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Aktuelle Informationen und Studien zu Mesoamerika
News and studies on Mesoamerica – Noticias y contribuciones sobre Mesoamérica

Vol. XXVI

Juni 2004

Nr. 3



Ancient Textile Remains From Barton Creek Cave, Cayo District, Belize

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Introduction

This report provides descriptions and interpretations of a fragment of cotton cloth recently recovered from Barton Creek Cave, located in the upper Belize River valley of western Belize. The discovery of preserved textiles is exceptionally rare in the hot, humid, and seasonally wet environment of the Maya Lowlands. Consequently, technical descriptions and interpretations of recovered textiles are uncommon for this region. First, a description of the physical and archaeological context of Barton Creek Cave and the textile remains is provided. Second, the technical attributes of the fragment are discussed. Finally, we attempt to interpret the function of the cloth remains and explore broader implications of this discovery.

Description of Barton Creek Cave

Barton Creek Cave is located in Cayo District of western Belize near the modern town of San Ignacio (Figure 1). The entrance of Barton Creek cave is a resurgence that issues a large volume of water into Barton Creek, which is one of the principal tributaries of the upper Belize River watershed. The vegetation in this region of Belize conforms predominantly to the 'Subtropical Moist Forest Life Zone' (Fedick 1995:19), which is composed primarily of semi-deciduous, broadleaf forests. Pine forests that extend north from the Mountain fine Ridge characterize the foothills of the upper Barton Creek valley.

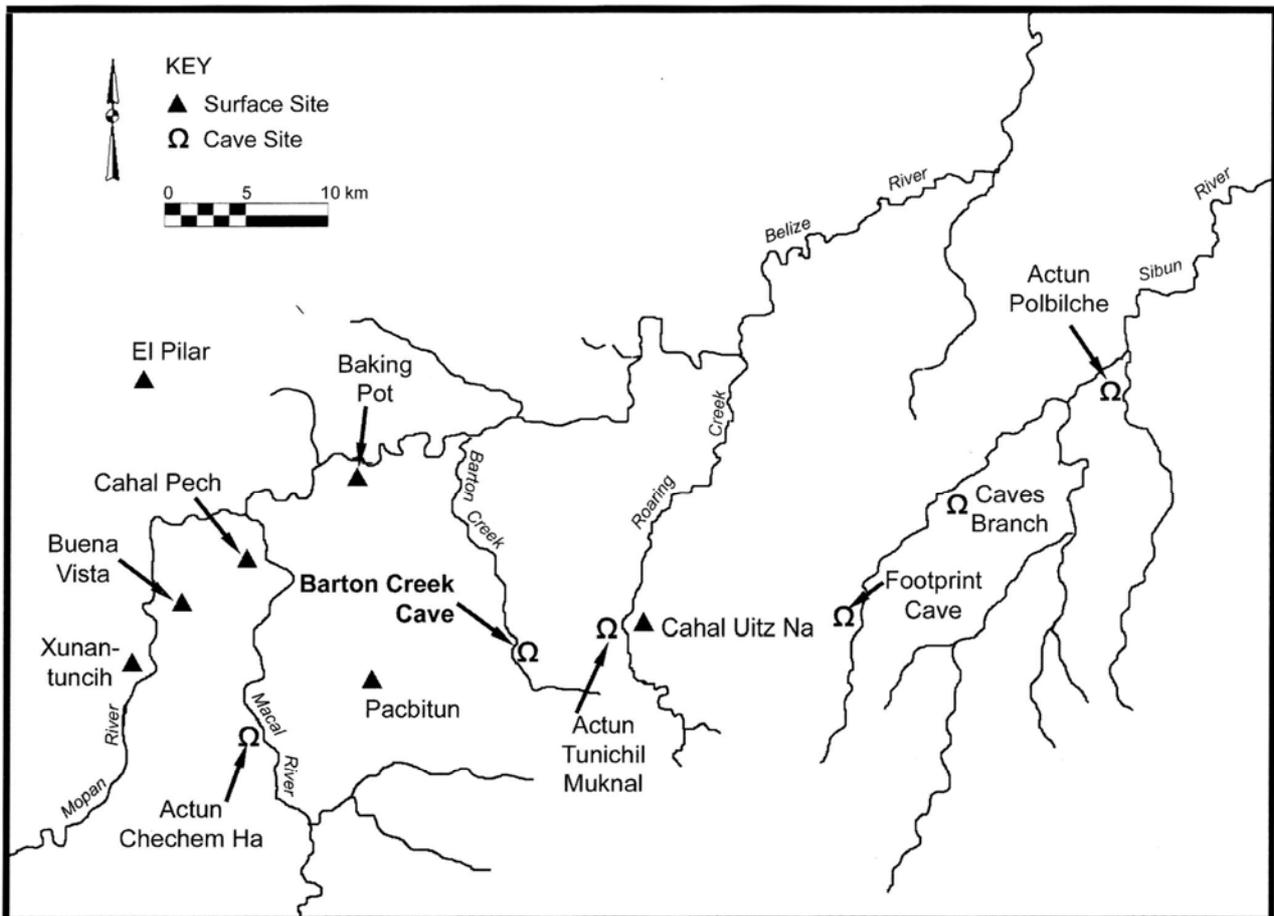


Figure 1. Map of upper Belize River valley showing location of Barton Creek Cave.

Barton Creek Cave (Figure 2) can be classified predominantly as a trunk conduit that intersects several collapsed chambers. This classification refers to caves with large trunk passages that channel significant quantities of water through the soluble karst, draining off from highland regions (Miller 1996) – in this case, the Maya Mountains. Such caves are generally considerable in size and contain numerous large chambers. Extensive mapping of Barton Creek Cave has revealed that the central trunk portion of the cave is over 3 km in length.

Since the mid-1990's Barton Creek Cave has been open to tourists, who take guided canoe trips on the cave's river. As such, the cave has become a popular destination in Belize's eco-tourism industry. At the request of Belize's Institute of Archaeology, the Western Belize Regional Cave Project initiated archaeological investigations at the cave in June 2000, in order to map the cave, document archaeological, osteological, and botanical remains, and to record any past or recent disturbance caused by looting or tourism. The goals of this research were to understand the nature of the cave's utilization over time, to place the use of this site within a regional perspective of ancient Maya occupation in the upper Belize valley, and to protect the cave as a unique cultural resource of Belize.

Cultural remains, restricted to the first 550 m from the entrance, are located on 11 ledges flanking the central watercourse and on two flowstone bridges that cross over the watercourse (Figure 2). The majority of artifacts rest directly on the exposed surfaces of the ledges with little or no deposition of stratigraphic matrices, a common feature of caves in this region. Ancient remains include a diverse collection of ceramic vessels, ground stone artifacts, chipped stone artifacts as well as plant and human remains (Mirro and Owen 2001; Morehart 2001, 2002; Owen 2002). Although no radiocarbon samples have yet been processed, temporally diagnostic ceramics date the utilization of Barton Creek Cave from the Protoclassic to the Late-Terminal Classic phase (ca. A.D. 0–900), with considerably more ceramics attributable to the Late-Terminal Classic phase (Mirro and Owen 2001). These findings suggest that Barton Creek Cave was used more frequently during the Late-Terminal Classic, a pattern noted for many other caves located in western Belize (Awe 1998), though further refinement of the cave's chronology is needed.

Contextual Associations of the Textile Fragment

The textile fragment from Barton Creek Cave was recovered from a one liter flotation sample collected from a 4 x 6 m surface feature (Feature 23) located on Ledge 2, Area C (Fig. 2). The feature is a concentration of ash, charred floral remains, and artifacts in a shallow, eroded, and dry rimstone pool. The ash and charring that are in evidence indicate that this feature comprises the remains of an ancient hearth set alight within the confines of the rimstone pool. The pool is situated beneath an overhanging boulder that has spalled off the cave wall. Portions of the boulder appear to have fractured and collapsed in antiquity, perhaps due to the heat of the fire, and partially covered the feature. If the boulder had fractured as a result of the fire this event would have smothered and prevented the complete combustion of some materials, particularly organic remains. Nevertheless, the rocks protected

the feature and its contents from deterioration and disturbance, resulting in one of the best-preserved archaeological deposits in the cave. The association of Roaring Creek Red dishes and Cayo Unslipped jars (Gifford 1976:40–243,276–287) allows this feature to be assigned to the Spanish Lookout phase of the Late Classic period (A.D. 700–800).

The exceptional preservation of Feature 23 is attested not only by the discovery of the textile fragment hut also by the recovery of remarkably preserved charred macrofloral remains (Morehart 2001, 2002). In terms of the number, weight, and diversity of plant remains, Feature 23 yielded more than what commonly is recovered from an entire habitation site in the Maya Lowlands. These plant remains include complete and fragmented maize (*Zea Mays*) cobs, kernels, and stems (some cobs have intact kernels and husks and, thus, can be technically referred to as 'ears'); the seeds and rinds of two species of squash (*Cucurbita moschata* and *C. pepo*); a bean (*Phaseolus sp.*) cotyledon; the seeds and calyxes of chile peppers (*Capsicum annum*); and a number of taxa of wood charcoal, such as pine (*Pinus sp.*), cacao (*Theobroma sp.*), copal (*Protium sp.*), and nance (*Brysonima sp.*). The contents of Feature 23 are believed to be the remnants of an offering left to earth deities, probably as a symbolic repayment after harvest for the use of their domain (Morehart 2002).

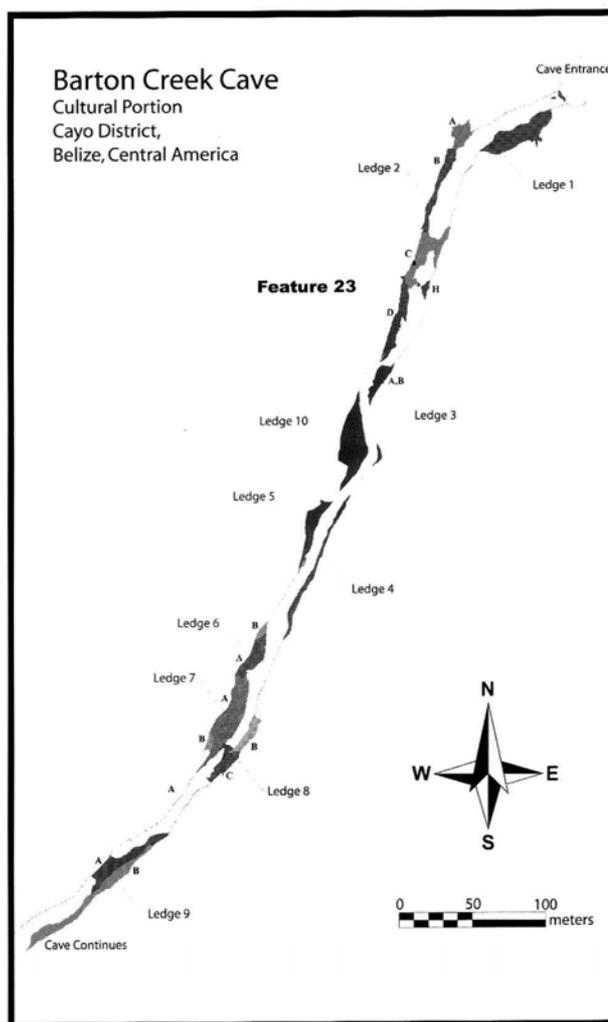


Figure 2. Plan Map of Barton Creek Cave showing location of Feature 23.

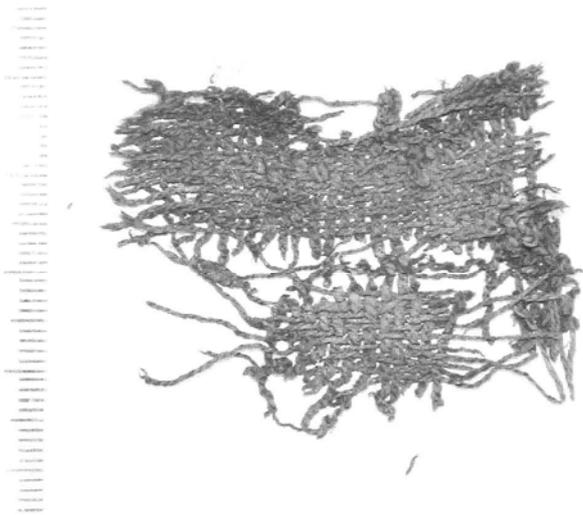


Fig. 3. Cotton textile fragment from Feature 23, Barton Creek Cave.

Technical Attributes of the Textile Fragment

The textile fragment from Feature 23 is approximately 5 cm long and 3 cm wide (Figure 3). The cloth is charred, though its internal structure remained well intact despite the potentially harmful effects of carbonization. Scanning electron microscopy revealed long, narrow, uni-cellular fibers characteristic of cotton (*Gossypium sp.*) (Figure 4). In addition to the textile fragment, five individual plied yarns were recovered from another sampling locus in the feature. These yarns are likely remnants of the same fabric because their technical attributes are identical.

It was not possible to distinguish between the warp and weft elements in the textile fragment because no end or side selvage treatments were preserved (see King 1978). As a result, the two elements are designated here simply as A and B. The cotton fibers of both the A and B elements were Z-spun (Figure 5). The Z-spun singles were then S-plied to create composite yarns. "Z" and "S" refer to the direction of twist of spun or plied yarns according to whether the spiral conforms to the central slant of the letters "Z" or "S."

Diameter measurements, the number of twists per cm, and the angle of twists for yarns of warp and weft elements are useful methods to assess and document the tightness of twist of elements and overall textural differences in textiles. The A elements are looser with roughly 0.56 mm composite yarns, 12 turns/cm, and a 20° angle of twist. The B elements are wider in diameter with 1.04 mm composite yarns and have a tighter ply with 12 turns/cm and a sharper 55° angle of twist. These structural differences between the two elements in the textile specimen make the B elements stand out more than the A elements. A count of the A and B elements reveals that the number of A elements per cm² (14) are almost double the number of B elements (8). Despite the greater number of A elements in the overall weave, their reduced diameter and looser twist makes them less prominent than the wider, more tightly twisted B yarns.

The weaving technique used to manufacture the Barton Creek textile fragment was difficult to ascertain due to the incomplete nature of the specimen. Nevertheless, some general observations can be made. The weaving technique appears to be somewhat inconsistent, a factor that may be the

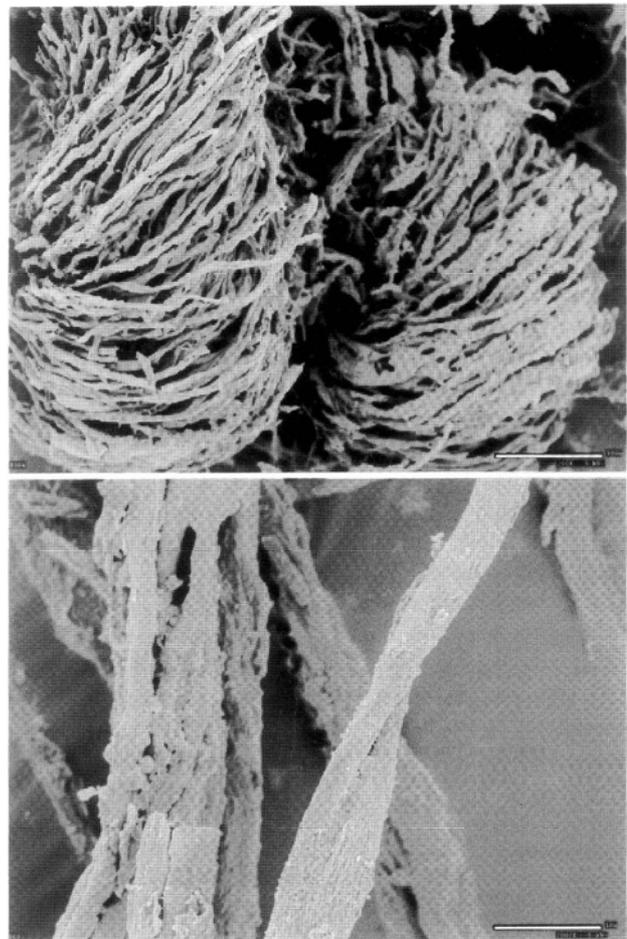


Fig. 4. Scanning electron micrographs of cotton (*Gossypium sp.*) fibers that compose the textile specimen. Top: $\times 200$; Bottom: $\times 2000$.

result of preservation or poor manufacture. Overall, however, the primary structure conforms to a twill pattern, particularly a 2/2 twill (Figure 6). Twill weaves are marked by the diagonal alignment of groups (at least three for twills) of warp and weft elements (Emory 1980:2). Warp and weft elements in the same grouping do not pass (float) over or under the same opposite warp and weft elements. As each warp or weft float over or under a corresponding warp or weft element, the next element in a group is stepped up one warp or weft beyond the previous one. This continuous stepping creates the diagonal pattern distinct to twills. A group of warp or weft elements in a twill can be identified when the first element of the next group passes over or under the same element that the first element of the previous group passed over or under. 2/2 twills are even twills in which both the warp and weft elements, in groups of four, pass over and under two corresponding warp and wefts (Emory 1980:2-93). Although we were unable to establish which elements in the Barton Creek Cave specimen were warps or wefts, both the A and B elements correspond to this pattern, which suggests that the cloth is a 2/2 twill. This assessment of the textile fragment's primary structure should be considered tentative, and further examination of the specimen is planned for the future.

The Barton Creek Textile Remains in Perspective

The earliest evidence of cotton in the upper Belize valley consists of a single seed recovered from a Middle Formative

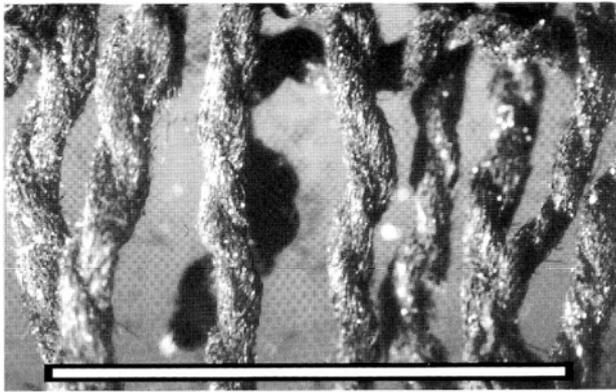


Figure 5. Close-up of A elements showing Z-plyed, S-spun yarns. Bar = 0.5 cm.

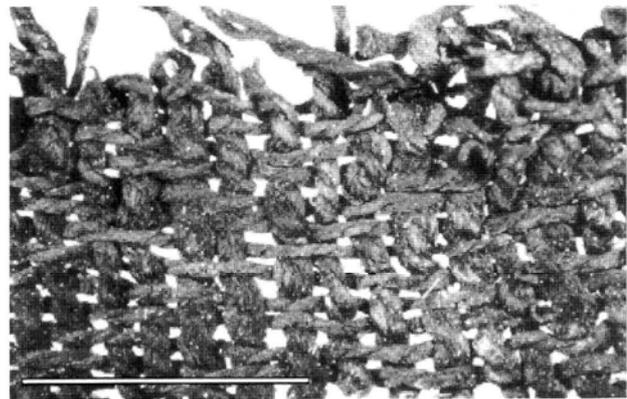


Fig. 6. Close-up of textile specimen showing weaving pattern. B elements are vertical and A elements are horizontal in image. Bar = 1 cm.

period deposit at Cahal Pech (Wiesen and Lentz 1999). Cotton cultivation is documented several centuries earlier in the Maya Lowlands (Miksicek 1990:04; Wisemen 1990:20), however, and it is possible that cotton was being grown prior to the Middle Formative period in the upper Belize valley. By the Late Classic period it is likely that the cultivation of cotton in the Maya Lowlands increased in order to produce cloth for exchange and tribute. Ethnohistoric records indicate that some 16th century Maya communities were specialized in the production of cotton mantas that were exchanged for needed or desired items unavailable locally, such as kakaw (Jones 1989). Bishop Fray Diego de Landa observed that Yukatek Maya elites maintained lands that were planted with cotton, and the lower class was obligated to pay tribute in cotton cloth to local lords (Tozzer 1941:6, 215). This practice is attested for the Classic period; polychrome vessels diagnostic of this period often depict cotton cloth being offered to rulers as tribute. Furthermore, many works of Classic period iconography, such as the lintels of Yaxchilan, Mexico, depict nobles and rulers wearing elaborately decorated textiles. The acquisition of cotton cloth likely served to enhance the power and prestige of Maya chiefs. By wearing finely made cotton garments decorated with cosmologically salient symbols, Maya nobles may have been identified as a distinct social and ideological group from the rest of the population – a factor that assisted in maintaining their socio-political and economic distinction.

Attempts to place the Barton Creek Cave textile fragment into a larger perspective of ancient Maya textile production and utilization are restricted on multiple levels. Virtually no inferences about textile production and consumption spheres have focused on preserved textiles themselves, largely due to the poor preservation of organic materials in this region. Instead, hypotheses have been formulated from observations of durable artifacts associated with textiles, namely spindle whorl attributes and distributions, figurative art depicted on polychrome ceramic vessels and figurines, and, more rarely, textile imprints on ceramics and stucco. This condition restricts our ability to make comparisons with other textile specimens recovered from Maya sites. Furthermore, little can be said concerning wider patterns of textile production in this region of the Maya Lowlands based on only one specimen. Despite these limitations in sample size and comparative data, it is possible to explore the broader significance of the Barton Creek Cave textile remains.

The Barton Creek Cave textile fragment is similar to other textile remains recovered from the Maya Lowlands in that most have been found in ceremonial contexts, including burials, caches, caves, and cenotes (Brady 1995:3; Carlsen 1987; Lothrop 1992; Rue et al. 1989:98). The greater representation of ceremonial contexts likely is due to the better preservation of ritual deposits since they commonly represent single episodes of activity that were often intentionally sealed in the past rather than cumulative records of disposal. The largest collection of Maya textiles was retrieved from the ‘Cenote of Sacrifice’ of Chichen Itza, (Lothrop 1992), and it is possible that some are the remnants of clothing worn by sacrificial victims who were thrown into the cenote as offerings to rain deities (see Tozzer 1941:23). Similar to the Barton Creek Cave specimen, the majority of the textiles from the Cenote of Sacrifice were manufactured from Z-spun yarns, and most specimens were further S-plyed into composite yarns (Lothrop 1992:7,46; see also Anawalt 1984:14). Z-spun, S-plyed yarns were also found at Mayapan (Mahler 1962, 1965; see also King 1973: 74), and Z-spun textiles have been recovered from Aguateca and Rio Azul (Dickau and Lentz 2001; Carlsen 1986, 1987). Given the fact that only two options are available for spinning and plying, namely “Z” or “S,” it is not certain if this structural similarity among Maya textiles is significant.

The function of textiles from ancient Maya ritual contexts was variable. At Rio Azul, the textiles were found in burials and were likely either clothing worn by or cloth shrouds draped over individuals interred (Carlsen 1986, 1987). At Gordons Cave III, near Copan, human bones were found wrapped in textiles (Brady 1995; Rue et al. 1989). Several eccentric flints were found in a cache at Copan with remnants of cloth wrapping (Agurcia Fasquelle and Fash 1991:02–103; Fash 1991:02, 103), suggesting that they may have been deposited as sacred bundles (see Freidel et al. 1993:70–272).

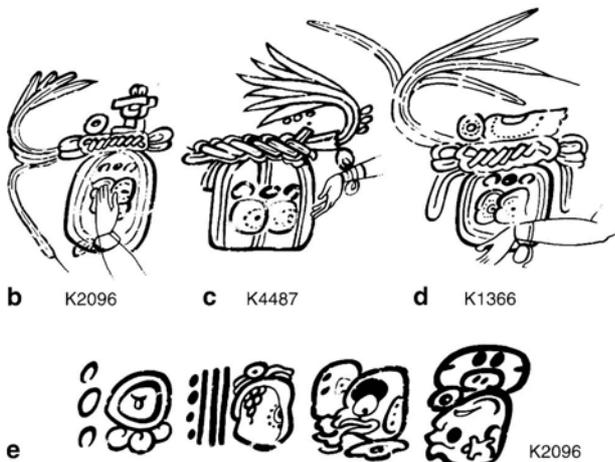
The textile fragment from Barton Creek Cave was found with several species of domesticated plants, including maize, beans, squash, and chile peppers. The only other textile remains documented from the Maya Lowlands in direct association with maize is a carbonized fragment recovered in front of a palatial bench at Aguateca (Dickau and Lentz 2001). Charred maize kernels were found adhering to the Aguateca textile fragment, which may have been a final offertory cache prior to the site’s invasion and destruction (Dickau and Lentz 2001; Inomata 2003:115).



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a

Figure 7. a: Roll-out photograph of a 'Codex Style' vessel representing an example the mythological underworld scene (Photo © Justin Kerr). b: Examples of bundles carried into the cave that are marked by the caption *ju'n pik*. c: Example of a glyphic caption accompanying these iconographic scenes; transcription, transliteration, and literal translation provided. (Drawings by Christophe Helmke based on photographs by Justin Kerr.)



b

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c

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d

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e

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3-IK / 19-SIHO'M / OCH-CH'EN-na / CHAK-AJAW
 ux ik' / b'olonlaju["]n [sak]siho'm / och[i] ch'een / chak ajaw
 Lit.: "[On the date] 3 Ik' 19 Sak, Chak Ajaw cave-enters."

It is possible that the cloth from Barton Creek Cave was laid down as a blanket on which the food offerings were placed, a practice of contemporary Maya cave rituals such as the Wastek (Alcom 1984). Alternatively, the cloth may have been used to wrap the food into an offering bundle that was deposited in the cave. This interpretation is supported by a close analog depicted in the iconographic programs of several contemporary Late Classic 'Codex Style' vessels. The iconographic program, first identified by Robicsek and Hales (1981:1-74, 80-82), is represented by at least sixteen vessels with only minor variations. The scenes in question represent a mythological event involving two facing groups of supernatural figures standing waist deep in water (Figure 7a). The water is indicated by swirls of brown wash accentuated in some instances by conch shell motifs, fishes, and wafer lilies. One group represents heavily armed warriors, with the principal figure named *chak ajaw* ("Great Lord") in accompanying glyphic captions. The other group is an unarmed group of elites carrying bundles and stacks of tribute cloth, headed by a principal figure that is reminiscent of the youthful maize deity (Figure 7a). The bundles frequently are marked by the glyphic caption *ju'n pik* (Figure 7b-d), which can be understood as the numeral "one" followed either by a numerical classifier (Macri 2000) or by the noun "cloth" (Nikolai Grube,

personal communications to Helmke 2003). The former reading suggests that the bundles may have contained 8000 unspecified items (Macri 2000:8, 23; Schele and Grube 1993), whereas the latter simply may designate the bundles as "One Cloth." While the iconography suggests an aqueous netherworld, the glyphic captions that occasionally accompany these scenes are more explicit; the most common caption reading, "Chak Ajaw enters the cave" (*ochi ch'e'en chak ajaw*), indicates that these scenes were intended to depict an event taking place in a cave (Figure 7e). Although the exact nature of this mythological event is unclear, it may have served as a template that guided actual cave rituals-including those undertaken in Barton Creek Cave.

In addition, Taube (1985) has documented several bundles in the iconographic corpus of the Classic period Maya that contain motifs representing maize. Although it is possible that the maize signs served as metaphors for more sacred items (Taube 1985:78), it is also possible that many bundles contained actual maize (Stenzel 1968:51; Stuart 2001:6) and perhaps other food items. If the Barton Creek Cave remains are the remnants of such a bundle, it is the only one yet recovered from the Maya Lowlands.

Conclusions

Despite the importance of cloth in the economic and symbolic life of the Maya, adverse environmental conditions largely prevent the preservation of textiles in the archaeological record. The discovery of a cotton textile fragment from Barton Creek Cave provides a rare glimpse of this aspect of ancient Maya material culture. The weaving pattern is similar to some specimens recovered from the Maya Lowlands, especially those from the Cenote of Sacrifice (Lothrop 1992). Furthermore, the spinning technique of the majority of known examples, including the fragment from Barton Creek Cave, is based on Z-spinning, but it is uncertain if this similarity is significant. The direct association of the Barton Creek Cave textile fragment with several species of domesticated cultigens suggests that the cloth was part of the offering bundle deposited in the cave, conforming to contemporary iconographic representations.

Acknowledgements

The authors wish to thank the Institute of Archaeology of Belize and the staff, students, and workers of the Western Belize Regional Cave Project (WBRCP). The WBRCP was supported by a grant (to Awe) from the Social Sciences and Humanities Research Council of Canada. Paleoethnobotanical research was supported by a grant (to Morehart) from the Foundation for the Advancement of Mesoamerican Studies, Inc. (FAMSI, Grant # 00097). Thanks are extended to David Lentz and Mary Pohl for the use of laboratory facilities. In addition, we would like to thank Justin Kerr for his kind permission to reproduce one of his roll-out photos.

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RESUMEN: En este artículo se presenta el descubrimiento de un fragmento de textil de algodón en la cueva Barton Creek que se ubica en el valle superior del Río Belice. El fragmento es un tejido del patrón de 2/2 tela cruzada que consiste en las urdumbres y las tramas de S-hilado con cabos de Z-hilado. Se lo fecha al Período Clásico Tardío Maya (A.D. 700–800). Es posible compararlo con otros textiles recuperados de depósitos rituales en otros sitios arqueológicos de las Tierras Bajas aunque sólo existe información limitada acerca de ellos. El tejido fue recuperado en contexto con muchas especies de cultivos domesticados, incluyendo maíz, frijoles, calabazas y chiles, probablemente los restos de una ofrenda a los dioses. Es probable que se usara estos textiles para envolver ofrendas de comida.

ZUSAMMENFASSUNG: Gegenstand dieses Berichtes ist die Entdeckung eines Textilfragmentes aus Baumwolle aus der späten klassischen Periode (A.D. 700–800), das in der Barton-Creek-Höhle im oberen Tal des Belize-Flusses, im westlichen Belize gefunden wurde. Das Textilfragment besteht aus Z-förmig gesponnenen, S-förmigen Zwirn „Kette und Schuss“ – Elementen, die in eine 2/2 Körperbindung zusammengewebt sind. Die Deutung dieses Textilfundes korrespondiert mit der begrenzten Information, welche über Textilfunde aus zeremoniellen Kontexten andernorts im Maya-Tiefland vorliegt. Das Gewebe wurde in unmittelbarem Zusammenhang mit Pollen und Überresten domestizierter Nutzpflanzen wie Mais, Bohnen, Kürbis und Pfefferschoten gefunden. Somit ist das Gewebe wahrscheinlich der Überrest einer Opfergabe an Erdgottheiten. Es ist möglich, dass das Tuch als Einwickelmaterial für die Speiseopfer in Form eines heiligen Bündels gedient hat.