
13 **LITHIC PRODUCTION AND DOMESTIC ECONOMY IN AN ANCIENT MAYA NEIGHBORHOOD AT CHAN CHICH, BELIZE**

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During the initial mapping of Chan Chich, survey teams discovered three separate areas at the site containing lithic workshop debris. The largest of these comprised several small residential groups and four mounds of lithic debitage on a hill over 1 km southeast of the Main Plaza and on the opposite bank of Chan Chich Creek. Known as Group H, the house mounds and associated piles of tool-making debris afforded the opportunity to study craft specialization, domestic economy, and domestic architecture within the suburban settlement of the site. In 1998, the project conducted excavations at Group H to determine the nature and intensity of lithic production activities there. This paper summarizes those results and suggests that Group H represents an ancient Maya neighborhood.

Introduction

In both its original incarnation (1996 to 2001) and its revived form (2012 to 2014), the Chan Chich Archaeological Project (CCAP) has primarily focused on elite architecture in the urban epicenter. A notable exception to this observation is the 1998 investigations at Group H, under the direction of Richard K. Meadows. The work at Group H was specifically directed at questions of lithic tool production and/or maintenance within a domestic context (Meadows and Hartnett 2000). Meadows and Hartnett (2000) reported the results of their limited investigations at Group H in a technical report, but did not extend the analysis further. Their data, however, offer an opportunity to address both ancient Maya domestic economy and the nature of non-elite settlement in the periphery of Chan Chich, specifically testing the hypothesis that Group H represents an ancient Maya neighborhood.

Neighborhoods in Maya Cities

Neighborhoods have received attention recently in Maya archaeology, and Michael E. Smith (2010, 2011) in particular has been encouraging archaeologists to consider settlement clusters within an urban context, rather than as non-urban components of the landscape. A neighborhood, as defined by Smith (2010:139), is a residential zone that has "considerable face-to-face interaction and is distinctive on the basis of physical and/or social characteristics." Neighborhoods were important in urban life because of their composition, their social roles, the social relationships created among neighbors, and their functional roles

within cities (Smith 2010:137). Importantly, residents of neighborhoods would often share one or more social attributes such as ethnicity, class, or occupation, which may be reflected in shared patterns of material culture. Smith (2010:145-146) notes that such patterns may be identified archaeologically based on spatial data and material culture in three ways:

1. areas bounded by physical features (natural and/or human-constructed);
2. spatial clusters of buildings or spaces;
3. areas of social distinctiveness.

Boundaries to neighborhoods can be natural or constructed features (Smith 2010:148). Clusters of buildings are particularly useful for identifying neighborhoods in low-density cities, such as those built by the Maya, and Smith (2010:148) suggests that clusters—a term long employed by Maya archaeologists—of Maya houses can be considered urban neighborhoods. Elsewhere, Smith (2011) suggests that Ashmore's (1981:51) group-focused patio cluster, defined as "one or more patio groups with a surrounding cluster of other structures and/or groups," is the type of cluster most likely to represent a neighborhood at Maya sites. Social distinctiveness includes social attributes shared by the residents of a neighborhood, such as race, ethnicity, class, religion, occupation, and/or political affiliation (Smith 2010:148).

Discovery and Investigations of Group H

Although the major groups of buildings at Chan Chich had been mapped first by the Rio Bravo Archaeological Project in 1988 and 1990

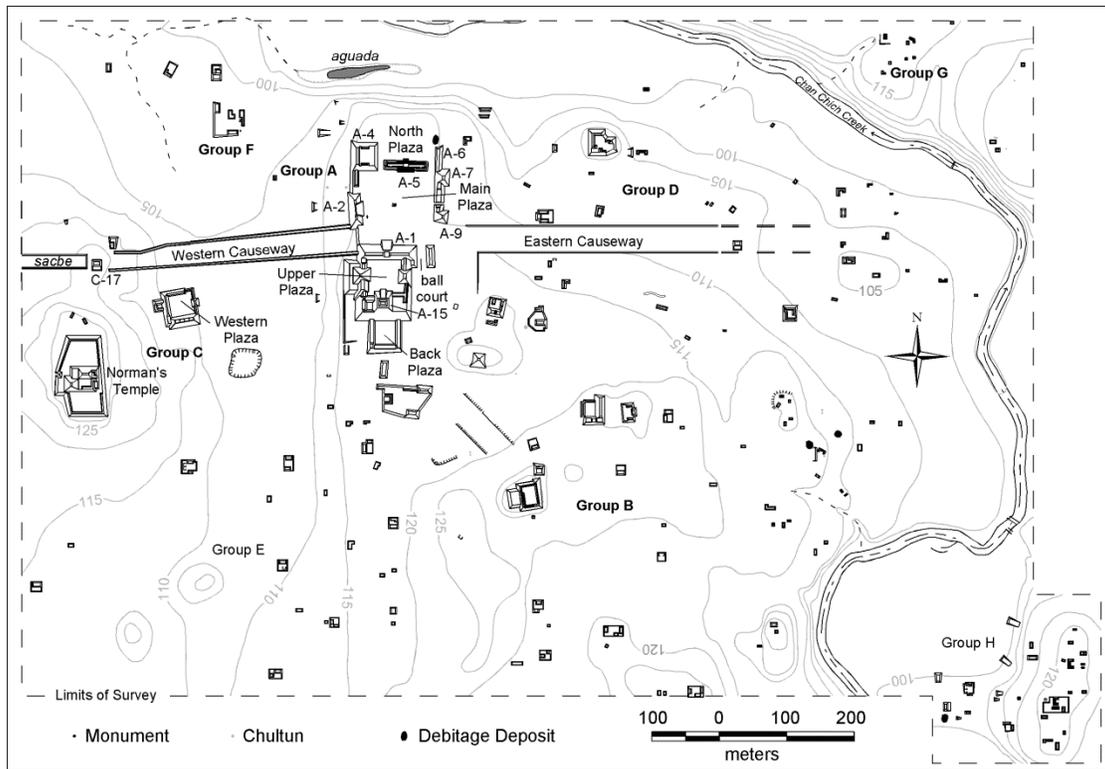


Figure 1. Map of the Chan Chich showing the locations of debitage deposits. Courtesy of the Chan Chich Archaeological Project.

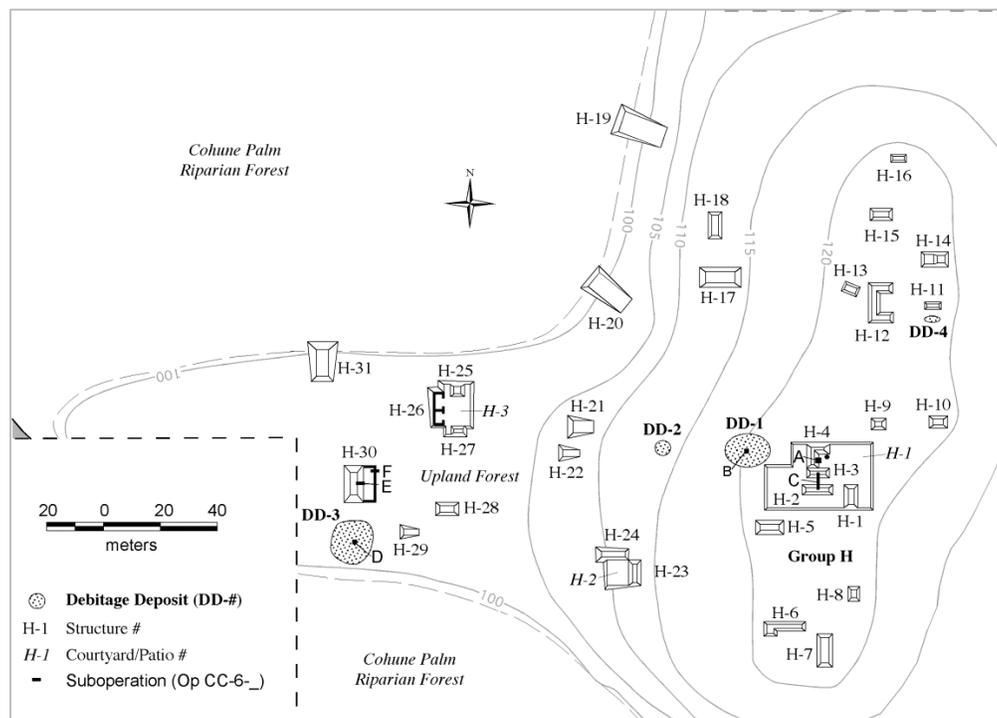


Figure 2. Map of Group H at Chan Chich showing the locations of debitage deposits and 1998 excavation units. Courtesy of the Chan Chich Archaeological Project.

(Guderjan 1991), the nature of settlement around the urban epicenter was unknown when the CCAP began in 1996. During the first season of work, the project planned to map 1 km² of densely forested terrain around the site core, but efficient line cutting allowed the survey teams to expand the map by an additional 0.5 km² to the east of the original block. The last mapping transect cut ended up on the east bank of Chan Chich Creek, the opposite bank from the monumental architecture, on a low hill dotted with small mounds. Inspection of two of the mounds revealed them to be apparent piles of chert debitage measuring over 1.5 m tall (Houk et al. 1996:26). Although survey teams had discovered two other areas with chert debris at the site—one in the North Plaza near Structure A-6 and one associated with Structure B-25—Group H was clearly the most extensive. Accordingly, the mapping effort was extended farther to record as much of the settlement associated with the piles of debitage as possible within the time remaining (Figure 1).

During the 1997 season, a team revisited Group H and collected several thick oval bifaces from the surface of the debitage mounds. Based on those initial observations, Richard Meadows (1998) developed a research design for the following season that focused on establishing a chronology for the occupation of Group H and investigating two debitage deposits (Meadows 1998:87–89). Excavations of the debitage deposits and the analysis of tools, tool fragments, and lithic flakes addressed questions related to tool production, tool maintenance, and the differences, if any, between the two debitage deposits to determine the kinds of activities that took place at Group H (Meadows and Hartnett 2000:27).

Over the span of 4 weeks during the 1998 season, a small crew directed by Meadows excavated six suboperations (Subops A–F) as part of Operation CC-6 (Meadows and Hartnett 2000). The work targeted domestic architecture and two of the four known debitage deposits.

Boundaries and Spatial Configuration of Group H

Group H comprises 31 structures, three courtyards or patio groups, and at least four distinct piles of debitage on the summit and

broad west slope of a large hill (Figure 2). Chan Chich Creek and a wide swath of flat floodplain covered in riparian forest between the base of the hill and the creek form the western edge of the group. Although not formally mapped, the southern boundary is also defined by Chan Chich Creek and the hill's steep slope. The eastern limits of the group are similarly not mapped, but Meadows and Hartnett (2000:15) report a series of apparent agricultural terraces north and east of Patio Group H-1 on the flanks of the hill's slopes. The northern limits of the group are not mapped, but small groups of structures are located on the summit of an adjacent hill (Meadows and Hartnett 2000:15). Although only a little over a kilometer from the center of Chan Chich, Group H would likely be cut-off from the urban epicenter for days or weeks at a time during the height of the rainy season.

The architectural arrangement represents a group-focused patio cluster as defined by Ashmore (1981:51) and comprises three formal patio groups with formally prepared platforms and 22 isolated structures, five of which may form another patio group without a formal platform. Patio Group H-1, a platform supporting four structures, crowns the summit of the hill. Immediately to the south is a small group of structures on a bluff looking south over Chan Chich Creek. Off the northwestern corner of Patio Group H-1 is Debitage Deposit (DD-) 1. A few meters to the west and slightly down the slope is a smaller deposit, DD-2, which is not directly associated with any structures. At the base of the slope are Patio Group H-3, five free-standing structures, and DD-3. Low masonry walls are visible on the surfaces of Structure H-26 and Structure H-30. The structures in Group H are generally small and low, but they are formally organized and largely share a common north-south orientation. The two structures that clearly deviate from the common orientation are Structures H-19 and H-20, two of three small platforms built at the base of the hill and oriented perpendicular to the slope. These three structures may have served special functions related to the swath of floodplain west of the hill.

The available data suggest that Group H is bounded by natural features to the west and

south (Chan Chich Creek) and by topographic and/or cultural features to the east (hill slope/agricultural terraces). The structures in the group are formally organized and represent a cluster. Furthermore, the artifacts recovered from limited architectural excavations support the interpretation that the tested buildings represent domestic structures (see further elaboration below). Therefore, Group H meets the neighborhood criteria of physical boundaries and spatial clustering of buildings.

Group H Social Distinctiveness and Domestic Economy

Evidence in support of "social distinctiveness" and an evaluation of domestic economy at Group H comes from the 1998 excavations that targeted Structure H-30, three structures at Patio Group H-1, and two debitage deposits (see Figure 2). Although ceramic recovery was generally low, Meadows and Hartnett (2000) determined that the structures and patio group they tested were all built and occupied during the Late Classic period. Testing at Patio Group H-1 documented poorly preserved architecture and determined that the surface of the patio was likely packed earth and limestone, not plaster. The courtyard appears to have been constructed in one event, which elevated the platform approximately 50 cm above bedrock. Excavations yielded many local artifacts, including ceramics, manos, debitage, and broken bifaces, but non-local artifacts were recovered as well, such as a granite metate fragment, an obsidian blade, and a shell pendant.

Meadows and Hartnett (2000) report a burial from beneath the patio's floor between Structures H-2 and H-3, near the base of the northern structure. Burial 5, which was analyzed by Frank and Julie Saul, contained the poorly preserved remains of an adult male between the ages of 25 and 35 years old. He was buried in a flexed position with his head to the west. Two battered biconvex oval bifaces and a complete secondary flake made of "red-stained brown chert" appear to have been intentionally buried with the body (Meadows and Hartnett 2000:23).

Structure H-30 is one of the larger mounds in Group H. It measures 15 m in length, 6 m in width, and 2 m in height, and has a low masonry wall on its eastern side that forms a

small enclosure or courtyard. The excavations determined that two construction phases might be present at Structure H-30, both apparently dating to the Late Classic period. The two suboperations combined to expose an intact plaster floor and a profile of the low wall extending off the eastern side of the structure. These features suggest that the structure may have been open along its eastern side facing the courtyard, facilitating activities undertaken in the courtyard. Recovered artifacts included a ceramic spindle whorl, chert biface fragments, and a proximal obsidian blade fragment (Meadows and Hartnett 2000).

Additional excavations at two debitage deposits indicate that occupants of Group H likely participated in a common economic activity, perhaps for over a century. Meadows' crews placed 1.5-x-1.5-m suboperations in the centers of DD-1 and DD-3, employing arbitrary 10-cm thick levels and collecting 1,000-cm³ column samples from the northeast corner of each level.

DD-1 is located 16 m due east of Structure H-4, which is part of Patio Group H-1. The deposit measures 12 m north-south and 16 m along the east-west axis. Prior to excavations, Meadows' crew noted large secondary flakes, several broken biface preforms, and some large limestone cobbles that exhibited abraded surfaces on the ground surface of the debitage deposit. Excavation of suboperation CC-6-B determined that DD-1 is approximately 1 m thick and rests on an artificially constructed platform. Although the composition of the deposit varied from level to level, it was dominated by lithic debitage, including primary decortication flakes, tertiary flakes, biface thinning flakes, and microdebitage. The deposit also contained broken biface preforms, oval biface fragments, limestone cobbles that were likely used as hammer stones, a bark beater, and moderate amounts of pottery (Meadows and Hartnett 2000:20).

The second debitage deposit tested was DD-3, 10 m south of Structure H-30. This mound measures 16.4 m north-south by 15 m east-west, and is 1.8 m high. Suboperation CC-6-D was excavated from the summit of the mound to bedrock. The debitage deposit was approximately 85 cm thick and formed on a

limestone shelf that appears to have been swept clean and used as the location for a lithic workshop (Meadows and Hartnett 2000:24). The upper levels of Suboperation CC-6-D yielded a large amount of lithic debitage ranging from a fine-grained purple and brown chert to a more coarse-grained white and blue chert. The debitage varied to some degree between levels, with primary and secondary flakes dominating the upper levels. In Levels 3 and 4, the excavations encountered a large deposit of coarse-grained sand that appears to have been lain down in a uniform fashion. Below this layer, secondary and tertiary lithic debitage again predominated. Unlike DD-1, the top three levels in DD-3 yielded no other cultural material besides lithic tools and debitage, suggesting different formation characteristics.

Tool Forms

The excavations of Subops CC-6-A through -F recovered 151 tools and tool fragments. Meadows and Hartnett (2000: Table 2.1) provide information on each specimen's size, form, condition, raw material, evidence of use/reuse, and breakage; only the high points are summarized here. The majority of tools and tool fragments came from DD-1. The distribution of preforms, which accounted for 21.5 percent of the total assemblage, indicates that tool production is represented at the debitage deposits, where 92 percent of the preforms originated, while tool maintenance was more prevalent at the domestic structures sampled by the excavations. However, differences between the two debitage deposits are also revealed by the distribution of tools. Of the 117 tools and fragments found in the debitage deposits, 74 came from DD-1, and 28 of those, or 37.8 percent, were preforms. This contrasts with the lower number of tools ($n=43$) and the lower percentage of preforms ($n=6$, or 14 percent) from DD-3. The differences support the interpretation that DD-1 represents the remains of stone tool production activities, while at DD-3 (which exhibits much less production discard), other activities like tool maintenance may have been more prominent (Meadows and Hartnett 2000:32).

It was clear from the analysis of tool forms and tool form fragments that local chert

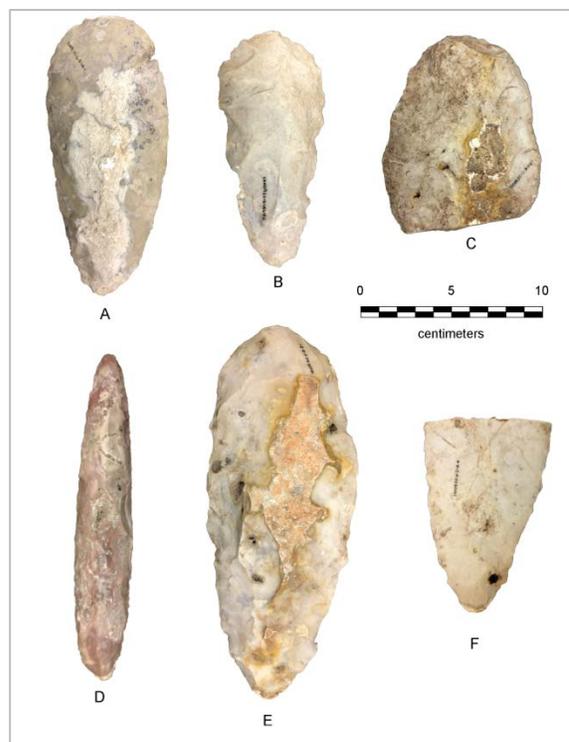


Figure 3. Examples of stone tool forms produced at Group H during the Late Classic: a, b) small oval bifaces; c) general utility biface fragment; d) narrow biface; e) large oval biface; f) thin biface fragment. Courtesy of the Chan Chich Archaeological Project.

was likely utilized in lithic production at Group H. These are highly chalcedonous materials, considered to be of moderate quality, with numerous voids and fossil inclusions visible. Although no quarries have been identified at Chan Chich, numerous chert cobbles are present in the bed of Chan Chich Creek. It seems probable that the creek was the source of the material being worked at Group H.

The analysis of the tools and fragments indicates the residents of Group H produced at least six formal types of tool forms from these local cobbles (Figure 3). Small oval bifaces (15.2 percent) accounted for the most common special form, but general utility bifaces (14.6 percent) and narrow bifaces (14.6 percent) were nearly as prevalent. Large oval bifaces—not the fine tools produced at Colha but rather a production continuum between general utility bifaces at one end and bifacial celts at the other—accounted for 11.3 percent of the assemblage. Three tools (2.0 percent) fall into the thin biface form. The remaining tools (41.0

Table 1. Estimates for Volume, Density, and Tools Produced at DD-1 and DD-3.

DD	Base Radius (m)	Height (m)	Volume ^{1,2} (m ³)	Density (kg/m ³)	Min. Tools/ Max. Tools ³	LC Min. Tools/Year ⁴	LC II Min. Tools/Year ⁵
1	7.0	1.0	77.5	2,007	103,695/155,543	518	1,037
3	8.5	0.85	96.8	1,781	114,934/172,401	575	1,149

1. Volume of DD-1 calculated by WolframAlpha (2014a)
2. Volume of DD-3 calculated by WolframAlpha (2014b)
3. Based on conservative estimates for debitage waste of 1,000 g (maximum tools) and 1,500 g (minimum tools) after Whittaker et al. (2009:150).
4. Minimum number of tools produced assuming deposit formed over 200 years in the Late Classic.
5. Minimum number of tools produced assuming deposit formed over 100 years in Late Classic II.

percent) fall into a generic biface category, which includes most of the preforms from the assemblage.

Tool forms varied between the two debitage deposits, with the main differences being in the production of general utility bifaces, which were much more prevalent in DD-1, and narrow bifaces, which were more prevalent in DD-3 (associated with Structure H-30). The other tool form classifications are relatively similar in terms of overall frequency of appearance, with the exception of large oval shaped bifaces, which were also more common at DD-1.

Production Intensity

Research at Colha in northern Belize indicates that the Maya used a two-step process in producing chert tools (Shafer and Hester 1983, 1991). The first step was the roughing out of large macroflakes and/or very roughly shaped biface blanks at the quarry for later reduction in workshop and/or domestic contexts. The second step was the thinning and shaping of a blanks and preforms into final form. The results of limited debitage analysis recovered at Chan Chich indicate a similar pattern. In the workshops at Group H, craft persons reduced macroflakes via bifacial reduction into tool forms for immediate use and perhaps also for local exchange. The debitage indicates the conservative nature of lithic technology via the standardized form of individual flakes. These debitage deposits represent a continuum of

reduction, evidenced by the presence of numerous larger secondary flakes to the copious quantities of microdebitage (Meadows and Hartnett 2000).

Four types of information are needed to estimate the number of tools produced at each Group H debitage deposit per year: total volume of deposit, density of debitage, amount of waste from each stone tool, and use span of the deposit. Fortunately, all four of these can be estimated or calculated based on available data. For the purposes of calculating volume, the two debitage deposits are treated as spherical caps, and, with known heights for each cap and base radii averaged from the measured horizontal extents of the two deposits, is possible to estimate the total volumes of debitage at DD-1 and DD-3 to be 77.5 m³ and 96.7 m³, respectively (Table 1).

The debitage data from the column samples collected in each level can be used to estimate the density of debris in the two suboperations. At DD-1, the average density of debitage throughout the deposit was 2,007 kg/m³ compared to 1,781 kg/m³ at DD-3.

Experimental tool production by Whittaker et al. (2009) provides a framework for estimating the amount of waste discarded as part of the production of each biface. Whittaker et al. (2009) excavated a lithic workshop and associated debitage dump at the nearby site of El Pilar, which has comparable raw material to Chan Chich. At El Pilar, the knappers produced comparable tool forms to those at Chan Chich,

described by Whittaker et al. (2009:140) as "ovoid bifaces, usually with a thick biconvex cross section," commonly referred to as "'general utility bifaces,' 'oval bifaces,' and 'flaked celts.'" As part of their research, Whittaker's team made replica bifaces and calculated the amount of waste flakes (as both counts and weights) produced for each finished tool. They determined that conservative estimates are 1,000 to 1,500 g of debitage waste per biface (Whittaker et al. 2009:150). Based on those estimates and the densities we calculated for the Group H deposits, each cubic meter represents between 1,338 and 2,007 bifaces at DD-1 and between 1,187 and 1,781 bifaces at DD-3. Based on the calculated volumes for the deposits, DD-1 and DD-3 each likely represents the debitage waste associated with the production of approximately 100,000–170,000 bifaces.

Estimating the scale of production at Group H is difficult because we do not know how long it took each deposit to form, but Table 1 includes estimates for the minimum number of tools produced per year assuming 200-year and 100-year periods of use. The results suggest that knappers produced minimally 500 to 1,100 bifaces per year at each deposit during the Late Classic period. If the deposits formed more quickly, the number of tools produced each year could actually be substantially higher.

In sum, the available data from Group H points to a common economic activity—stone tool production and maintenance. Therefore, Group H seems to reflect social distinctiveness, the third criteria for an ancient Maya neighborhood.

Discussion

It is clear from the analysis of lithic materials reported by Meadows and Hartnett (2000) and summarized here that a number of different tool forms were being produced and maintained by the ancient inhabitants of Group H. The most common forms include the small oval biface, the general utility biface, and the "narrow biface. These were likely intended for use in agriculture, domestic tasks, woodworking, and masonry as evidenced by use wear on complete specimens associated with the structure excavations (Meadows and Hartnett

2000:38). The two deposits, however, suggest that knappers at the two locations focused on the production of different tool forms, but still produced the other forms in lesser numbers. The technological knowledge of how to produce these standard forms over what may have been one or two centuries was a critical component of the lithic craft economy at Group H (Meadows and Hartnett 2000:38). Future research should compare the nature of lithic production from Group H to that of the other two areas with documented debitage deposits in Group B and the North Plaza to examine models of production and exchange (see Figure 1).

It also seems reasonable to refer to Group H as a "neighborhood," as defined by Smith (2010). All three archaeological indicators are present: physical boundaries, clustered houses, and social distinctiveness. However, it is unclear whether all of the dozens of presumably residential buildings scattered around the Chan Chich urban epicenter were organized into neighborhoods that conform to these principles, or were perhaps organized in some other way. Nevertheless, the identification of one Late Classic neighborhood at Chan Chich opens up future research possibilities to identify other spatial clusters of houses sharing common economic functions within the urban landscape, or to perhaps identify additional criteria that can be used to recognize ancient Maya neighborhoods in an urban context. One possibility to be explored is that neighborhoods like Group H are only found on the outskirts of the urban landscape, while those households within the urban epicenter (that is, within 1 km of the Main Plaza) formed essentially a large and specialized neighborhood related to the urban activities of the civic/ceremonial site core.

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References Cited

Ashmore, Wendy

1981 Some Issues of Method and Theory in Lowland Maya Settlement Archaeology. In *Lowland Maya Settlement Patterns*, edited by Wendy Ashmore, pp. 37–69. University of New Mexico Press, Albuquerque.

Guderjan, Thomas H.

1991 Chan Chich. In *Maya Settlement in Northwestern Belize*, edited by Thomas H. Guderjan, pp. 35–50. Maya Research Program, San Antonio, Texas and Labyrinthos, Culver City, California.

Houk, Brett A., Hubert R. Robichaux, and Jeffrey Durst

1996 Results of the 1996 Season. In *The 1996 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk and Hubert R. Robichaux, pp. 21–30. Papers of the Chan Chich Archaeological Project, Number 1. Center For Maya Studies, San Antonio, Texas.

Meadows, Richard K.

1998 A Research Design for Group H. In *The 1997 Season of the Chan Chich Archaeological Project*, edited by B. Houk, pp. 87–91. Papers of the Chan Chich Archaeological Project, Number 3. Center for Maya Studies, San Antonio.

Meadows, Richard K., and Kristen M. Hartnett

2000 Archaeological Excavations at Group H: Investigating Craft Production and Domestic Architecture at Chan Chich, Belize. In *The 1998 and 1999 Seasons of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 15–39. Papers of the Chan Chich Archaeological Project, Number 4. Mesoamerican Archaeological Research Laboratory, The University of Texas, Austin.

Shafer, Harry J., and Thomas R. Hester

1983 Ancient Maya Chert Workshops in Northern Central Belize, Central America. *American Antiquity* 51:158–166.

1991 Lithic Craft Specialization and Product Distribution at the Maya Site of Colha, Belize. *World Archaeology* 23:79–97.

Smith, Michael E.

2010 The Archaeological Study of Neighborhoods and Districts in Ancient Cities. *Journal of Anthropological Archaeology* 29:137–154.

2011 Classic Maya Settlement Clusters as Urban Neighborhoods: A Comparative Perspective on Low-Density Urbanism. *Journal de la Société des Américanistes* 97(1):51–73.

Whittaker, John C., Kathryn A. Kamp, Anabel Ford, Rafael Guerra, Peter Brands, Jose Guerra, Kim McLean, Alex Woods, Melissa Badillo, Jennifer Thornton, and Zerifeh Eiley

2009 Lithic Industry in a Maya Center: An Axe Workshop at El Pilar, Belize. *Latin American Antiquity* 20:134–156.

WolframAlpha

2014a

<http://www.wolframalpha.com/input/?i=volume+of+spherical+cap+1+m+high+7+m+base+radius>, electronic document, accessed April 14, 2014.

2014b

<http://www.wolframalpha.com/input/?i=volume+of+spherical+cap+0.85+m+high+8.5+m+base+radius>, electronic document, accessed April 14, 2014.