




# Animate Stone: Maya Chert 'Debitage' and Ontological Perspectives

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## ABSTRACT

Ethnographic and ethnohistoric research concerning Maya conceptions of stone illustrate that the Maya consider stone animate. In archaeology, discussions of animate stone focus on ritual contexts. 'Utilitarian' objects, like debitage, are recognized as symbolic when deposited in ritual spaces but not in quotidian ones. However, the animate nature of stone suggests that its significance should be discussed in quotidian contexts. We compare chert debitage from ritual and production areas in the Maya lowlands utilizing ethnographic, ethnohistoric, and epigraphic information about the agency of stone, specifically chert. These discussions highlight the integration of Indigenous perceptions of non-human objects in archaeology interpretation.

Résumé: La recherche ethnographique et ethno-historique relative aux conceptions Mayas de la pierre met en évidence que les Mayas la considèrent comme animée. En archéologie, les débats sur la pierre animée s'intéressent aux contextes rituels. Les objets "utilitaires", tels que le débitage, sont distingués comme symboliques lorsqu'ils sont déposés dans des espaces rituels, mais pas dans ceux du quotidien. Toutefois, la nature animée de la pierre suggère que sa signification doit être discutée dans des contextes quotidiens. Nous comparons le débitage de chaille issu de régions rituelles et de production dans les plaines mayas en nous appuyant sur des informations ethnographiques, ethno-historiques et épigraphiques portant sur le travail de la pierre, en particulier la chaille. Ces discussions

mettent l'accent sur l'intégration des perceptions indigènes quant aux objets non-humains au sein de l'interprétation archéologique.

Resumen: Las investigaciones etnográficas y etnohistóricas sobre las concepciones mayas de la piedra ilustran que los mayas consideran animada la piedra. En arqueología, las discusiones sobre piedras animadas se centran en contextos rituales. Los objetos "utilitarios", como el lascado, se reconocen como simbólicos cuando se depositan en espacios rituales, pero no en espacios cotidianos. Sin embargo, la naturaleza animada de la piedra sugiere que su significado debería discutirse en contextos cotidianos. Comparamos el lascado de pedernal de áreas rituales y de producción en las tierras bajas mayas utilizando información etnográfica, etnohistórica y epigráfica sobre la acción de la piedra, específicamente el pedernal. Estas discusiones resaltan la integración de las percepciones indígenas de objetos no humanos en la interpretación arqueológica.

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**KEY WORDS**

Lithics, Maya, Ontologies, Debitage

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## Introduction

Archaeological analyses of lithics often rely on Western perceptions of stone quality and morphological tool typologies to interpret their functions. However, Western perceptions of stone and other materials are often incompatible with Indigenous ontologies, particularly in terms of how people understand the relationships between humans and non-human objects. In this paper, we examine Maya ontological perspectives of stone, and how they can be used to interpret deposits often conceived of as 'trash' or 'debitage' in archaeological parlance. We suggest that deposits of stone in ritual and quotidian contexts have much more in common, due to the animate nature of stone, than is implied by the distinctions archaeologists draw when separating them into two distinct types of contexts, as this dichotomy is not representative of Maya ontologies (see Astor-Aguilera 2008, 2018).

As non-Maya, US-based archaeologists, we interpret these perspectives through preserved and published Maya texts, particularly those dating prior to Spanish contact (about 1550 CE), and anthropological studies of stone among contemporary Maya communities. These sources provide insight into Maya understandings of the animate nature of stone that we

then apply to the Preclassic (2000 BCE–200 CE) and Classic (200–800 CE) periods to reinterpret stone artifacts, particularly objects normally labeled quotidian/utilitarian.

While focused in the Maya region in modern-day southern Mexico and northern Central America, our analysis draws on broader trends in archaeology including relational ontologies, or the multidirectional interactions between things in the world (Friedel 1998; Grauer 2020; Harrison-Buck 2020; Pacheco 2021), and studies of the cultural variability in trash discard activities, interpretation of 'trash,' and differing cultural values for discarded materials (Cameron 2001; Fladd et al. 2021; Gifford-Gonzalez 2014; Hill 2000; McNiven 2013). Such studies reject the dichotomization between ritual and utilitarian deposits (Cameron 2001; Fladd et al. 2021; McNiven 2013), as such dichotomies are often inconsistent with non-Western ontological perspectives (see also Grauer 2020; Harrison-Buck 2020; Pacheco 2021). In this article, we address similar questions through examinations of relational stone ontologies, arguing that chert debitage held significance to past peoples regardless of the intended end product, which is what led to the placement of chert debitage in ritually important spaces. We argue that it is the inherent properties of the chert materials that make chert debitage ritually significant, rather than only the context in which it was deposited. In the following section, we discuss Maya beliefs concerning stone, as understood through ethnographic and epigraphic sources, before providing case studies of chert debitage deposition in the lowland Maya region.

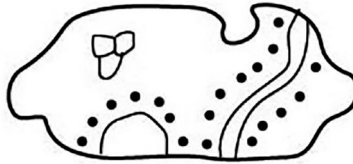
### **“On 1 Ahau was the Birth of the Flint [chert]” (Roys 1965:63)**

In the Maya world, lithic raw materials including chert, obsidian, and limestone are animate and possess a lifecycle and personhood (Astor-Aguilera 2020; Bassie-Sweet 1996; Doyle 2022; Houston et al. 2006; Houston 2014). According to Classic period Maya texts, objects made from materials quarried from the ground, like stone, possess qualities consistent with personhood including a human-like lifecycle (Clarke 2020; Clarke et al. 2012; Hendon 2012; Houston et al. 2006; Houston 2014). Stone, like most objects in the world, possess a lifeforce (sometimes glossed as a 'soul'), or *ch'ulel* in Tzotzil (Vogt 1965; in our discussion we use the word in Tzotzil for similar concepts in different Mayan languages, e.g., *Kux* in Yukatek (Houston 2014:78)). *Ch'ulel* is the force that energizes people and things (Houston and Stuart 1996:292) and is associated with the birth and death of individuals and objects. Ethnographically throughout the Maya region, human and non-human entities have power and agency due to their *ch'ulel* (Brown 2004; McAnany and Brown 2016; Mock 1998a; Saunders 2019; Stross 1998; Vogt 1965; Zamora Corona 2020). Landscape features, includ-

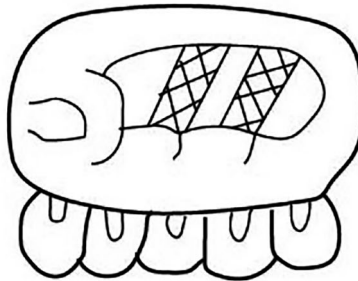
A.



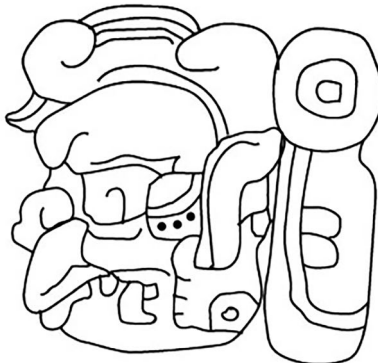
B.



C.



D.



◀ **Figure 1.** **a** *tuun* (stone) glyph showing the face present in one way of depicting this glyph. Redrawn from Montgomery Dictionary of Maya hieroglyphs (2002: T528hv), [research.famsi.org/Montgomery\\_dictionary](http://research.famsi.org/Montgomery_dictionary), **b** *took'* (chert) glyph showing the shape of the bifacial knife in the glyph element. Redrawn from Montgomery Dictionary of Maya hieroglyphs (2002: T257), [research.famsi.org/Montgomery\\_dictionary](http://research.famsi.org/Montgomery_dictionary), **c** *taj* (obsidian) showing darkness element in center of glyph. Redrawn from Montgomery Dictionary of Maya hieroglyphs (2002: T565v:136), [research.famsi.org/Montgomery\\_dictionary](http://research.famsi.org/Montgomery_dictionary), **d** *Kaloomte'* glyph showing Chahk holding a chert tool. Redrawing from Bassie-Sweet (2021: Figure 4.1)

ing rock outcrops, are among the many materials possessing a lifeforce (Frühsoerge 2015; Maxwell and Garcia Ixmata 2008; Saunders 2019; Zamora Corona 2020). While ethnographic and ethnohistoric analyses provide the most detailed understanding of this concept, epigraphic and archaeological analyses illustrate that the understanding that objects possessed a lifeforce dates back to at least the Preclassic period (Cecil and Pugh 2018; Garber et al. 1998; Grauer 2020; Houston and Stuart 1996; Mock 1998b; O'Neill 2009).

The lifeforce of human and non-human persons (sensu Hendon 2012) is associated with their birth and death. The relationship between lifeforces, lifecycles, and personhoods of lithics is illustrated in “The Birth of Flint” (Roys 1965:61–63), an ‘incantation’ recorded in a colonial Yukatek manuscript. Chert (flint) tools are described as being birthed like other living persons (human and non-human) rather than being crafted as a tool: “Four days it turns. This rock is its mother. Her offspring are you, small fragment of flint [chert]” (Roys 1965:61). While stone has its own lifeforce, objects can also be imbued with *ch’ulel* through their relationships with other persons, including relationships operationalized through ritual practice (Frühsoerge 2015; Stuart 1996). The presence of this lifeforce in physical objects can also be observed through the intentional destruction, or ‘killing,’ of objects that sometimes accompany the end of their use-life. To remove the lifeforce accumulated by an object throughout its history, it may be ‘killed’ before discard, usually by making a hole in it, breaking it, and/or burning it (Cecil and Pugh 2018; McAnany 1995; Mock 1998b; McGee 1998; O'Neill 2009; Schele and Miller 1986; Stross 1998). The human-like characteristics of stones are made apparent in the Maya glyph for stone (*tuun*), which sometimes includes a face (Figure 1a; Stuart 2010), and its relationship with lightning (Bassie-Sweet 1996).

Lithic raw materials are also associated with deities and natural phenomena. Obsidian (*taaj*) objects are marked by the symbol for darkness or blackness (Figure 1c; Agurcia et al. 2016; Stone and Zender 2011). Bassie-Sweet and Hopkins (2018) suggest that marking obsidian objects with the symbol for darkness relates not to its black and dark grey color but is

instead a reference to the use of obsidian blades and lancets as bloodletters, and the relationship between bloodletting and the act of creation. Chert, on the other hand, is related to lightning and the god of rain, *Chahk* (Agurcia et al. 2016; Doyle 2022; Taube 1992) and chert axes in particular are lightning personified (Doyle 2022; Houston 2014). In fact, among some modern Maya communities, chert is thought to be created by lightning strikes (Bassie-Sweet 2021; Schele and Miller 1986). The glyph for chert (*took'*) mimics the shape of an ovoid bifacial knife or axe, and refers not only to chert, but also to blood sacrifice, and is sometimes marked with bands or dots, which reflect the natural sparkle and lines found in some cherts (Stone and Zender 2011). It is also associated with death and warfare, frequently appearing on war-related costumes and paraphernalia (Figure 1b; Stone and Zender 2011).

The ancestral Maya associated both chert and obsidian with *K'awiil*, a deity related to transformation rites, royal rituals, and lightning (Stone and Zender 2011; Taube 1992). *K'awiil* is depicted with (or as) a lightning axe. In a clear pairing of natural phenomena, the god of rain, *Chahk*, often carries a *K'awiil* axe (Bassie-Sweet 1996; Doyle 2022; Taube 1992). *K'awiil* presided over activities like bloodletting, which is a performance that connects the sacrificer to the various Maya cosmological realms. Bloodletting implements, often made of obsidian, are frequently depicted in Maya art with faces, indicating their status as animate persons, as exemplified by the so-called 'Perforator God,' an anthropomorphic bloodletting tool (Schele and Miller 1986:176). Therefore, *K'awiil*, bloodletting, and lightning are all associated with transitions between the plane on which we live and the upperworld and underworld (Stone and Zender 2011). Contemporary ethnographic studies note the continued close relationship between chert and lightning among modern Maya groups, including the understanding that chert is formed through lightning strikes (Bassie-Sweet 2021).

In Maya art from the Classic period, rulers are often depicted holding *K'awiil* axes, and/or holding chert/shield combinations (Bassie-Sweet 2021; Doyle 2022). The *Kaloomte'* title, one of the highest titles held by Maya rulers, includes a depiction of a *Chahk* holding a *K'awiil* axe (Figure 1d; Bassie-Sweet 2021) and rulers often took regnal names that included *Chahk* and *K'awiil* to indicate their close relationship to those important deities (Doyle 2022). The maize god, one of the most important deities in the Maya pantheon who is also associated with rulership, is sometimes depicted with a lightening element, most often in the headdress (Doyle 2022; Salazar Lama 2022; Taube 1992), while *K'awiil* also sometimes wears the maize god's headdress (Taube 1992). Furthermore, in some Maya creation stories, *Chahk* granted humans access to maize, which was hidden underground, by cracking the surface of the earth with a lightning strike, sometimes shown in Classic Maya art as *Chahk* using a stone axe to crack

open a turtle carapace, representing the earth's surface (Chinchilla Mazariegos 2017:222–223; Friedel et al. 1993; Salazar Lama 2022:143, 151; Stross 2010:208; Zender 2006:10). Furthermore, lightning strikes are broadly connected with agricultural fertility (Doyle 2022:133), creating an important connection between stone and chert agricultural tools, lightning, maize, and rulership.

While stone materials have the potential to be animate, it is the relationships that stone objects have with humans and other non-human persons that determine whether objects are discussed as animate persons in some contemporary Maya populations (Astor-Aguilera 2008, 2018). That is, personhood is relational: it is constituted not *sui generis*, but out of the relationships a human or non-human person has with other such persons (Astor-Aguilera 2018). The importance of those relationships leads Bassie-Sweet (2021:260) to suggest that “anyone could use flint [chert] and obsidian, but harnessing the supernatural power that was thought to be inherent in these substances were the prerogative of the elite.” Similarly, Houston (2014:91) agrees that it is “implausible” for all stone working to involve ritual and spirits but suggested that “if rock conducts certain essences, then all stonecutting, even of limestone for building and fill, involves an act that is more ritual than not.” Thus, stone inherently has an animate nature, but the personhood and power of a particular object was understood in light of its relationships with other persons (Astor-Aguilera 2008).

It is interesting, however, to consider the case of chert producers, as they would have had different relationships with the toolstone material and the objects they made (or birthed) than the people who used those objects, whether commoners or elite individuals (see Hruby 2008 for a discussion of ritual chert production by elites). Houston (2014:24–5) notes that there is violence in the manufacture of chert tools that parallels the intended injury caused by chert projectiles and that the sounds associated with its manufacture suggest it was a substance of “mayhem.” While not all chert production is that loud, it does create noise and sometimes a sulfur smell, which relates to its association with lightning. It is unlikely that tool producers considered chert production to be a dangerously chaotic activity, as it occurred within household spaces and the resulting debitage was intentionally left in discrete areas adjacent to houses and public spaces (Hearth 2012; Horowitz 2021; Johnson 2016; VandenBosch 1999; VandenBosch et al. 2010; Whittaker et al. 2009).

While producers may not have found debitage to be dangerous or chaotic, that does not mean debitage deposits were neutral. Bassie-Sweet (1996) highlighted ethnographic evidence that lithics were considered to be sources of protection. We will consider the presence of large deposits of chert lithics, in what are usually considered ‘ritual’ and ‘utilitarian’ contexts, to address the reasoning for their deposition in these contexts, and

the ways we can utilize Maya ontological perspectives to interpret similar deposits in variable contexts.

### Archaeological Contexts and Interpretations of Lithic Deposits

When archaeologists find Maya lithic objects, they typically are categorized as either quotidian, such as tools and debitage, or ritual, which are objects found in special contexts like caches and burials or objects that have a presumed ritual function, like bloodletters and eccentrics (see Agurcia et al. 2016). Eccentrics are shaped lithic objects often deposited in ritual contexts (Agurcia et al. 2016:71; Clark et al. 2012). This dichotomization between ‘utilitarian’ and ‘ritual’ tools has a long antiquity in Maya lithic studies, dating back to Kidder’s (1947) publication on the lithics of Uaxactun, where he divided flaked stone artifacts into these categories based on their discovery in special contexts like caches or graves, a high level of skill required for their manufacture, and/or the unlikelihood that they were used for everyday tasks. Kidder (1947:4) acknowledged that in some circumstances it was next to impossible to differentiate between utilitarian and ritual items, illustrating one of the challenges with applying this dichotomy to objects. Many early lithic studies were based on the Kidder (1947) and Ricketson and Ricketson (1937) typologies, and thus these ritual versus quotidian designations became entrenched (Hester 1976; Johnson 1996; Sheets 1977:141), despite many early scholars who questioned this dichotomy (Gibson 1986).

Several recent studies show the challenges of applying this dichotomy to the classification of lithic artifacts. For example, use-wear analysis of obsidian blades recovered in ritual contexts show that some were used for tasks that we would not consider ‘ritual’ (Stemp and Awe 2014; Stemp et al. 2015, 2017, 2018). As another example, pieces of debitage, inferred to be quotidian trash, are also found in ritual contexts, in which case they are often inferred to have ritual significance. And as we have argued above, the Maya view of stone as possessing the qualities of lightning and an animate material precludes the easy application of labels of quotidian and ritual. Investigations of trash and trash disposal practices in other regions have illustrated that disposal practices and meaning are culturally variable (e.g., Cameron 2001; Fladd et al. 2021; Gifford-Gonzalez 2014; Hill 2000; McNiven 2013), and that ‘midden’ deposits can also be ritual spaces, issues which we address for Maya lithic debitage deposits.

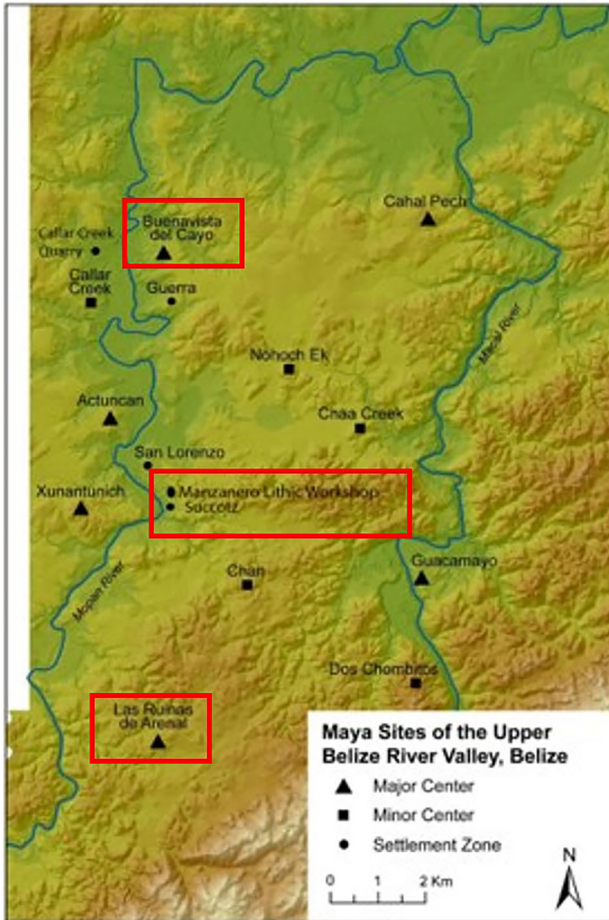
In a similar vein, previous investigations in the Maya region have examined ‘problematic deposits,’ large deposits of different types of artifacts, including so-called utilitarian objects. They are considered problematical with regard to interpreting their function or the intent of past behavior(s)



that created them (Moholy Nagy 1997:47). Scholars have often debated whether a particular deposit was trash, a ritual deposit, or part of peri- or post-abandonment activities (see Aimers et al. 2020 for an overview; see also Chase and Chase 2020; Clayton et al. 2005; Lamoureux-St.-Hilaire et al. 2015, 2020; Hoggarth et al. 2020; Mock 1998a; Stanton et al. 2008; Stemp and Awe 2020; Tsukamoto 2017). As Navarro-Farr and colleagues (2008) pointed out, some deposits that are initially interpreted as trash are the accumulated remains from episodic post-abandonment ritual activities that are integral to social memory processes (see also Stanton and Magnoni 2008). Furthermore, the objects themselves may have had personhood, which resulted in their placement in such deposits (Navarro-Farr et al. 2008). While the contexts discussed here are not the same as these 'problematic deposits,' the types of deposition, utilitarian objects in potentially ritual contexts, are similar.

We address two types of lithic debitage deposits: debitage sheets and mounds found in the workshops where stone tools were produced, which are usually inferred to be quotidian spaces; and large deposits of lithic objects associated with burials, generally accepted as ritual contexts. Production workshops are present throughout the Maya lowlands, mostly in household contexts (Barrett 2011; Hearth 2012; Horowitz 2021; Hruby 2008; Johnson 2016; VandenBosch 1999; VandenBosch et al. 2010; Whittaker et al. 2009), although there is also evidence of site-level specialization at Colha (Hester and Shafer 1984; King 2012; Masson 2001; Shafer and Hester 1983, 1991). The workshop deposits typically contain a mix of debitage that derives from extraction and early-stage reduction activities (Barrett 2011; Horowitz 2021) along with the production debris that derives from crafting specific tool forms, most of which are bifaces (e.g., Hearth 2012; VandenBosch et al. 2010; Whittaker et al. 2009). There is some evidence for the production of eccentric flints (Hruby 2008), and while the production of eccentrics and other so-called 'ritual' items is often assumed to have required some specialized knowledge of ancient Maya symbolism, this type of knowledge has proven difficult to identify archaeologically (e.g., Helms 1993; Hruby 2008; Inomata 2001, 2007; McAnany 2010). Within lithic workshop contexts, debitage deposits include broad sheets on the ancient ground surface, higher piles or mounds, and even buried deposits. The assemblages found in workshop deposits can be compared with those found in non-workshop spaces, including ritual contexts.

Large deposits of lithics have been found in ritual contexts across the lowlands, particularly above Classic period royal burials (Andrieu 2011, 2020; Audet 2006; Baron 2016; Coe 1988; Estrada-Belli and Tokovinine 2022; Hall 1989; Horowitz et al. 2020; Hruby and Rich 2014; Johnson and Johnson 2021; Moholy Nagy 1997; Zralka et al. 2016, 2017). Other types of ritual contexts, including caches, also often contain large quantities



**Figure 2.** Map showing locations discussed in the text, marked in red squares around the site name. Map by B. Cap, used with permission of Mopan Valley Archaeological Project/Mopan Valley Preclassic Project

of lithics (Demarest et al. 2014; Iannone 1993; Lytle 2020; Ramos-Ponciano 2018). Andrieu's (2011, 2020) review of large lithic deposits associated with royal burials found that the assemblages consist primarily of bifacial thinning flakes. She proposed that these materials were debitage that was brought in from workshop areas and redeposited in ritual contexts, in part to account for the paucity of workshop deposits in the Maya lowlands. Earlier scholars had proposed that these deposits were made in situ by producing bifaces while the tombs were being sealed as part of the sequence of rituals associated with royal burials; were byproducts of making tools used

in tomb construction; or were made as markers so that Maya in the future would know that there was an important tomb below (Coe 1988; Hall 1989; Moholy Nagy 1997). Bassie-Sweet's (1996) discussion of the protective qualities of chert suggests that we should also consider the possibility that these lithic layers were deposited as a form of protection of the tomb and its contents.

Given the extensive discussion among archaeologists about how 'trash,' 'utilitarian,' and 'ritual' contexts can be defined, and the presence of large deposits of lithics in both workshop and burial contexts, further discussion of the relationships between these deposits is warranted. Using ontological perspectives and discussions of the contexts in which we find deposits, we can use the lithic assemblages to infer the symbolic importance of the waste from stone tool production, and its relationship with both ritual and political power among the Maya.

### **Regional Background: Mopan Valley**

We provide a case study of 'ritual' and 'utilitarian' examples of large lithic deposits from the Mopan Valley, Belize, in the central Maya lowlands (Figure 2). Decades of previous excavations in the region (see Chase and Garber 2004; Houk 2015; Willey 2004 for overviews) provide a detailed political history and a broad understanding of the ancestral economy that allow for more detailed discussions of the role of lithics in non-quotidian deposits. During the Preclassic (2000 BCE–200 CE) and Classic periods (200–800 CE), the Maya were sedentary, maize-based agriculturalists with hierarchical political and social structures, with divine rulership. The Mopan Valley contains a particularly dense concentrations of sites for the Maya lowlands (Chase and Garber 2004).

Our discussion focuses on chert, as it is a ubiquitous, naturally occurring material in the Mopan Valley. In comparison, obsidian is present but in much smaller quantities, as it was imported into the Mopan Valley from modern-day highland Guatemala and central Mexico, between 500 and 1,000 km away, using inland and coastal trade routes that shifted through time (see Feinman et al. 2022). In the Mopan Valley, chert is widely, but unevenly, distributed across the landscape in bedded deposits within limestone, in alluvial bar and bank deposits, and on the surface and within the soil matrix, due to the erosion of the parent bedrock (Horowitz 2017a; Horowitz et al. 2021). Chert tools are found in households of all socioeconomic statuses across the region, and in the Late and Terminal Classic periods, they were exchanged at centralized marketplaces (Cap 2015, 2019, 2021; Horowitz et al. 2019; Lindley 2021; Peuramaki-Brown 2012; Robin 1999; Yaeger 2000). Chert was utilized to produce tools for

multiple functions including but not limited to, food preparation activities (e.g., cutting meats and processing plants), agricultural tasks, construction activities, wood working, and ritual activities. Thus, chert artifacts are a useful class of objects for interrogating the ritual-utilitarian dichotomy as they are found in households, marketplaces, workshops, and ritual deposits.

We draw on examples from two lithic production areas, the Succotz Lithic Workshop (SLW), and the Manzanero Lithic Workshop (MLW), both located in hinterland settlements outside of major centers, and three large lithic deposits associated with ritual activities within the civic-ceremonial centers of Buenavista del Cayo (hereafter Buenavista) and Las Ruinas de Arenal (hereafter Arenal) (Figure 2) to address the nature of lithic debitage and the intention behind its deposition.

SLW and MLW are specialized biface production workshops that operated during the Classic period (200–800 CE) and were managed by householders who lived adjacent to the workshops (Horowitz and Toombs 2023; VandenBosch 1999; Vanden Bosch et al. 2010). The workshops produced bifaces for distribution to surrounding communities where they were used for generalized tasks. Arenal emerged as a political center by the Middle Preclassic period (900–300 BCE), when the rise of divine kings occurred in the Maya region and continued to be an important settlement through the Terminal Classic period (Brown and Horowitz 2023; Horowitz and Brown 2019, 2020; Taschek and Ball 1999). Buenavista was occupied from the Preclassic through Terminal Classic period but was an important regional power slightly later than Arenal, during the Early Classic (300–600 CE) and early Late Classic periods (600–670 CE; Ball and Taschek 2004; Brown and Yaeger 2020; Yaeger and Brown 2019; Yaeger et al. 2015).

### Comparing ‘Ritual’ and ‘Quotidian’ Lithics

In the following section, we compare the nature of lithic assemblages from quotidian production areas and ritual contexts in western Belize, specifically biface production workshops and large ritual lithic deposits. Our analysis demonstrates that the lithic assemblages in both kinds of contexts are similar, suggesting that the materials deposited over tombs do in fact derive from workshop areas (see Andrieu 2011, 2020; Horowitz et al. 2020). The significance of this similarity when considered through Maya ontological perspectives will be discussed below.

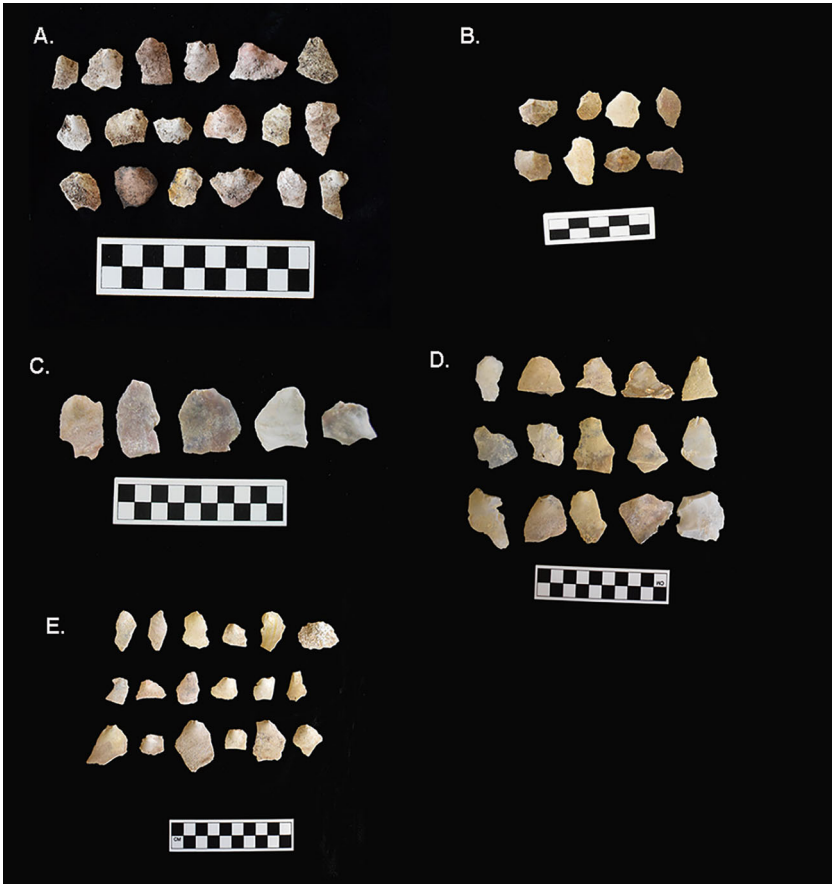
**Table 1** Whole flakes larger than 2 mm from the Succotz Lithic Workshop and the Manzanero Lithic Workshops

Succotz Lithic Workshop	
Artifact Class	Count (percent)
Thinning Flakes	4,165 (72.7%)
Hard Hammer Flakes	671 (11.7%)
Pressure Flakes	888 (15.5%)
Total	5,724
Manzanero Lithic Workshop	
Artifact Class	Count (percent)
Thinning Flakes	4,771 (72.9%)
Hard Hammer Flakes	1,478 (22.6%)
Pressure Flakes	290 (4.4%)
Core	1 (< .1%)
Retouched Flakes	3 (< .1%)
Rejuvenation Flakes	1 (< .1%)
Total	6,544

### ‘Quotidian’ Lithics?

We first discuss evidence of biface production from two household production workshops. The Succotz Lithic Workshop (SLW; Figure 2; VandenBosch 1999; VandenBosch et al. 2010; Horowitz 2017b) and Manzanero Lithic Workshop (MLW; Figure 2; Horowitz and Toombs 2023), are household workshops, where most debitage is derived from biface production. Investigations at SLW and MLW did not reveal any evidence for ritual practice nor of any ritual production (Horowitz and Toombs 2023). Evidence for ritual production includes activities unrelated to the ‘basic necessities’ of production (Hruby 2008:70). We provide an overview of the types of debitage identified in the workshops to interrogate the discussion of these products as debitage or trash.

Horowitz undertook test excavations in both workshops to obtain samples of reduction debris for analysis. Although VandenBosch (1999) had investigated the SLW before, the data presented here stem from new, opportunistic sampling (Horowitz 2017b). The MLW was investigated through surface collections and test units (Horowitz and Toombs 2023). The materials from SLW were not screened while the MLW materials discussed here were screened through ¼-inch mesh. The difference in recov-



**Figure 3.** Lithic debitage from **a** Manzanero Lithic Workshop, **b** Succotz Lithic Workshop, **c** Buenavista Feature 383-1, **d** Buenavista Feature 385-6 and **e** Arenal. Photographs by R.A. Horowitz

ery method impacted the size of materials, with more microdebitage present from SLW.

The lithic assemblages from both workshops consisted mostly of bifacial thinning flakes, with limited evidence of early-stage and hard hammer flakes that are suggestive of generalized reduction (Table 1, Figure 3a, b; Horowitz 2017b; Horowitz and Toombs 2023; VandenBosch 1999; VandenBosch et al. 2010). Table 1 presents data on the types of whole flakes from each context; other types of debitage (e.g., broken flakes, shatter) are not included in the table because we cannot determine how they were produced. They were counted and weighed, however (Debitage including non-

whole flakes: SLW:  $n = 16,747$ ; MLW:  $n = 13,895$ ). For the MLW, the data presented are from a single  $1 \times 1$  m excavation unit and thus does not represent the entirety of the collected assemblage.

The predominance of thinning flakes in both assemblages indicates a focus on the final stages of biface production. The high densities of the deposits and the overall large quantities of debitage materials indicate production at a scale larger than necessary for use within a single household (SLW: 500,000–1 million flakes/m<sup>3</sup> (VandenBosch et al. 2010); MLW: 55,564 flakes/m<sup>3</sup>). These patterns suggest the finished products were distributed beyond the bounds of the workshop, probably exchanged in the valley's marketplaces (see Cap 2021). In both cases, the predominance of bifacial thinning flakes and pressure flakes, from shaping of bifaces, coupled with the low amount of cortex (SLW:  $n = 221$ , 1.3%; MLW:  $n = 617$ , 4.4%) suggest that most workshop production focused on the later stages of biface production, with limited evidence for earlier stages of production. This pattern suggests a system of segmented production, in which earlier stages of production and raw material testing occurred elsewhere, presumably nearer to the raw material sources (see Horowitz 2017a, b). Beyond the debitage, we recovered very few other lithic artifacts, such as bifaces (SLW:  $n = 4$ ; MLW:  $n = 4$ ) and hammerstones (SLW:  $n = 1$ ).

As noted above, we found no materials or objects in the workshops indicative of ritual activities, but the Maya understanding of chert as animate and possessing of a human-like lifecycle, as outlined above, suggests a significance to these spaces. In particular, the Manzanero Lithic Workshop is located on top of a steep hill (Figure 4) and is not near any currently known outcrop of chert. Thus, we might ask, why was this inconvenient location that entailed high transportation costs chosen to produce tools? One possible explanation is that Xunantunich, one of the most important political and ritual centers in the region, is visible from this site, perhaps indicating a connection between the two places. Among the Maya, hilltops are associated with lightning, which may tie together chert's association with lightning and the workshop's location (personal communication Astor-Aguilera September 2022).

### **'Ritual' Lithics**

Here we explore three cases of large lithic deposits recovered from 'ritual' contexts. We excavated and analyzed chert debitage deposits from ritual contexts at the sites of Buenavista and Arenal, which are located approximately 10 km apart along the Mopan River valley (Figure 2). Buenavista's civic-ceremonial core includes two tall temple-pyramids, an E-group, a royal palace, two ballcourts, a marketplace, and other residential and



**Figure 4.** View from MLW with a view of Xunantunich; the site is circled in the image. The modern village of Succotz can be seen in the valley below. Photograph by R.A. Horowitz

administrative compounds (Figure 5; Ball and Taschek 2004; LeCount and Yaeger 2010; Yaeger et al. 2015, 2019, 2023a, b). The two ritual deposits of lithics we discuss here were found associated with royal burials, Feature 383-1 set within the Central Plaza, and Feature 385-6 found in Structure 3c, the southernmost of three shrines set atop Structure 3, one of the site's two temple-pyramids (Figure 5; Yaeger et al. 2015, 2019, 2023a, b). It should be noted that many other ritual deposits have been discovered at the site that include lithic objects, such as caches (e.g., Taschek and Ball 1992; Yaeger et al. 2023a, b), and deposits of eccentrics are quite common (Ramos-Ponciano 2018). Here we focus only on the two deposits associated with royal tombs because, in contrast to these other deposits, they are primarily composed of production debitage (see also Horowitz et al. 2020, 2023).

Feature 384-1 was a masonry tomb chamber in front of Structure 3 in the Central Plaza (Yaeger et al. 2015, 2023a, b). During our excavations, we determined that the chamber had been reentered in antiquity and the body and most of the funerary objects removed, as indicated by the pres-



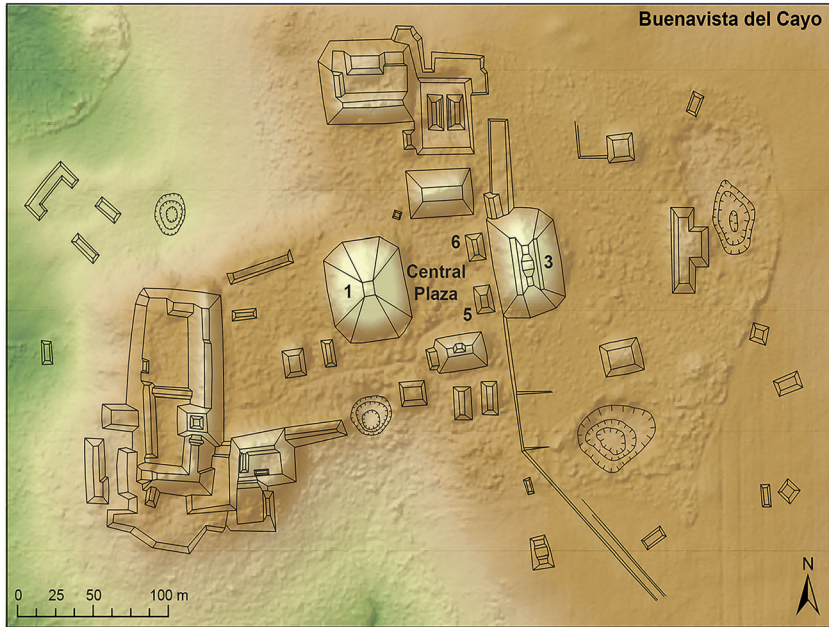
**Table 2** Whole flakes from deposits above Features 384-1 and 385-6 at Buenavista

Technological Class	Feature 384-1 Count (percent)	Feature 385-6 Count (percent)
Bifacial Thinning Flakes	5,769 (85.4%)	769 (68.6%)
Hard Hammer Flakes	947 (14%)	346 (30.9%)
Rejuvenation Flake	0	6 (.5%)
Retouched Flake	1 (< .1%)	0
Core	30 (.4%)	0
Total	6,747	1,121

ence of only a few bones, some broken ceramic vessels, and scattered fragments of shell and slate adornments. The matrix that the Maya used to fill the chamber following its reentry contained a very high density of debitage, which we infer had originally been in a layer above the tomb, which had been removed during the reentry. The amount of lithics recovered ( $n = 12,844$ ; Table 2, Figure 3c) was small compared to similar contexts, probably due to its disturbed nature, but the assemblage was consistent with similar deposits. We analyzed the debitage using an aggregate analysis (see Andrefsky 2005; Horowitz 2017a; Horowitz et al. 2020 for details on aggregate analysis methodology) and found that most of the lithic artifacts were thinning flakes, probably from the production of large bifaces. There were limited non-biface production materials, suggestive of earlier stages in the biface production process (Horowitz et al. 2020), but the low frequency of pieces with cortex ( $n = 132$ , 1%), indicates that most production derived from later stages of biface production. In addition to the debitage, we recovered only a few objects that were not debitage, such as bifaces ( $n = 4$ ) and hammerstones ( $n = 4$ ).

The second deposit was found above a masonry royal tomb, Feature 385-6, that had been placed deep under Structure 3c, a shrine set atop the larger platform of Structure 3 (Figure 5; Yaeger et al. 2019). It dates to the beginning of the Late Classic period. Above the capstones of the tomb were three distinct layers of lithics, each separated from the next by a thin layer of clay fill (see Horowitz et al. 2020; Yaeger et al. 2023a, b). The tomb contained the internment of a single individual placed on a wooden bier. 19 vessels and two mirror fragments were placed around the individual (Yaeger et al. 2023a, b).

We again conducted an aggregate analysis of a sample of the materials. We sampled each layer of lithics ( $n = 2081$ ) and then extrapolated from the sample using total weight to estimate the total quantity of debitage in the three layers, estimated to be approximately 32,222 pieces (see Horowitz et al. 2020).



**Figure 5.** Map of Buenavista showing locations discussed in the text. Map by B. Cap, used with permission of the Mopan Valley Archaeological Project and Mopan Valley Preclassic Project

Of the analyzed sample, most identifiable flakes are bifacial thinning flakes from the production of large bifaces (Table 2, Figure 3d). Like the deposit above Feature 384-1, there is also some evidence of other types of reduction activity, but no cores or bifaces. The small frequency of debitage with cortex ( $n = 36$ , 1.7%), suggests most of the debitage stems from later stages of biface production. In comparing this deposit with the MLW and SLW debitage, there are many similarities in composition, suggesting that the Feature 385-6 debitage was acquired from debitage deposits in production workshops.

The civic-ceremonial core of Arenal is made up of three distinct architectural groups connected to each other by causeways (Figure 6). Group A is the main ritual area of the site. Extending across the eastern half of the main plaza within Group A, in front of Structure 1, and above the earliest plaza floor, we uncovered an 8–12 cm thick Middle Preclassic deposit that covered an area of at least 59 m<sup>2</sup> and was comprised of lithic debitage, unmodified riverine shells, and rough marine shell beads. The deposit was placed above the earliest plaza floor, under which was

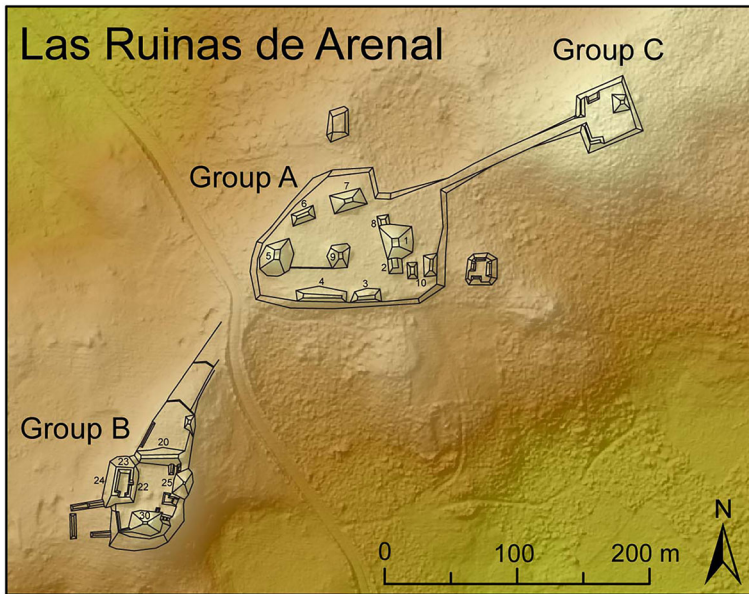
**Table 3** Whole flakes and other materials from the Arenal deposit (does not include flake fragments or shatter)

Technological Class	Count
Thinning Flakes	5,162 (74%)
Hard Hammer Flakes	1,507 (21.6%)
Rejuvenation Flake	42 (.3%)
Retouched Flake	28 (.2%)
Retouch Flake	185 (1.2%)
Pressure Flake	41 (.3%)
Core	3 (< .1%)
Total	6,968

bedrock. The Maya placed a series of Preclassic ritual deposits and burials on top of bedrock and in cuts made into it. Some of these predate the deposit, while others are later and were intrusively placed through the deposit. Taken together, the lithic and shell layer, the caches, and the burials reflect a sequence of ritual events that marked the space as ritually important at the time of the center’s foundation and then resanctified it periodically over time, adding to its sacred nature and cosmological efficacy (Brown and Horowitz 2023; Horowitz and Brown 2019, 2020; Horowitz et al. 2020).

We analyzed a lithic sample from a contiguous 12 m<sup>2</sup> area ( $n = 15,716$ ), multiplying by the total excavated area to estimate the number of lithics and riverine shells in the deposit. We determined that the excavated portion of the deposit included an estimated 100,000 flakes, 115,000 freshwater shells, and an exact count of 761 marine shell beads (see Horowitz et al. 2020, 2023). Through the aggregate analyses we found that the debitage is almost exclusively bifacial thinning flakes (Table 3, Figure 3e), mirroring that from the Classic period deposits at Buenavista (Table 2). In addition to the debitage, a hammerstone ( $n = 1$ ) and drill ( $n = 1$ ) were also recovered from this context. The predominance of thinning and pressure flakes points to mostly later stage reduction activities, which is supported by the low frequency of debitage with cortex ( $n = 886$ , 5.6%).

The comparison of the assemblages in these distinct ritual contexts at Buenavista and Arenal (Tables 2, 3) illustrate that they are nearly identical in composition: they consisted of predominately bifacial thinning flakes, with limited evidence of earlier stages of reduction and very few tools. These ritual context examples suggest that the deposited debitage is not trash, or at least, it is not simply trash.



**Figure 6.** Map of Arenal showing locations discussed in the text. Map by B. Cap, modified from Taschek and Ball (1999), used with permission of the Mopan Valley Archaeological Project and Mopan Valley Preclassic Project

### Comparing Contexts

Having discussed debitage from three ritual contexts from the Middle Preclassic and Classic periods, we now compare those with the two lithic production workshops. As illustrated in the debitage analysis (Tables 1, 2, 3; Figure 3), all are dominated by thinning flakes, which form 72% of the production assemblages and 69–85% of the ritual assemblages. One area of variation is in the quantities of pressure flakes from biface finishing, which were present in production contexts (4–15%), but minimal or absent (0.3%) in ritual contexts. This may be in part due to the small size of pressure flakes: if flakes were being gathered from workshop deposits using woven baskets or similar implements, the small flakes like pressure flakes would be more likely to fall through the weave of the basket or get embedded in them.

To interrogate this issue further, we examined debitage size (Table 4). Most debitage was between 1 and 4 cm, with the SLW and Buenavista burial contexts having some larger materials. The SLW also contained large amounts of microdebitage indicative of in situ production activities. The

MLW microdebitage is not yet analyzed, and the other contexts lack microdebitage, suggesting they were not areas of in situ production.

Overall, the lithic workshop contexts and the ritual contexts are similar in the presence of large quantities of biface production debitage. There are differences in material size, not all of which result from differences in recovery techniques. The SLW and MLW show the variation present within workshops, and given their distance from Buenavista and Arenal, it is unlikely that either served as the source of debitage for the ritual deposits in those locations. However, the lack of microdebitage from the ritual deposits indicates they are secondary deposits.

### Discussion and Conclusions

We can use insights from Maya texts, art, and ethnographic observations to interpret the significance of chert debitage layers in the plaza at Arenal and above the tombs at Buenavista. We believe these deposits relate symbolically to the underworld of the Maya cosmos, a dark place under the earth's surface, associated with caves, stone, and water where people went after death (Brown 2017; Brown et al. 2018; Coggins 1988; Horowitz et al. 2020, 2023; Johnson and Johnson 2021). The riverine and marine shells in the deposit at Arenal reinforce that association (see also Biggie et al. 2023). Furthermore, the relationship between chert and K'awiil, a deity associated in the Classic period with royal authority, may form part of the reason for the placement of lithic layers above tombs, as chert may have been related to authority (Bassie-Sweet 1996; Doyle 2022; Houston 1996; Stone and Zender 2011; Taube 1992). The predominance of bifacial thinning flakes ties these deposits even more closely to K'awiil, who is often associated

**Table 4** Size classification of debitage examined

Size Grade	SLW	MLW	Buenavista Feature 384-1	Buenavista Feature 385-6	Arenal
16 cm+	1 (< .1%)	0	0	0	0
8–16 cm	56 (3.4%)	0	4 (< .1%)	1 (< .1%)	4 (< .1%)
4–8 cm	692 (41%)	980 (7%)	462 (3.6%)	240 (11.5%)	174 (1.1%)
2–4 cm	920 (55%)	5,186 (37%)	5,295 (41.2%)	926 (44.5%)	3,465 (22%)
1–2 cm	*	6,774 (48.5%)	6,894 (53.7%)	804 (38.6%)	10,156 (64.6%)
Less 1 cm	*	1,029 (7.4%)	189 (1.5%)	110 (5.3%)	1,917 (12.2%)
Total	1,669	13,969	12,844	2,081	15,716

\*SLW debitage of this size was classified with the microdebitage ( $n = 61,000$ ). As microdebitage has not yet been analyzed for MLW and is not present in the ritual deposits, these materials were not included

with bifaces in Maya iconography. Finally, as Bassie-Sweet (1996) commented, lithic debitage could be seen as a way of protecting the noble burials in the tombs under them.

There remain questions as to how to interpret the “trash” recovered in production workshops, however. Our examples demonstrate that the types of debitage found in all of these contexts are similar and reflect biface production (see Tables 1, 2, 3, Figure 3; Andrieu 2020). Furthermore, these analyses suggest that the materials placed in ritual contexts are redeposited materials that originally derived from workshops. This pattern raises the question of what the relationship between these two types of deposits was and how workshop deposits should be interpreted.

As discussed above, multiple lines of evidence indicate that Maya world-views, past and present, understand chert to be an animate material. While we lack direct evidence in lithic workshops of the use of rituals or esoteric knowledge in the production process, it is of course possible—even likely—that these activities did exist, even if we cannot identify them in the archaeological record, and other scholars suggest that such knowledge was important for production of more elaborate objects such as eccentrics (e.g., Agurcia et al. 2016; Clarke 2020; Hruby 2008).

Our analyses demonstrate that it is the *context of deposition*, not the *types of material present*, that distinguishes between these workshop and ritual deposits. Thus, we might ask, is it the context that makes the object ritually significant or do the materials already possess ritual properties? We argue that chert debitage was already intrinsically significant, and that its animate nature was one reason it was chosen for placement over important spaces. This mirrors the contemporary example of Maya people using chert flakes for protection (Bassie-Sweet 2016). Furthermore, given the relational nature of personhood in Maya ontologies (e.g., Hendon 2012), the power and potential agency of chert objects would have been enhanced by their relationships to powerful deities, K’awiil and Chahk.

What then, does this analysis suggest for us as archaeologists? In our analyses, we often dichotomize ritual and quotidian objects, especially when discussing lithics. Given that chert and obsidian were animate materials and objects made of those materials had personhood, however, we should reconsider this dichotomization. The same object—a piece of chert debitage or an obsidian blade fragment—had a lifeforce and sacred essence, *ch’ulel*, regardless of whether it was in a debitage pile in a workshop or in a layer capping a royal tomb. The nature and strength of that essence, the power, and the agency of that object, could change, however, depending upon its relationships with other objects, buildings, and people and with its engagements with other persons over the course of its life. In that respect, a chert flake deposited above the tomb in Buenavista Structure 3c—placed during a ritual that entailed prayers, invocations of powerful

deities, and offerings of other powerful materials and objects, and that took place within the body of a sacred pyramid that itself was understood to be a living person—was plausibly a more powerful being than one that lived its life in adebitage mound in the Succotz Lithic Workshop. Thus, while we believe that the distinction between ‘ritual’ and ‘quotidian’ has some heuristic utility for describing ancient behaviors and the deposits that result from them, it is inappropriate to use those terms to describe classes of objects or materials, as they deviate substantially from Maya ontological perspectives.

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### **Declarations**

**Conflict of interest**      The authors declare none.

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