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Surviving Postclassic Maya Collapse–Belize

Research Year: 1997

Culture: Maya

Chronology: Classic to Post Classic

Location: Northern Belize

Site: Laguna de On Island

Table of Contents

[Introduction](#)

[Update Notes](#)

[Synopsis of forthcoming book by Marilyn A. Masson](#)

[Further Reading](#)

Introduction

The **Belize Postclassic Island Maya Project** is devoted to understanding the processes of Maya social transformation and adaptation from the time of the Classic period collapse through the Spanish conquest. Investigations at **Laguna de On Island, Belize**, have allowed us to study the reproduction of domestic and ritual institutions in the volatile period from 1000 A.D. to 1500 A.D.

Studies at this island village suggest that populations from the northern Belize area (*Honey Camp Lagoon to Bacalar, México*) were able to create many aspects of their daily economic life in ways that were similar to the Classic period.

In other ways, the setting of the Postclassic world opened up new economic activities such as weaving, obsidian trade, exchange in precious stones and metals, and increased availability of game animals due to reforestation. Essentially, the average villager was far more affluent and healthy and enjoyed an increased life expectancy at Laguna de On in the Postclassic period compared to the Late Classic.

Two populations are now known from the island, through mortuary patterns and radiocarbon dates. They date from 1000-1200 A.D. and 1200-1400 A.D. The burial patterns suggest significant political disruption occurred around 1200 A.D. as a decline in formalism of funerary behavior is observed and later individuals appear to be placed hastily in shallow graves.

Religious ritual was also selectively reproduced in the Postclassic. At Laguna de On, villagers elected not to construct monumental architecture as an expression of political power. They did practice ancestor worship and calendric rituals that have their origins in the Classic period. One symbol of the past was found in 1996, a *God K* effigy flint eccentric which we believe is an heirloom sceptre probably raided in the Postclassic from a Classic period structure. This object was obtained for the purpose of caching it in a censer ritual directed at ancestors and rain deities at Laguna de On. An increase in shrine construction and censer ritual is observed after 1200 A.D., and we are exploring the connection of this ritual activity with the changes in burial patterning at the site.

During the 1997, we located a new Postclassic monumental center at Progreso Lagoon, known to locals as *Caye Coco*. We believe it is likely to be the Colonial Maya site of **Chanlacan**, capital of **Chetumal** after the fall of Santa Rita and seat of the 1547 rebellion against Spanish Bacalar according to Grant Jones in his book *Maya Resistance to Spanish Rule*. This site will be the focus of our 1998 season. If it is verified to be Chanlacan, we will have the opportunity to study processes of Maya adaptation from the Postclassic through Colonial times.

Update Notes, December 18, 1998:

Accelerator Mass Spectrometer 14C Dating of Human and Faunal Bone from the Mayan Lowlands, Belize

by Thomas W. Stafford

Radiocarbon dating of human or faunal bone from Central American archaeological sites is often presumed impossible because the tropical region's high temperatures and rainfalls degrade bone physically and chemically. However, radiocarbon results from Laguna de On, Belize indicate that bones and teeth at this Postclassic site contain well-preserved collagen that dated accurately by AMS 14C techniques. When similar soil conditions are encountered, fossil bones from Central American archaeological sites will yield equally accurate radiocarbon ages on human burials and faunal remains.

There are three significant questions regarding radiocarbon dating at Classic and Postclassic sites in Mesoamerica: do any fossil bones from tropical climates contain protein; will this protein yield an accurate radiocarbon age; and why should bone be dated instead of more standard materials such as wood or charcoal.

The consistently warm, wet, and humid conditions in tropical climates are perceived as being the worst conditions for preserving bone, either physically or chemically. This is true for Pleistocene and older localities and many cave sites where great antiquity and wet conditions have destroyed bone protein. Unfavorable geochemical conditions are high environmental temperatures, abundant amounts of water that constantly or intermittently flow through the fossils, and acidic forest soils that leach collagen and dissolve the bone mineral. At these sites, either bone is lost entirely or its protein has been destroyed and radiocarbon dating is impossible for the remaining bone mineral.

Prominent exceptions are sites such as Laguna de On, Belize where several favorable geochemical factors existed. Here, bone is extremely well preserved and its radiocarbon ages are more accurate than those on charcoal or wood. In June 1997 Stafford completed ten accelerator mass spectrometer radiocarbon (AMS 14C) ages on human and animal bone from archaeological excavations at Laguna de On. Marilyn Masson, SUNY-Albany, is excavating this Postclassic site in Belize. The radiocarbon ages were on long bones or teeth from human burials, and turtle, tapir, turkey, and crocodile bones that were recovered 50 to 80 cm beneath the modern ground surface. The bones yielded from 60 to 90% of the collagen present in a modern bone. This degree of chemical preservation was unexpected because tropical-site bones often contain 0 to 5% of their original protein content. The bones and teeth were readily dateable because 10% collagen preservation is the minimum required for accurate dating. The lowest protein preservation from Laguna de On was 60%, a value well above the minimum required.

The reason the Laguna de On specimens were chemically and physically well preserved was a combination of three factors: sediments and soils enclosing the bones and teeth contained abundant limestone fragments; midden soils had high organic carbon contents; and the specimens were less than 5000 years old. The single most important factor was the high limestone content of the soil. The limestone clasts buffered weakly acidic rain waters and plant acids and prevented the bones and teeth from being chemically altered. The "recent" geologic age of the fossils minimized the time available for protein degradation. However, the geochemical conditions at Laguna de On would have preserved bones and teeth up to 10,000 years old due to the alkaline conditions at the site.

The Laguna de On bone dating results are especially applicable to Masson's proposal to perform similar bone dating work at Caye Coco, Progreso Lagoon, Belize. Caye Coco's geochemical environment and soil conditions are nearly identical to those at Laguna de On. Consequently, teeth and bone from Caye Coco will have protein preservations similar to those from Laguna de On.

Radiocarbon dates on bone and teeth are favored over wood and charcoal because direct dates on human burials and faunal remains prevent association errors. Despite their ease-of-dating, wood and charcoal fragments can be dislocated vertically by numerous animal and human activities. In contrast, dates directly on the human remains or faunal bone will provide absolute ages for the specimen. This 100% certainty is not possible from even the best, "well-associated" organic archaeological materials. The increasing use of AMS dating for milligram-size samples exacerbates the effects of bioturbation because one to ten millimeter diameter wood or charcoal fragments are more susceptible to lateral and vertical movement than are the larger samples commonly used for conventional radiocarbon dating.

The final consideration regarding bone and tooth radiocarbon dating is the absolute accuracy of the age. Bone and teeth can be dated with absolute accuracy only if the bones and teeth contain adequate amounts of protein and if adequate chemical pretreatments are used to isolate and purify the bone protein. Protein content is

assessed quantitatively by two methods: measuring the specimen's amino acid content and by measuring the yields for protein obtained after each chemical pretreatment step. These methods are quantitative and yield absolute data that indicate whether or not the bone contains sufficient quantities of well preserved collagen for dating.

After protein content is determined to be adequate, the protein must be extracted, isolated and purified by using stringent chemical methods. Regardless if bone dates are measured by conventional or AMS techniques, commercial laboratory techniques inadequately purify protein for dating. These dates are on either total collagen or gelatinized collagen. These two chemical fractions yield inaccurate radiocarbon dates 45% to 80% of the time. These chemical fractions yield inaccurate radiocarbon ages especially from sites where humates are a common contaminant. Tropical groundwaters and soils are particularly large sources of humates, and bones from these locales are especially susceptible to humate-derived age errors. The only technique suitable for dating bone accurately is to continue the chemical isolations to the level of total, purified amino acids. The chemical fraction dated is "XAD-purified gelatin hydrolyzate from decalcified bone." If a bone has acceptable protein content and preservation, and the XAD chemical phase is used for dating, there will be absolute confidence that each bone date is accurate.

In summary, bone and teeth from Caye Coco, Progresso Lagoon, Belize are well suited for AMS radiocarbon dating based on the excellent results from identical dating experiments at the Postclassic site, Laguna de On. The favorable geochemical and soil conditions preserve significant amounts of well preserved bone protein that can be dated accurately if strenuous chemical methods are used to isolate and purify the bone collagen. AMS 14C dates directly on bone will yield ages that are not affected by questions concerning the organic matter's association with the bone.

Submitted 04/01/1997 by:
Thomas W. Stafford, Jr., Ph.D.
Stafford Research Laboratories, Inc.
5401 Western Avenue, Suite C, Boulder, CO 80301
thomasw@staffordlabs.com

The Project Director, Dr. Marilyn Masson, can be contacted at:
Department of Anthropology
University of Albany-SUNY

Email is the preferred method:
Dr. Marilyn Masson
mdelaguna@hotmail.com

This project accepts volunteers through Earthwatch or SUNY-Albany's archaeological field school.

Synopsis of forthcoming book by Marilyn A. Masson: *In the Realm of Nachan Kan: Postclassic Maya Archaeology at Laguna de On, Belize.*

University of Colorado Press, Boulder

The transformation of lowland Maya society during the Postclassic period (A.D. 1000-1500) culminated in the development of an affluent and stable coastal and agrarian network of polities that were integrated into a broad scale mercantile society. This book examines ways in which this society represented a complex, sophisticated, extensive organization of semiautonomous units that were closely integrated, yet embraced a decentralized political economy.

Postclassic Maya patterns of cultural development and organization are reflected in this book from the perspective of the small rural island settlement of Laguna de On, a location that was distant from the governing political centers of the day. The diachronic analysis of regional settlement patterns, the evolution of ceramic traditions, household and ritual features, and artifacts from the site are used to track developmental changes over time during the Postclassic period. These data suggest that affluent patterns of economic production and local and long distance exchange were established at this community by the 11th century, and continue to develop, virtually uninterrupted, until the time of Spanish arrival.

After the mid-13th century, an amplification of long distance trading is observed, along with an increase in ritual and elite activities. Contemporary political and religious artistic traditions at the temples of Mayapán, Tulum, and Santa Rita are analyzed to provide regional context for the changes in community patterns at Laguna de On. A Late Postclassic Maya cultural florescence is documented in the archaeological data, ethnohistorical accounts, and artistic programs examined in this book, which are closely correlated with the rise of Mayapán to power and the efforts of this site's leaders to integrate the Maya lowlands.

Further Reading

For related information see the report submitted to FAMSI by Marilyn Masson: [Postclassic Political and Economic Development in the Chetumal Province: Establishing a Chronological Framework](#)