# Plants of the Underworld: Ritual Plant Use in Ancient Maya Cave Ceremonies

**Research Year**: 1998
**Culture**: Maya
**Chronology**: Classic to Contemporary
**Location**: Belize, Guatemala, Honduras, El Salvador
**Sites**: Actun Nak Beh, Barton Creek, Actun Chapat and Actun Chechem Ha

**Table of Contents**

## Introduction

For the ancient Maya, caves were sacred areas of the natural landscape. Caves were perceived as points of access to the underworld (Awe 1998; Bassie-Sweet 1991; Brady 1989; Brady and Stone 1986; Pohl 1983). Post-Conquest sources, such as the Popol Vuh, refer to the underworld as *Xibalba* (Tedlock 1985). *Xibalba* was the home of many powerful gods in the Maya pantheon. Thus, caves were an apt stage for ceremonial activities that were heavily laden with cosmological import. Researchers have proposed a number of interpretations for the kinds of rituals that were conducted in caves. The majority of these ideas focus either on fertility rites, emphasizing the relationship between the underworld and deities associated with rain and agriculture (Awe 1998; Brady 1988, 1989), or on political rituals, examining the role of caves in the transference and negotiation of social, economic, and political power (Brady and Ashmore 1999; Halperin 2001; Halperin *et al.* 2001; Helmke 1998; Pohl 1983).

Most theories of Maya cave utilization have been based predominantly on observations of durable artifactual assemblages to the virtual exclusion of botanical remains (Brady 1989; Gibbs 1997; Halperin 2000; Helmke 1998; Helmke and Awe 1998; Ishihara 2000; Pohl 1983; Stone 1995). In addition, there have been few investigations of ancient ritual practices at surface sites using archaeobotanical databases (see, for exception, Guderjan 2000; McNeil 2000). In response to the paucity of studies of plant remains recovered from ritual contexts, this paper presents some preliminary results and interpretations of paleoethnobotanical research undertaken in four caves located in western Belize: Actun Nak Beh, in the Roaring Creek River Valley, Barton Creek Cave, in the Barton Creek River Valley, and Actun Chapat and Actun Chechem Ha, in the Macal River Valley (Figure 1) (see Morehart 2001; Morehart in prep.). I argue that the degree of proximity of the cave sites to ceremonial centers resulted in differential patterns in the archaeobotanical record that reflect distinct ritual activities. Unlike other paleoethnobotanical studies, that have examined only the economic potential of archaeobotanical remains, the present work emphasizes the symbolic nature of plant utilization. Ethnographic data justify this perspective. Among the contemporary Maya plants and foodstuffs used in rituals, many are selected due to specific symbolic elements that are associated with them (Flores and Balam 1997; Kintz 1990; Redfield and Villa Rojas 1934:128-147; Roys 1931; Steinberg 1999; Vogt 1976:89-90). Thus, each has its place not simply due to its economic utility, but, rather, due to its cosmological and mythological salience and history.

*Submitted 01/31/2002 by*:
Christopher T. Morehart
morehart123@yahoo.com

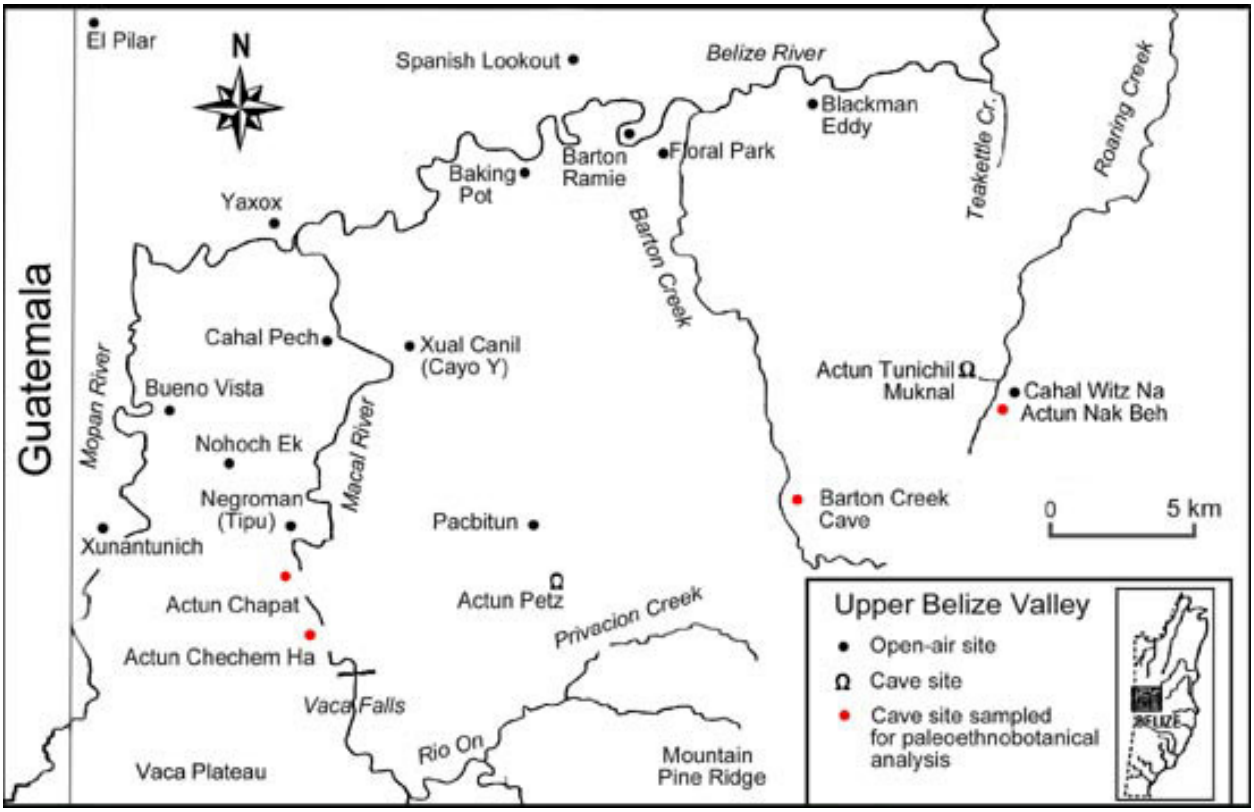


**Figure 1. Map of the Upper Belize Valley indicating cave sites discussed in text.**

## Paleoethnobotanical Investigations

Archaeobotanical sampling yielded a number of well preserved food remains including domesticated crops and the fruits of economically useful trees. Numerous species of wood charcoal were recovered as well.

Actun Nak Beh was the only cave that yielded carbonized remains of edible tree fruits. The pits of nancé (*Byrsonima crassifolia*) (Figure 2) and the endocarps of the cohune palm (*Attalea cohune*) (Figure 3) were retrieved from a Late Classic burial located at the cave's entrance.

**Figure 2. Nancé (*Byrsonima crassifolia*) pit from Actun Nak Beh.**

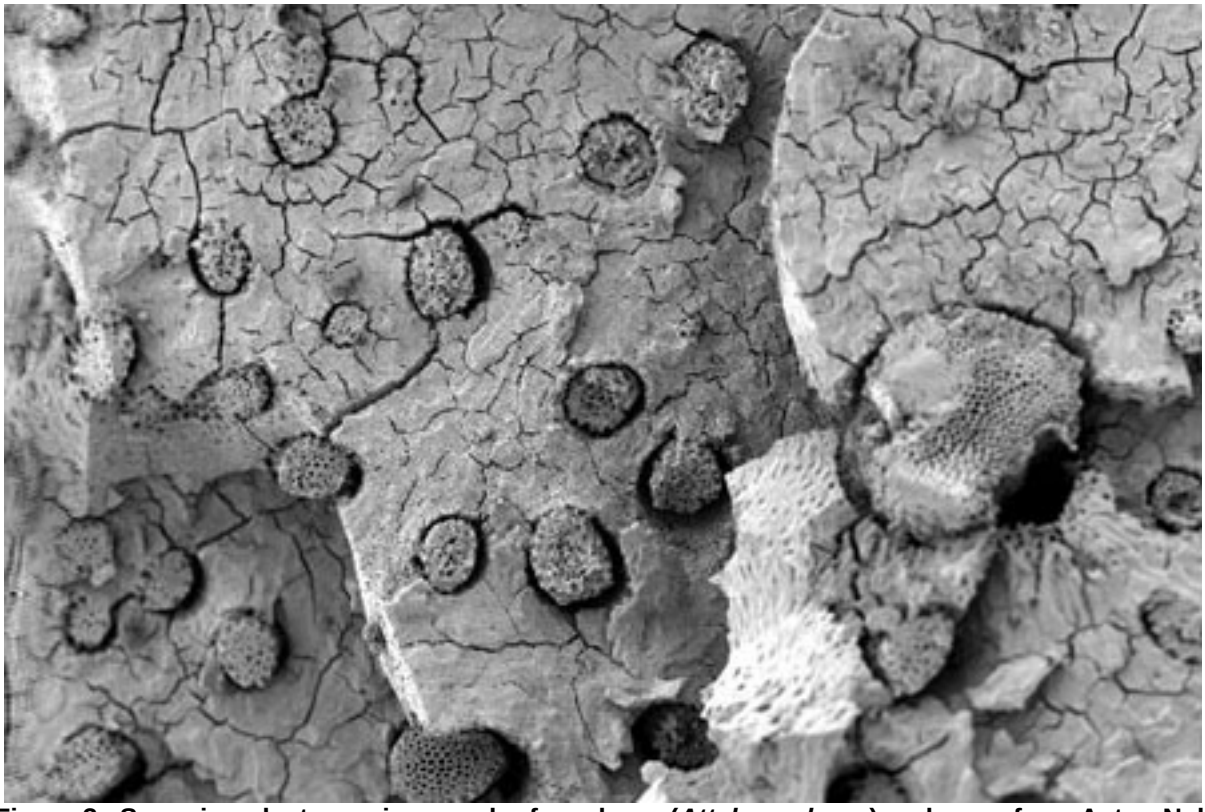

**Figure 3. Scanning electron micrograph of a cohune (*Attalea cohune*) endocarp from Actun Nak Beh.**

**Figure 4. Maize (*Zea mays*) cob fragment from Actun Chapat.**

Archaeobotanical specimens from domesticated cultigens were found at Actun Chapat, Actun Chechem Ha, and Barton Creek Cave. Evidence of domesticated crops from Actun Chapat consist of maize fragments (*Zea mays*) (Figure 4), beans (*Phaseolus* sp.),

and squash rinds (*Cucurbita* sp.). Maize cobs and kernel fragments were retrieved from Actun Che chem Ha as well ( Figure 5 ). A lso at Chechem Ha, microfloral analysis conducted on soil from complete vessels and residues from ceramic sherds yielded maize starch grains ( Figure 6 ). The best-preserved domesticated food remains wer e found at Barton Creek Cave. Maize and beans were found in hearth features and burials dist ributed throughout th e cave. A single, larg e hearth feature at Barton Creek Cave yielded an amazing ass emblage of domesticates, incl uding squash rinds and the seeds of two species of squash, Cu curbita moschata and Cucurbita pepo ( Figure 7 ). The assemblage also included 41 chile pepper (*Capsicum annum*) seeds (Figure 8) and the fruit bases (calyxes) of chile peppers and maize remains ( Figure 9 ). The maize remains consist of complete and fragmented cobs and kernels. Some cobs have the husks still intact, while others are small, underdeveloped bas al cobs. Also, maize stem fragments were foun d in abundance ( Figure 10 ). The numerous maize stems, in conjunction with the entirel y unprocessed ears and basal cobs, suggest that entire maize plants were deposited. The same obse rvation can be made of the squash and chile peppers because the seeds of each were found in a ssociation with fragments of their fruits. A carbonized te xtile fragment was recovered from the same feature ( Figure 11). The cloth is composed of Z-spun, S-plied warp and weft elements, woven into a 2 X 2 twill patte rn (Figure 12). Electron microscopy revealed that cotton fibers were used to manufacture the textile.

Finally, many wood charcoal remains we re identified in t he archaeobotanic al assemblage. The mos t ubiquitous charcoal recovered was pine ( *Pinus* sp.) (Figure 13). All caves y ielded pine remains, although the distribution of pine varied among the cave sites. A wide variety of hardwoods we re identified als o, including avocado (*Persea* sp.), habín (*Piscidia* sp.), copal (*Protium* sp.), and cacao (*Theobroma* sp.).


**Figure 5. Maize (*Zea mays*) cobs from Actun Chechem Ha.**

**Figure 6. Maize (*Zea mays*) starch grains from Actun Chechem Ha.**

**Figure 7. Squash seed (*Cucurbita pepo*) from Barton Creek Cave.**

**Figure 8. Scanning electron micrograph of a chile pepper seed (*Capsicum annum*) from Barton Creek Cave.**


**Figure 9. Maize cobs (*Zea mays*) from Barton Creek Cave.**

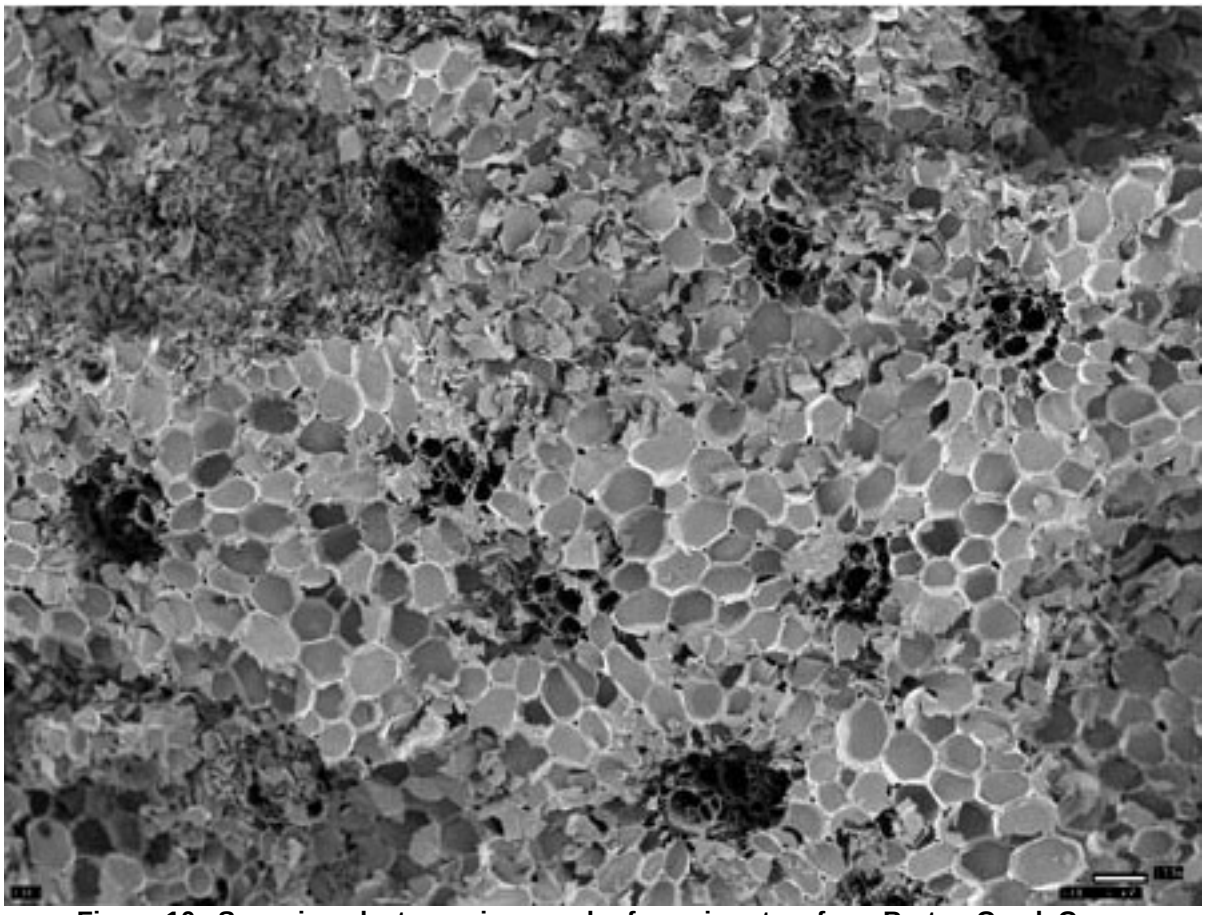

**Figure 10. Scanning electron micrograph of a maize stem from Barton Creek Cave.**

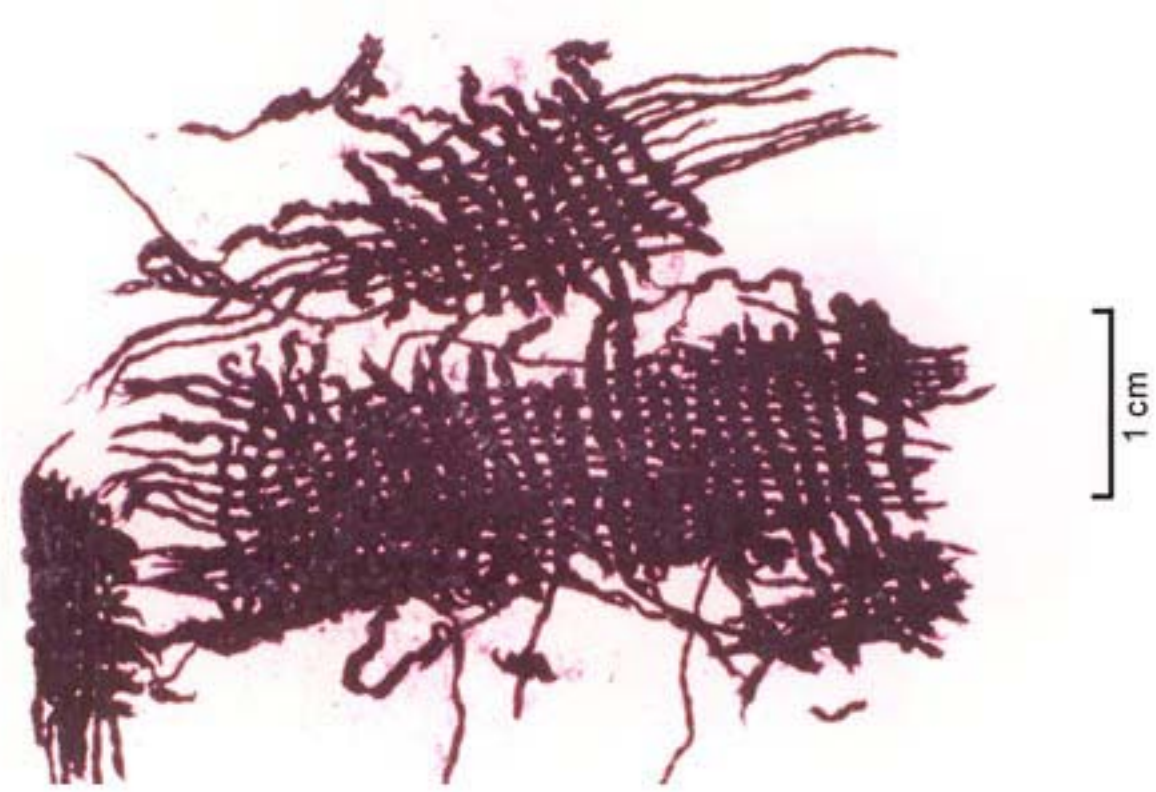


**Figure 11. Textile fragment from Barton Creek Cave.**

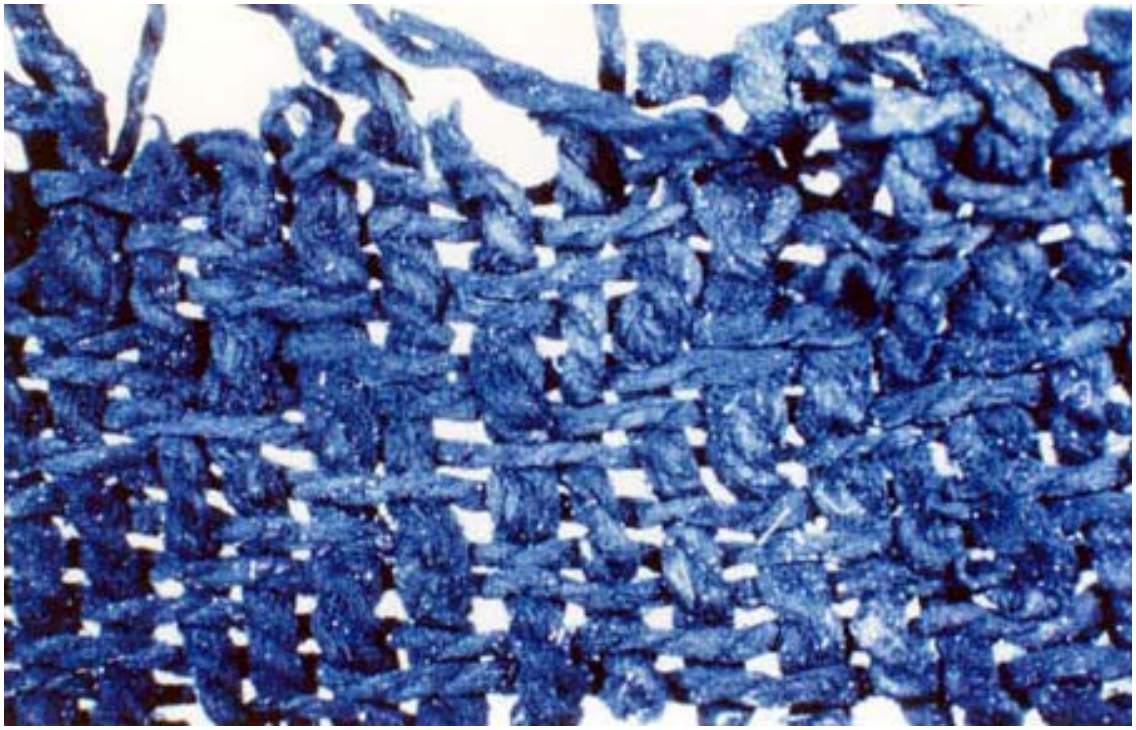

**Figure 12. Close-up of textile fragment from Barton Creek Cave.**

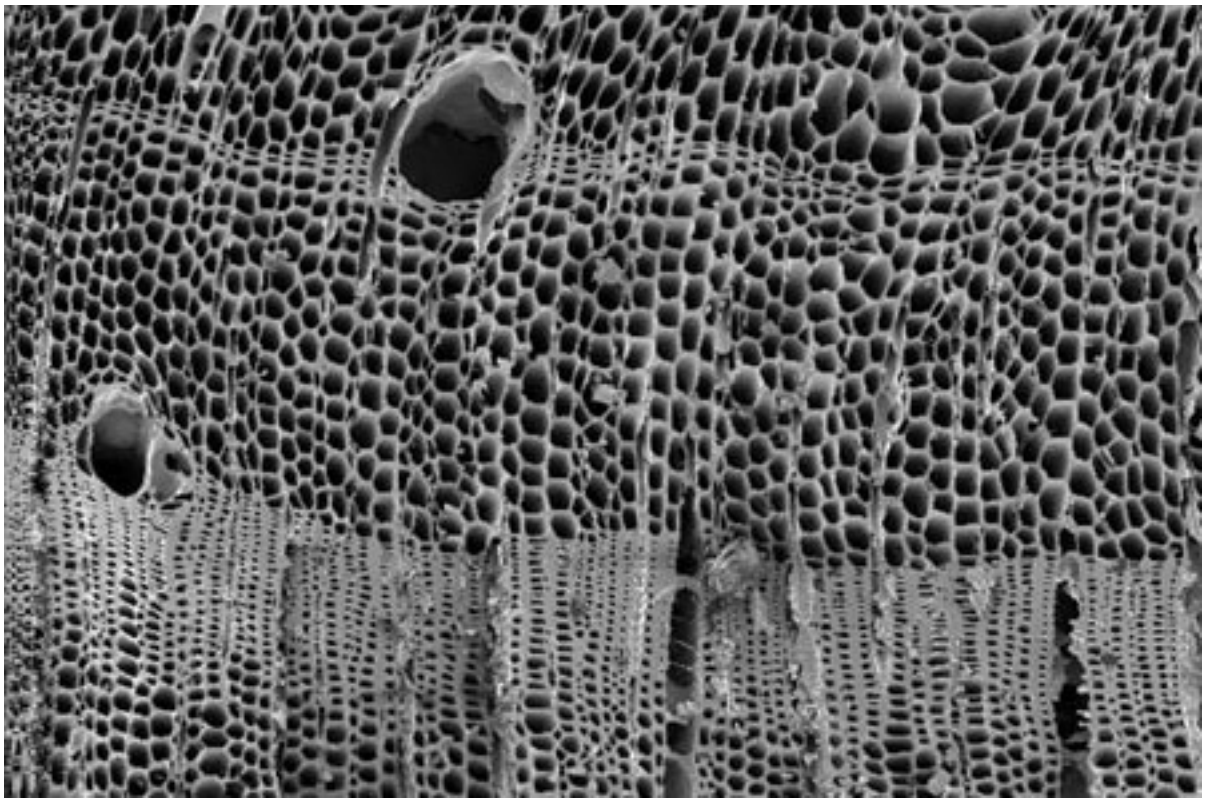

**Figure 13. Scanning electron micrograph of pine (*Pinus* sp.) charcoal from Barton Creek Cave.**

## Discussion

Domesticated crops were yielded only fr om the dark interiors of caves in the rural countryside. I suggest that these sites were the loci for rites conducted to appease gods associated with agric ultural fecundity. Am ong many contemporary Maya groups, maize is believed to have had a subterranean origin (Thompson 1970:348-354), and iconography from the Classic period often depict the maize god emerging from a fissure in the eart h's surface (Figure 14). The Tzotzil of Chiapas, México, make pilgrimages to the caves and mount ains s urrounding Z inacantán during maiz e-field cer emonies in order to communicate with the Earth Lord who resides there (Vogt 1969:457).

**Figure 14. Maize god emerging from fissure in earth's surface (adapted from Freidel *et al*. 1993).**

Examination of the archaeob otanical s pecimens themselves also s upports the interpretation that the agricultural rites were conducted at the rural cave sites . With the exception of the maiz e starch grains from Actun C hechem Ha, that are probably t he remnants of an ancient maiz e-based ceremonial beverage [1] , there appears to be a clear preference for offerings of unprocess ed, domesticated crops in the rural areas. This observation is especially salient with the Barton Creek maize in which maize stalks and cobs with intact husks were recovered ( Figure 15 ). Other caves in the Maya

[1] The types of ceramic vessels that yielded maize starch grains can largely be classified as utilitarian wares. Thus, if the vessels had previously been used in a domestic sphere then the recovery of maize starch may actually reflect their prior use as utilitarian tools.

lowlands where corncobs have been recovered include Cueva de las Pinturas (Brady *et al*. 1997) and Naj Tunich (Brady 1989; Brady and Stone 1986) in Petén, Guatemala, and Gordon's Cave #3, located near Copán, Honduras (Brady 1995).

Most ethnographic accounts of the ritual use of unprocessed maize are associated with agricultural rituals. For instance, Quiché priest-shamans of Momostenango, Guatemala, collect armloads of corn stalks, and arrange them around shrines to ask deities for agricultural productivity (Tedlock 1982:80). The Yucatec Maya of Chan Kom use unprocessed maize during first fruit ceremonies, known as *hol-che* (Redfield and Villa Rojas 1934). Finally, the Tzotzil Maya hang unhusked maize ears from wooden crosses to protect the stored, harvested maize (Vogt 1976:56).

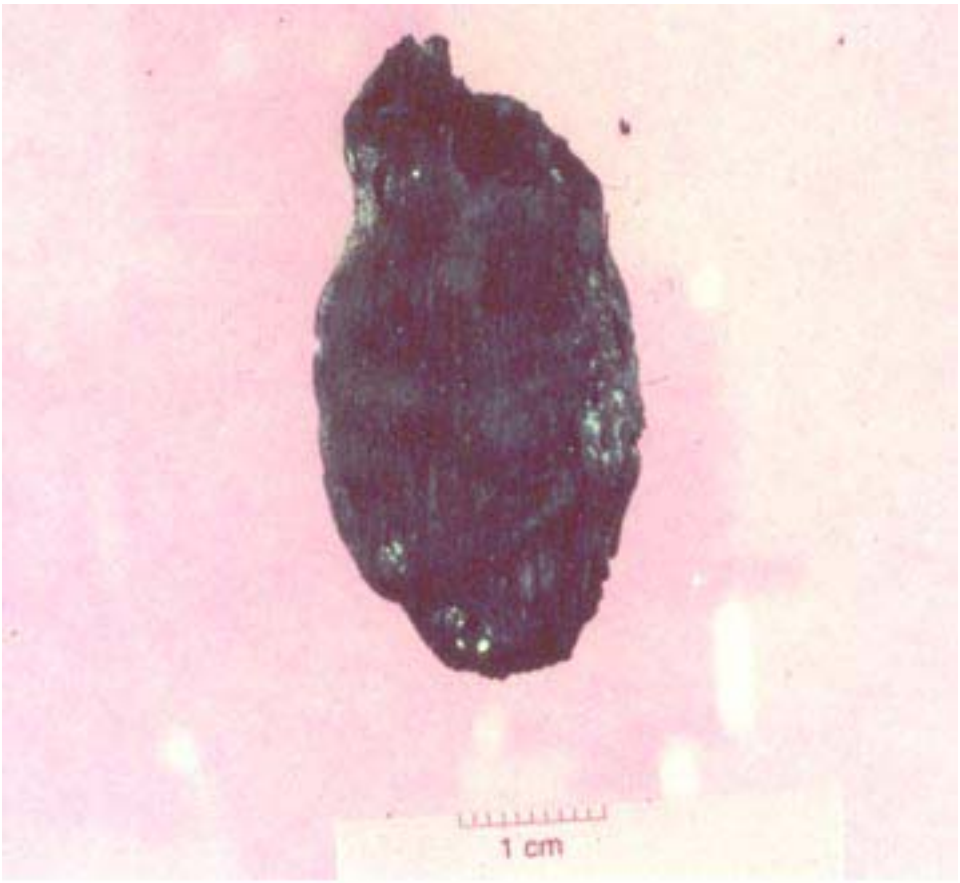


**Figure 15. Unhusked maize cob from Barton Creek Cave.**

In contrast to the rural cave sites where ceremonies associated with agricultural products were common, qualitatively different ritual practices are evident at Actun Nak Beh. A causeway connects the entrance of Actun Nak Beh to the medium-sized, ceremonial center Cahal Witz Na' (Figure 16). The direct association of the cave with the surface site suggests that the ideological potency of caves was crucial to the

legitimization and maintenanc e of political aut hority for the rul ers of Cahal Witz Na' (Halperin 2001; Halperin *et al.* 2001). The only food it ems re covered from Actun Nak Beh consist of nancé and cohune fruits from a burial in t he cave's entrance. Among the post-Conquest Maya, elites maintained orchards of economically useful trees that were an inheritable s ource of bot h wealth and prestige (T ozzer 1941). If this ethnohistoric analogy is applicable to Actun Nak Beh's archaeobotanical assemblage, then it appears that socially and ideologic ally dominant gr oups at Cahal Witz Na' utilized the ope n space of the cave's entrance for more public rituals that involv ed material displays of wealth in order to secure t heir right to rule. By public, I simply mean a s ocial realm where collective social opinions can be formed (see Habermas 1991).

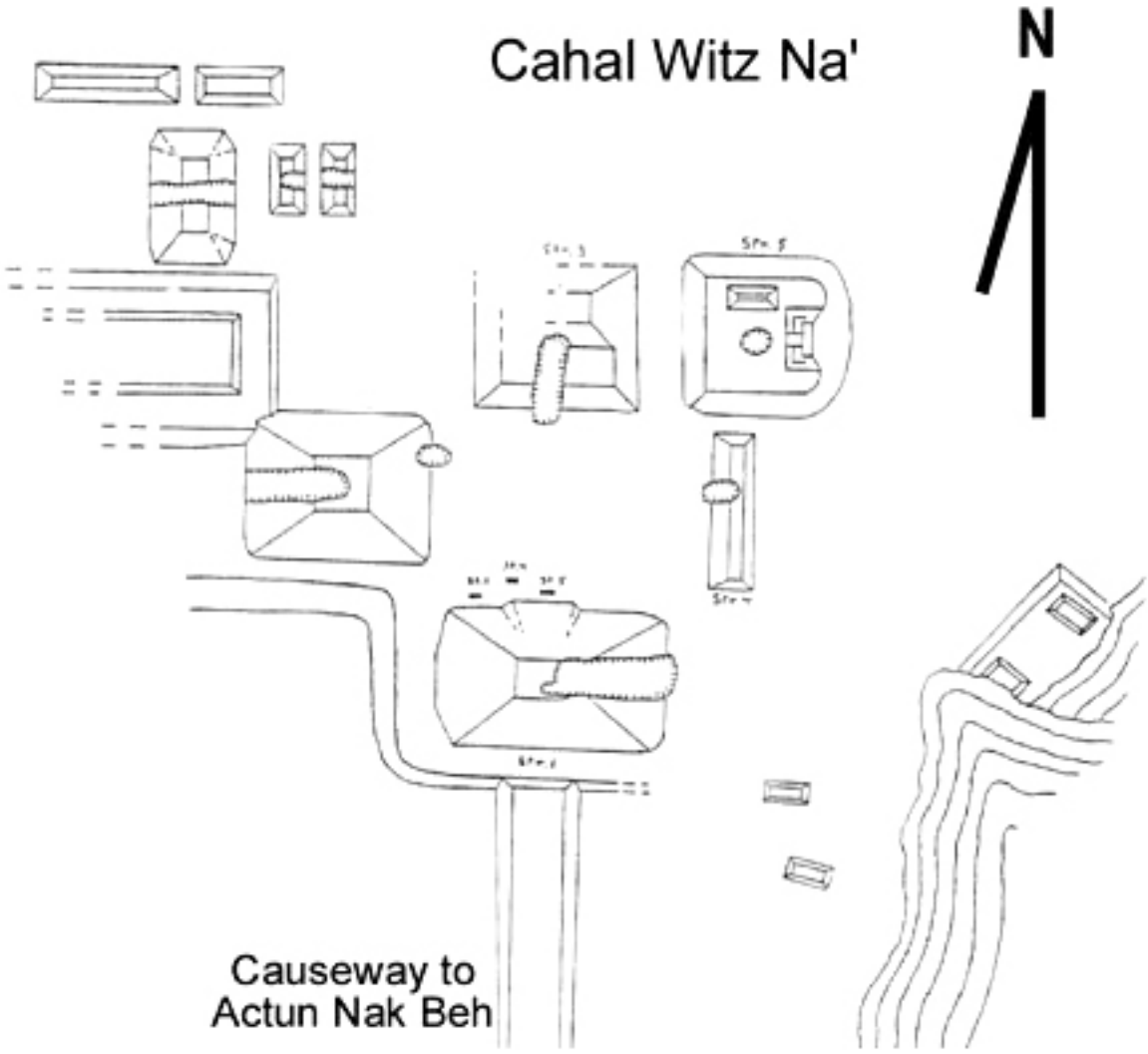


**Figure 16. Plan sketch of Cahal Witz Na' (adapted from Awe *et al*. 1998).**

A Classic period example of this practice is found in Pakal's tomb at Palenque (Figure 17), where Pakal's ancestors are depicted with economically useful fruit trees (Robertson 1983:68, figs. 181-186). Pakal's father, *Kan Bahlum Mo'*, is associated with a nancé tree. According to Patricia McAnany (1995:75), the association between Pakal's ancestors and orchard species metaphorically links these trees to inheritable sources of social, political, and economic power. Archaeobotanical data from other Maya sites can be viewed in a similar manner. For example, at Cerros, located in northern Belize, the percentage of nancé and coyol palm recovered from the site's center grew dramatically as Cerros became more socio-politically complex (Cliff and Crane 1989).

**Figure 17. Kan Bahlum Mo' with nancé tree (adapted from Robertson 1983))**

A parallel contrast between the more urban area of Actun Nak Beh and the rural loci of the other cave sites is observable in the charcoal assemblages. Pine charcoal was the most ubiquitous wood charcoal recovered. In general, pine is commonly found in abundance at archaeological sites in the Maya region. Pine is an excellent source of fuel, and, at some sites, extensive forest clearing for pine fuelwood may have severely degraded the environment (Abrams and Rue 1988; Abrams *et al.* 1996). The species of pine that is represented in the archaeobotanical assemblages is likely *Pinus oocarpa*, which grows north of the Belize Valley in the Mountain Pine Ridge (Figure 18). David Lentz (2001, personal communications) has suggested that pinewood was probably a centrally controlled trade good during Classic period Maya society. The archaeobotanical data from the cave sites conform to Lentz's hypothesis. At Actun Nak Beh, pine was by far the dominant wood charcoal both temporally and spatially (Figure 19). At the more rural cave sites, such as Actun Chapat, hardwoods greatly outweigh pine[2] (Figure 20). This pattern indicates that the users of Actun Nak Beh had more access to pine resources than the users of the caves in the surrounding countryside.

**Figure 18. Pinus oocarpa at Mountain Pine Ridge, Cayo District, Belize.**

[2] The distribution of hardwoods and pine at Actun Nak Beh is based upon the percentage of deposits containing each wood type, also called ubiquity. At Actun Chapat, the distribution is based on the weights of each wood type. The separate methods were undertaken because of differential preservation between the two sites. Ubiquity was used at Nak Beh because poor preservation affected the weights of woods more than their appearance in separate deposits. At Actun Chapat, preservation was good, and ubiquity analysis inflated the importance of certain woods, such as pine. Because wood charcoal weight was not as severely affected at Chapat, weights were used to evaluate the relative importance of pine and hardwoods.

The recovery of pine charcoal from ceremonial contexts is not surprising. The ritual use of pine has been observed among many contemporary Maya groups (Thompson 1970:182). Religious practitioners commonly stand on a carpet of pine needles during ceremonies (Breedlove and Laughlin 1993; Vogt 1969, 1976), and offerings of pine branches are placed in front of crosses erected in caves (Thompson 1970:268). Pine rosin is also utilized for incense, a practice of the Lacandón of Chiapas, México (McGee 1990).

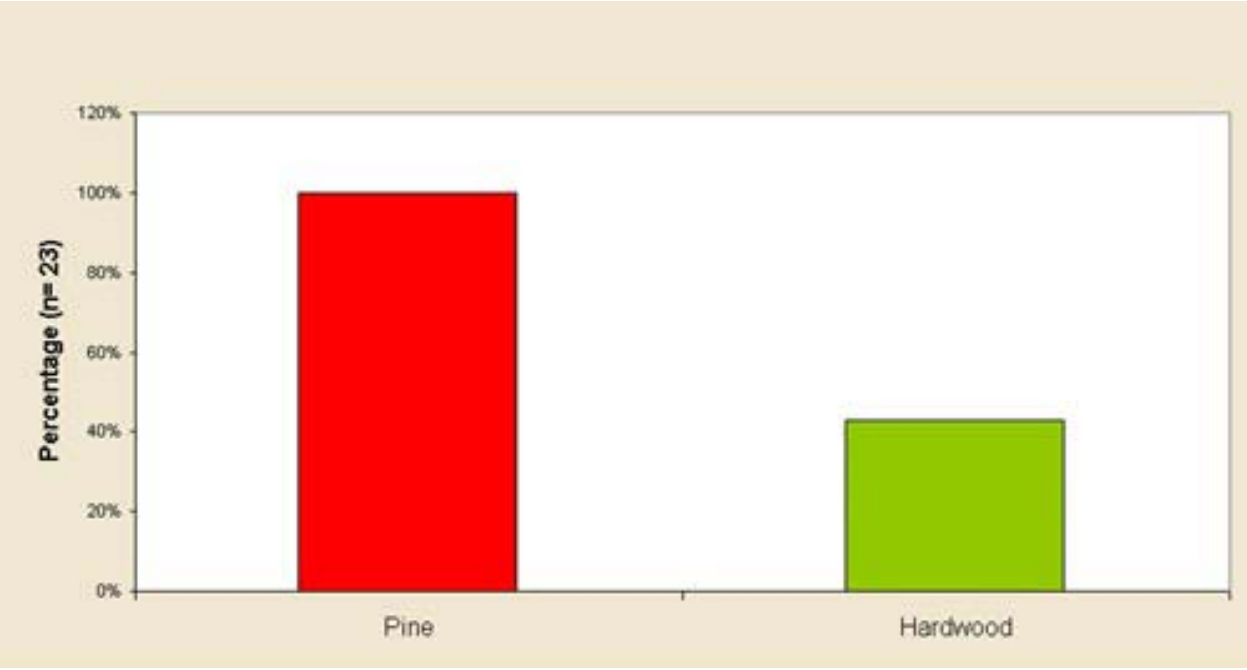


**Figure 19. Distribution of pine and hardwood charcoal at Actun Nak Beh.**

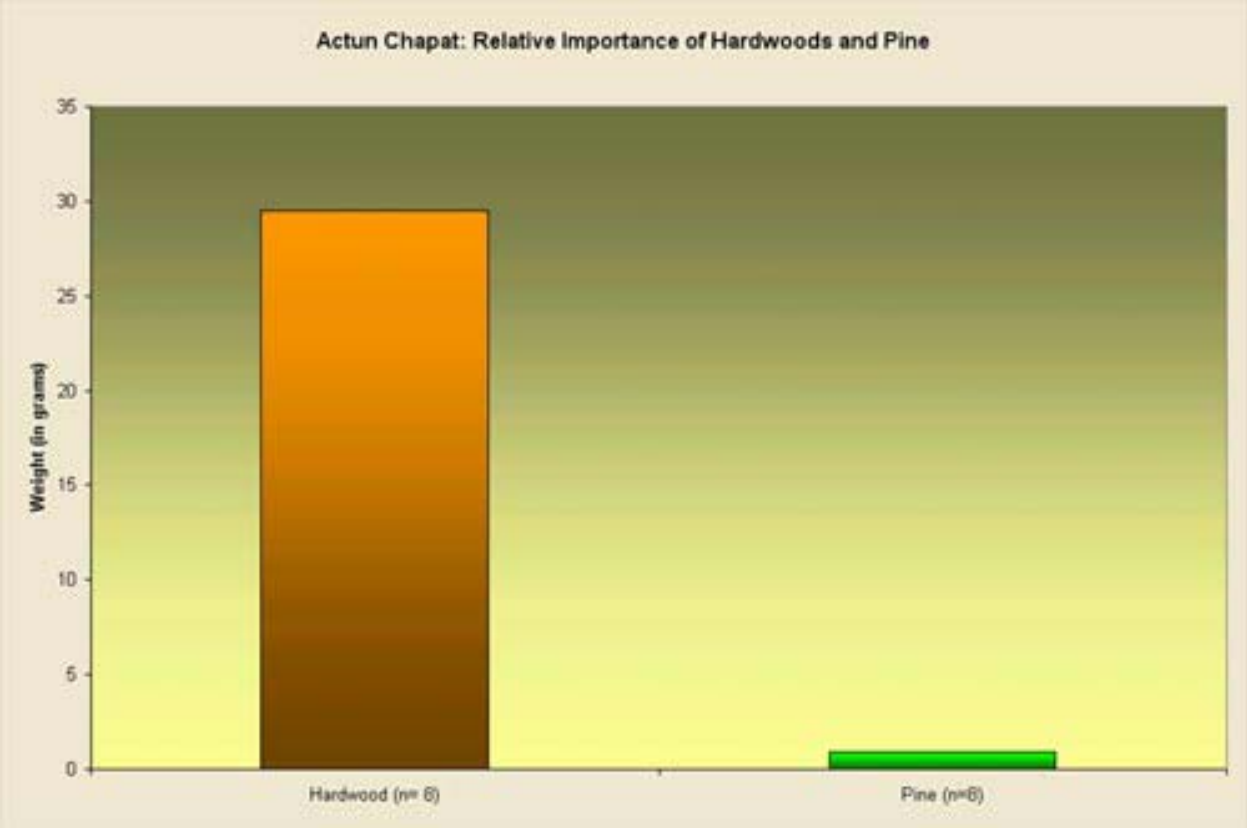


**Figure 20. Distribution of pine and hardwood charcoal at Actun Chapat.**

Ethnographic analogies from th e Maya highlands reveal a relationship between the prehistoric ceremonial burni ng of pine and t he modern use of c andles. Among the Tzotzil, the general term for pine is *toj* (Breedlov e an d Laughlin 1993, 2000), which corresponds to the Tzeltal name, *tah* (Berlin *et al*. 1974). During Tzotzil ritual speech, candles and pine t orches are referred to as sem antically parallel set s of things (Breedlove and Laughlin 2000 :183; Vogt 1976). T he similarity between pine and candles is likely because pine torches ar e an ancient a nalogue to the modern day us e of candles, a position also proposed by Evon Vogt (1976:105). Indeed, the Class ic Maya phonetic sign for *ta** is a bundle of pine f aggots (Stuart 1987) ( Figure 21 ). Candles are an integral component of the ritual assemblages among many modern Maya groups. For the Tzotzil, they are tort illas for the gods (Vogt 1976). If this ana logy is correct then the ancient burning of pine can be interp reted as food offerings–a feasible proposition given the many other food remains recovered from the cave sites.


**Figure 21. Classic Maya phonetic sign for *ta** (adapted from Stuart 1987).**

## Conclusion

In conclusion, the study of archaeobotanical remains from ceremonial contexts offers researchers an unexplored perspective to understand the ritual lives of the ancient Maya. An explanatory framework that emphasizes the symbolic nature of plant utilization adds substantially more depth to the interpretative process than is possible if one relies solely on the economic potential of botanical resources. This approach is strengthened by the combined application of archaeological, iconographic, epigraphic, ethnographic, and ethnohistoric data to the archaeobotanical assemblages. In addition, a regional analysis of paleoethnobotanical remains provides an opportunity to explore differential ritual practices and plant use strategies that reflect broader social, economic, and political conditions.

## Acknowledgments

I would like to thank the Department of Archaeology of Belize for making this research possible as well as Dr. Jaime Awe for accepting me as a staff member on the Western Belize Regional Cave Project. Training, resources, and interpretative suggestions provided by Dr. David Lentz were absolutely crucial to this study. Dr. Mary Pohl, Dr. James Brady, Dr. Kathryn Josserand, Dr. Nicholas Hopkins, and Karen Bassie-Sweet offered many valuable suggestions and guidance throughout the course of this research. Finally, I would like to extend my thanks to all the staff of the Western Belize

Regional Cave Project for their help and encouragement, especially Christina Halperin, Christophe Helmke, Reiko Ishihara, Josalyn Ferguson, Harri Kettunen, Mike and Vanessa Mirro, Cameron Griffith, Jon Spenard, and Caitlyn O'Grady. This research was partially funded by the Foundation for the Advancement of Mesoamerican Studies, Inc. (Grant # 00097).

**List of Figures**

**Sources Cited**

Abrams, E. and David Rue
1988 The Caus es and Consequenc es of De forestation among the Prehistoric Maya.*Human Ecology* 16(4):377-395.

Abrams, E., A. Freter, D. Rue, and J. Wingard
1996 The Role of Deforestation in the Collapse of the Late Classic Copán May a State. In *Tropical Deforestation: The Human Dimension,* edited by L.E. Sponsel, T.N. Headland and R.C. Bailey Columbia University Press: New York.

Awe, Jaime J.
1998 The Western Belize Regional Cave Pr oject: Objectives, Context, and Problem Orientation. In *The Western Belize Regional Ca ve Project: A Report of the 1997 F ield Seas on,* edited by Jaime J. Awe, pp. 1-21. Department of Anthropology, Occasional Paper No. 1, University of New Hampshire, Durham.

Awe, J.J. and C.G.B. Helmke
1998 Preliminary Report on t he Reconnaissanc e of Cahal Witz Na', Roaring Creek River Valley, Cayo District, Belize. In *The Western Beliz e Regional Cav e Project: A Report of the 1997 F ield Season,* edited by Jaime J. Awe, pp. 1-21. Department of Anthropology, Occasional Paper No. 1, Univ ersity of New Hampshire, Durham.

Bassie-Sweet, Karen
1991 *From the Mouth of the Dark Cave: Co mmemorative Sculpture of the L ate Classic Maya.* University of Oklahoma Press, Norman and London.

Berlin, B., D.E. Breedlove, and P.H. Raven
1974 *Principles of Tzeltal Plant Classification: An Introduction to the Botanical Ethnography of a Mayan-Speaking People of Highland Chiapas.* Academic Press: New York, NY.

Brady, James E.
1988 Sexual Connotation of Caves in Mesoamerican Ideology. *Mexicon* 10(3):51-55.

1989 *An Investigation of Maya Ritual Cave Use with Special Reference to Naj Tunich, Guatemala.* Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles.

1995 A Reassessment of the Chronology and Function of Gordon's Cave #3, Copán, Honduras. *Ancient Mesoamerica* 6:29-38.

1997 Settlement Configuration and Cosmology: The Role of Caves at Dos Pilas. *American Anthropologist* 99(3):602-618.

Brady, James E. and A. Stone
1986 Naj Tunich: Entrance to the Maya Underworld. *Archaeology* 36(6):18-25.

Brady, J.E., G.A. Ware, B. Luke, A. Cobb, J. Fogarty and B. Shade
1997 Preclassic Cave Utilization near Cobanerita, San Benito. *Mexicon* 14(5):91-96.

Brady, J.E. and W. Ashmore
1999 Mountains, Caves, Water: Ideational Landscapes of the Ancient Maya. In *Archaeologies of Landscape, Contemporary Perspectives,* edited by W. Ashmore and A.B. Knapp, pp. 124-48. Blackwell Publishers, Oxford.

Breedlove D.E. and R.M. Laughlin
1993 *The Flowering of Man: A Tzotzil Botany of Zinacantán,* Vol. I and II. Smithsonian Institution Press: Washington D.C.

2000 *The Flowering of Man: A Tzotzil Botany of Zinacantán,* abridged edition. Smithsonian Institution Press: Washington D.C.

Cliff, M.B. and C.J. Crane
1989 Changing Subsistenc e Econom y at a Late Preclas sic Maya Community. In *Prehistoric Maya Economies of Beliz e,* edited by P.A. McAnany and B.L. Isaac, pp. 295-324. Research in Economic Anthropology, V. 4. JAI Press: Greenwich.

Flores, Jose S., and J.K. Balam
1997 Importance of Plants in the Ch'a C haak Maya Ritual in the Penins ula of Yucatán.*Journal of Ethnobiology* 17(1):97-108.

Freidel, D., L. Schele and J. Parker
1992 *Maya Cosmos: Three Thousand Years on the Shaman' s Path.* William and Morrow: New York.

Gibbs, Sherry A.
1997 Those Laid to Rest in Xi balba: Skeletal Remains fr om Actun Tunichil Muknal, Belize. In *Belize Valley Archaeological Reconnaissance Project: Progress Report of the 1996 Field Seas on,* edited by Jaime J. Awe and James M. Conlon, pp. 105-114. Department of Anthropology, Trent Universit y, Peterborough.

Guderjan, Thomas H.
2000 *Sampling Botanica l Re mains at Blue Creek, Beliz e.* Report submitted to the Foundation for the Advancement of Mesoam erican Studies, Inc., Crystal River, Florida.

Habermas, Jurgen
1991 *Structural Transform ation of the Public Sphere.* MIT Press: Cambridge, Massachusetts.

Halperin, Christina
2000 *Caches in Caves: Ancient Maya Use of the Pachichylus Shell.* Paper presented at the 2000 Annual Meeting of the Midwest Mesoamerican Society.

2001 *Caves, Rit ual, and Power: Investigations at Actun Nak Beh, Cayo District, Belize.* Unpublished Master's thesis, Departm ent of Anthropology, Florida State University: Tallahassee, Florida.

Halperin, C., S.A. Gibbs, and D. Hodgman
2001 *Caves and the Manipulation of I deology: Insights from Actun Nak Beh.* Paper presented at the 66 th Annual Society for American Archaeology Meeting, New Orleans, Louisiana.

Helmke, C.G.B.
1998 *Molded-Carved Vases as Indicators of the Social Status of Cave Users in the Terminal Classic.* Paper presented at the 64th Annual Meeting of the Society for American Archaeology, Chicago.

Helmke, C.G.B. and J.J. Awe
1998 Preliminary Analysis of the Pictographs, Petroglyphs and Sculptures of Actun Uayazba Kab, Cayo District, Belize. In *The Western Belize Regional Cave Project: A Report of the 1997 Field Season,* edited by J. Awe, pp. 141-199. Department of Anthropology, Occasional Paper No. 1. University of New Hampshire, Durham.

Ishihara, Reiko
2000 *Ceramics from the darkness: An Investigation of the Ancient Maya Ritual Cave Activity at Actun Chechem Ha, Cayo District, Belize.* Unpublished Bachelor's thesis, Archaeology program, University of Tsukuba, Tsukuba, Japan.

Kintz, Ellen R.
1990 *Life Under the Tropical Canopy: Tradition and Change Among the Yucatec Maya.* Holt, Rinehart and Winston, Inc., Fort Worth, Texas.

McAnany, Patricia A.
1995 *Living with the Ancestors: Kinship and Kingship in Ancient Maya Society.* University of Texas Press: Austin.

McGee, Jon. R
1990 *Life, Ritual, and Religion among the Lacandón Maya.* Wadsworth Publishing Company: Belmont, California.

McNeil, Cameron
2000 *Paleobotanical Remains from Early Classic Ritual Contexts at Copán.* Paper presented at the 65th Annual Meeting of the Society for American Archaeology: Philadelphia, PA.

Morehart, Christopher T.
2001 Paleoethnobotanical Investigations in Seven Caves in the Roaring Creek, Barton Creek, and Macal River Valleys of Western Belize: Goals, Methods, and Preliminary Results. In *The Western Belize Regional Cave Project: Progress Report of the 2000 Field Season,* edited by Jaime Awe. Department of Anthropology, University of New Hampshire, Occasional Papers Series: Durham, New Hampshire.

In prep. Ancient Maya Cave Utilization: A Paleoethnobotanical Perspective. Master's thesis, Department of Anthropology, Florida State University: Tallahassee, Florida.

Pohl, Mary
1983 Maya Ritual Faunas: Vertebrate Remains from Burials, Caches, Caves, and Cenotes in the Maya Lowlands. In *Civilization in the Ancient Americas,* edited by R.M. Levanthal and A.L. Kolata. pp. 55-103. University of New Mexico Press, Albuquerque.

Redfield, Robert and A. Villa Rojas
1934 *Chan Kom: A Maya Village.* The University of Chicago Press, Chicago.

Robertson, Merle Greene
1983 The Temple of Inscriptions. In *The Sculpture of Palenque.* Vol. 1. Princeton University Press: Princeton, New Jersey.

Roys, Ralph L.
1931 *The Ethno-Botany of the Maya.* The Department of Middle American Research, Tulane University: New Orleans, Louisiana.

Steinberg, Michael K.
1999 Maize Diversity and Cultural Change in a Maya Agroecological Landscape. *Journal of Ethnobiology* 19(1):127-139.

Stone, Andrea
1995 *Images from the Underworld: Naj Tunich and the Tradition of Maya Cave Painting.*University of Texas Press, Austin.

Stuart, David
1987 Ten Phonetic Syllables. In *Research Reports on Ancient Maya Writing,* vol. 14. Center for Maya Research: Washington D.C.

Tedlock, Barbara
1981 *Time and the Highland Maya.* University of New Mexico Press: Albuquerque.

Tedlock, Dennis
1985 *Popol Vuh: The Mayan Book of the Dawn of Life.* Simon and Schuster, Inc.: New York.

Thompson, J.E.S.
1970 *Maya Hist ory and Religion.* University of Oklahoma Press, Norman and London.

Tozzer, Alfred M., ed.
1941 *Landa's Relación de las Cosas de Yucatán.* Papers of the Peabody Museum of American Archaeology and Ethnology, Harvar d University, V. 18: Cambridge, Massachusetts.

Vogt, Evon Z.
1969 *Zinacantán: A Maya Community in the Highlands of Chiapas.* The Belknap Press of Harvard University, Cambridge, Massachusetts.

1976 *Tortillas for the Gods: A Symbolic Analysis of Zinacanteco Rituals.* University of Oklahoma Press: Norman.