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CAVE ARCHAEOLOGY OF BELIZE

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Approximately 300 caves have been documented in Belize in the past 100 years. These include 198 registered archaeological sites. Ethnohistoric, ethnographic, iconographic, and archaeological sources indicate the importance of caves in Maya culture over a period spanning at least 1,500 years. The few analyses of ceramics from Belize caves indicate use predominantly during the Late/Terminal Classic and Early Postclassic (A.D. 600-1100). A wide array of archaeological evidence such as ceremonial dumps, burials, art, and artificial construction support the idea that caves were used primarily for ceremonial activities. Looting is a major problem, and lack of funding seriously compromises not only the protection of cave sites, but also the preservation of materials and publication of the information recovered by archaeological research.

Our understanding of the importance of caves within Maya culture comes from three major sources: ethnohistoric accounts, ethnographic studies, and archaeological reports. The ethnohistoric and ethnographic sources address almost exclusively the Maya of Guatemala and Mexico. However, many aspects of Maya culture were sufficiently similar throughout the region that these sources can also be applied to Belize. They have been summarized extensively by various authors (Thompson, 1959, 1970, 1975; Pohl & Pohl, 1983; Schele & Miller, 1986; Bonor, 1986, 1989; Bassie-Sweet, 1991; Brady, 1989). In addition, recent advances have been made in interpreting cave and underworld themes in Maya art, iconography, and epigraphy (Coe, 1978; Schele & Miller, 1986; Bassie-Sweet, 1991).

In general, the Maya believed that caves, as well as standing bodies of water, were entrances to the underworld known as Xibalba. This is a watery place inhabited by numerous unpleasant deities representing death, disease, old age, sacrifice, decay, and foul smells. Souls of the dead are required to journey through the nine levels of Xibalba, suffering numerous tests of wisdom and courage. The Sun himself successfully completes this journey each night, taking the form of the Jaguar God of the Underworld. Caves also have a very contrasting and positive aspect as the source of clouds, rain, thunder and lightning, and are thus associated with life, fertility, and rebirth. In the Maya world, caves were not simply inanimate physical features, but rather living manifestations of spiritual power. Associated with the important cycles of both life and death, caves were logical places for rituals and ceremonies. One cannot help but respect the courage of the Maya who ventured far into these realms of darkness, perhaps in small groups guided only by the light of their torches, and burdened not only with their physical offerings but also with the considerable weight of their religious beliefs.

Archaeological investigations have great potential to further increase our understanding of the Maya by studying the physical evidence left in caves. In 1983, the number of recorded archaeological sites in the Belize Department of Archaeology files was 403, of which 86 (21.3%) are caves (Gutchen 1983). By August 1995, the number of registered cave sites had increased to 198 (Bonor, pers. comm., 1995), and ongoing projects are constantly adding new discoveries. The exact total is uncertain, because some caves have been recorded under different names, and multiple entrances to one cave system have often been recorded as separate sites. An additional problem is distinguishing between rockshelters and caves, since that distinction is sometimes not clear in the Department of Archaeology site files or in published reports. Unless noted otherwise, this paper deals exclusively with Belize caves extending beyond the daylight zone, rather than rockshelters. Unfortunately, very few of these sites have been intensively investigated, and only a handful of thorough cave archaeological studies in Belize have been completed or published. In this report, I provide a selective review of the available archaeological information regarding Belize caves. Note that some information—particularly regarding burials—is presented in general terms because of the threat of looting. Many caves in Belize are located on government or private land, and permission to visit them should first be obtained from the appropriate authorities, such as the Department of Archaeology, Forestry Department, and/or private landowner.

HISTORY OF ARCHAEOLOGICAL RESEARCH

1884-1954

The earliest published reference to archeological materials from a cave in Belize is by Lefroy (1884), who describes pottery from a cave near Garbutt's Falls on the Belize River, in the Cayo District. In an unpublished 1897 letter, Cayo District Commissioner F.L. Davis refers to approximately 44 vessels that he removed from a cave near Benque Viejo (Thompson, 1975). From 1894 to 1930, however, virtually all of the published information about Belize cave archaeology was written by Thomas Gann, a British Colonial Medical Officer. He was not an archaeologist, but had a strong interest in the ancient Maya, including their use of caves. Because his work required travel throughout the country, Gann was able to investigate caves near San Ignacio, Benque Viejo, and Arenal in the west-

ern Cayo District (1894-95, 1925, 1929), near Sarteneja and Blue Creek in the Orange Walk District (1896-97, 1918), near Churchyard in western Belize District (1929), on Indian Creek which marks the boundary between the Belize and Cayo Districts (1929), and near San Antonio and Laguna in the Toledo District (1925, 1929). (The "caves" he describes at Sarteneja and Blue Creek may have been artificially dug rather than natural.)

Gann also participated in the first formal institutional work in Belize cave archaeology, as part of the 1928 to 1930 British Museum Expedition to the Pusilha ruins and caves in the Toledo District (Gann, 1928, 1930; Joyce et al., 1928; Joyce, 1929; Gruning, 1930; Gann and Thompson, 1937). Because of his extensive pioneering contributions, Gann probably deserves the informal title of "grandfather" of Belize cave archaeology.

During this early period, only one other institution was involved in Belize caves. In 1928, the Museum of the American Indian funded Gregory Mason's investigations in Rio Frio Caves A, B, and C, and Chikin Ac Tun in the Mountain Pine Ridge of the Cayo District (Mason, 1928, 1940).

The years from 1931 through 1954 represent a hiatus in cave research, other than a one day visit in 1938 by British civil servant Alexander Hamilton Anderson to Awe Caves (now known as Las Cuevas) in the Chiquibul area (Anderson, 1952, 1962). It is important to realize, however, that caves were being discovered and at least partially explored during this period by the few people going "back-a-bush"—the game hunters, chicleros, loggers, surveyors, geologists, and Forestry Department personnel. Modern cavers have often followed old overgrown logging roads to "discover" caves, only to find nearby sapodilla trees (*Achras sapota*) marked by the chicleros and stumps of large mahogany trees (*Swietenia macrophylla king*) removed by the loggers. Caves with names such as Awe, Casconil, and Eduardo Quiroz are tributes to the forest guards and others who first found them.

1955-1970

The Department of Archaeology was established in 1955 with A.H. Anderson as the first Archaeological Commissioner (hereafter referred to as A.C.) from 1957 to 1967. Like Gann, he was not a trained archaeologist, but his keen interest in caves proved to be a powerful force for cave archaeology in the country. Anderson was aided in his work by two American spelunkers living in Belize, W. Ford Young and Frank Norris, who discovered and explored many caves with archaeological remains, primarily in the Cayo District. During this same period, British Liaison Officer Don Owen Lewis was locating numerous caves in the Toledo District (Young, 1961).

In 1957, with Anderson's assistance, the British Museum excavated Las Cuevas/Awe Caves (Digby, 1958a, 1958b). From 1957 to 1961, Anderson also conducted limited collections and excavations in Cubeta Caves, Eduardo Quiroz Cave, and Rio Frio Cave E (Anderson, 1962). Sadly, many of his notes and collections were damaged or destroyed by Hurricane Hattie in 1961, and he was not able to publish his findings before his retirement and death in 1967.

Fortunately much of Anderson's work was published and carried on by David M. Pendergast, an American who became the primary figure in Belize cave archaeology throughout the 1960's. In 1961 he was taken to several caves in the Cayo District by Anderson (Pendergast, 1962). This trip resulted in his 1963 excavations at Eduardo Quiroz Cave (Pendergast, 1964, 1971). In 1964 he conducted excavations in Actun Balam (Pendergast, 1966, 1969) and in 1967 became Acting A.C. when Anderson retired. Subsequent publications include a general summary of Anderson's work (Pendergast, 1968a), the description of a vessel recovered from Cubeta Cave (Pendergast, 1968b), the results of Anderson's work in Rio Frio Cave E (Pendergast, 1970), and an account of his own 1970 investigations of Actun Polbilche (Malone, 1971; Pendergast, 1974).

Continuing the tradition of Anderson and Pendergast, the German archaeologist Peter Schmidt (A.C. 1968-1971) reported on his 1970 excavations in the small but important cave of Uchentzub in the Cayo District (Schmidt, 1978). Schmidt also made a lasting contribution by beginning a formal cataloging system of sites and artifacts within the Department of Archaeology. He recorded many cave sites by reviewing Anderson's notes and letters as well as the published literature.

1971-1979

Two significant events occurred in 1971 and 1972. Joe Palacio became the first Belizean-born A.C. (1971-1976), and the Department of Archaeology hired two American cavers, Barbara MacLeod and Carol Jo Rushin, as Peace Corps volunteers (1972-1975). Together with Archaeological Assistant Harriott Topsey and Wildlife Conservation Officer Lucilo Sosa, they documented numerous archaeological finds in caves throughout Belize (MacLeod, 1974, 1978; Rushin, 1974, Rushin-Bell, 1982). One of the more spectacular discoveries during this period was made by a non-caver Peace Corps volunteer, Kim Kennedy, who in 1973 found 24 complete or nearly complete vessels placed in front of an altar in Hokeb Ha in the Toledo District (anon., 1973; Palacio, 1977a, 1977b).

The presence of MacLeod and Rushin had a significant long-term impact in that it attracted visits from other foreign cavers, primarily from the United States. Tom Miller made his first cave archaeology discovery in Blancaneaux Cave on his first visit in 1973 (Halliday, 1973). Miller returned to conduct his doctoral research on the karst hydrology and morphology of the Caves Branch area from 1976 to 1979 (Miller, 1981). An important result of his research was the discovery of numerous large caves with important archaeological sites that were reported to the Department of Archaeology. MacLeod returned to Belize in 1978 with Dorie Reents to co-direct the Petroglyph Cave and Caves Branch Valley Project (Reents,

1980a, 1980b; Reents-Budet & MacLeod, 1986). Elizabeth Graham, an archaeologist from the United States (Acting A.C. 1977-1979), organized excavations in Actun Chek in 1979 (Graham, McNatt & Gutchen, 1980).

1980-1989

As a result of the groundwork laid in the 1970s, and the continuing cooperation between the Department of Archaeology and foreign cavers, the 1980's saw an explosion of caving expeditions to Belize. Harriott Topsey, the second Belizean-born A.C. (1979-1995), and several Acting A.C.'s supported and occasionally conducted cave archaeology work. The Department also requested my services as a caver-archaeologist through the Peace Corps from 1983 through 1986. One of the projects that included cave archaeology as a primary research goal was the series of Chiquibul expeditions in 1984, 1986, and 1988, partially funded by the National Geographic Society and directed by Tom Miller. Cavers located numerous archaeological remains inside Actun Kabal and Cebada Cave, two of the longest and largest caves in Belize (anon., 1986a, 1986b, 1987; Crittenden, 1987; McNatt, 1984; Miller, 1984, 1986b, 1986c, 1988; Stone, 1984; Weintraub, 1984).

Another project was the 1988-92 Maya Ceremonial Caves Project, funded by Earthwatch in conjunction with the NSS Maya Caves Project (Schaeffer & Cobb, 1988). Based at Laguna Village in the Toledo District, it located approximately 60 caves, 44 of which had archaeological remains (Walters, n.d., 1988a, 1988b, 1989). Other major projects that found archaeological remains as a byproduct of cave exploration include the 1984 to 1988 Rio Grande Project in the Toledo District (Dougherty, 1985, 1986; Miller, 1986a), the 1988 Queen Mary College Speleological Expedition, and the 1989 British Speleological Expedition (Marochov & Williams, 1992).

Two additional discoveries were made in the Cayo District during the 1980s and deserve mention. In 1986, a burial chamber was found in Actun Tunichil Muknal (Miller, 1989a, 1989b, 1989c, 1989d, 1990; Roberts, 1990). Another important cave, Chechem Ha, found by a hunter ca. 1989, contains 64 complete vessels and several ceremonial features (anon., 1990; Hun, 1992; Kirk, 1993; Williams, 1992a, 1992b).

1990-PRESENT

The Department of Archaeology continues to be active in cave research. Belizean archaeologist Paul Francisco documented several caves in the Toledo District as part of the 1990 Columbia River Forest Reserve Expedition (Matola, 1991). Jaime Awe of Belize (A.C. 1976-1977) was the archaeologist in "Journey Through The Underworld," a 30 minute television documentary film on Belize cave archaeology/biology (National Geographic Society, 1995). Juan L. Bonor, a cave archaeologist from Spain, is currently working for the Department and excavating caves in the Caves Branch area (Bonor, 1994, 1995, pers. comm., 1995; Bonor & Martinez, 1995).

Two current projects from the U.S. have included cave archaeology as part of their objectives. Philip Reeder has directed speleological and geomorphic investigations in the northern Vaca Plateau of the Cayo District since 1990. His teams have located over 100 caves, many of which contain significant remains of the ancient Maya (Reeder, 1990, 1991, 1993, 1995, pers. comm., 1995). In the Toledo District, the Maya Mountains Archaeological Project began in 1992 under the direction of Peter Dunham, and has also made very important discoveries in caves (Dunham, 1995, pers. comm., 1995; Prufer, 1995, pers. comm., 1995, 1996).

Judging from the first 100 years of archaeological investigations in the caves of Belize, it can be stated with certainty that many more important discoveries will be made in the future. Every piece of evidence, when properly documented, adds to our knowledge of the ancient Maya and their use of caves.

CHRONOLOGY

One of the most important questions to answer about cave sites is determining the dates when they were used. Ancient Maya culture has been divided into three major periods: Preclassic, Classic and Postclassic (Table 1).

Dating of cave sites presents some unique problems. Stratified deposits are often not present because the underground environment is not subject to the usual above-ground processes of weathering and natural deposition that can separate cultural layers. Despite public perception, rockfalls in caves are geologic events that are sporadic rather than common, and of little relevance to most cave sites. Major floods in active river caves tumble and break artifacts rather than preserve them under a layer of sediment. The most obvious form of natural deposition in many cave sites is the calcite deposited by dripping water. Artifacts are often covered in a calcite crust, and may even have stalagmites growing on top of them. No isotopic dating of speleothems on artifacts has yet been conducted, but the rate of calcite deposition varies tremendously in both space and time, so the results probably could not be generalized.

Table 1. Chronology of Maya Cutural Periods.

Modern:	1841 - Present
Historic:	1541 - 1841
Postclassic:	900 - 1541
Late Classic:	600 - 900
Early Classic:	250/350 - 600
Protoclassic	A.D. 100 - 250/350
Late Preclassic:	300 B.C. - A.D. 100
Middle Preclassic:	900 - 300 B.C.
Early Preclassic:	1800/1400 - 900 B.C.
Archaic:	pre-1800/1400 B.C.

To give a hypothetical example, imagine finding two complete ceramic vessels placed next to each other on a ledge. One was placed under an active drip, which has deposited a one meter tall stalagmite on top of the vessel; the other was not placed under a drip and does not have any calcite deposition. Because of their close association, one might at first assume that the vessels were put in place at the same time. However, the styles of the vessels indicate that one of them was made in Early Classic times, ca. A.D. 200, while the other was made in early Postclassic times, ca. A.D. 1,000, although the date of manufacture does not necessarily indicate the date of placement. Fortunately, both vessels contain charcoal and other organic material that can be radiocarbon dated. The radiocarbon dates closely approximate the dates of manufacture, strongly suggesting that the vessels were placed on the ledge at two discrete times, separated by about 800 years.

The above example refers to the two means by which cultural remains in Maya cave sites are dated. By far the most common technique is relative dating of pottery based on changes in styles of manufacture, form, and decoration. This method depends on comparisons with ceramics excavated from stratified deposits at surface sites, but there are limitations to this approach. For example, the most common form of vessel found in most caves is the olla or storage jar. Although this particular form has a wide range of sizes, only minor variations occur in shape and decoration, and the basic style remains consistent throughout a very long time span. Assigning dates to such vessels is often problematic. Other limitations of this method include the local variation in styles from region to region, and the frequent lack of comparative material from nearby surface sites that may be linked to use of the caves.

Radiocarbon dating of organic cultural remains can provide more absolute dates than comparative dating of ceramic styles. Although wooden artifacts and cultural vegetal remains such as maize or seeds are rare, human bone is relatively common, and charcoal from torches (generally recognized by archaeologists as pitchpine) and hearths is plentiful in many cave sites. Surprisingly, only two radiocarbon dates could be found in the published reports on Belize caves (Pendergast 1970, 1974). Processing radiocarbon samples is expensive because of the special facilities needed. The analysis of ceramics and other artifacts is also expensive because of the time involved and specialized knowledge required.

PRECLASSIC (1800 B.C. - A.D. 200)

One probable Late Preclassic sherd was found in Eduardo Quiroz Cave (Pendergast, 1964, 1971), and several sherds from the same period were recovered from Caves Branch Rock Shelter (Bonor, 1994, 1995, Bonor & Martinez, 1995). Preclassic ceramics have been found in caves in all of the areas adjacent to Belize: Yucatan, Mexico (e.g. Brainerd, 1958), Guatemala (e.g. Brady, 1989, 1991), and Honduras (e.g. Healy, 1974). The small number of Preclassic ceramics known from Belize caves is probably a result of the incomplete nature of archaeological investigations, rather than the lack of cave use during this period (Brady, 1995, pers. comm.).

EARLY CLASSIC (A.D. 200 -600)

Ceramics from this period have been found in Eduardo Quiroz Cave (Pendergast, 1964, 1971), Caves Branch River Cave (MacLeod, 1974, Reents, 1980b), and Caves Branch Rock Shelter (Bonor, 1994, 1995; Bonor & Martinez, 1995). They make up 38.1% of the vessels represented in Petroglyph Cave (Reents, 1980a), perhaps indicating that this was the main period of use for this cave. In the Toledo District, Walters (1988b, 1989) mentions Early Classic ceramics from caves in the Actun Dzib, Blue Creek, and Deep River areas, but no detailed descriptions have been published. Prufer (1995, pers. comm., 1995) reports finding a cache of Early Classic vessels in a cave in the Toledo District.

LATE CLASSIC (A.D. 600 - C.A. 800)

Several of the most beautifully painted and unique vessels found in Belize caves date from this period, including two that have appeared on Belize postage stamps. The polychrome "Hokeb Ha vase" was one of twenty-four complete or nearly complete vessels found as an offering in the Toledo District (Palacio, 1977a, 1977b). The polychrome "Actun Balam vase" was partially reconstructed from a looted ceremonial cave deposit in the Chiquibul area (Pendergast, 1966, 1969). These are exceptional examples of apparent elite items not commonly found in Belize caves. Only "sparse" Late Classic evidence was found in the 44 cave sites documented by the Maya Ceremonial Caves Project in the Toledo District (Walters, 1988a, 1988b, 1989). Late Classic materials were also reported from Uchentzub (Schmidt, 1978), and may represent the main period of use in Eduardo Quiroz Cave (Pendergast, 1964, 1971) and Rio Frio Cave E (Pendergast, 1970). The one radiocarbon date from Rio Frio Cave E is only slightly later, at A.D. 830. One partial vessel was recovered in Batty's Cave (Pendergast, 1974) and another in Actun Polbilche, as well as a radiocarbon date of A.D. 625 from Actun Polbilche (Pendergast, 1974). In Petroglyph Cave, 32.9% of the ceramic collection was Late Classic, a slight decrease from the Early Classic (Reents, 1980a). Late Classic ceramics have also been found in Caves Branch Rock Shelter (Bonor, 1994, 1995; Bonor & Martinez, 1995).

TERMINAL CLASSIC/EARLY POSTCLASSIC
(CA. A.D. 800 - 1100)

Ceramics from this transitional period are dominant in Actun Balam (Pendergast, 1966, 1969), Actun Chek (Graham, McNatt, and Gutchen, 1980), Actun Polbilche (Pendergast, 1974), and Las Cuevas (Digby, 1958a, 1958b). The latest ceramics in Eduardo Quiroz Cave (Pendergast, 1964, 1971) and a vessel from Cubeta Cave (Pendergast, 1968b) also date to this time. Schmidt (1978) places major use of Uchentzub in

the Postclassic, although contradictory data from major surface sites made it difficult for him to be sure which subdivision of the Postclassic was indicated. Several forms of vessels from unspecified caves in the Toledo District are also tentatively dated to this period (Walters, 1989). Petroglyph Cave continues to show a slight decrease in the number of vessels represented through time, but the Terminal Classic is still significant at 29% of the total collection (Reents, 1980a).

Historic (A.D. 1541-1841)

No cultural remains, Mayan or other, from this period have been documented in Belize caves, which is surprising given the complex history of the country during the colonial era. However, occasional first-hand accounts persist of finding Spanish gold and weapons in caves (Pedro Reyes, pers. comm., 1992).

Uses of Caves

Thompson (1959, 1975) lists the following major uses of caves by the Maya: 1) sources of drinking water, 2) sources of "virgin water" for religious rites, 3) religious rites, 4) burials, ossuaries, and cremations, 5) art galleries, 6) ceremonial dumps, 7) places of refuge, and 8) other uses. This list has proven to be effective in interpreting most cave sites, and is used here as a general basis for evaluating the archaeological evidence from caves in Belize.

Minor Uses

Thompson mentions the historic use of caves as temporary places of refuge, for example during the War of the Castes in Yucatan, and of walls in caves being used as hunting blinds, but neither of these has been documented in Belize. Former Belize A.C. Harriot Topsey suggested that bat and/or bird guano may have been extracted from caves for use as fertilizer (Marachov & Williams, 1992). Although not mentioned by Thompson, this is an intriguing idea since the Maya practiced large-scale agriculture in areas of very low soil fertility. Thompson does mention the use of caves as a minor source of minerals, but this activity is discussed in a following section on clay mines.

Sources of Drinking Water

Any cave with easily accessible water could have been used for this purpose, even in places with plentiful surface water. However, in several karst areas of Belize this activity would have been a necessity rather than a convenience, particularly during the dry season. Large portions of the Vaca Plateau, Chiquibul Forest, and southern Maya Mountains around Little Quartz Ridge do not have perennial streams. In recent times, permanent water sources such as Las Cuevas and Cebada Cave were used as camps by chicleros, hunters, and/or loggers. Actun Kabal and Cebada Cave were also primary camps for cavers on the Chiquibul Caves expeditions because of the water supply. The surface site of Las Cuevas may have been established because of the permanent spring inside the cave, a practice common in most of the Mayan karst areas (Veni, 1990). Specific use of caves for drinking water is difficult if not impossible to discern in the archaeological record, and would likely be obscured by other more obvious ceremonial activities.

Religious Rites

As mentioned in the introduction, a wide array of deities is associated with caves in traditional Maya belief. The numerous ethnohistoric and ethnographic accounts have already been adequately summarized by authors including Thompson (1959, 1970, 1975), Pohl and Pohl (1983), Bonor (1986, 1989), and Bassie-Sweet (1991). Because caves were associated with such basic ideas as life (in the form of rain) and death (the journey through the underworld), the list of deities and associated reasons for conducting rituals in caves is very long. It includes but is not limited to rain, fertility, birth, agriculture, hunting, jaguars, deer, frogs, serpents, disease, aging, death, ancestors, calendrical period endings, and rebirth. MacLeod and Puleston (1978) theorize that the isolation and total darkness of the cave environment would have been ideal for spiritual vision quests by individuals, and perhaps further enhanced by auto-sacrifice in the form of ritual bloodletting. The burning of copal incense likely accompanied every ritual, and human sacrifice was occasionally required. Based on the archaeological evidence, ritual offerings could include every example of Maya material culture such as items of pottery, stone, bone, shell, and wood, as well as incense, maize, and other more perishable items. However, the evidence is heavily biased toward those materials that have been preserved. Missing from the archaeological record are the droning chants of priests; the music from flutes, whistles, and drums, including perhaps the pounding of "stone drums"—speleothems that resonate sound when struck; the pungent smoke from copal incense and torches; the dark and mysterious environment of the cave. The combined effect on any person involved with these ceremonies must have been overwhelming.

Unfortunately the archaeological evidence does not usually provide answers about which specific ritual(s) took place. Some caves appear to have been used for one primary activity, but others were used for a variety of ceremonial functions. Some of these uses are identifiable and are discussed below within the context of Thompson's list.

Sources of Virgin Water (Zuhuy Ha)

Traditional Maya ceremonies required new/pure/virgin offerings, including water. Spring water and dripping water found in cenotes and caves fulfilled this need, and was usually collected in ollas. Sherds of these vessels represent the most common type of pottery found in most caves. In some instances the vessels are still complete and in place under dripping speleothems. A classic example was found in Actun

Figure 1. Bowl placed under drip in Actun Kabal to collect zuhuy ha (virgin water), now covered by a 1-m-tall stalagmite. Photo courtesy of George Veni.

Kabal in the Chiquibul, where one vessel that still caught water from an active drip was also partially covered by a one-meter-tall stalagmite (Figure 1). Any cave with dripping and/or flowing water was a potential source, so there are literally scores if not hundreds of caves in Belize that may have been used for the collection of zuhuy ha. Areas of dripping speleothems with large numbers of olla sherds can be observed in some of the more frequently visited caves in Belize, for example St. Herman's, Actun Tzimin, and Caves Branch River Cave. However, the available literature provides only a short list of caves with actual documented archaeological evidence for this specific activity: Actun Kabal (McNatt, 1984; Stone, 1984), Eduardo Quiroz Cave (Pendergast, 1964, 1971), Las Cuevas (Digby, 1958a, 1958b), an unnamed cave near Benque Viejo (Gann, 1925, 1929), and probably Rio Frio Cave A (Mason, 1928, 1940).

Certain caves such as Actun Kabal, Cebada Cave, and Las Cuevas very likely served dual purposes as sources of both zuhuy ha and drinking water. Easily accessible permanently flowing streams just inside the entrance could have provided drinking water, while less accessible interior chambers with dripping speleothems would have been more suited for the collection of zuhuy ha. Long dry seasons or periods of drought would reduce the amount of water available from both sources. The Maya might have prepared for this situation by storing sufficient quantities of water in ollas.

Ceremonial Dumps/Offerings

Substantial deposits of cultural debris have been found in several caves, occurring as piles at the bottom of vertical shafts. These deposits do not represent occupation middens but rather materials that were obviously thrown into the caves. They usually contain large amounts of broken pottery of all kinds, plus items of flint, obsidian, bone, and shell, fragments of metates and manos, a variety of faunal remains, and sometimes even human bones. The piles include not only domestic pieces such as undecorated utilitarian pottery and simple grinding stones, but also elite objects such as obsidian blades and elaborate polychrome pottery.

Thompson interpreted these types of deposits as ceremonial "dumps." The custom of ceremonially discarding both secular and religious items was common throughout the Maya area. This activity was an important part of rituals, in particular the renewal ceremonies at the end of Maya calendrical cycles which included 260 day, 360 day, 20 year, 52 year, and even 400 year intervals.

Actun Balam contained such a deposit at the bottom of a 4-m shaft just inside the entrance. The pile measured over 5 m in diameter and 1.5 m high and held over 22,000 sherds, plus a variety of other remains (Pendergast, 1969). A deposit over 1 m thick was found under an entrance shaft in Pusilha Cave No. 1 (Joyce et al., 1928, Joyce, 1929). Brady and Rodas (1995) compare the assemblage of artifacts from these caves with that from a similar dump in Cueva de los Quetzales in Guatemala. The number of elite artifacts in these deposits apparently reflects the social setting of the cave. Actun Balam is not located near a major center and did not have many elite items, the "Pottery Cave" at Pusilha is located near the ceremonial center of the same name and contained a greater proportion of elite objects, while Los Quetzales is directly associated with a surface center and yielded a large number of elite goods.

Two recently discovered caves in the northern Vaca Plateau offer an excellent opportunity to test this hypothesis further. Macal Chasm is a large 53-m-deep vertical shaft with an 8-m-high pile of cultural debris on the bottom. It is located only 100 m from the central plaza of a ceremonial center, Ix Chel. Pottery Hill Cave is located 1500 m from the central plaza but is directly associated with an outlying structure. It is a small cave but contains thousands of sherds, including many polychromes, at the bottom of a 2-m entrance slope. These two caves have not yet been excavated (Reeder, 1993, 1995, pers.

comm. 1995).

Pendergast (1969) proposed that at least some of these piles were more than just ceremonial rubbish heaps, and were specifically intended as offerings to cave deities. For example, Actun Balam is not near any known surface site, so people would have had to make a special pilgrimage to throw the materials down the shaft. Discarding such a significant item as the Actun Balam vase would likely carry more importance as a ritual offering than any other purpose. Thompson's and Pendergast's ideas are not mutually exclusive and actually complement each other. Artifacts and other remains thrown into caves could have been intended for both ceremonial destruction and as offerings. This action would have fulfilled two needs of the Maya, to discard the pieces ceremonially, and at the same time to make offerings to the cave gods.

All of the examples given above involve artifacts apparently used outside the caves and thrown down vertical shafts, which is the basic definition of a ceremonial dump. However, one probable exception to this rule must be mentioned. About 50 m inside one of the Actun Kabal entrances is a large room (40 m long by 20 m wide and, 10 m high) christened the "Ledge of Offerings" because of the thousands of artifacts found there (Figure 2). The entrance is located at the bottom of a large sinkhole, and the room is illuminated by indirect sunlight. At the highest end of the room a 10 m vertical climb leads to a passage where zuhuy ha was collected. The lowest end of the room overlooks a nearly vertical shaft that drops approximately 25 m to an underground river, appearing very much like an underground cenote. Access to the ledge is possible from only one place along the edge of this shaft. A detailed description of the artifacts cannot be given here. Suffice it to say that the great quantity and variety of artifacts represent all the characteristics of a classic ceremonial dump, except that these objects were carried rather than thrown into the cave. The nature of the assemblage together with the physical setting of the room strongly suggest the idea of ceremonial discards deposited in the cave as offerings.

Figure 2. A sampling of artifacts found at the Ledge of Offerings, Actun Kabal: ceramic whistle, two incensarios, and obsidian blade. Photo courtesy of George Veni.

The large quantities of olla sherds and complete ollas found in caves most likely represent vessels used there, and another form of ceremonial discarding. As part of the cycle of renewal and the need for pure containers for the pure water, the vessels were periodically smashed or ceremonially "killed" by punching one or more holes in them. In many cases, the sherds and/or complete vessels were then placed in niches, under rocks, or on ledges in areas where no dripping water occurs, thus fulfilling their final role as offerings. Complete ollas (some without kill holes) and olla sherds are also found in dry caves with no speleothems or other sign of zuhuy ha collection. In these instances the vessels were either used for some purpose other than zuhuy ha and/or were placed as offerings.

Burials

Human burials have been found in at least 23 caves in Belize, and represent approximately 200 individuals. The exact number of individuals is difficult to determine, because the mixing of bones by both cultural and natural processes often obscures the remains of individuals in a particular burial or cave. For example, even in ancient times earlier burials were inadvertently disturbed and mixed by the digging of later ones, and in recent times the actions of looters have had the same result. Burials in caves are susceptible to natural events ranging from short-term floods, which can wash them away in a single moment, to the slow but steady drips of water, which can conceal them with calcite (Figure 3).

A further complication is the wide range of burial practices used by the Maya in Belize caves: primary and secondary, single and multiple, extended and flexed, formal interments and shaft burials, ossuaries and cremations, elite and commoners, with grave goods and without, with orientation to a primary direction or not, male and female, young and old, natural causes versus possible sacrifices. Although the presence of human remains is mentioned in many reports, very few detailed descriptions have been published (Pendergast, 1971; Roberts, 1990). Therefore my discussion is limited to general aspects such as (1) major burial caves, (2) probable elite burials, and (3) the possibility of sacrifice.

Major burial caves are defined as those that contain a large number of burials and/or appear to have been used primarily for the purpose of burials. In sheer numbers, one cave in the northern Vaca Plateau is significant with an estimated 40 individuals, while another recently discovered cave in the same area has at least 12. In the northern Mountain Pine Ridge, one cave contained approximately 20 individuals, but unfortunately most of these have apparently been removed or disturbed by casual visitors. Three other caves in this area held totals of seven, six, and six burials. A large cave in the Caves Branch area contains at least 26 burials, whereas a recently discovered small cave in the same area yielded the somewhat surprising

Figure 3. Human skull covered by calcite. Photo by Logan McNatt.

total of at least nine individuals. One cave in the Toledo District is reported to have more than 23 burials and another held five. These ten caves contain approximately 154 individuals, representing the vast majority of known burials in Belize caves. At least four of the caves appear to have functioned primarily as burial sites; there are not enough data from the other six to enable any conclusions about their major use.

Elite burials are defined here by two traits. First, skulls with artificially flattened foreheads, and teeth inlaid with jade, obsidian, and/or iron pyrite indicate people of high status. Second, certain items such as slate-backed iron pyrite mosaic mirrors and elaborate personal adornments made from jadeite, bone, and/or shell were usually possessed by the elite rather than lower status individuals. Although one or two such items might be found with a low-status individual, an assemblage of such artifacts as associated grave goods strongly suggests an elite burial. Cave burials with one or both traits are not common in Belize, and flattened skulls are reported from only three cave sites. One of these contained 26 burials of which at least one had a flattened skull but no grave goods. A second cave held six individuals, three of whom had flattened skulls, but again no associated grave goods. In the third cave, which contained an estimated 40 burials, a minimum of five had flattened skulls. Several of these had mandibles with inlaid teeth. Associated artifacts included a slate/pyrite mirror, jade beads, an alabaster bead, and a decorated bone pin. At least one dozen skulls had been removed from the main burials and placed in a separate walled chamber.

Two additional caves contain apparent elite burials based on associated grave goods, but information on the presence/absence of flattened skulls is not available. One of these caves held a multiple shaft burial with a least six individuals and a large quantity of associated artifacts including a slate/pyrite mirror, four drilled jaguar canines, a deer antler, 5 to 10 obsidian blades, and approximately 600 shell beads. The second cave has at least 12 burials, some of which are associated with polychrome pottery, obsidian blades, and jade, shell, and turquoise jewelry.

Additional elite burials may have been found but not recognized or reported. The grave goods sometimes associated with such burials are prime targets of looters, so some data may have been removed. However, the available information backs up the general consensus among archaeologists that caves were most often used as burial sites by the "common folk" rather than the elite.

Human sacrifice in caves is very difficult to demonstrate based on the archaeological evidence alone. As Roberts (1990) states regarding Maya burial practices in general: "Skeletal mutilation after death has been observed (Welsh, 1988) including, apparently, decapitations, hand and foot removal and intentionally smashed or drilled skulls and long bones." Pendergast (1971) comments that "the difficulty of distinguishing between sacrifice and honorific burial of a naturally-deceased individual is such that no identification of sacrifices can be made in the absence of clear signs of violent death." Given these limitations, absolute proof of human sacrifice in caves may depend on finding an obsidian or chert sacrificial knife protruding from the skull or chest of a burial. Therefore the following comments are offered as speculative inquiry rather than scientific fact.

The possibility that some of the human remains found in Belize caves may be the result of sacrifice is worth considering. The association of caves with rain ceremonies, and the association of rain ceremonies with occasional human sacrifice, particularly of children, is documented in various ethnohistoric and ethnographic accounts (Thompson, 1975; Bonor, 1986, 1989). One possible example of this association in Belize is a large river cave in the Caves Branch area which contains 26 burials, of which 16 are infant/child. The predominance of infant/child remains in what is clearly a ceremonial setting suggests that they were special offerings. In traditional Maya belief, the value of such offerings to the gods would be greatly enhanced if they were sacrifices.

Assuming that sacrificial victims do represent some of the human remains found in caves, there exists the question of where they were sacrificed—outside the cave or within? Many caves with burials are easily accessible, the burials are found within a short distance of the entrance, and there is no indication of possible sacrifice. However, at least two of the major burial caves contain large burial chambers that can be reached only by traversing difficult climbs and/or long stretches of water. It is this type of setting that I think would be most likely for possible sacrifice, for both ceremonial and practical reasons. The darkness, isolation, and acoustics of the cave environment would provide an ideal location for a solemn ritual, particularly one regarding sacrifice. For practical matters, as one modern visitor observed after experiencing the difficulty of traversing the climbs and water, it would be much more logical and dignified to escort a live sacrifice (at least in the case of an adult) to the final destination than to struggle with hauling the body of a deceased one. Both the ancient Maya and their gods might have had a similar perspective.

ART

Petroglyphs (carvings in rock) are rare in Belize caves. Perhaps the best known example is Petroglyph Cave, so named because of etchings on large rimstone dams just inside the entrance (Reents, 1980a). These glyphs include "step-frets in series of seven, cloud symbols, and the Union Jack—a possible variant of the day sign Akbal" (Figure 4; MacLeod & Puleston, 1978). Also cut into the faces of the rimstone dams are numerous holes of unknown function, ranging in size from 2-18 cm wide and 0.5-10 cm deep. Some of them are large enough to serve as handholds and footholds, but many of them are not. They may have served as small niches for the burning of copal incense and/or other offerings, or perhaps as torch holders, but this is merely speculation since natural erosion and desiccation of the dams has obliterated all evidence. Bonor (1995) describes the recent discovery of petroglyphs in a small cave next to the Caves Branch Rockshelter, including one "Quincunx" glyph, and others that he believes are definitely associated with water. Also in the Caves Branch area is a large interior cave room with flat rocks naturally embedded in the wall. Irregular lines circling outward from a central point are etched into these rocks.

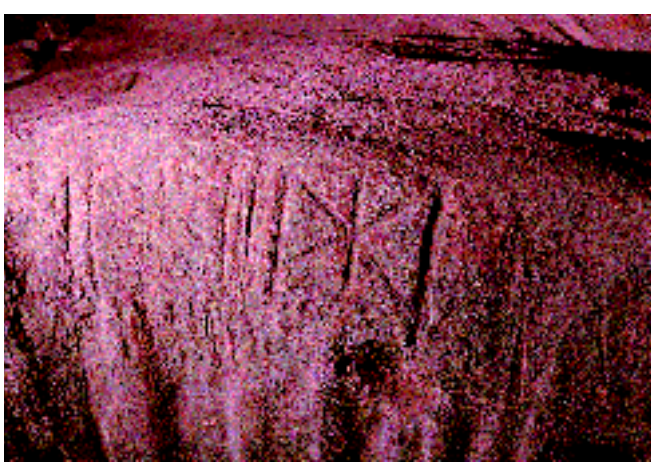

Figure 4. Petroglyphs carved in a rimstone dam in Petroglyph Cave. Photo by Logan McNatt.

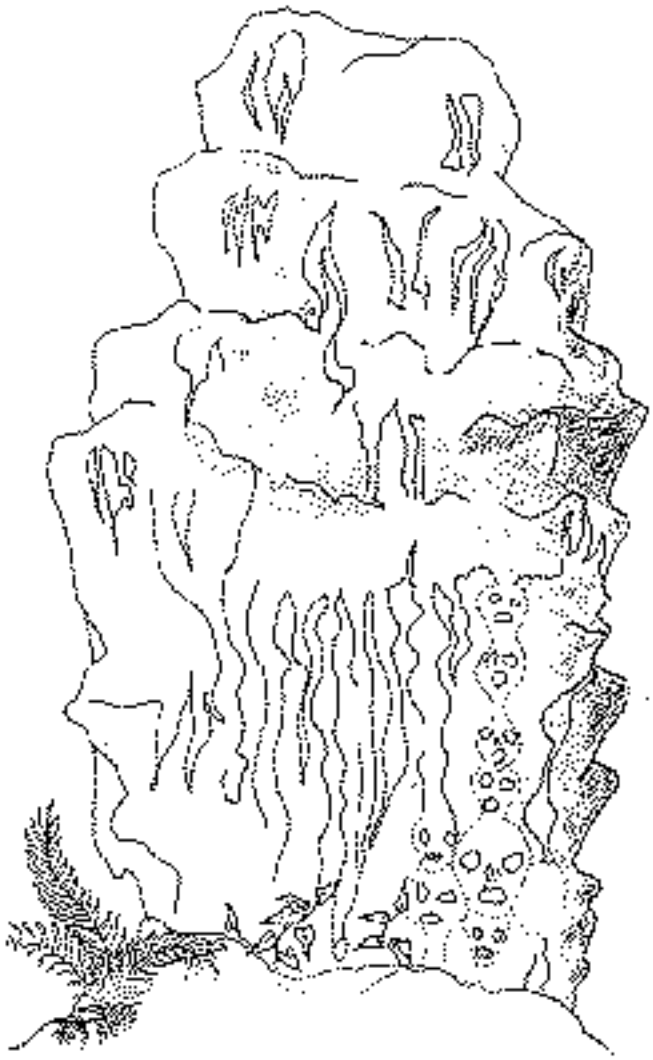

Figure 5. Faces carved in 4-m-tall stalagmite in the Caves Branch area. Drawing courtesy of Marit Brook-Kothlow.

Another style of petroglyph has been found in two caves. Eight simple human-like faces are carved into a stalagmite approximately 20 meters inside a large entrance in the Caves Branch area (Figure 5). A similar face appears on a rock outside a large cave entrance in the Toledo District. Bonor (1995) discusses the association of such faces in caves with water, so perhaps it is more than coincidence that both of the above examples involve major river caves.

Pictographs (paintings on rock) are equally rare in Belize caves, with all three known sites located in the Toledo District

(Stone, 1995). Actun Dzib (originally recorded as Actun Tz'iib) has three panels of charcoal drawings on smooth cave walls approximately 25 meters inside the entrance (Figure 6; Walters, 1988a, 1988b, 1989). The majority of these drawings are geometric designs and stick figures of humans and animals, which Stone describes as "the finest schematic paintings in the corpus of Maya cave art." Only one human figure, set apart from the rest, is drawn in a more typical Maya style. The cave contains Maya ceramics and burials, but it is virtually impossible to prove any association between these remains and the drawings. Sadly, some of the pictographs in Actun Dzib have been vandalized by modern graffiti, and the burials have been severely disturbed by looters.

The other two pictograph caves are only about 30 m in length, and contain few drawings. Roberto's Cave, near Laguna Village, has six (Walters, 1988b). Bladen 2 Cave, on the Bladen Branch of the Monkey River, has four, two of which are deity heads. When these drawings were made and why these particular caves were chosen is not known. A thorough discussion and analysis of these three Belize cave sites and all other known Maya cave pictograph sites is presented by Stone (1995).

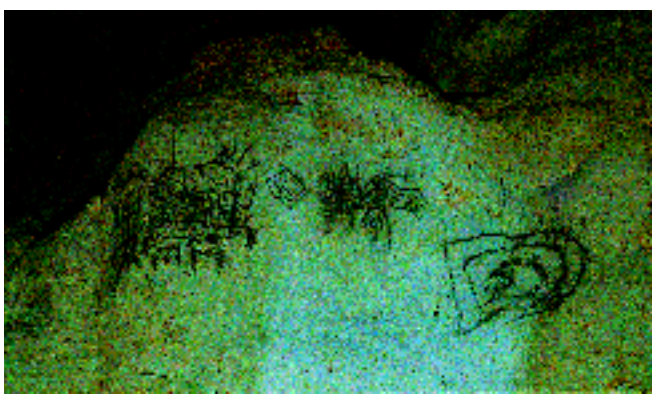

Figure 6. Pictographs in Actun Dzib. Photo by Logan McNatt.

ALTARS, IDOLS AND STELAE

These features are reported from only eleven caves in Belize. A formal altar was found in Hokeb Ha, consisting of a flattened platform 1.65 m by 1.27 m with a 0.3-m-high retaining wall of river cobbles. Immediately in front of it were 24 complete or nearly complete vessels (Palacio, 1977a, 1977b). In an unnamed cave near Benque Viejo, Gann (1929) found a "table-like altar" approximately 2.5 m long, with an associated platform and two ollas in front, and carved steps leading up to the recess containing the altar. In Rio Frio Cave C, Mason (1928) refers to "a structure which I have called an altar, although I am uncertain as to its use." From his description and the dimensions (9.1 m long by 2.7 m wide by 1.2 m high), this structure is simply a large platform rather than an altar. In a cave along the Deep River, Toledo District, Walters (1988b) depicts an altar of four flat stones, roughly 1.5 m square, but does not provide a verbal description.

A very different type of altar was found in Actun Kabal, consisting of two upright stones about 0.5 m tall and 0.2 m apart, supported by rock rubble. One of these stones was a broken stalagmite. Immediately in front of the uprights was a meter-square area of flat stones. The entire feature was coated by dried silt from a flood, which may have washed away or covered any associated artifacts or other remains such as charcoal (McNatt, 1984; Stone, 1984, 1995: Figure 5-48). A similar style of altar, consisting of three vertical stalagmites, is reported from a cave in the Bladen Branch area (Prufer, 1995).

In some cases the attributes of "altar" and "idol" are combined. For example, in an unnamed cave near Benque Viejo, Gann (1925) observed "the top of one of the stalagmites in the great chamber had been rudely carved to represent a human head, and that in front of it was placed a more or less cubical block of stone, which may have served as an altar."

Features which are best described as idols are known from only three caves in Belize. One is the carved stalagmite described above by Gann. Another altered stalagmite is located at the back of Rio Frio Cave E, approximately 150 m from the entrance. This imposing speleothem is 2.25 m wide, 2.5 m thick, and 2.75 m tall, and resembles a seated human figure. Despite its substantial weight, the figure appears to have been moved an unknown distance to its present location at the back center of the cave. A series of eight small circular depressions were cut into the front of the figure. A.H. Anderson recovered olla sherds, burnt wood, and possible copal charcoal from a depression in front of the "head," indicating use as an altar. Pendergast (1970) discusses the figure and its possible relationship to other activities in the cave. Although the figure likely represents some Maya cave deity, neither its identity nor the ceremonies associated with it can be determined with any certainty.

A head carved out of a clay bank in Actun Chek (Figure 7) poses similar problems. This feature measures 0.3 m high by 0.25 m wide, and is located in a clay mine 450 m inside the cave. A black stain on the ceiling immediately above indicates that some substance, possibly copal, was burned on top of the head. This evidence, and a small complete olla placed immediately below together with other associated artifacts, indicate that the idol also served as an altar. For a thorough description and discussion of this feature, see Graham, McNatt, and Gutchen (1980).

Three caves in Belize contain stones placed in upright positions resembling a crude form of stela. In the entrance of Petroglyph Cave, a 1.6-m-tall broken stalagmite was held in place by rock rubble (Reents, 1980a; Reents-Budet & MacLeod, 1986). Another broken stalagmite about one meter tall was obviously placed on a dirt floor in a cathedral-like room at the end of Chechem Ha, about 200 m from the entrance (anon., 1990). The most intriguing example is a slate slab, also about one meter tall, found in a small chamber over-

Figure 7. Face carved in a clay bank, height 0.3 m, Actun Chek. Drawing courtesy of Kathy Bareiss-Roemer.

looking an active stream passage in Actun Tunichil Muknal (Miller, 1989b, 1989c, 1989d, 1990). A primitive face is carved on one side, and the edges of the slab have been scalloped in such a way as to remind one observer of a stingray spine. As with so many features found in caves, the exact purpose of these stones and the ceremonies associated with them may never be known. However, it may be significant that two of the three sites containing stelae are major burial caves.

Clay Mines

Although the extraction of clay and other minerals is known from several caves in the Yucatan, this activity is known from only one cave in Belize. Actun Chek (Footprint Cave) has three areas of red clay deposits that contain obvious digging marks. The clay appears white because of a thin coating of calcite. All of these areas are located within the dark zone of the cave, from 100-450 m inside the entrance. Reaching them requires traversing a river that flows through the cave. In one locale, a finely chipped chert knife was found, similar to the sacrificial knives used by the Maya. At the most interior mine site, a grotesque clay face had been sculpted out of the clay bank, and a complete small olla was placed immediately below it. Sherds, charcoal, and other signs of cultural activity were associated with this mine (Graham., McNatt, & Gutchen, 1980).

MacLeod and Puleston (1978) argue that these mines were a type of ritual activity. The location in dark and relatively inaccessible places, and the association of ceremonial features such as the clay face and chert knife strongly support this view. The authors also suggest that the clay may have been used for the specific purpose of making ceremonial vessels painted with underworld scenes to be placed in tombs. Although logical, this hypothesis could be tested only by matching a chemical analysis of these clay sources with clay from specific vessels.

Artificial Construction in Caves

The Maya artificially modified the natural setting in so many caves in Belize and elsewhere that this subject requires separate discussion. Some features in the dark interior such as narrowed passages, walls separating chambers, and sealed chambers have no practical purpose other than ceremonial. Other features such as terraces, walls, platforms and steps in the daylight zone of large entrances could have been used for habitation rather than strictly ceremonial purposes. However, the overwhelming importance and use of caves as sacred areas is a strong argument against such domestic use (Brady et al.,1992; Brady, pers. comm., 1995).

Only five caves in Belize have received intensive investigations of artificial construction in the entrance areas, and only one of these contained evidence of long-term use. Excavations in Eduardo Quiroz Cave (Pendergast, 1971) revealed a refuse midden 0.5-0.9 m thick in Chamber 1, 10-20 m inside the entrance. The chamber also contained walls, terraces or steps, a plaster floor, and five burials including two children. A wall of dry-laid stones separates the rear of the chamber from the rest of the cave. Because the interior of the cave beyond the chamber was obviously used for ceremonial purposes, it is difficult to imagine a strictly secular use of the cave entrance by a family or other small group of residents. Pendergast concludes that Chamber 1 was occupied for considerable lengths of time, and that the occupants perhaps served as caretakers for the cave. Their duties might have included supervision of the collection of zuhuy ha in the interior, the cyclic destruction and replacement of zuhuy ha vessels, and other ceremonies for which there is less definite archaeological evidence. Whether the caretakers lived in the cave throughout the year or only periodically during ceremonies is open to question, although Pendergast thinks that the midden and burials suggest continuous occupation in Eduardo Quiroz Cave.

Las Cuevas (Digby, 1958a, 1958b) is located below and adjacent to a minor ceremonial center of the same name. A permanently flowing stream immediately inside the entrance probably provided drinking water for the surface site, while dripping speleothems in the cave interior were obviously used for the collection of zuhuy ha. The large entrance room is illu-

minated by daylight during part of each day, and has three platforms, several walls, and traces of plaster floors. Digby excavated these features but does not mention finding an occupation midden similar to the one in Eduardo Quiroz Cave. Few artifacts were uncovered in the entrance area, including fragments of several incensarios and one vessel that may have held a cremation.

Rio Frio Cave C is a large tunnel-like cave, cut by the Rio Frio through a limestone hill. It is approximately 150 m long, 50 m wide and 25 m high, with large entrances at either end. Indirect sunlight illuminates the entire cave, except for several small side passages and recesses. Mason (1928, 1940) removed a large platform approximately 9 m long by 3 m wide by 1 m high. He found a deposit of ashes and several pieces of jadeite, but no occupation midden.

Petroglyph Cave has one of the most spectacular entrances known in Belize. It is located at the bottom of a 150-m-wide sinkhole with vertical walls 10-30 m high. Only one place affords "easy" access, and even this requires artificial aid such as ropes or a log ladder. The entrance itself is approximately 70 m wide by 30 m high, opening into a room about 220 m long. The floor drops precipitously to a permanently flowing stream 40 m below, accessible by only one precarious route, which shows signs of use by the ancient Maya. The ceiling of this immense void is 40-60 m above the stream, and the entire area is illuminated by daylight. The trail to the stream passes beside a huge rock (ca. 15 m long by 10 m wide by 10 m high) that fell from the ceiling before the Maya used the cave. At the base of this rock was a series of 5-6 wide steps which have been destroyed by looters. On a breakdown/talus slope above the steps are eight terraces with low retaining walls of dry laid stones. From any viewpoint, even the most jaded modern visitor is impressed by the cathedral aspects of this vast chamber.

MacLeod and Reents conducted investigations in the cave in 1978, including some excavations in the entrance chamber (Reents, 1980a; Reents-Budet & MacLeod, 1986). Although numerous sherds, pieces of obsidian, modified and unmodified shell, ash and charcoal from hearths, and other remains were found scattered around the room, there was no midden or other sign of continuous occupation. This negative evidence of occupation is reinforced by positive evidence of ceremonial use such as petroglyphs, a stalagmite "stela," and major use of the cave for burials. In practical terms alone, the difficulty of moving in and out of the cave makes it an unlikely residence.

A final example of major artificial construction is found in the Chiquibul Chamber, the largest entrance of Actun Kabal in the Chiquibul Cave system (McNatt, 1984; Miller, 1984; Stone, 1984). At the time of its discovery, it was the fifth largest cave room known in the world, with an 80-m-wide entrance opening into a room approximately 150 m wide by 250 m long by 45 m high. Like the entrance of Petroglyph Cave, it is at the bottom of a huge sinkhole, but access is comparatively easy and does not require any artificial aids. There is a permanent spring at the rear of the chamber, and the entire

Figure 8. Colluvium-covered terraces on talus slope into Chiquibul Chamber, Actun Kabal; note people and tent in foreground for scale. Photo courtesy of George Veni.

room is illuminated by daylight during part of each day. A massive breakdown pile on one side of the chamber concealed numerous complete vessels, including large ollas and several polychrome dishes and plates. On the other side of the chamber, a large talus slope extends from ceiling to floor. A total of 31 terraces and platforms were mapped in the entrance, with most of them found on the talus slope (Figure 8). Some of these features are contiguous and up to 25 m long, while others are isolated. The size and surface area of the terraces varies greatly, but all are held by retaining walls of dry-laid stones from 0.25-1.5 m in height. It is possible that the entire slope was terraced and that many of the surfaces and retaining walls have been covered with colluvial debris. The series of terraces descend the slope to a large colluvial fan, that has been leveled and outlined with rocks, on the edge of a 20-m-wide rocky streambed that carries water only during floods. On one side of the fan is a massive 10-m-tall stalagmite which has natural features resembling a human figure. The overall visual effect is of a grand amphitheater, with the terraces serving as viewing platforms and the colluvial fan as "center stage." One unmortared stone wall 20 m long by 1 m thick by 1.5 m high is located between two large breakdown blocks. The calcite-covered remnant of another wall is found at the rear of the chamber between two speleothems. These walls are easily avoided, and appear to have no other purpose than to restrict or direct access to the spring at the back of the chamber.

The spring provides a major source of permanent water during the dry season. For such an important resource located within the sacred setting of a cave, the presence of part-time or full-time caretakers is a possibility. Other areas of the cave were used for various ritual purposes such as zuhuy ha collection and ceremonial dumping. During the 1984 and 1986 Chiquibul Cave expeditions, a thorough surface examination of the terraces was conducted, which yielded only a thin scat-

ter of sherds and a few other artifacts. Although no excavations were undertaken, the surficial nature of these terraces on the talus slope does not indicate the presence of a deeper midden deposit.

In the examples cited above, there is no evidence to suggest that the platforms and terraces supported perishable structures. However, three caves do contain tantalizing evidence of such structures. In another major entrance of Actun Kabal, a 3-m-square outline of flat stones has all the appearances of a building foundation. About 50 m inside one of the large entrances of the Caves Branch River Cave, approximately 30 postholes were found (MacLeod, pers. comm., 1995). In Actun Balam, Pendergast (1974) found "39 fragments of unburnt clay daub, with impressions of poles, leaves, and what appears to be grass." The pieces of daub were small, dissolved easily in water, and were recovered only because conditions in the cave were relatively dry and unusually conducive to preservation. They were located in a high alcove containing numerous vessels and other remains including a wooden spear. Pendergast interprets them as the probable remains of a pole screen or framework enclosure of the artifacts, rather than as the remains of a dwelling. Such small clues provide intriguing hints of the possibility of perishable structures in other caves, where more typical wet conditions have eliminated such fragile remains from the archaeological record.

In conclusion, the available evidence indicates that artificial construction in the daylight zones of large entrances in Belize caves was intended for ceremonial purposes rather than domestic habitation. First, these entrances provide access to significant ceremonial areas within the dark zone. Second, they do not usually contain refuse middens indicative of long-term occupation. Although such a midden was found in Eduardo Quiroz Cave, Pendergast interprets it as a result of ceremonial "caretaker" activities rather than a purely secular use. Many caves with artificial construction in Belize offer the opportunity for excavations to determine the presence/absence of middens and perhaps perishable structures.

Problems

Looting

The most obvious and critical problem confronting cave archaeology in Belize is looting. The theft of antiquities for sale on the black market is a worldwide problem, and Mayan artifacts are increasingly popular among collectors. One reason for this may be the international publicity that any major discovery receives, often in glamorous terms of "lost treasure" rather than a more educational or scientific approach. Other reasons include the relative poverty of many people in less developed countries, the ease of transporting artifacts through already established networks such as drug-smuggling, the low risk of prosecution, and the low fines compared to the financial rewards.

Since 1971, Belize has had strong laws protecting its archaeological resources (anon., 1971; Government of Belize 1971; Gutchen, 1983), but enforcing those laws is very difficult. Caves are particularly vulnerable to looting. There are many of them, the entrances are often naturally concealed far from roads and habitations, and they contain artifacts that are usually not buried and can thus be easily collected with minimal effort and time.

The extent of the problem is widely recognized but difficult to measure. Occasional publications have mentioned the looting of caves (anon., 1982, 1984; Rushin-Bell, 1982). The only systematic study of looting in Belize was made by Mark Gutchen (1983), a former Peace Corps volunteer for the Department of Archaeology from 1978 to 1980. Of the 86 registered cave sites in his study, 37 or 43% had documented damage from looting. The actual damage may be much greater, as Gutchen states:

Determining the extent of looting in cave sites is often quite difficult because it is possible to remove artifacts without leaving any trace. The only ways to determine if artifacts were removed, therefore, are 1) to have information as to their presence before the looting took place; 2) to have data from reliable informants that the items were removed; or 3) to seize artifacts illegally removed and have the thief report the location to investigators.

In 1976, Tom Miller and I took Acting A.C. Jaime Awe into a large cave in the Caves Branch area to show him several complete vessels and a human skeleton that had been found during our initial exploration. We took photographs but did not remove the artifacts because the cave was known only to our small group of five people. Unfortunately, one of this group (neither a caver nor archaeologist) told others, and word eventually spread. When we returned to the cave nine months later, we found that the vessels had been stolen, the skeleton trampled on, and the skull removed. Although the culprits were known by several witnesses, they were not prosecuted due to a lack of direct evidence.

In 1978, a beautiful calcite-encrusted human skull was chipped out of its sacred resting place by persons unknown. Until then, the skull had been respectfully viewed by dozens of modern explorers over a ten year period. As recently as 1992, a series of steps in Petroglyph Cave was dismantled and discarded as rubble, apparently by some looter futilely searching for "treasure." The vessels, skeletons, and steps in these caves had been sitting undisturbed for over 1,000 years, but were removed/destroyed in a few brief moments of greed. All we have to offer future generations are photographs.

The causes of looting are complex and not easily resolved. Matsuda (1994, 1995) provides an interesting discussion from the looter's perspective. He argues rather convincingly that until basic social and economic disparities that create poverty are resolved, then looting will continue to be a viable source of income for some people. Griffin (1986) defended the collec-

tor's viewpoint in a National Geographic article, which surprised and angered many archaeologists. Their rebuttal is given by Chase, Chase, and Topsey (1988). The onus of the problem ultimately rests upon the buyers and collectors, most of whom live in foreign countries. As long as there is a demand, there will be a supply.

FUNDING

A second more subtle but equally critical problem affecting cave archaeology in Belize and many other countries is best described as the lack of funding. The Department of Archaeology (DOA) is the primary governmental agency in charge of archaeology throughout Belize. Major responsibilities include documentation of all known archaeological sites (including many non-Maya historic ruins), curation of antiquities, maintenance of several Maya ruins open to the public, and administrative duties involving the many foreign projects working in Belize. In addition, the DOA provides lectures, exhibits, and other public education and information services.

In spite of these many responsibilities, the DOA has consistently been underfunded and understaffed, and there has been a significant turnover in personnel over the years. Understandably, archaeology is a low priority compared to building roads, schools, and other basic infrastructure. The lack of funding affects cave archaeology in three important ways: protection, preservation, and publication.

Protection of cave sites is a daunting task. Employment of full-time guards and/or the installation of cave gates are costly and impractical measures in most cases. Protection will more likely result from serious efforts by archaeologists, cavers, government agencies and others to increase public awareness and reduce the basic causes of looting. The problem appears much larger than any practical solution.

However, several cave sites in Belize have been protected. Chechem Ha in the Vaca Plateau was gated with funds and labor provided by Chaa Creek, a nearby tourist resort owned by Mick and Lucy Fleming. The Antonio Morales family serves as guardians of the cave, offering lodging, meals, and guided tours for visitors. In the Caves Branch area, Ian Anderson operates a similar service to several different caves, providing an opportunity for people to visit the caves while restricting access by unauthorized persons. Las Cuevas in the Chiquibul Forest Reserve has recently become the location of a research station, which allows self-guided tours of the cave by visitors. Other than the gate at Chechem Ha, these caves have been preserved in their natural state with no artificial development such as lights or trails. Artifacts and other archaeological remains can be observed and photographed by visitors but are not disturbed. The combination of efforts by private "ecotourism/adventure" entrepreneurs and/or non-profit research organizations in cooperation with governmental agencies such as the DOA and Forestry Department may provide future protection for other important cave sites throughout the country.

Preservation as used here regards both the physical remains and written information gleaned from cave archaeology. Although a Department of Museums was established in 1990, Belize does not yet have a National Museum. There is an appalling lack of storage space for artifacts, requiring the DOA to use offices, a dirt-floored basement, and for several years even unused jail cells for storage. Threats from termites, silverfish, heat, dust, and humidity are constant. Lack of security is also a problem; in 1983 the DOA was broken into and ten irreplaceable artifacts were stolen, including two from caves (anon., 1983).

Hundreds of artifacts from caves are present in the collections, ranging from dozens of large ceramic vessels to many small fragile items of bone, shell, and wood. Although some of the items are stored on shelves, many are packed away in cardboard boxes, which, by necessity, are piled on top of each other. Misplacement and mixing of artifacts is an inevitable result. For example, while working for the DOA in 1984, I found a box with large ceramic sherds and several historic bottles. In the box was a silverfish-eaten scrap of paper with a barely legible handwritten note: "Found by two white men in a cave in the Toledo District." It is doubtful that the bottles came from a cave or were originally associated with the potsherds. Without a date or other information the artifacts were necessarily labeled PNK, meaning Provenience Not Known.

In addition to the potential for damage, accessibility for cataloging, analysis, photography, and further study is a problem. The lack of adequate storage space combined with a shortage of laboratory and office space is a severe hindrance to both DOA personnel and foreign researchers wishing to conduct studies of archaeological materials, whether from caves or other sites.

Preservation of written information about cave sites is also a problem. Within the DOA, much of the data are buried in letters, memos, and reports of trips, which are filed by date rather than subject. Many of the files are yellowed and brittle from age, and have suffered damage from silverfish. For example, A.H. Anderson typed many lengthy letters on onion-skin paper, which include information about his work in caves. I found one of his letters explaining how Casconil Cave got its name, from combining the last names of the discoverers "Castillo, Cocum, and Cunil." This information had not been previously recorded on the card catalog for this site.

Outside of Belize, a great deal of information about Belize cave sites also exists in both published and unpublished form: articles, journals, trip reports, maps, and photographs, by cavers, archaeologists, tourists, and other visitors. DOA policy requires copies of such information from all officially permitted projects, but obviously cannot keep track of information acquired by casual visitors. Actun Polbilche is an example of how important this information can be. The cave was discovered by non-archaeologists from the United States, who removed some artifacts and casually reported their findings in a non-archaeological publication (Malone, 1971). Fortunately

the report came to the attention of archaeologist David Pendergast; the cave contained rarely preserved perishable items—a wooden spear and wooden box—as well as numerous complete ceramic vessels and other cultural material (Pendergast, 1974).

Publication, or rather the lack of publications about cave sites despite the hundreds of reported discoveries, is the final result of the lack of funding. It is much easier and less expensive to find the sites than it is to conduct an extensive evaluation and interpretation of them. Many serendipitous discoveries have been made by both Belizeans and foreigners who visited caves and unintentionally found archaeological remains. The DOA itself has conducted numerous investigations in caves—essentially salvage operations to recover artifacts because of the threat of looting—which have never been published. Even major caving and archaeological projects that expect to find cave sites cannot usually include the costs of archaeological excavations, analysis, and write-up. With the growing population, development, and research in Belize, the rate of archaeological discoveries in caves has increased, but unfortunately so has the information gap.

Obviously, funding of archaeological research in caves is not the primary responsibility of any particular country, government agency, archaeological or caving organization, or individual. Ironically, the lack of funding is less of a problem for looters and their buyers/collectors than for archaeologists and governments. As long as "finding" surpasses "funding," efforts to protect, preserve, and publish will be severely limited, and cave sites will continue to be an increasingly endangered heritage.

The Future of the Past: Suggestions for Future Research

This paper offers only a broad overview of cave archaeology in Belize. Each of the major topics could be and should be discussed in much greater detail. Certain subjects such as perishable remains, exotic trade goods, and the relationship of cave sites to surface sites, are mentioned only briefly or not at all. I accept full responsibility for these and other omissions and for any errors, and have the audacity to offer the following suggestions for future work.

Laboratory Analysis

A tremendous amount of material has been collected from caves in Belize, but much of it has never been analyzed. (Examples include several projects in which the author participated such as the Footprint Cave and the Chiquibul Caves expeditions) These artifacts represent a significant component of the DOA's collections, and an invaluable resource for current and future cave studies. The following analyses should be completed:

A. Ceramics, Lithics, and Faunal (non-human) Materials: Ceramics are the most common cultural remains found in caves, and are the major source for not only dating the use of caves but also interpreting the meaning of use. Studies of ground stone and chipped stone artifacts can include typology, use-wear, and residue analyses. Animal teeth and bones, as well as marine and freshwater shells, have been found as both modified artifacts and as unmodified naturally occurring remains. Analyses of the faunal remains can identify which animals may have been exploited for food and/or ceremonial use, and provide clues to the micro-climate of the cave in which they were found.

B. Burials: Human skulls and other skeletal remains can often provide answers to questions such as age, sex, diet, disease, social status, and cause of death.

C. Exotics: Although jadeite and obsidian have been found in numerous caves in Belize, the only known sources are outside the country. Species of marine shells have been found from both the Atlantic and Pacific. Lithics such as chert, basalt, and granite occur only in certain places within Belize but are found in caves throughout the country. Chemical and/or biological analyses can often pinpoint the sources of these materials, and provide important information on trade routes and the relationship between sites.

D. Perishables: Although preservation of items such as wood is rare in Belize caves, the DOA collections include several wooden artifacts that have never been analyzed for identification of the material used, or submitted for radiocarbon dating. Outside the lab, other unique perishable remains such as the human footprints and clay mask in Actun Chek are susceptible to damage from both floods and casual visitors. They have been photographed, but should be further documented with latex or plaster molds. Vegetal remains, such as a reported corn husk in an olla in Chechem Ha (anon., 1990), also should be preserved and analyzed.

E. Archival: A wealth of information about caves is buried in trip reports, letters, and memos within the DOA files. In particular, much of A.H. Anderson's work in caves is recorded in his letters and memos typed on thin onion-skin paper. The letters include memorable comments on not only the caves, but also on Belize in general. "The Letters of A.H. Anderson" would make a fascinating volume.

Field Work

Despite the hundreds of cave sites known in Belize, basic information is still lacking for many of them:

A. Location: Until recently, the lack of adequate topographic maps prevented precise location of most caves, especially those found far from roads or other recognizable landmarks. Satellites and GPS systems now make it possible to locate caves precisely, but considerable time and effort is needed to relocate many caves. Of course, information about locations of cave sites would have to be controlled by the DOA and other responsible agencies to prevent looting and disturbance by casual visitors.

B. Maps: Many cave sites have not been mapped. Cave

surveys in Belize have generally been accomplished by caver volunteers, and the maps are often not published or available to other researchers. The maps do not usually include archaeological remains, and at least in the case of large caves do not provide enough detail for an archaeologist to precisely locate such remains. Even well-known and frequently visited caves such as St. Herman's and Rio Frio Cave C do not have adequate maps, although both caves are tourist sites and have been surveyed. In most cases, distribution of cave maps should be restricted for the same reasons as those involving locational information. Surveying or in some instances resurveying the known cave sites in Belize would be an expensive but highly productive undertaking, and might be accomplished by using the skills of the many experienced caver volunteers who visit Belize each year.

C. Collections and Excavations: Most cave sites in Belize have not been adequately sampled from an archaeological standpoint. Even a small controlled surface collection and one or two test pits in each cave could provide important data regarding such basic questions as stratigraphy, chronology, and use. Charcoal samples could easily be collected in numerous caves for radiocarbon dating.

Publication

The lack of detailed archaeological publications on cave sites in Belize has already been mentioned, and was a major difficulty in writing this paper. Even if field work and laboratory analyses have been conducted, the information is virtually useless unless it is communicated and shared. As Chase, Chase, and Topsey (1988) state: "Not writing up and not publishing findings is irresponsible. However, non-archaeologists need to understand that for every day spent in the field, at minimum seven days are required for processing, analyzing, and writing." The few published reports, particularly those by David Pendergast, cast a luminous glow in the otherwise stygian darkness of cave archaeology in Belize.

As a final thought, perhaps Alexander Hamilton Anderson's statement is just as true today as when he made it: "The more I see of caves with Maya remains the stronger I feel that they merit, almost demand, far deeper probing than the very shallow scratching that has been done to date" (Anderson, 1962).

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