard behaviors? Does the current data from Caracol on at least two workshops show a standard behavioral practice of disposing of discrete packages or lenses of different kinds of flaked-stone objects within architecture as opposed to behind it? Does this help to better understand daily cleaning efforts by the occupants of ancient Maya dwellings? And, more broadly, how do these workshops articulate and integrate with the broader domestic economy? Is a domestic workshop strategically positioned near local markets or vice versa? What is the historical trajectory of workshops within an ancient city where markets may have been the primary mechanism for household provisioning? It is argued that a consideration of the archaeological investigations undertaken at the "Dormir Group" and other Caracol residential groups will begin to answer these questions.

Current Study at the "Dormir Group" Caracol, Belize

The "Dormir Group," comprised of Caracol Structure L55, L56, and L57, was investigated as part of a complete residential

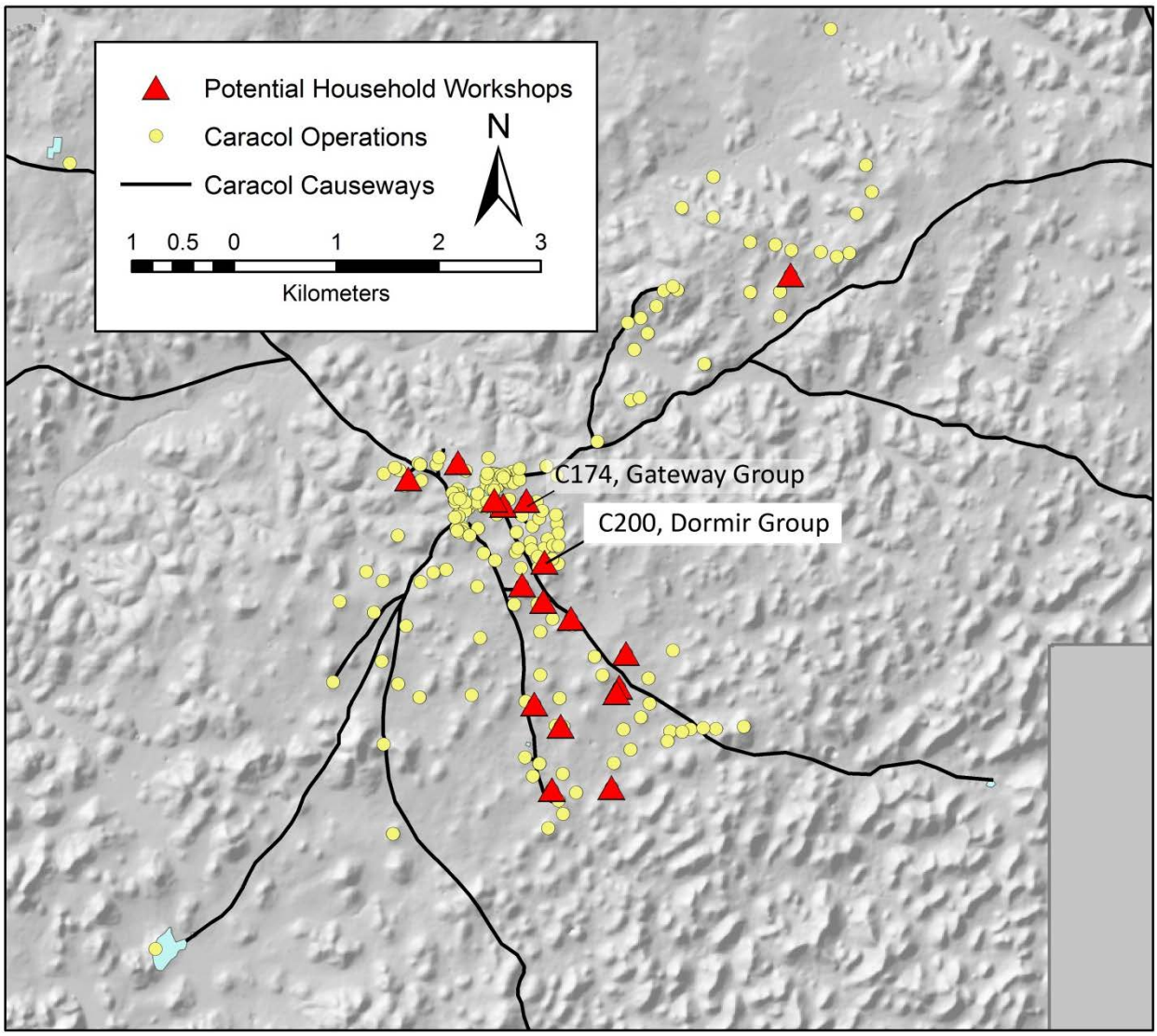

Figure 1. Map of Caracol showing excavation operations and potential chert flaked-stone workshops.

sample that comprised an ancient Maya neighborhood. The group itself is located on the bluff at the southernmost extent of a plateau area occupied by 16 contiguous residential groups. This neighborhood area is surrounded on all sides by lower agricultural terracing. Although this architectural group is relatively small in overall size, it provided archaeological data reflecting a function that was not recovered in the other investigated household groups. Dormir's three structures occupy the east, north, and west sides of a raised platform constructed directly on the limestone bedrock (Figure 2). This type of architecture is typical in the outlying settlement at Caracol and it has been encountered in other workshop groups. Like the "Gateway Group," it had perishable superstructures and production waste recovered from within construction fill (Martindale Johnson 2008, 2014). Finding construction fill with production debitage is common at Caracol and occurs at other sites, like Colha (Roemer 1991:56), Santa Rita Corozal (Marino 2014), and Tikal (Moholy-Nagy 1997). The Dormir group also included an eastern ritual structure, which is typical of Caracol residential groups (D. Chase and A. Chase 2004), that contained a burial and a pottery cache vessel.

Investigations within Structure L55, the northern structure, were done by means of a

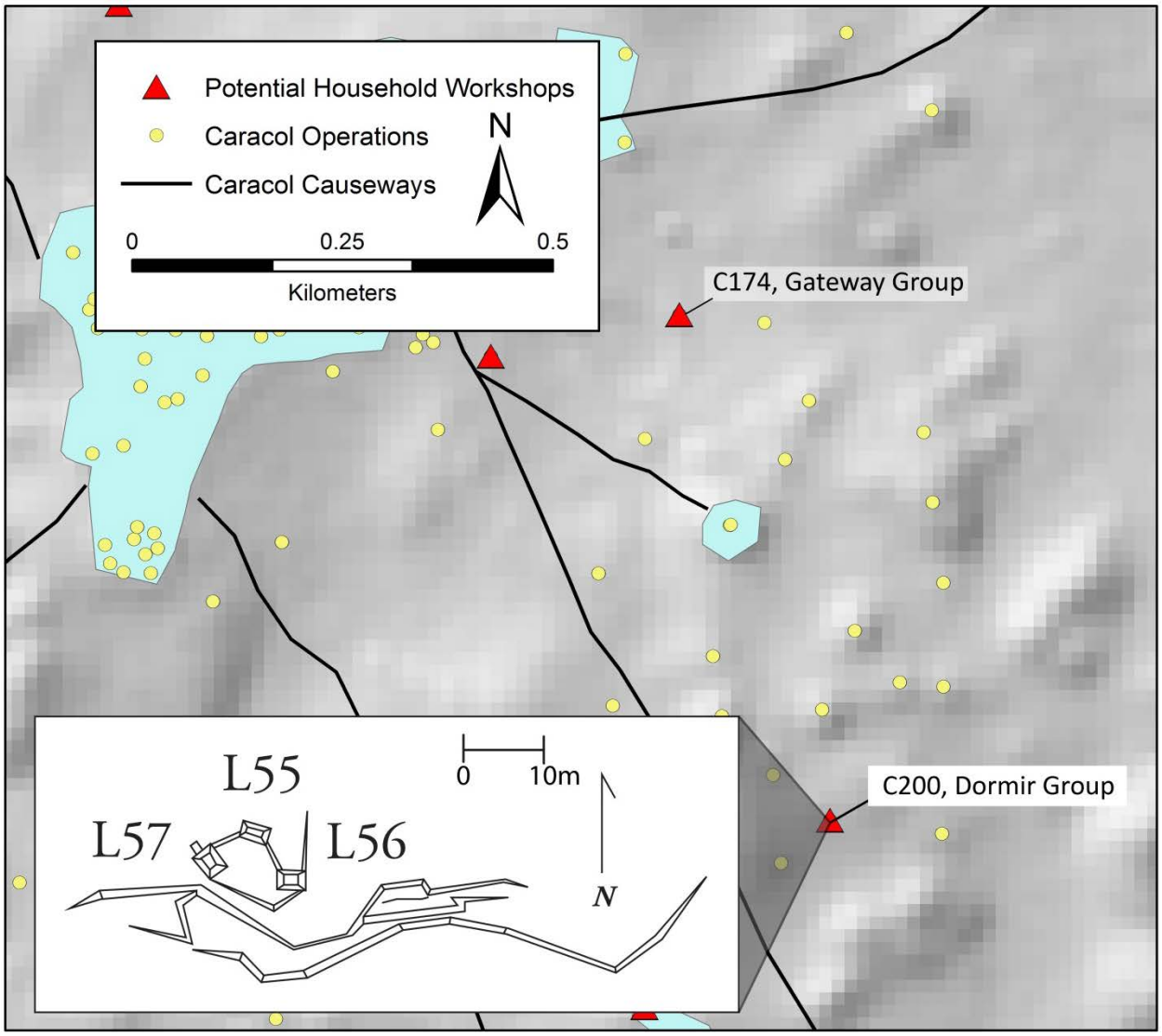

Figure 2. Location and architectural plan of "Dormir Group", Operation C200, Structures L55-L57.

small centerline trench that measured 2 meters east/west by 4.2 meters north/south. Other excavations on the eastern and western structures were similar in size and placement on the central axis, but recovered different artifact assemblages. The investigation within Structure L55 was subdivided during excavation into eleven lots or smaller spatial units based on various elements within the structure associated with either cut-stone architectural features, floors, construction efforts and fills, stratigraphic changes, or discrete deposits of household refuse. Matrix from the entire excavation was screened with ¼" mesh. In total, approximately 6.94 cubic meters of earth, rock, and artifacts were systematically removed during the excavation of this structure (Figure 3).

The Flaked Stone Assemblage and its Context: Evidence of Shared Knowledge and Production Techniques between Obsidian and Chert Crafters

In total, 3,133 chert artifacts were recovered from within the Structure L55 axial trench. This contrasts with the paucity of chert flaked-stone recovered from the two other similarly-sized excavations; only 14 chert artifacts were recovered from the eastern mound and only 16 chert artifacts were recovered from the western mound. The bulk of chert lithic

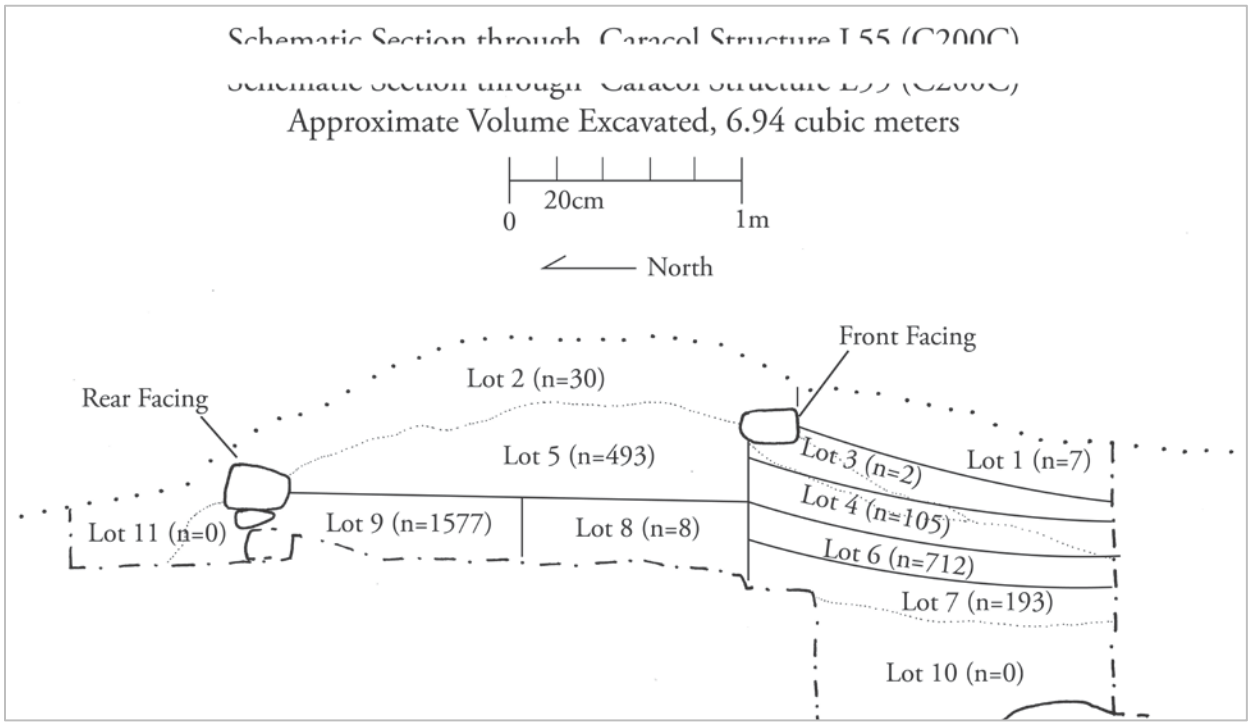

Figure 3. Eastern section of Suboperation C200C in Caracol Structure L55, showing diagram of excavated lots with number of chert artifacts per lot. Note the abundance of chert artifacts concentrated in Lot 9.

debris recovered from *within* the northern structure were flakes (n=1,742); also recovered were utilized blade tools (n=584), unutilized blades (n=249), angular waste pieces or lithic chunks (n=365), cores of various types (n=157), flake tools (n=13), rejuvenation pieces (n=11), core tools (n=8), biface fragments (n=3), and lastly a battered cobble (n=1). To illustrate the density of the deposit, Table 1 lists the 1,577 or 55.6% of the chert artifacts recovered from Lot 9. This lot contained all classes of chert artifacts with the exception of a battered cobble that came from another lot. Because of the dense concentration and occurrence of all types of artifacts in this small spatial unit, it is likely that this small excavation lot probably recovered the debris from a discrete production area; this debris had been recycled into an ancient residence to create interior volume (see Figure 3) and to prevent the debris from being encountered on the surface, effectively eliminating dangerous materials from open areas. Martindale Johnson (2014:87, Figure 4) shows a similar excavation diagram that also depicts discrete lenses of deposited chert

Table 1. List of chert artifacts recovered from Suboperation C200C Lot 9. Notice that a broad technological sequence was recovered from this lot with the exception of a battered cobble recovered from another lot within this excavation.

Chert Flaked-stone Types from Lot 9	
Angular Waste (chunks)	211
Flake (w/; w/o cortex)	808
Blade	116
Core (and fragments)	88
Core Rejuvenation Debitage	11
Flake Tool	7
"Drill" (blade tool)	331
Biface Fragment	1
Core Tool	4
Battered Cobble	0

artifacts recovered from the internal construction fill of a building in the "Gateway Group".

The recovered artifacts are consistent with the production of short chert blades. These kinds of products, in association with small chert blade "drills," are commonly found within analyzed workshops from Caracol (Martindale

Figure 4. A sample of multidirectional cores from Suboperation C200C, Structure L55.

Johnson 2008; Pope 1994; Pope Jones 1996). Chert blades of this type were usually modified distally to create a bit-like drill feature that was used to modify other materials, such as wood, shell, or slate (Pope 1994). Artifacts with these features generally follow a previously documented reduction sequence (Martindale Johnson 2014:87, Figure 5). This process included the removal of cortical surfaces from small chert nodules to create roughed-out cores. These cores were then further reduced to create one or more striking platforms from which blades or large flakes were removed for use as tools. Although the bulk of cores and related production debitage showed similar patterns documented elsewhere, some cores – unidirectional pressure (or indirect percussion) cores and rejuvenation debitage – showed remarkable similarities to those seen in the obsidian blade industry. The Dormir examples constitute the first occurrence in which these types of cores have been recorded from household investigations. Also recovered at Dormir were rejuvenation debitage in the form of chert core-sections very similar to obsidian core-sections recovered elsewhere at Caracol. The inclusion of these kinds of artifacts suggests then that multiple technical strategies were used to produce blade tools and that these chert crafters had shared knowledge with obsidian crafters. That these techniques occur at Caracol enables discussion of the possibly integrated and shared techniques of lithic crafting at Caracol. The different chert core types, rejuvenation debitage, and blade tools are described below to further demonstrate the multiplicity of techniques used to create a standardized tool type.

Multidirectional Cores

Multidirectional cores are common at Caracol's workshops. Observations during cataloguing these cores recorded that the bulk of chert blade production was performed by creating at least two perpendicular or opposing oblique platforms on different margins of a small nodule of chert. The knapper would then use direct or indirect percussion to remove two or three blades from these core platforms. The diagnostic attributes on some of these cores also shows a noteworthy amount of shattering on the margins opposite the striking platforms, indicating that these cores may have been placed on an anvil during knapping. These cores typically still have a significant amount of cortex on them and are blocky in shape; as a result, blades produced from these kinds of cores often have cortex on their dorsal surfaces (Figure 4).

Unidirectional and Bidirectional Cores

Unidirectional and bidirectional cores appear to be less common at chert workshops and more typical of obsidian blade-cores at Caracol, but when these chert cores are recovered they are usually conical in shape and polyhedral in cross section (Figure 5). This shape is a legacy of removing blades in one direction or two opposing directions as the core is rotated and blades removed (see Titmus and Clark 2003; Flenniken and Hirth 2003). This technique, common among obsidian blade production, is a more controlled indirect percussion or pressure production technique that creates a more uniform core with flat knapping platforms that is nearly absent of cortex (see Moholy-Nagy 1991:192 Figure 2a-c; Roemer 1991:62 Figure 4b). Figure 5 shows an obsidian core fragment from an adjacent residential group

positioned next to chert unidirectional cores from Structure L55, manifesting similar attributes between obsidian and chert exhausted cores of this type. For example, small step and hinge terminations are present along one or many lateral margins. This feature is usually present on cores that are in need of lateral rejuvenation or are too small to knap effectively, resulting in errors prior to discard. These kinds of terminations are caused by either an inconsistent force applied to the core's striking platform and/or an improper angle of force applied to remove a flake or blade (Andrefsky 2005: 21 Figure 2.8 and 2005:87).

Rejuvenation Techniques

Common among pressure cores is the need to rejuvenate the platforms or split the core by either laterally sectioning the core or removing the older platforms. This process enables the knapper to create a fresh error free platform with new lateral margins from which to remove more blades. Roemer (1991:62 Figure 4a) refers to these chert objects as being a "core tablet from a blade core," while Hirth (2006:74 Figure 3.9 and 2006:304) describes them as "core sections" or "core section flakes" and as part of the core rejuvenation process. By viewing these debitage from above or through the core cross-section, one can see the regular lateral scars that have been caused from removing blades and creating a polyhedral cross-section. Figure 6 shows the similarity some chert core sections from Structure L55 have to polyhedral obsidian core sections recovered elsewhere at Caracol. These similarities include: (1) polyhedral cross-sections; (2) bulb of force placed perpendicularly to the direction of the core to remove the existing platform ;(3) and, multiple facets, or flake scars, on the dorsal portion of core sections caused by errors in platform preparation. A closer examination of these core sections is provided in Figure 7, which depicts an alternative, lateral view of the chert rejuvenation artifacts compared to obsidian core sections.

Blade Tools

Like other lithic workshops at Caracol the goal of lithic reduction, regardless of blade production technique (i.e., multidirectional or

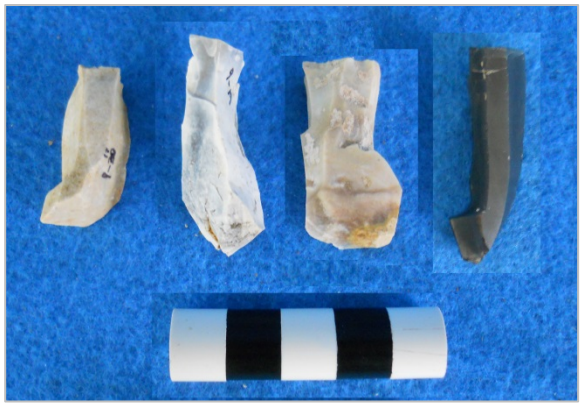

Figure 5. A sample of unidirectional and bidirectional cores from Suboperation C200Cpositioned to the left of a smaller exhausted unidirectional obsidian blade-core from Suboperation C199B.

Figure 6. A sample of chert rejuvenation artifacts from Suboperation C200C (upper) next to similar obsidian rejuvenation artifacts recovered from an above tomb context in the epicenter of Caracol (lower).

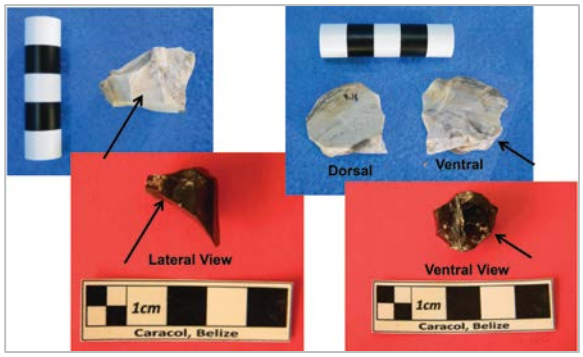

Figure 7. A lateral and top view of chert (upper) and obsidian core sections (lower) resulting from the rejuvenation process. Notice the similar sized cross-sections (left) and the platforms on each have multiple flakes on dorsal surface and a similar sized cross-section (right).

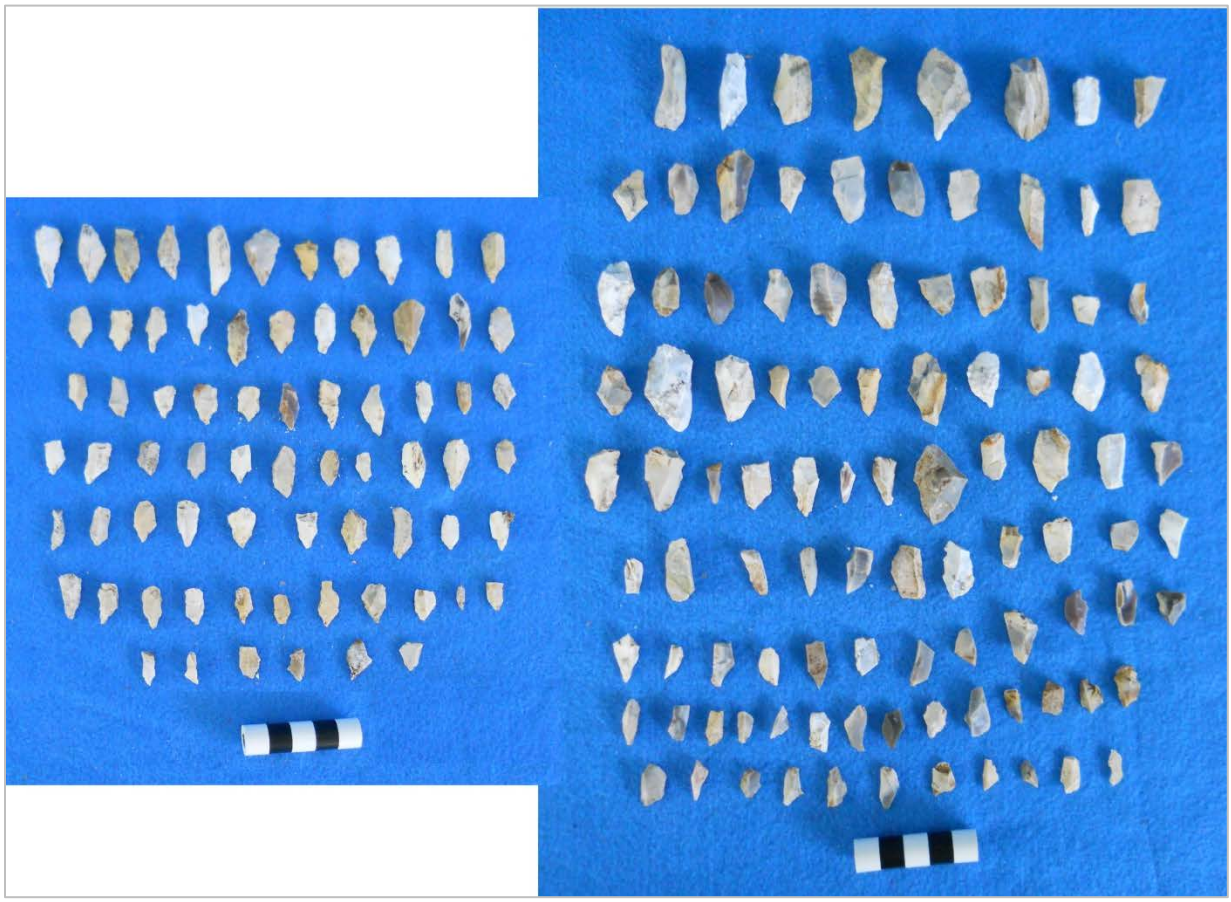

Figure 8. A sample of chert tools recovered from Suboperation C200C Lot 5 (left) and Suboperation C200C Lot 9 (right).

unidirectional core reduction), was to produce small blade-like objects that were then shaped laterally and distally to create a drill-like shape. From a preliminary assessment of the 584 blade tools, or "drills," using a 20x magnification jeweler's loop, we observed varying tool sizes and minor variations in shaping and use (Figure 8). No metrics are available at the current time to quantify the diversity in tool size. Although a more detailed quantitative study of these tools is required to determine if these variations are significant, variations among the assemblage could suggest that these differences were likely due to either normal variation that occurred during production or that different sizes and surface features correlate with alternative tool functions. Figure 8 shows the various sizes recovered from Lot 5 and Lot 9. Because some amounts of shell were recovered along with the chert artifacts, it is possible that at least some of these tools were used to modify shell. Shell found in association with these tools has been documented previously at Caracol (Pope 1994).

Conclusions

The resulting comparison between the chert flaked-stone data from Caracol Structure L55 with the two other small structures at the "Dormir Group" and the nearby residential groups is important in gaining an understanding not only of domestic lithic economies but also of an economically integrated landscape. Based on the paucity of flaked-stone data from other nearby residential groups, it is likely that the people associated with the Dormir Group served a function unlike those found in neighboring residential groups to the northeast and southwest. When compared with the other residential groups, the residents of the small Dormir residential group appear to have had access to an abundant source of raw materials to produce a major tool type used by both crafting

and non-crafting households. The debitage recovered from Structure L55 demonstrates that the associated crafters shared knowledge of traditional techniques of chert tool craft production and those more difficult and controlled techniques that were used to produce obsidian pressure blades. Although techniques of this kind have been found elsewhere (see Roemer 1991; Moholy-Nagy 1991), this is the first documented instance that these crafting techniques occurred at Caracol during the Late Classic Period.

Investigations at this house group, therefore, shed light on the practices of ancient Maya domestic crafters and how they may have been exposed to and learned – through crafting – different techniques of lithic production. In addition, these dynamics further emphasize that an integrated domestic economy is characterized by shared resources, as well as shared knowledge of the techniques of production and use. In effect, not only were resources shared within this broader "community of practice", but the knowledge of acquiring raw materials and resources, as well as the techniques used to transform these material resources into tools or crafts, were also shared through an integrated exchange network.

This case-study has attempted to demonstrate the nuances of production and the dynamic technical practices that took place within a domestic crafting economy. The use of obsidian blade production techniques on chert – a locally available unrestricted resource – provides intriguing evidence about the crafters who only produced chert tools, but who were also fully aware of broader domestic traditions that involved the crafting of obsidian blade tools.

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