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Explorations in ancient Maya blood-letting: Experimentation and microscopic use-wear analysis of obsidian blades

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ABSTRACT

Auto-sacrificial blood-letting was an important ritual practice for the ancient Maya. Letting blood using implements like sharpened bone, stingray spines, thorny ropes, and obsidian blades provided the Maya the means to petition their ancestors and the gods for rain, good harvests, and success in warfare, among other needs and desires. The prevailing assumption is that obsidian blades recovered from ceremonial or ritual contexts, like caches, burials, and caves, were used for blood-letting. This belief is primarily founded on contextual, epigraphic, iconographic, and ethnohistoric information. With some exceptions, however, this interpretation does not typically include any use-wear analysis of the blades themselves. Reasons for the limited application of use-wear analysis to identify obsidian blood-letters recovered from ceremonial or ritual contexts include observational difficulties associated with the minimal wear development resulting from their short term use in this activity and contact with a soft and yielding medium like human flesh. This paper explores an approach to assist in identifying obsidian blades likely used for auto-sacrificial blood-letting based on high-power microscopic (400×) use-wear analysis. The need for this experimental work was initiated by the recovery of some obsidian blades from Actun Uayazba Kab, an ancient Maya cave in Belize, that were suspected blood-letters. Emphasis is placed on the observation and differentiation of wear features produced on 26 experimental obsidian blade segments used to cut pig skin/flesh, as a proxy for human flesh, as well as soft cow hide, fresh pig bone, fresh cohune palm fronds, and queen conch shell. The wear on the suspected blood-letters from Actun Uayazba Kab is similar to that produced on the experimental replicates after very minimal use (30 strokes). Moreover, the combination of wear features on the skin/flesh, hide, bone, plant, and shell can be distinguished from one another even after short-term use.
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1. Introduction

Auto-sacrificial blood-letting by the ancient Maya, as a means to contact their ancestors and the gods, was among the most important rituals performed using obsidian blades (Schele and Freidel, 1990; Schele and Miller, 1986). For the Maya, preferred body parts to acquire blood through auto-sacrifice included the ears, lips, nostrils, tongue, arms, legs, and the penis (Joralemon, 1974). Traditionally, blood-letting and the importance of blood in ritual practices has been deduced from indirect evidence in the form of artwork, hieroglyphic writing, ethnohistoric documentation, and the recovery of obsidian blades from ritual contexts, including burials, caches, and caves (e.g., Awe et al., 2005; Colas et al., 2000; Helmke, 2009; Joralemon, 1974; Moholy-Nagy, 2003; Munson et al., 2014; Schele and Miller, 1986; Stone, 1995; Stuart, 1984; Tozzer, 1941). Yet, there is little direct evidence for auto-sacrificial blood-letting derived from the study of the blades themselves (see Chase, 1991: 90).

This research project focuses on the development of an approach to identify obsidian blades used as cutting implements for blood-letting by the ancient Maya based on high-power use-wear analysis. The use-wear features that would most likely result from blood-letting by experimentally producing and using obsidian blade segments to cut raw pig skin/flesh (*Sus scrofa domesticus*), as a proxy for cutting human flesh, were documented using a metallurgical microscope at 400× magnification. The results of this use-wear experiment were combined with those of two earlier use-wear experiments using the same metallurgical microscope and a laser scanning confocal microscope (LSCM). When combined, the use-wear data from the three separate experiments produced a series of wear traces on obsidian tools that were consistent with short-term contact with animal soft tissue and were similar to wear traces on some obsidian blades from ritual contexts recovered from the ancient Maya cave site of Actun Uayazba Kab. It is believed these experimentally produced wear data can be used to identify

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obsidian artifacts recovered from Maya ritual contexts that were most likely used for auto-sacrificial blood-letting using a cutting motion.

2. Blood-letting and obsidian blades from ritual contexts

The impetus for research into obsidian blades as blood-letters was the observation of use-wear by the author on blade segments excavated from Actun Uayazba Kab, a cave in Western Belize used by the ancient Maya in the Late-Terminal Classic period (700–950 CE). Some of these blades possessed poorly developed wear that could not be assigned to known actions or functions based on previous obsidian use-wear analyses (Stemp, 2016; Stemp and Awe, 2014; Stemp et al., 2013). The original use-wear analysis of the blade segments from Uayazba Kab was performed with a reflected light microscope at magnifications of 40× and 200×.The blades had clearly been used based on edge microflaking and the presence of striations on their surfaces, but they lacked more developed wear in the form of surface abrasion or polish. These obsidian artifacts were consequently classified as "indeterminate" in terms of function; however, there was a strong suspicion based on limited experimentation at the time (see Stemp and Awe, 2014) that some of the blades may have been used as blood-letters. In particular, the minimal edge damage, few striations oriented parallel and slightly diagonal to the edge, the lack of surface wear (polish and/or abrasion) suggested limited contact with a soft material.

When a sample of the "indeterminate" blades from the cave were re-examined at 400× magnification in the summer of 2015, some had minimal wear development in the form of microscars on the tool edges (Fig. 1a) and micropitting (Fig. 1b) or microflaking on the margins of the stress fissures (Fig. 1c, d) that were not previously observed in the initial analysis conducted at 200× magnification. The use-wear on the stress fissures was similar to that observed by Stemp et al. (2015) in their second experiment (see below).

3. A history of use-wear analysis and obsidian blood-letters

3.1. Use-wear of archaeological artifacts

Overall, there has been little use-wear analysis of obsidian blades as possible blood-letters. In the past, Maya archaeologists presumed that obsidian blades, particularly long, pointed lancets, recovered from contexts interpreted as "ritual" or "ceremonial" (see Brady and Peterson, 2008: 81; Sievert, 1992: 34), such as burials, caches, and caves, were used as auto-sacrificial blood-letters (e.g., Brady, 1989: 324; Colas et al., 2000: 9; MacLeod and Puleston, 1978: 7). Often the lack of edge damage on these narrow pointed blades, based on observation with the naked eye, was considered confirmation of their use as blood-letting implements (Coe, 1959: 30; Willey et al., 1965: 447; see Kidder 1947: 15). With the use of low-power stereomicroscopy (<100× magnification), Shafer observed that obsidian blades from Petroglyph Cave, Belize, lacked "crushing or abraded edges that would have resulted from contact with hard materials (e.g. hardwood, bone or stone)" (Reents-Budet and MacLeod, 1997: 64). This led Reents-Budet and MacLeod (1997: 101) to surmise that "[t]he plethora of bloodletters in Petroglyph Cave's inventory of artifacts, combined with the suggestion by Harry Shafer that many had been used to cut soft materials (such as flesh), point to their use for human blood-sacrifice".

Based on high-power reflected-light microscopy (200×), Aoyama (2001: 14) interpreted two blades from Gordon's Cave no. 3, Honduras, as likely used for blood-letting based on minimal development of edge microflaking and the lack of polish and striations. He identified nine other blades with more developed wear as tools used for cutting meat/hide or skin that may have been associated with the sacrifice of rodents (Aoyama, 2001: 12, Tables 6, 14).

Aoyama (2009) also suggested the possibility that obsidian blades from Structure M8-8 (The House of Axes) at Aguateca, Guatemala,

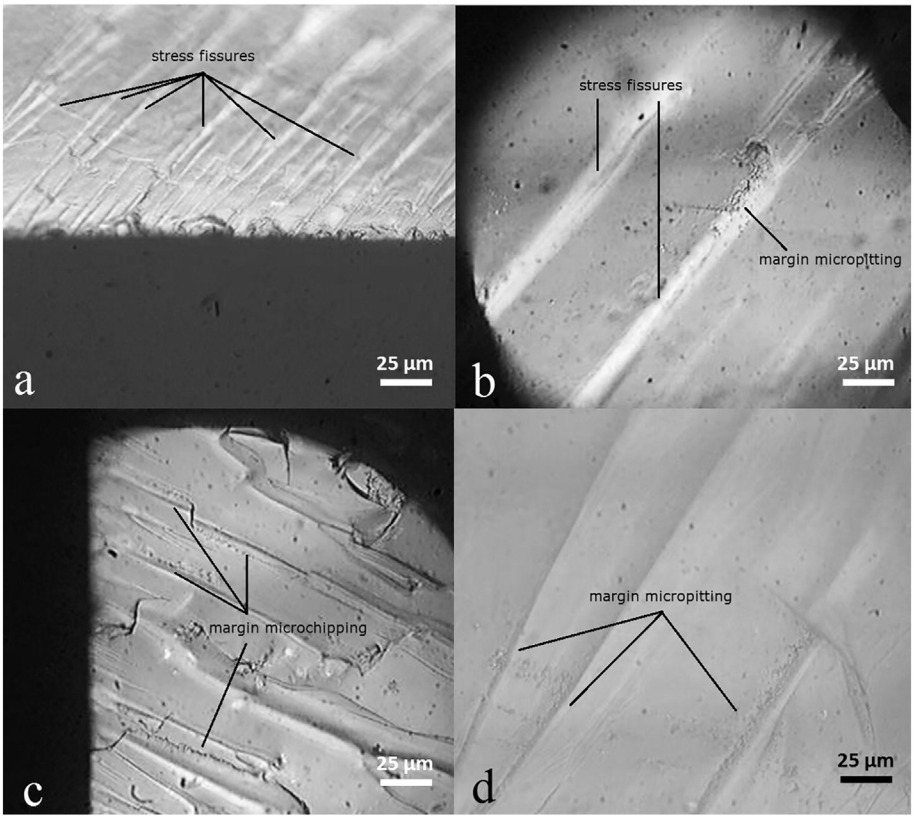

Fig. 1. Photomicrographs of use-wear on obsidian blade segments from Actun Uayazba Kab, Belize, taken with a Unitron MS-2BD metallographic microscope under incident light (400×): (a) UK-BA-282 – bending, feathered- and mild-hinge-terminating microflake scars along the edge; (b) UK-Pool1-259 – surface micropitting along the margin of the stress fissure and extending away from the margin; (c) UK-98-UPL-307 - microchipping on the stress fissure margins; (d) UK-98-BA-365 - microchipping on the stress fissure margins.

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