16 RECENT RESEARCH IN THE BLADEN NATURE RESERVE: THE PRECERAMIC OCCUPATIONS OF MAYAHAK CAB PEK AND SAKI TZUL ROCKSHELTERS

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From the perspective of Central America, the peopling of the New World was a complex process lasting thousands of years and involving multiple waves of migration in the late Pleistocene and early Holocene periods. As the ice age ended across the New World people were adapting to changing environments and resources. In the Neotropics these changes would have been pronounced as patchy forests and grasslands gave way to broadleaf tropical forests. Investigations since 2014 are demonstrating that early Holocene humans lived, hunted, and were buried in and around rockshelters in the Bladen Nature Reserve. Data from these studies are illuminating the life histories and subsistence strategies of these earliest colonists of the lowland tropics.

Introduction

This article discusses the archaeology of two rockshelters in southern Belize that contain evidence for some of the earliest history of human occupations in the neotropical lowlands of eastern Mesoamerica and in Belize. These shelters, located within the Bladen Nature Reserve, have been largely protected from depredations by their remote location in one of the most protected reserves in Central America. We discuss the background of pre-ceramic research in the region, the physical geography of the region and known paleoecology, and the data we use to document the earliest inhabitants of southern Belize.

In the neotropical lowlands of Mesoamerica the generally accepted chronology of Paleoindian Period from 13,500 – 10,000 BP. followed by a long Archaic from 10,000-2900 BP (Lohse et al. 2006) is not particularly anchored to cultural changes reflected in well dated regional archaeological records (Prufer et al. 2019) and likely need to be revised in light of emerging genetic and paleodietary data (Posth et al. 2018; Kennett et al. In Press). Conservatively it is estimated the initial New World colonists would have lived in Central America prior to 14,500 BP (Braje et al. 2017). There they encountered a far less tropical, environment than today. At that time the landscape was probably composed of “heterogeneous, even patchy, vegetation across small distance scales; and stretches of forest alongside water courses in regions where forests were significantly reduced” (Piperno 2006:286). Pollen and macrofossil plant data suggest the structure of forests may have already been tropical, but the distribution of broadleaf forests was significantly less than in the modern climate regime (Piperno and Pearsall 1998) and vegetation was more diverse than simple Pleistocene grassland/Holocene forest dichotomies would suggest (Piperno 2011). Confronted with a greater diversity of large mammals and a wider range of riparian forest and grasslands humans would have initially adapted to ecosystems that were far different than today. By 9,000 BP conditions were becoming wetter and warmer (Winter et al. 2020) and, in the Petén, there is evidence that closed canopy forests were experiencing at least some anthropogenic burning (Renssen et al. 2009; Anderson and Wahl 2015) with mixed herbaceous and woody plants being represented in charcoal records. Pre-agricultural burning peaks much later, between 8,000 and 6,000 BP (Schüpbach et al. 2015), during the Holocene Thermal Maximum, arguably the warmest and wettest period of the Holocene (Renssen et al. 2009). After 10,500 BP the abundance of higher-ranked plant and animal resources declined as rainforest overtook many Pleistocene open areas where game would have fed on scrub and grasses (Piperno and Pearsall 1998).

Dates reported here as CalBP are based on calibrated radiocarbon dates using the IntCal13 calibration in the software package Oxcal (Bronk Ramsey 2017; Reimer et al. 2013). Other estimates in years BP are derived from generalized chronologies in the literature, but both refer to years before the present, (present=1950).

Research Reports in Belizean Archaeology, Vol. 17, 2020, pp. 199-208.

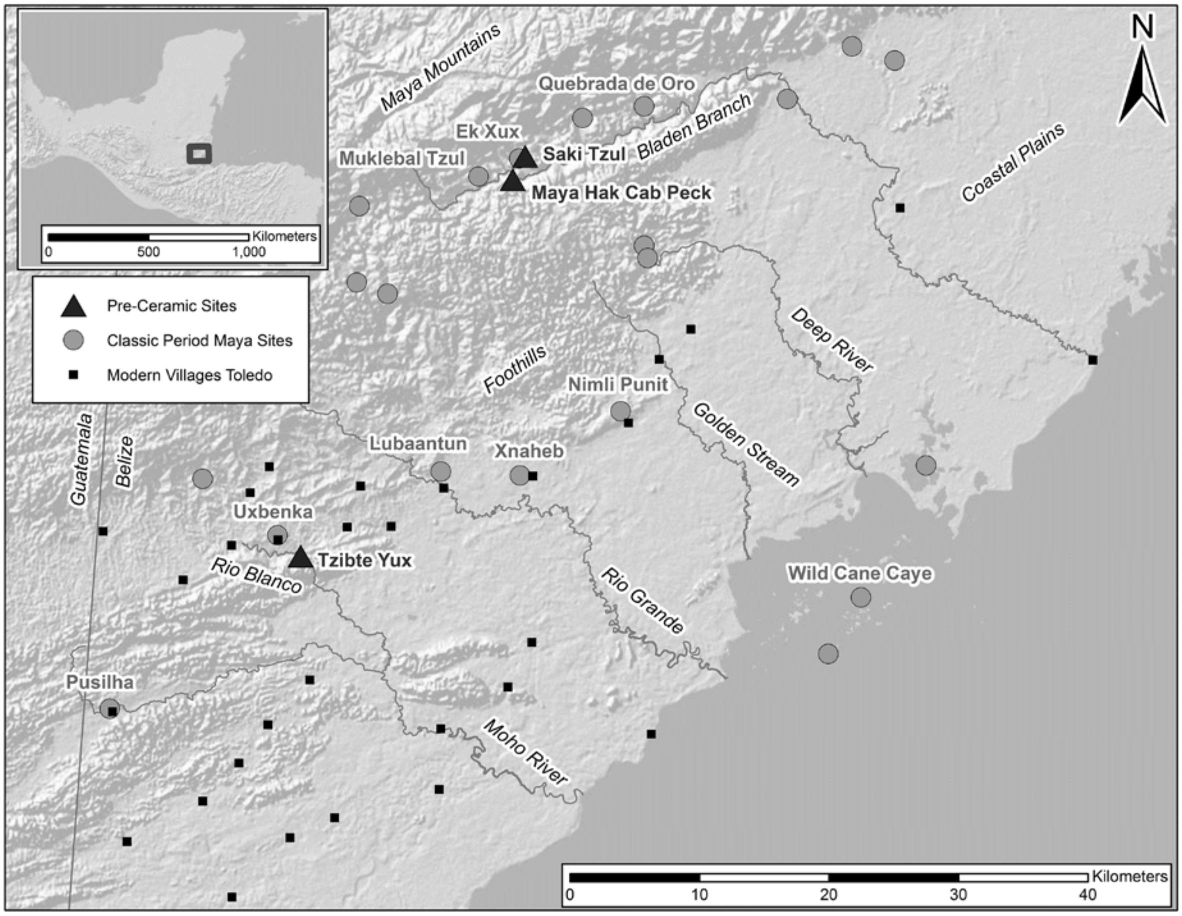

Figure 1. Map of southern Belize showing the locations of pre-ceramic and Classic Period cultural sites and modern villages and communities. Note that both Saki Tzul and Mayahak Cab Pek are located in the upper reaches of Bladen Branch of the Monkey River, near to the Classic Period center Ek Xux. Map by AE Thompson for the BPAAP.

Rockshelter and Excavation Descriptions

Mayahak Cab Pek (MHCP) and Saki Tzul (ST) are rockshelters located in an interior valley of the Maya Mountains in the Bladen Nature Reserve, a protected wilderness area where there has been minimal modern human disturbance of archaeological sites (Figure 1). Recent work from 2014-2019 has demonstrated that the cultural use of these rockshelters began prior to 13,000 CalBP and continued through 1,000 CalBP. The two sites were first documented in 1997-1998 (Prufer 2002). At that time, shallow excavations at MHCP produced burials with excellent preservation of human and faunal remains but did not identify pre-agricultural contexts (Saul et al. 2005). Though the two rockshelters are located 1.4km apart, they have similar stratigraphic sequences and contain similar assemblages of artifacts and biological remains. Both have dry sediments and large overhangs, reflecting that little direct rainfall affected cultural deposits. This also helps to explain the excellent preservation of unburned bone and other organic materials and only minor root activity close to the driplines. A Classic Period Maya center is located between the two rockshelters in the Ek Xux valley, and another is located just 2.7 miles distant (Dunham and Prufer 1998), indicating that the interior of the Maya Mountains were dynamic and active cultural landscapes for thousands of years.

Mayahak Cab Pek (MHCP)

MHCP is an east facing shelter (Figure 2) under a 20 m high limestone face with easily discernable bedding planes, many marked by caramel colored chert lenses and cobbles. The ground surface of the rockshelter runs roughly

Figure 2. View of MHCP rockshelter facing south. The E-NE aspect of the rockshelter and massive canopy of the forest made for low-light conditions and a challenging work environment. Photo: BPAAP.

south-southeast to north-northwest with a slope gradient that varies between 6 and 14 degrees steepening towards the south. The shelter surface is located approximately 20 m above the present-day stream bed of an unnamed tributary of the Bladen Branch of the Monkey River. The rockshelter overhang offers a substantial amount of shelter to the surface below, which is extremely dry and dusty. The drip line extends to ~8 m from the cliff face. The rockshelter floor shows no signs of erosion from water flow. The rockshelter wall shows a few indicators of travertine growth, likely from water seepage. The overall area of the rockshelter floor is approximately 180 m^2. Disturbance from plant growth is not significant since the ground surface is largely sheltered from rain. The east facing aspect and high canopy forest cover limits direct sunlight. Recent studies in 2014, 2016-2018 documented preceramic contexts.

In 1998 and from 2014-2019 a dozen excavation units were placed in MHCP extending to a depth of over 320 cm below the surface (Figure 3a). These were done in 5 cm to 15 cm arbitrary and natural levels based on observed stratigraphic changes and cautious level endings when stratigraphic changes were not observed. The original 1998 excavations consisted of 1x 2 m units along the back wall of the rockshelter (Units 2A-34, see Figure 3a). Several of the units partially excavated in 1998, were then reopened and excavated to bedrock in subsequent years (Units 28-30). The 1998 basal excavation surface had been covered to protect deeper contexts.

The general stratigraphy at MHCP is consistent and well dated (Prufer et al. 2019). The ceramic bearing upper portions (dating from 1,000-3,000 B.P.) of the stratigraphy can be generally characterized as repeating two sub-stratigraphic soil units, which include midden fill overlying dense concentrations of cobbles that likely represent occupation surfaces. This sequence of midden deposit and cobble fill was repeated no less than three times. The midden deposits contain high amounts of flake stone, faunal material, ceramics, much of which show evidence for burning. Jute (*Pachychilus* sp., a freshwater snail) concentrations comprise up to 50 percent of the matrix, particular toward the bottom of the ceramic levels and continuing into the top of the aceramic levels. These jute shells all appear to be spire lopped, which has been suggested elsewhere as an indicator that jute was a prepared food product (Halperin et al. 2003). These levels contain dense cobble rich horizons primarily of sub-round to sub-angular limestone and porphyritic igneous clasts. Given the generally rounded nature of the clasts, they likely derived from river gravels, not roof fall, and would have been transported to the rockshelter by humans. Many of the igneous rocks were worked by crude splitting and flaking of volcanic rocks for expedient chopping and cutting tools, with little evidence of retouch. In the Bladen River, below the shelter, more than 50% of the floats are porphyritic igneous cobbles, suggesting they are a source of

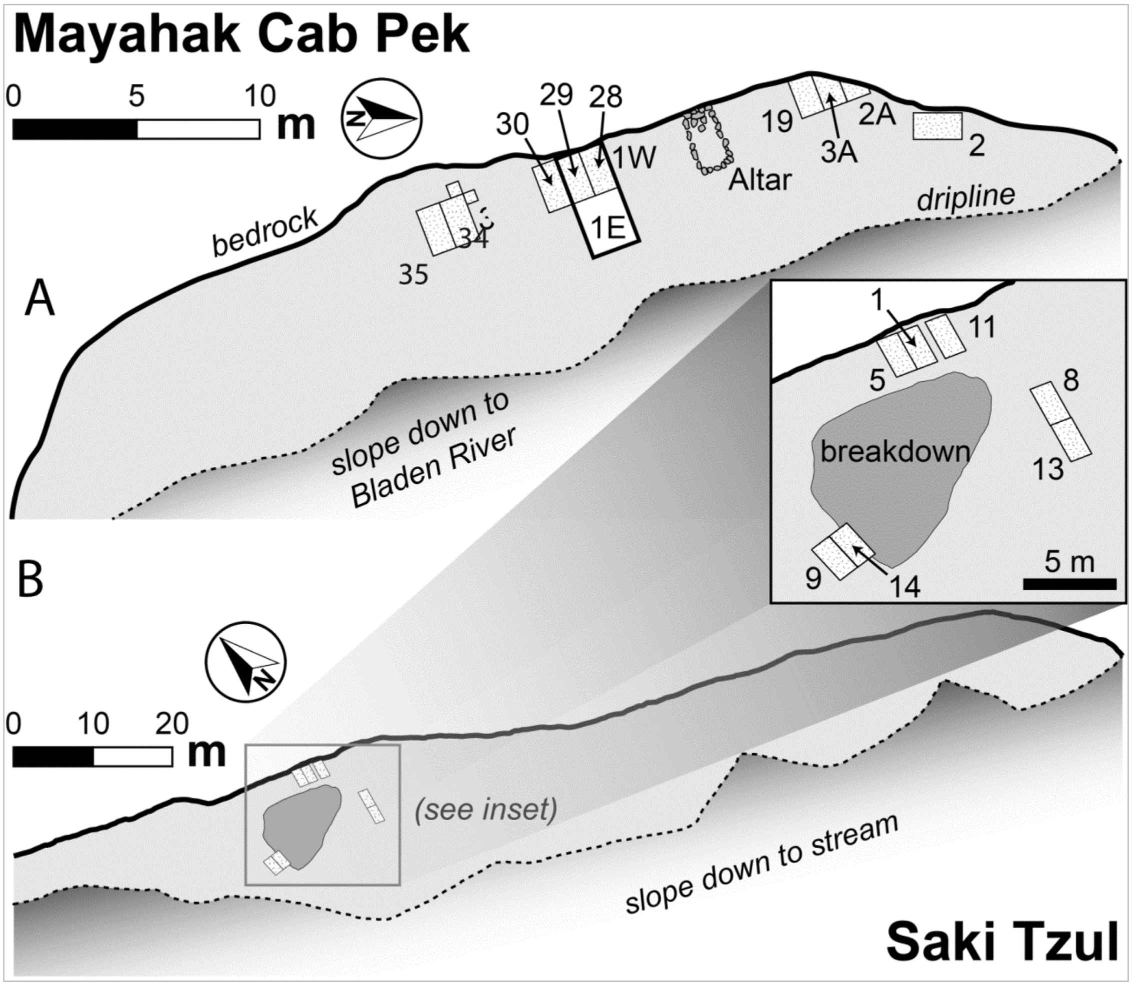

Figure 3. Plan view of MHCP (A) and ST (B). After Kennett et al. In Press Figure S1. Graphic by K. Prufer, A. Alsgaard, and T. Harper for the BPAAP.

expedient tools manufactured at or carried to the rockshelter. The fine-grained matrix found in both midden and cobble horizons consisted of black (10 YR 2/1) silt to silty-loam sediments.

The aceramic levels were characterized as black (10YR 2/1) silt to silty-loam fine grained matrix with varying degrees of sub-angular to angular cobble-boulder sized clasts of limestone interpreted as roof fall mixed with crude porphyritic igneous tools. This stratigraphic unit is poorly sorted and likely represents the natural accumulation of exogenic (silt) and endogenic (roof fall) sediment. The intrusive nature of some burials made it difficult to interpret stratigraphic sub-units. Artifact and faunal concentrations are moderate and consistent in the aceramic levels and jute snail concentrations decline with depth to less than 10 percent of the matrix in the lowest cultural levels. The size and the number of cobbles, both limestone and porphyritic igneous rocks and expedient tools, tended to increase with depth and comprising up to 75% percent of the matrix between strata dated to 5,000-9,000 CalBP. In the lowest cultural levels, earlier than 9,000 years ago the soils are a silty matrix we found a smaller frequency of chert tools, but they were larger and have a higher concentration of expedient unifacial and bifacial blades. These silty matrices terminate on bedrock (likely roof fall breakdown) over reddish clays and decaying limestone devoid of any cultural materials. The silty matrix above decaying limestone layers represent the first intensive human use of the

Figure 4. View of the giant cliff face at ST rockshelter. The wall is over 90m high, towering over the rainforest and the dry area under the overhang is extensive, and has only been tested in limited areas. Photo: BPAAP.

rockshelter and at MHCP dates to approximately 12,000 B.P (Prufer et al. 2019).

Saki Tzul Rockshelter

Saki Tzul (ST) rockshelter is located in the Ek Xux valley, along a tributary of the Bladen Branch and 70m above the Ek Xux Creek. It is also situated less than 300 m from the Classic Period Maya center Ek Xux. ST is located on the eastern side of the valley 1.4 km north from MHCP and is a starkly white limestone outcrop, and one of the most impressive geological features on the local landscape. The massive rockshelter (Figure 4) is approximately 80 m tall, 145 m long, and is between 8 m and 15 m wide and is visible from the air. The dry surface area is estimated to be 1700 m^2. The rockshelter runs along a generally east-west axis with differences in the elevation of the ground surface, with the most level area being the location of the 2016 investigations. With a south facing exposure, the rockshelter received abundant sunlight throughout the day. We did note that during a large storm some rain blew in from heavy winds resulting in enough moisture for some observable scrubby vegetation to grow within the dripline. A large breakdown boulder from the cliff face is a noticeable feature of the rockshelter that influenced our selection for the location of the 2016 excavations.

In 1999 one excavation unit was opened at ST and then between 2016 and 2018 seven additional excavations were conducted in the west third of the shelter and in an area around a large breakdown boulder and the cliff face (Figure 3b). Like at MHCP, ST was excavated in 5cm to 15cm natural and arbitrary levels. Stratigraphy is similar to MHCP, with significant mixing and disturbances in the ceramic levels reflecting greater numbers of people utilizing the shelter, and less disturbance in the aceramic levels.

Ceramic containing levels were generally characterized by abundant disarticulated human remains, faunal bone, burnt wood fragments, ceramics, lithics, and obsidian. Towards the end of the base of levels containing ceramics overall artifact density is high and two distinct midden layers containing >70% jute shell and small cobbles were identified. Soils were dark greyish brown (10 YR 4/2), with soft organic rich silts mixed with the midden materials. Several small features consisting of fire cracked rocks, burnt faunal bone, and unburnt human bone were documented. The upper levels at ST are more disturbed than at MHCP, perhaps due to their proximity to the ruins of Ek Xux. Dating of charcoal from these levels produced inconsistent results and reversals, albeit all younger than 3,500 CalBP.

Like at MHCP the transition from ceramic to aceramic periods is seen in levels characterized as jute rich middens. In some areas of the rockshelter there are two distinct jute midden layers dating to the about 4,000 CalBP. These contain abundant faunal bone, lithics, carbonized plant materials and seeds, chert, and obsidian. Like at MHCP the jute density declines with depth but there are *jute* deposits in all levels and time periods attesting to the dietary importance of these small riverine gastropods.

Levels below 4,000 CalBP were notable for increasing numbers of large aquatic snails (Pomecea sp.) as well as larger faunal bones, increasing numbers of carbonized plants and seeds, chert, obsidian, and isolated human remains. Within these dense cultural layers *Jute* concentrations continue to decline relative to depth. At least three cobble surfaces were encountered with several small likely firepits cutting into those surfaces. Sediments become increasingly silty and ashy and, in one unit, ended just above a hard plaster or lime marl floor extending across the surface of a 2x2 m unit at levels dating to before 7500 CalBP. This floor was up to 12 cm thick in places. This floor was not evident or intact in other units.

General Chronology

The occupation sequences at MHCP and ST span close to 12,000 years. Stratigraphic integrity (Figure 5) is largely intact, with some mixing within stratigraphic units presumably from human and animal activity. These disturbances are much more pronounced in the upper levels dating to the Classic Period (1,000-3,000 CalBP). The middle and early Holocene stratigraphy is much more and has fewer reversals (Prufer et al. 2019). Both rockshelters show definitive evidence of human use prior to 12,000 CalBP. The stratigraphy of ST is more compact, with a long chronology relative to depth. This may suggest more intensive use of MHCP over time. It is easier to access, requiring a climb of < 30 m from the creek below, while accessing ST requires a much more difficult and steeper climb of over 80 m. ST is also much larger, and human activity may have been distributed across the larger surface resulting in shallower contexts of similar age. Finally, differences in stratigraphy may be related in part to aspect. ST has a south facing shelter open to the large (1 km wide) Ek Xux valley with some windblown rainfall and more air circulation today. MHCP opens to the NE and partially faces into a box canyon and receives very little sunlight or air circulation. These differences in sunlight, moisture, and air circulation may have facilitated more biogenic decay and movement of fine sediments at ST than MHCP, and less accumulation over time. Several early dates at ST (pre-15,000 CalBP) predate occupations known in Central America by several millennia, but are consistent with early dates proposed for North America (Waters et al. 2018) and South America (Dillehay et al. 2015). Similarly old dates have been recovered from a small rockshelter in southern Belize, but additional work is needed to ascertain the relationship of these dates to human activity (Prufer et al. 2017, 2019).

The overall occupation sequence of both rockshelters is based on 191 ASM radiocarbon dates on both charcoal and human bone (Kennett et al. In Press; Prufer et al. 2019). They suggest regular use of the sites starting in the late Pleistocene and continuing through the Classic Period (Figure 6). The data suggest steady but episodic use from 13,000 through the adoption of agriculture at 4,700-4,000 CalBP, and a separate rise in use of the rockshelters during the Classic Period (ca. 2,800-1,000 CalBP). With excavations still on-going it is possible that we will fill some of these temporal gaps as more radiocarbon dates are run.

Mortuary Use

Elsewhere (Kennett et al. In Press; Posth et al. 2018) we have described the burial population from MHCP and Saki Tzul and their individual dates. To date, we have fully analyzed 52 skeletons from these two rockshelters. These directly dated burials span from 9,610 CalBP to 1,060 CalBP. The population consists of 13 males and 12 females and 27 individuals for whom sex could not be determined using standard osteological methods because they were too young or too fragmentary. The age profile of these samples includes 31 adults (young, middle, and older, though in many cases these subcategories could not be determined), 6 juveniles, and 11 infants. There were four individuals for whom age could not be determined.

The earliest are two individuals from MHCP. They were recovered in 2014 and in 2017 from excavations in the lowest, silt rich soils within 30 cm of non-cultural bedrock. The oldest is Burial MHCP.17.1.8, recovered just 15 cm above bedrock at a depth of 252 cm below the surface. This consists of the remains of a male adult (sex assessed during field and osteological analysis) buried in the shallow pit in a flexed position. The skeleton was directly dated to 9610–9470 CalBP (2σ PSUAMS 4290) on enamel carbonate with the integrity of the

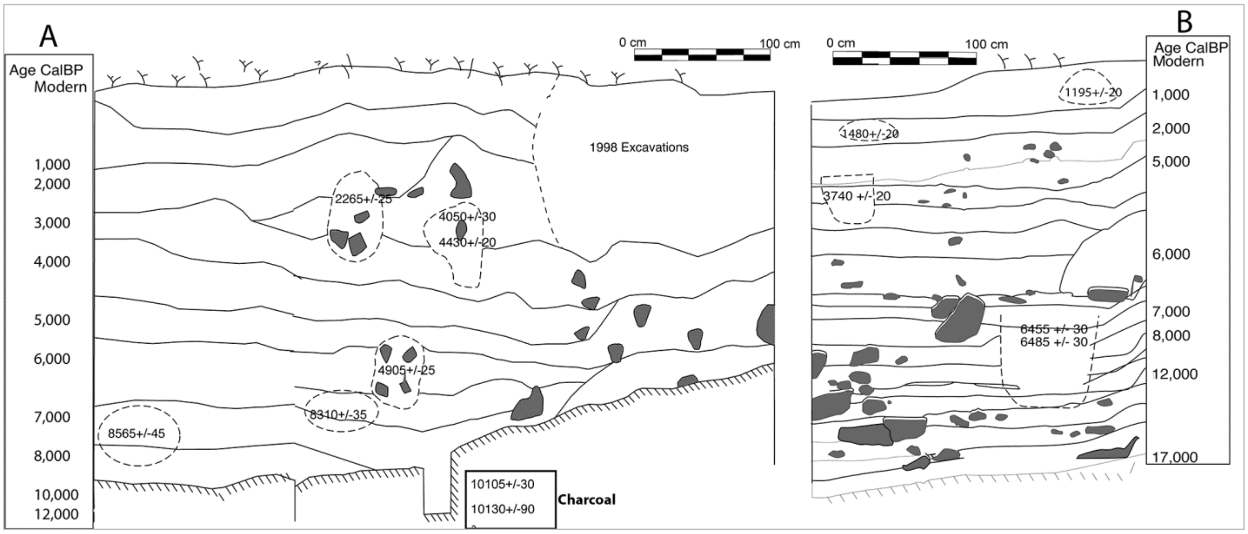

Figure 5. Schematic profiles of MHCP Unit 1 (2014-2017) and ST Unit 1 (2016) showing generalized stratigraphy and age model in years CalBP. Dashed circles represent selected mortuary features and dates of directly dated human skeletal material (uncalibrated). Figures by K. Prufer, A. Alsgaard, and E. Ray.

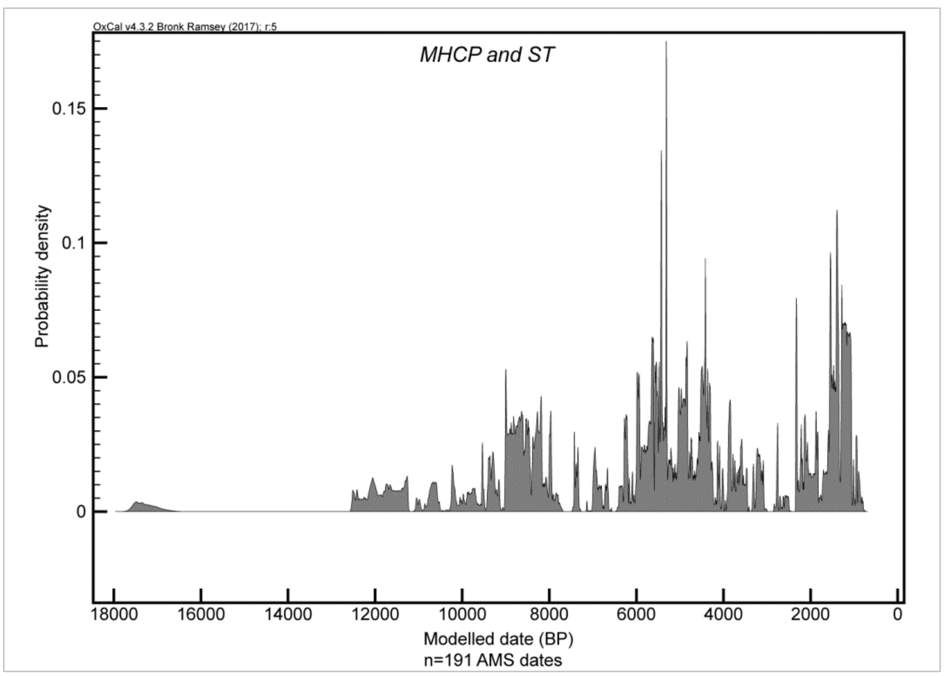

Figure 6. Summed probability distribution of all dates from MHCP and ST as a single phase. These are a proxy for the use-intensity of the rockshelters. While probability distributions can be difficult to justify statistically, they are a best estimate for the chronological distribution of the items dated and they provide a visualization of the overall distribution of dated events within the phase (Bronk Ramsey 2017, 2017).

enamel confirmed with FTIR. Enamel carbonates are known to potentially produce dates younger than the actual time of death. The other, Burial MHCP.14.1.6, was an older female (determined by DNA) who was fully disarticulated and buried 205 cm below the ground surface in a shallow pit (Posth et al. 2018). The skeleton, which was largely complete, was in a matrix rich in large chert flakes. The skeleton was directly dated on XAD purified amino acids from bulk tissue collagen to 9430-9140 calBP (2σ, UCIAMS 151854 and 151855).

At ST the oldest two individuals we found in a shallow (20-25 cm deep) pit cut into the hard plaster or lime marl floor dating to before 7,500 CalBP. Burials ST.16.1.2 and ST.16.1.3 are the remains of two males individuals found together as a single interment. A rock layer, consisting of porphyritic volcanic river float and limestone cobbles covered the burial. This is a constructed cultural feature indicating intentional burial architecture for these two individuals. Burial feature artifacts included human remains, lithics, carbonized plants and seeds, and faunal bone, but no specific patterning was indicated for these materials found in the burial cut. The burials were placed on a prepared layer of flat river cobbles that had been set into the pit.

Burials ST.16.1.2 and ST.16.1.3 are both middle-adult males who were interred in flexed positions within the same burial feature, the base of which is located 191 cm below the modern (Posth et al. 2018) ground surface at ST. ST16.1.2 was directly dated to 7440-7310 calBP (2σ, PSUAMS-3205) and ST16.1.3 was directly dated to 7460-7320 calBP (2σ, PSUAMS-3206). Both assays conducted on tooth enamel. FTIR was used to confirm the integrity of the enamel, and several comparative enamel/collagen studies suggest that the age of these ST individuals is likely underestimated by 200 years. Combined, these individuals are the oldest burials recovered from stratified mortuary contexts in Central America. They represent remarkable window into mortuary practices of some of the earliest New World residents. They are largely contemporaneous with some of the earliest known skeletons from South America, and for Burials MHCP.14.1.6 and ST.16.1.2 and ST.16.1.3 they show genetic affinity with early population dispersal as people first moved into the Neotropics (Posth et al. 2018). An additional 12 individuals who predate 4,650 CalBP and are distinctive non-maize consumers and likely foragers, based on analysis of ^{13}C (carbon isotope) values measured on both bone collagen and bone apatite (Kennett et al. In Press). These 16 individuals have ^{13}C values ranging between -21.6 and -20.3‰ suggesting minimal or no maize (C_4 plant) consumption. Combined, these represent an unprecedented view into the preceramic populations in neotropical Central America.

Ten additional skeletons dating between 4680-4010 CalBP are incipient maize consumers based on ^{13}C carbon isotope values between -20.6‰ and -13.1‰ from bone collagen (Kennett et al. In Press). These individuals are remarkable in that they have isotope values indicating that they grounded in two worlds. First the foraging populations long hypothesized to have been experimenting with different plants throughout the early Holocene while also living largely mobile lifestyles in what were probably semi-sedentary groups without formal villages or architecture, as has been proposed elsewhere in neotropical Central America (Ranere and Cooke 2003; Piperno and Pearsall 1998). Second, they were consuming some degree of maize but are not using maize as a staple component of their diet. Elsewhere, we have hypothesized that this may be indicative of the consumption of maize stalk juice, a liquid high in sucrose that also could have been fermented (Kennett et al. In Press), and has been also suggested elsewhere in Mesoamerica (Smalley and Blake 2003).

The remaining 18 individuals for whom we have complete data were all maize consumers, with ^{13}C -12.2‰ and -8.2‰. They date between 4,000 and 1,060 CalBP and may include some individual who lived at one or more of the known Classic Period Centers in the Maya Mountains (Dunham and Prufer 1998). Of particular interest are four individuals who date between 3,000 and 4,000 CalBP (Kennett et al. In Press). In the Maya Lowlands the earliest known settled agricultural villages date to around 3,000 CalBP (Ebert et al. 2019). This suggests the presence of semi-mobile forager-farmers in the region at least 1,000 years before the development of settled villages and public architecture that characterize Maya societies.

Conclusions

Research being conducted by the BPAAP in Southern Belize is changing the way we view the pre-ceramic history of the region. Over a 10,000 year period people repeatedly visited and found shelter in MHCP and ST. Evidence from these shelters indicates that humans were using these spaces for tool use or manufacture based on large amount of chert debitage and worked igneous rock. They were regularly transporting rocks to the shelters from the rivers below each site. The presence of Late Paleoindian bifaces, commonly known as Lowe Points is suggestive of hunting (Prufer et al. 2019). In all levels and time periods we have evidence of hunting mammal, reptiles, and birds. In the Late Archaic it would appear that *jute* snails were harvested in the clear flowing waters of the Bladen Branch as an industry, and millions of consumed shells were deposited in the rockshelters. Remarkably, these shelters were also used episodically as mortuary spaces for over 10,000 years. They contain individuals of all ages and both sexes. Future research will continue to illuminate mortuary practices throughout the human adaptations in the neotropics.

Acknowledgments Many thanks to the Belize Institute of Archaeology for continued support and permits for this research. We further thank the Forest Department, Belize for permits to work in the Bladen Nature Research. This work would not have been possible without our collaborators at the Ya'axche' Conservation Trust. Many thanks also to all the members of the students and collaborators of the BPAAP for the last 5 years and especially to our friends in many villages in Toledo, in particular Santa Cruz, Golden Stream, and Medina Bank. Funding for this research came from Alphawood Foundation (2014-2019) and the National Science Foundation (SBE-1632061) to Prufer and National Science Foundation (SBE-1632144) to Kennett.

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