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REPORT

Household Participation in the Lithic Industry at the Took' Witz Group at El Palmar, Campeche, Mexico

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Abstract
This study examines the organization of large-scale chert biface production in the Maya Lowlands, focusing on Took' Witz, an architectural group of El Palmar in Campeche, Mexico. Excavations and debitage analysis at three *plazuelas* and a major debitage deposit revealed a complex lithic industry. The results identified segmented production activities in households, from sourcing materials and early-stage reduction to late-stage biface production. The production scale far exceeded household consumption, probably supporting intensive agriculture in the region. The results provide insight into the variable settings and organization of the biface industry throughout the Maya Lowlands.

Resumen
Este estudio examina la organización sobre la producción de bifaciales de pedernal a gran escala en las tierras bajas mayas, particularmente Took' Witz, un grupo arquitectónico de El Palmar ubicado en Campeche, México. Las excavaciones y el análisis de lascas en tres plazuelas y un gran depósito revelaron una compleja industria lítica. Los resultados identificaron actividades de producción segmentadas en las plazuelas, desde la obtención y decortezamiento de materia prima hasta la producción final de bifaciales. La escala de producción superaba el consumo doméstico que probablemente soportaba la agricultura intensiva de la región. El resultado proporciona información sobre las variables de configuración y organización industrial de bifaciales en las tierras bajas mayas.

Keywords: classic Maya society; chert biface production; El Palmar; household production; lithic industry

Palabras clave: sociedad maya clásica; producción de bifaciales de pedernal; El Palmar; producción doméstica; industria lítica

Chert bifaces were essential tools in the daily lives of the ancient Maya. Tools were produced in various production settings throughout the Maya Lowlands from the Preclassic through the Terminal Classic periods (900 BC–AD 1000), peaking at many sites in the Late Classic period (AD 600–900) (Andrieu 2013:25; Horowitz 2018:951). Colha, Belize, stands out as the most extensively studied industrial-scale production center (Shafer and Hester 1991). Secondary centers, including El Pilar (Whittaker et al. 2009:150), Chan Chich (Houk and Zaro 2015:132–133), Rio Bec (Andrieu 2013:29–31), and San Bartolo (Kwoka 2014), have also provided insights into the significance and variability of lithic production.

In contrast, less is known about production in the hinterlands where most of the population lived. The presence of quarries and production sites outside of centers indicates larger-scale toolmaking occurred in rural areas, although the settings and organization varied (Horowitz 2018). We define larger-scale

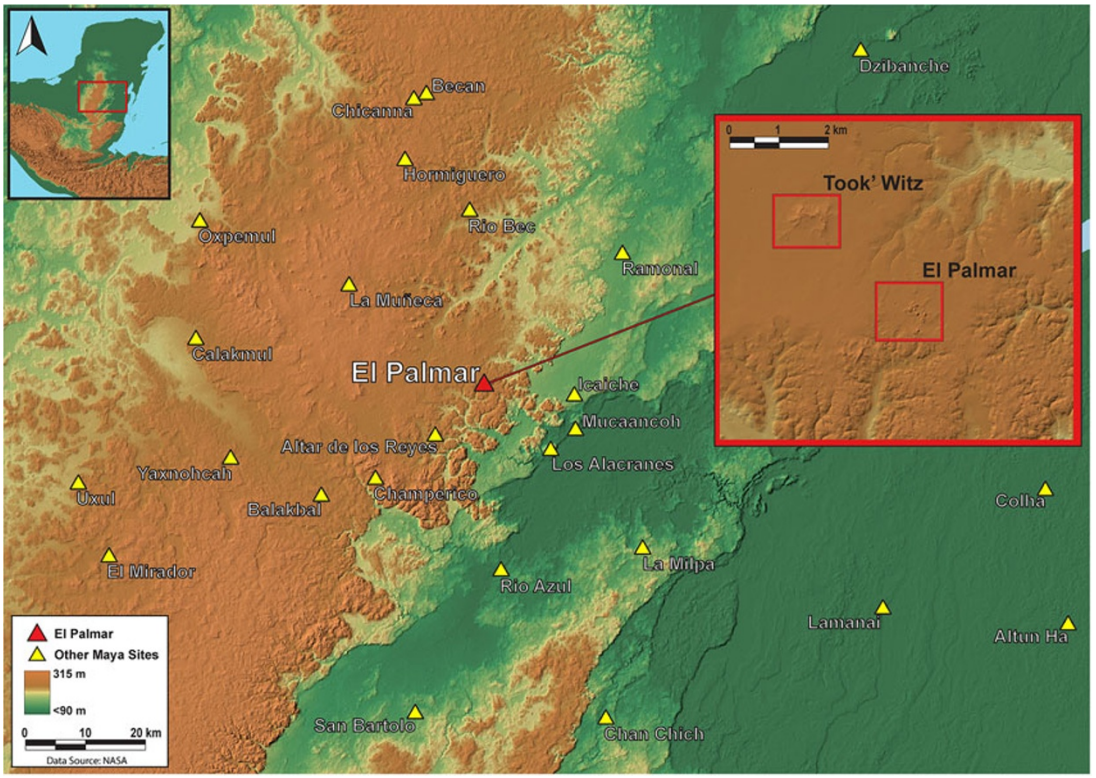

Figure 1. Map of El Palmar and other Maya sites. (Color online)

production as exceeding household consumption levels. Investigating lithic production in hinterland areas can reveal the relationship between economic systems and daily life.

Took' Witz, a small architectural group in the hinterlands of El Palmar, Mexico, offered additional insights into understanding the variable settings and organization of chert biface production in the Maya Lowlands. Analysis of lithic materials recovered from excavations revealed the scale and types of production activities in different households within Took' Witz. We discuss the organization of the lithic industry at Took' Witz through comparative analyses of debitage.

Took' Witz

Took' Witz is located 3.5 km northwest of El Palmar in Campeche, Mexico (Figure 1). In 2017, an airborne lidar survey mapped 94 km^2 surrounding El Palmar's civic core, uncovering extensive raised agricultural fields in the northwest *bajos*. On a ridge surrounded by the *bajo*, the lidar images showed a cluster of 216 structures, later named Took' Witz.

Ground verifications in 2018 detected a cluster of five large chert debitage deposits, Features 1–5 (Figure 2). These features are debitage piles lacking structural elements that range from 0.5 m to 2.0 m thick, with surface areas between 57.5 m^2 and 216.0 m^2. While Feature 3 is next to a structure, the other features are situated throughout the west side of the group between structures. Additionally, significant quantities of chert debitage were found within the construction fill of two structures (Figure 2).

Our pilot research explored Took' Witz's lithic industry through pedestrian surveys to identify additional deposits and quarries. We collected debitage samples from the surfaces of Features 1–5. While no additional features or quarries were found, chert cobbles were abundant on the surface near the *bajos* surrounding Took' Witz, similar to San Bartolo (Kwoka 2014:177). A technological analysis of the debitage samples revealed the full range of debitage associated with biface production

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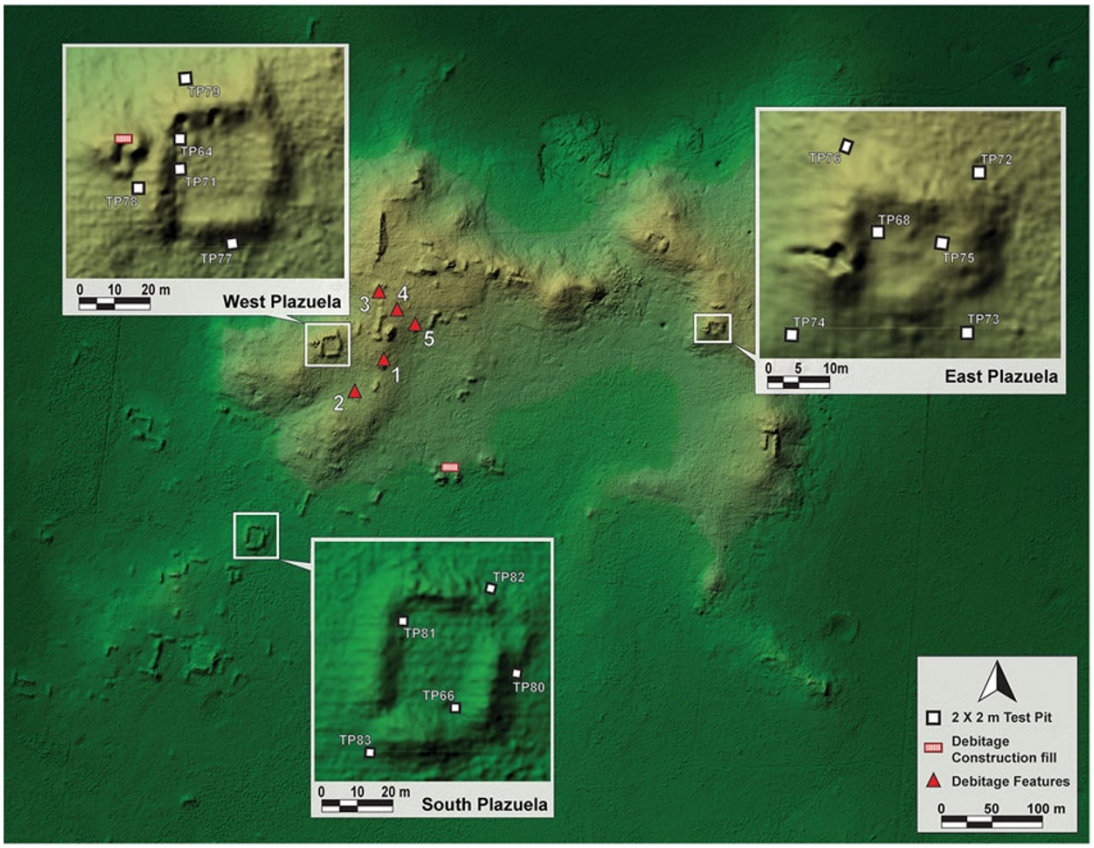

Figure 2. Map of Took' Witz with the locations of test pits and debitage features. (Color online)

(Tsukamoto et al. 2020:289–290). Along with the debitage, numerous oval bifaces on the surface of Feature 1 suggested biface production occurred at the feature.

In subsequent seasons, we examined the relationship between the lithic industry and households at Took' Witz. Three *plazuelas*—the West, East, and South—were selected due to their similar size and layout yet differing proximities to the debitage deposits. Each *plazuela* has four to five rectangular structures. The West Plazuela is on the hilltop, 50–100 m from the debitage deposits. The South Plazuela is in the low-lying area, 200 m southwest of the deposits, and the East Plazuela is on the ridge, 500 m from the deposits.

The distinct locations suggested variable associations with the lithic industry. These associations were tested through excavations and artifact analysis. We first sought to identify if toolmaking occurred at the *plazuelas*, and then to examine the types and scales of production.

Excavations

We examined tool production through a 1.0 × 1.0 m unit in the center of Feature 1, the sole debitage feature excavated. The deposit was 1.66 m thick—0.10 m of topsoil (Layer I), covering two layers of debitage, 0.66 m (Layer II) and 0.47 m deep (Layer IV), separated by a 0.30 m construction lens (Layer III). Fill 0.07 m thick covered the bedrock (Layer V). A 0.10 × 0.10 m column sample, separated into 0.05 m layers, was collected for debitage analysis. A ^{14}C sample found near the bottom of Layer IV, 1.39 m below the surface, indicated debitage deposition began between cal AD 607–675 (calibrated at 2σ with IntCal2020).

Subsequently, shovel testing was conducted at the three *plazuelas* to search for middens and determine excavation locations. A total of 182 shovel tests were conducted, spaced 4.0 m apart across the

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Table 1. Tools from Took' Witz.

Tool Types	Feature 1 Surface	Feature 1 Excavation	West Plazuela	South Plazuela	East Plazuela
Core	—	2	8	17	8
Biface: Preform	1	2	23	28	19
Biface: Oval	11	1	5	6	9
Biface: Cylindrical	5	—	—	—	—
Biface: Unknown	9	2	7	6	1
Drill	—	—	2	—	—
Burin	—	—	4	—	2
Projectile Point	—	—	—	—	1
Hammerstone	6	—	—	—	—
Obsidian Blade	—	1	1	4	2
Total	**32**	**8**	**50**	**61**	**42**

central plazas and outside the structures. No domestic middens with mixed materials were found behind structures. However, a 0.30 m layer of debitage capped the plaza floor of the West Plazuela, identified in 20 of 25 tests within the plaza. The layer was consistently thick across the western half of the plaza but thinned near the north and eastern edges. While we interpreted this as a termination deposit, it is possibly evidence of production within the plaza. Either interpretation demonstrates the availability of debitage at the *plazuela*.

Based on the shovel test results, we excavated 16 2.0 × 2.0 m test pits (Figure 2). Ceramic analyses of materials from the excavations suggest the *plazuelas* were occupied in the Late and Terminal Classic periods. Judging from these temporally diagnostic materials, the *plazuelas* were contemporaneous with production at Feature 1.

Artifacts recovered at the *plazuelas* suggest they were residential spaces. The ceramic assemblages were predominantly unslipped and monochrome jars and bowls with few polychrome sherds (<5.5%). Manos and metates were also found at the *plazuelas*. Exotic goods were very limited, including obsidian blades ($n = 7$), marine shells ($n = 5$), and granite manos ($n = 3$).

Results

Tools

Lithic tools collected during surveys and excavations provided a sample of the tool types produced and used at Took' Witz (Table 1). Like other biface production sites (Horowitz 2018:952), broken preforms and late-stage and finished bifaces were found at Feature 1 and the *plazuelas*. The primary tools were thin oval (Figure 3a) and cylindrical (Figure 3b) bifaces (1.8–2.9 cm thick), and thicker (3.0–4.8 cm) general utility bifaces with ground distal bits (Figure 3c). These tools represent common bifaces produced and used throughout the Maya Lowlands for quotidian tasks, including agriculture, food preparation, and construction (Horowitz 2018:951; Whittaker et al. 2009:140). Other tools were chert drills and burins, obsidian blades, and hammerstones, made of chert, quartzite, and repurposed manos.

Debitage Analysis

We employed a technological debitage analysis to observe the stages of biface production that occurred at each location (Andrefsky 2005:120; Whittaker et al. 2009:142–143). This method categorized debitage within an idealized production sequence of early, middle, and late-stage flakes. The categories observed included decortication flakes, general percussion flakes, biface thinning flakes, shatter, microdebitage, and indeterminate flakes.

Decortication flakes, with cortex covering more than 50% of the dorsal surface, represent early-stage production. General percussion flakes have less than 50% cortex and pronounced bulbs of percussion and represent the middle stage after cortex removal but before thinning. Late-stage production involves

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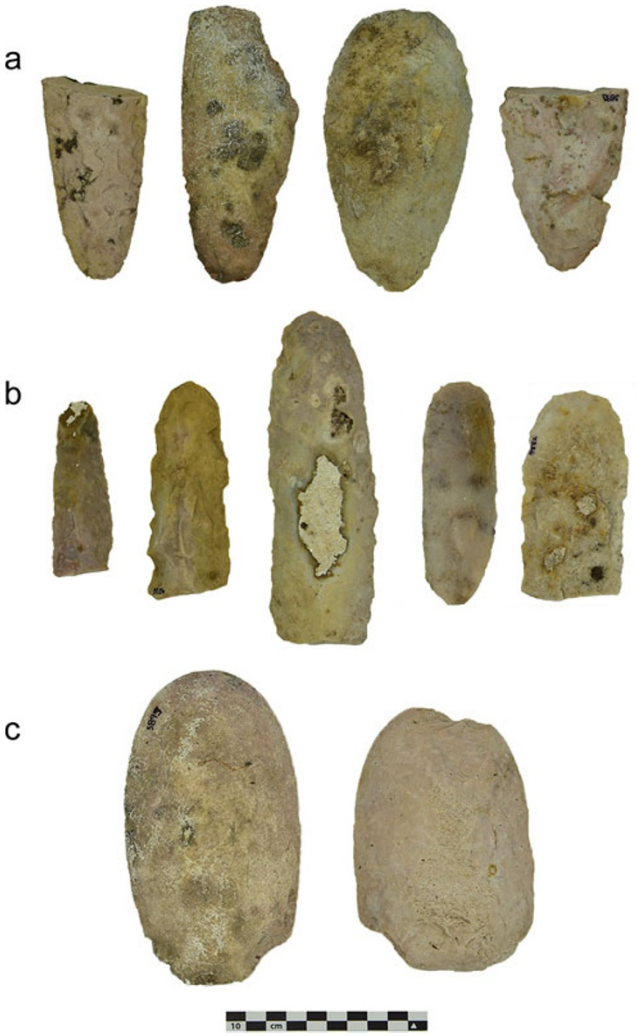

Figure 3. Sample of oval (a), cylindrical (b), and general utility bifaces (c) recovered at Took' Witz. (Color online)

final thinning and shaping, creating biface thinning flakes: thin and curved flakes with little to no cortex; small, lipped platforms; and evidence of previous flake removals (Andrefsky 2005:123). Shatter is angular debris lacking the typical attributes of debitage, while microdebitage measures less than 2 cm. All other flakes, especially those missing platforms, were labeled indeterminate. The final three categories are produced throughout all stages.

The debitage from the Feature 1 excavation included the full range of debitage, confirming patterns observed in the Features 1–5 samples (Figure 4). However, the excavation yielded significant microdebitage. There were relatively few decortication flakes but a greater quantity of later-stage general percussion flakes and biface thinning flakes.

Feature 1 results demonstrate Took' Witz was a biface-producing site during the Late and Terminal Classic periods. Extrapolating from the sample, which contained 35,838 flakes, the density of Feature 1 was 3,171,504 flakes per m^3. With an estimated volume of 244.08 m^3, Feature 1 contained approximately 774,100,700 flakes. This density is lower than workshops at Colha (Shafer and Hester 1991:83), comparable with other rural biface production sites like Succotz, and greater than informal tool production sites like Callar Creek and San Lorenzo (Horowitz 2018:951).

To estimate the number of tools made, we referred to experimental biface production, which produced 748–960 flakes per biface (Whittaker et al. 2009:146–147). Using this experimental range,

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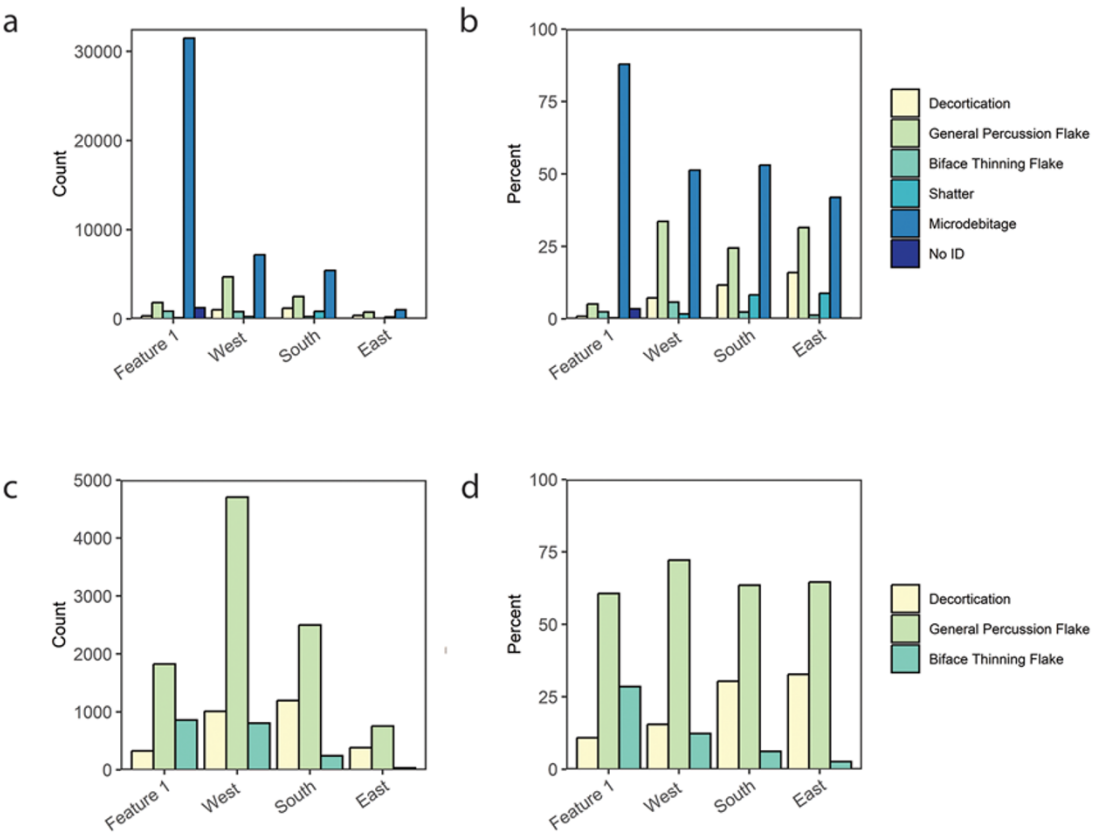

Figure 4. Proportions of observed flake types, based on count (a) and percent (b), and the proportions of decortication, general percussion flakes, and biface thinning flakes, based on count (c) and percent (d), from the four locales. (Color online)

806,355–1,034,894 bifaces were produced at Feature 1. The four additional debitage features, substantial debitage in structural fill, and the debitage layer on the plaza demonstrate that significantly more tools were produced throughout Took' Witz. While the estimates should be considered tenuously due to the small experimental sample, they help to establish that the number of tools produced far exceeded the community's demand and signify Took' Witz's significant role in biface production for the El Palmar kingdom.

The debitage analysis of the three *plazuelas* revealed different production processes at each household (Figure 4). The number of flakes in each assemblage varied significantly: West ($n = 13{,}958$), South ($n = 10{,}200$), and East ($n = 2{,}391$) Plazuelas. Although all flake types were present in each group, the proportions differed.

A Chi-Square Test of Independence assessed the association between three flake types—decortication, general percussion flakes, and biface thinning flakes—and locations. The results, χ^2 (6, $N = 14631$) = 1338.6, $p = 0.001$, rejected the null hypothesis of independence, demonstrating a highly significant association between flake types and locations. The Pearson residuals revealed that decortication flakes were overrepresented at the South (19.20) and East (11.46) Plazuelas but underrepresented at the West Plazuela (–12) and Feature 1 (–13.99). General percussion flakes are overrepresented at the West Plazuela (12.21) but underrepresented at Feature 1 (–8.12), the South Plazuela (–5.23), and the East Plazuela (–1.72). Biface thinning flakes were overrepresented at Feature 1 (27.79) and minimally underrepresented at the West Plazuela (–2.82) compared to the South (–15.366) and East (–11.12) Plazuelas.

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To understand the implications, we contextualized these differences with other excavation data. The overrepresentation of biface thinning flakes at Feature 1 and the presence of preforms and late-stage tools demonstrate that late-stage biface production was the primary activity at the feature. The scarcity of decortication flakes suggests that bifaces were primarily made from blanks or reduced cobbles, prepared elsewhere. The large quantity of microdebitage ($n = 31{,}486$; 87.86%) suggests it was a primary context for biface production.

The residents of the West and South Plazuelas participated in different segments of biface production. The West Plazuela focused on late-stage biface production, similar to Feature 1, seen in the underrepresentation of early-stage debitage and the numerous preforms and finished bifaces. Although biface thinning flakes were marginally underrepresented, at 5.76% of the assemblage, they were much more abundant than at the other *plazuelas*. Together with debitage in the structural fill and the debitage layer on the plaza, it is evident that late-stage biface production occurred in the group, and waste was systematically repurposed.

The South Plazuela sourced raw materials and performed primary reduction of cobbles, along with some biface production. Sourcing was evidenced by more than 100 tested chert cobbles, with one to two large flake removals, within the plaza floor fill. Abundant decortication flakes further suggest that sourced materials were tested to select high-quality ones. Lower-quality materials, unsuitable for tool production, were repurposed for construction. The majority of debitage (70%) originated from behind structures, most of which came from TP80 (51%) (Figure 2). This indicates that debitage was deposited in specific areas outside the structures, demonstrating systematic reduction and waste disposal.

The East Plazuela's connection to the biface industry is unclear. Unlike at the other *plazuelas*, there was no systematic dumping or reuse of debitage. Smaller quantities of preforms, finished tools, and debitage were found throughout the *plazuela*. Decortication flakes were overrepresented, while biface thinning flakes were underrepresented, demonstrating production from raw cobbles to finished tools, rather than emphasis on a single stage. These results suggest the household produced a smaller number of bifaces, possibly for household consumption.

Discussion

The study of Took' Witz revealed a segmented industry of biface production, expanding our knowledge about the organization of rural lithic industries. The excavation results and tool estimates show that multiple households collaborated to produce tools on a scale far beyond local consumption, probably used for intensive agriculture in the nearby *bajo*. The segmentation of production stages, observed at Took' Witz, was similar to Chan Chich (Houk and Zaro 2015:132) and Succotz, where early-stage reduction and later-stage tool production occurred in separate areas. Other rural sites show all stages from quarrying to final toolmaking at single locations (Horowitz 2018:953).

Many hinterland production sites, like those in the Mopan Valley, occurred in single households (Horowitz 2018: 950). Conversely, Took' Witz demonstrated wider community engagement, with lithic production occurring at households near debitage deposits and those farther away. Thus, Took' Witz provides an intermediate example between production within or near site cores, like at Colha, El Pilar, Rio Bec, San Bartolo, and Chan Chich, and rural production by individual households. These differences highlight the variable organization of labor in lithic production in the Maya hinterlands.

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Data Availability Statement. All relevant data are in Table 1, Figure 4, and Supplementary material 1.

Competing Interests. The authors declare none.

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Supplementary Material. The supplementary material for this article can be found at https://doi.org/10.1017/laq.2025.10114. Supplementary material 1. Flake Counts from Each Location (table).

References Cited

Andrefsky, William, Jr. 2005. *Lithics: Macroscopic Approaches to Analysis*. 2nd ed. Cambridge Manuals in Archaeology. Cambridge University Press, Cambridge.

Andrieu, Chloé. 2013. Late Classic Maya Lithic Production and Exchange at Rio Bec and Calakmul, Mexico. *Journal of Field Archaeology* 38(1):21–37.

Horowitz, Rachel A. 2018. Uneven Lithic Landscapes: Raw Material Procurement and Economic Organization among the Late/Terminal Classic Maya in Western Belize. *Journal of Archaeological Science: Reports* 19:949–957.

Houk, Brett A., and Gregory Zaro. 2015. Lithic Production and Domestic Economy in an Ancient Maya Neighborhood at Chan Chich, Belize. *Research Reports in Belizean Archaeology* 12:127–134.

Kwoka, Joshua J. 2014. Ideological Presentism and the Study of Ancient Technology: Preclassic Maya Lithic Production at San Bartolo, Guatemala. PhD dissertation, Department of Anthropology, University at Buffalo, State University of New York, Buffalo.

Shafer, Harry J., and Thomas R. Hester. 1991. Lithic Craft Specialization and Product Distribution at the Maya Site of Colha, Belize. *World Archaeology* 23(1):79–97.

Tsukamoto, Kenichiro, Luz Evelia Campaña Valenzuela, and Javier López Camacho (editors). 2020. *Proyecto Arqueológico El Palmar: Urbanización del Espacio Social en las Tierras Bajas Mayas: Octava Temporada Campo Programa de Trabajo 2019*. Archivo Técnico del Consejo de Arqueología. Instituto Nacional de Antropología e Historia, Mexico City.

Whittaker, John C., Kathryn A. Kamp, Anabel Ford, Rafael Guerra, Peter Brands, Jose Guerra, Kim Mclean, et al. 2009. Lithic Industry in a Maya Center: An Axe Workshop at El Pilar, Belize. *Latin American Antiquity* 20(1):134–156.

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