Gabriel D. Wrobel *Editor*

The Bioarchaeology of Space and Place

Ideology, Power, and Meaning in Maya Mortuary Contexts

Springer

The Bioarchaeology of Space and Place

Gabriel D. Wrobel
Editor

The Bioarchaeology of Space and Place

Ideology, Power, and Meaning in Maya Mortuary Contexts

Springer

Editor
Gabriel D. Wrobel
Department of Anthropology
Michigan State University
East Lansing
MI
USA

ISBN 978-1-4939-0478-5 ISBN 978-1-4939-0479-2 (eBook)
DOI 10.1007/978-1-4939-0479-2
Springer New York Heidelberg Dordrecht London

Library of Congress Control Number: 2014935963

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Acknowledgments

I would like to thank all the authors for their excellent contributions and for their patience. May thanks to those who agreed to review papers for their insightful comments: Clifford Brown, Arlen Chase, Christophe Helmke, Holley Moyes, David Pendergast, Dominique Rissolo, Alan Sandstrom, Estella Weiss-Krejci, and Marc Zender. Particular thanks to Marie Danforth, Bill Duncan, Christine White, and Vera Tiesler for their comments on the introduction, and to Christine White and Lori Wright, who served as discussants for the Society for American Archaeology session on which this volume was based. Finally, as always, thanks to my family for their love and support, especially Kristi Bowman and Quinn Bowman Wrobel.

Contents

Contributors

Ana Lucía Arroyave Universidad de San Carlos de Guatemala, Guatemala City, Guatemala

Jaime Awe Institute of Archaeology, Belmopan, Belize

Stephanie A. Cleland Department of Anthropology, The University of Western Ontario, London, Ontario, Canada

Andrea Cucina Facultad de Ciencias Antropológicas, Universidad Autónoma de Yucatán, Mérida, Yucatan, Mexico

Pedro Delgado Kú Instituto Nacional de Antropología e Historia, Centro INAH Yucatan, Merida, Yucatan, Mexico

Davide Domenici Department of History and Cultures, University of Bologna, Bologna, Italy

William N. Duncan Department of Sociology and Anthropology, East Tennessee State University, Johnson City, TN, USA

Carolyn Freiwald Department of Sociology and Anthropology, University of Mississippi, Oxford, MS, USA

Pamela L. Geller Department of Anthropology, University of Miami, Coral Gables, FL, USA

Charles Golden Department of Anthropology, Brandeis University, Waltham, MA, USA

Eunice Uc González Instituto Nacional de Antropología e Historia, Centro INAH Yucatan, Merida, Yucatan, Mexico

Christophe Helmke Department of American Indian Languages and Cultures, Institute of Cross-cultural and Regional Studies, University of Copenhagen, Copenhagen S, Denmark

Jennifer Piehl Institute of Archaeology, Belmopan, Belize

Stanley Serafin School of Human, Health & Social Sciences, Central Queensland University, Rockhampton, Australia

Department of Chiropractic, Macquarie University, Sydney, Australia

School of Humanities & Languages University of New South Wales, Sydney, Australia

Fred J. Longstaffe Department of Earth Sciences, The University of Western Ontario, London, Ontario, Canada

Carlos Peraza Lope Instituto Nacional de Antropología e Historia, Centro INAH Yucatan, Merida, Yucatan, Mexico

Griselda Pérez Robles Universidad de San Carlos de Guatemala, Guatemala City, Guatemala

Karyn C. Olsen Department of Anthropology, The University of Western Ontario, London, Ontario, Canada

Andrew K. Scherer Department of Anthropology, Brown University, RI, USA

Vera Tiesler Facultad de Ciencias Antropológicas, Universidad Autónoma de Yucatán, Mérida, Yucatan, Mexico

Christine D. White Department of Anthropology, The University of Western Ontario, London, Ontario, Canada

Gabriel D. Wrobel Department of Anthropology, Michigan State University, East Lansing, MI, USA

Jason Yaeger Department of Anthropology, University of Texas at San Antonio, San Antonio, TX, USA

About the Editor

Gabriel D. Wrobel is an Associate Professor of Anthropology at Michigan State University and the director of the Central Belize Archaeological Survey (CBAS) project. The primary focus of his research is mortuary contexts in caves and rockshelters in the Caves Branch River and Roaring Creek valleys, in which he seeks to reconstruct funerary pathways and explore aspects of social identity among those placed there. These data inform broader archaeological questions about the sudden and dramatic appearance of sociopolitical complexity in the area during the Middle Classic period, as well as its depopulation in the Terminal Classic period. While most of his research has concentrated on ancient Maya contexts in Belize, he has also worked in the American Southeast, in Kyrgyzstan, and in Egypt at the site of Hierakonpolis.

Chapter 1
Introduction

Gabriel D. Wrobel

Bioarchaeology in the Maya area has always confronted a series of substantial challenges. The tropical setting and complex mortuary programs of the Maya act to break apart and disintegrate bones and then scatter them across the landscape, where they are documented and recovered archaeologically in an often inconsistent manner. For these reasons, researchers faced with typically small, piecemeal datasets with variable amounts of contextual information have struggled to conform to traditional bioarchaeological approaches that focus on population-specific data for comparative analysis. However, in recent years, the broader field of bioarchaeology has increasingly shifted its focus to include a series of new approaches that not only provide a wider variety of methodological techniques, but that rely heavily on historical, archaeological, and taphonomic contextualization of human bone. Rather than forcing skeletal data into broad or inappropriate analytical categories, greater attention is directed at reconstructing and interpreting aspects of individuals' lived experiences and of the treatment of bodies following death. Modern mortuary analysis benefits from a much greater contribution by bioarchaeologists in the field, who can decipher taphonomic clues to recognize often subtle aspects of cultural treatments and distinguish these from the effects of natural diagenesis and bioturbation. Often directed by theoretical concepts of the body and personhood, this disciplinary transition has been particularly strong in the Maya area, in large part because both modern and ancient Maya groups have been documented and portrayed in an incredibly rich and diverse set of written and artistic sources spanning almost the last 4,000 years. This volume, which was based on a session organized for the 2011 meetings of the Society for American Archaeology in Sacramento, serves to highlight the creative and interdisciplinary nature of Maya bioarchaeology and more generally to demonstrate the significant potential for bioarchaeology of incorporating nuanced contextual readings of mortuary contexts.

G. D. Wrobel (✉)
Department of Anthropology, Michigan State University, 408 Giltner Hall,
East Lansing, MI 48824, USA
e-mail: wrobelg@msu.edu

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_1,

1.1 Small, Biased Burial Samples and Bioarchaeology

The extraction of meaningful anthropological data from skeletal remains is problematic due to a series of confounding issues, such as differential preservation, biases inherent in sampling and in reference standards, the vagaries of social roles apparent in mortuary contexts, inter- and intraobserver error, and lack of standardization in methods, all of which have been discussed and problematized extensively by concerned researchers (see for instance, Agarwal and Glencross 2011; Katzenberg and Saunders 2008; Wood et al. 1992, among many others). The papers from this volume specifically address one such limitation consistently faced by most bioarchaeologists around the world: small skeletal assemblages. Many researchers consider the use of populational data as an integral aspect of bioarchaeology, correctly pointing out that the identification of specific genetic traits or diseases is of little value without knowledge of the broader prevalence and distribution of these conditions within the specific cultural, environmental, and genetic landscapes of which individuals are a part (Larsen 1999, p. 3; Wright and Yoder 2003, p. 44). However, large, representative skeletal datasets conducive to statistical treatment are difficult, if not impossible, to obtain in most archaeological settings. This is particularly true in the Maya region, where the vast majority of documented pre-Colonial era skeletons are distributed among a highly diverse array of contexts across the landscape, rather than concentrated in cemeteries containing most or all members of a community. Mortuary locales typically contain single or small numbers of individuals, and it is most often the case that the logic by which the living utilized specific mortuary treatments or locations to reflect belief systems or the social roles of the deceased is poorly understood.

In addition to the complexities of mortuary practices in the Maya region, a major problem hindering skeletal studies is that archaeological research designs rarely include significant input from bioarchaeologists (as discussed by Webster 1997). Ideally, excavation strategies would be shaped to generate diverse, representative skeletal data useful for analysis and comparison of various organizational levels and subgroups within the general population. Unfortunately, relatively few projects have historically prioritized these considerations, and only a few Maya sites have long histories of intensive research that have (inadvertently or by design) generated such assemblages. Bioarchaeologists are generally relegated to studying what is available and trying to overcome inherent and inevitable shortcomings in the nature of the data, such as detailed taphonomic recording that would aid in reconstructing mortuary behavior. This lack of attention to bioarchaeological considerations results in several problems that result in or are negatively affected by small sample sizes and bias. For instance, even moderate-sized collections may be difficult to utilize for statistical analysis because of the large amount of missing data resulting from poor preservation, incomplete recovery, and secondary manipulation of bodies by the Maya. In addition, skeletal data must be further subdivided by time period, sex, social status, and other such variables as a basis for comparative analysis, and at a certain point, these subgroups become too small for statistical testing. This forces

researchers to group skeletons into broad temporal, geographic, and social categories, thereby limiting hypothesis testing to only the most general comparisons.

Most skeletal assemblages also reflect varying degrees of sample bias. For instance, archaeological investigations in the Maya region have traditionally targeted site cores, resulting in disproportionate numbers of individuals recovered from elite and ritual contexts. In addition, excavations of site cores and elite architecture are more likely to recover skeletons completely, since these contexts are often the focus of large-scale excavations, which inevitably will be expanded if necessary upon the discovery of richly furnished burials. In contrast, excavation strategies designed for broad sampling of smaller (nonelite) residential structures from surrounding settlement contexts typically rely on testpitting, whereby skeletons are not always excavated and recovered completely. Furthermore, in many cases the few skeletons excavated from particular sites are found in close proximity or in similar types of contexts, such as tombs, which influences the representative nature of the recovered skeletal assemblage. For instance, during my work at Chau Hiix in northern Belize, excavations of Structure 2 on the main plaza produced 70 primary burials, representing almost half of the individuals found at the site. Because mortuary patterning among the Classic Maya often appears to have been dictated by membership in corporate groups (see McAnany 1995), it is likely that the individuals in Structure 2 not only shared a similar social status, but also that many were genetically related. Thus, when studying epigenetic dental traits or pathologies, for instance, it is difficult to assess whether the measure of variability for the Chau Hiix population in fact is limited because the skeletal series is composed largely of a closely related subgroup.

A final issue related to working in an area in which most sites have relatively few skeletons, as discussed by Roberts and Mays (2011, p. 629) for the UK, is that because of the reliance on statistical testing regional skeletal research tends to favor the use of larger samples. Thus, much of our knowledge about biological variation among the ancient Maya is heavily based on a few of the largest skeletal collections. These tend to originate from bigger civic ceremonial cores (such as Tikal and Copan), and mostly date to the Late Classic period.

In addition, access plays a large role in what gets studied, and thus collections that are stored in museums or universities often dictate the direction of bioarchaeological research designs as they attract an inordinate amount of attention compared to collections that are made more difficult to analyze. For instance, the Colonial period cemetery of Tipu is relatively large, well preserved, and, thanks to Mark Cohen at SUNY Plattsburgh, widely available for scholarly investigation. However, the nature of Tipu's population, which was highly mobile and diverse, and whose biology reflects the environmental pressures of a frontier zone in the tumultuous Colonial period, presents a series of difficult challenges for pursuing meaningful bioarchaeological analogy with Classic period groups. In addition, because of this focused attention, biological models of the Maya experience during the Colonial period were, until recently (see Tiesler et al. 2010), largely based on this single tiny community that was likely highly atypical in the broader Maya Colonial setting. Other Colonial cemeteries, such as Lamanai (White 1986; Wright 1990) and Tancah

(Saul 1982), were less studied, not because of their lack of importance or relevance, but because they were less accessible.

There are a number of approaches commonly employed by bioarchaeologists faced with the task of producing accurate conclusions about a population based on small numbers of skeletons. These can be divided into three general approaches: strategies for generating larger sample sizes, application of new methodologies, and the use of theoretical models and cultural analogy to identify and interpret specific cultural behaviors from biological data.

Perhaps the most obvious way to alleviate sampling issues is to increase sample size and diversity by systematically continuing to excavate and recover skeletons. Indeed, recent bioarchaeological investigations in the Maya region have greatly benefited from vastly expanded research that not only supplements skeletal databases with larger numbers of observations, but also broadens potential comparisons by including skeletons from a much wider variety of contexts. Regional surveys have begun to explore a diversity of site types instead of focusing on single sites, which tends to obscure variability in ancient socioeconomic and political organization. Finally, researchers have begun to recognize the importance of expanding analysis beyond formal primary burials to include contexts traditionally called "problematic," which has the added benefit of accessing a wider variety of mortuary processes and stages (Berryman 2007, p. 378; Cucina and Tiesler 2007; Weiss-Krejci 2011). Related to this last point is a recognition by both archaeologists and bioarchaeologists that the use of static, dichotic categorization has often proven to be counterproductive to accessing emic meaning underlying mortuary behavior.

Another common approach for increasing the size of datasets is to engage in broad regional or temporal comparisons in which multiple assemblages from different sites are combined. For instance, this has been particularly fruitful for dental genetic traits (Cucina et al. 2005; Scherer 2007) and studies of cultural modifications (Tiesler 2001, 2013). As noted above, grouping individuals from diverse settings together limits the scope of inquiry to very general temporal, social, and geographical comparisons. However, the use of aggregate datasets can generate baseline results that can aid in constructing models explaining variability, which in turn can be used to interpret site- or subregion-specific data (see Storey et al. 2002). Unfortunately, problems related to interobserver error, lack of standardization for scoring and reporting data, and limited or lack of access to many collections, present challenges for constructing large, regional databases.

A second general approach to overcoming problems introduced from small, biased samples is through the application of innovative methodologies. Reviews of recent advances in bioarchaeology, many of which are aimed at solving problems related to the Osteological Paradox (Wood et al. 1992), often specifically focus on new methods (see Goodman and Leatherman 1998, p. 15; Larsen 2006; Wright and Yoder 2003). These can provide new sources of data that open up investigation of novel lines of questions, as well as create new protocols for analyzing data or improvements to old ones. As an example, several standards based specifically on Maya reference collections have been published recently, providing methods of age and sex estimation for poorly preserved skeletons (Danforth et al. 2009; Pavón et al. 2010; Wrobel et al. 2002). Other new methods better estimate minimum numbers

of individuals among fragmentary and commingled remains (Herrmann 2002). In addition, new strontium isotope baseline values in previously unstudied areas, like western Honduras and the Maya Mountains, as well as detailed isotope mapping at the local level, support more nuanced interpretations of the movement of individuals and groups (Freiwald 2011; Miller and Freiwald 2013; Price et al. 2010). Finally, increased focus on data that was largely ignored previously, such as taphonomy and recognition of patterns of secondary manipulation of bone (Cook 1999; Tiesler 2004, 2007), has opened up new and intriguing avenues of investigation identifying specific mortuary ritual behaviors. The incorporation of bioarchaeolgists into fieldwork has provided an opportunity to expand data collection to include direct in situ taphonomic observations of highly deteriorated remains. Detailed mapping of bones can help provide accurate reconstructions of mortuary pathways (see Duday 2009; Hermann 2002), and has further important implications for analysis and interpretation of isolated bone fragments commonly found in a variety of mortuary and nonmortuary contexts.

In some cases, specific methods are implemented to improve the effectiveness of data collection. For instance, while poor preservation, pathologies, and cultural treatments of bone inevitably obliterate datapoints on skeletal remains, statistical replacement models can often be used to recover missing metric data. Such methods act not only to increase sample sizes, but also to facilitate the application of multivariate statistics by increasing the number of skeletons comprising complete datasets (Scherer 2007; Wright and Vasquez 2003; see also Serafin et al., Chap. 6, this volume). However, it should be noted that small and biased source samples are typically used as the basis for defining the group variability with which the replacement equations are created, and thus may ultimately introduce further problems.

A final type of approach that is increasingly common in bioarchaeology can be distinguished by its lack of population-centered methodologies. Most modern bioarchaeological studies, including the ones in this volume, utilize various strategies discussed above to minimize sampling problems. However, many times problems introduced by cultural or taphonomic processes cannot be overcome; in these cases, rather than trying to "correct" small, biased samples, analysis can be refocused on identifying the source of variations among groups of skeletal remains found in particular contexts in order to determine how restrictive mortuary behaviors specifically reflect social, political, ideological, or economic systems within the society. Studies of this type rely heavily on contextualization for interpreting aspects of both the life- and death-course of individuals, using theoretical models of human behavior and organization, analogy based on artistic depictions and written sources, and much deeper overall integration with archaeologists (c.f. Baadsgaard et al. 2011; Chacon and Dye 2007; Knudson and Stojanowski 2009; Martin et al. 2012, 2013; Stodder and Palkovich 2012; Tung 2012). This increased focus on contextualization, however, is of course not unique to studies of small samples, and has been applied successfully to large samples, often to critically evaluate the composition of skeletal assemblages in relation to that expected of living populations (Agarwal and Glencross 2011; Stojanowski 2010).

1.2 Placing This Book in a Historical Context

This volume takes inspiration from problem-based approaches that have largely defined Maya bioarchaeology for nearly the last 3 decades. While others have recently presented detailed historical reviews of the broader field of bioarchaeology (Larsen 2006, Zuckerman and Armelagos 2011), as well as of the progression of research trajectories specifically in Mesoamerica (Buikstra 1997; Cucina and Tiesler 2005; Spence and White 2009, Tiesler and Jaén 2012), I simply aim to place this volume in a historical context. Like in other places in the world, early bioarchaeological research in the Maya area is overwhelmingly characterized by descriptive case reports with little to no contextual analysis. Inquiry was heavily influenced by classificatory approaches that dominated the field prior to the 1970s. For instance, cranial and dental modifications generated an inordinate amount of attention, with efforts initially focused on identifying modification methods and on creating typologies.

The late 1980s and 1990s marked a dramatic increase in the volume of bioarchaeological investigation in the Maya area, as well as in its integration with archaeological research (Buikstra 1997). This period in the broader field of biological anthropology was characterized by an increasing focus on processual ecology, human adaptability, and political economy, complimented by the influence of post-processual archaeology and its concentration on political, social, and economic contexts (Zuckerman and Armelagos 2011, p. 19). The timing of the development of Maya bioarchaeology may be seen as shaping its overall character as it is today, especially outside of Mexico, which may be distinguished in some ways by influences based on its much longer history of research (Tiesler and Jaén 2012). However, it should be noted that many of the specific research directions were dictated in large part by some of the sampling issues discussed above. While contemporaneous studies in other regions of the world focused heavily on sociobiological processes related to the transition to agriculture and the development of social complexity, these topics have received minimal attention from bioarchaeologists in the Maya region, primarily because human skeletal remains from these types of contexts are so few in number. Instead, research agendas tended to focus on questions that could be answered using the larger datasets recovered by archaeologists—i.e., predominantly from urban contexts dating to the Late and Terminal Classic periods. The development of this targeted research focus has resulted in the Maya being an important case example in which to investigate biological processes in the contexts of the peak and subsequent restructuring (formerly characterized as "collapse") of complex sociopolitical structure (Cucina et al. 2011; Danforth 1989, Saul 1973, White 1997, Wright 2006, Wright and White 1996). However, several larger skeletal collections that do not fit this description also attracted attention, and helped to broaden the scope of population-based investigation to include other issues, such as the impact of Colonialism (Cohen et al. 1997; Jacobi 2000; Saul and Saul 1997; White 1986; Wright 1990), the nature of Postclassic political and economic organization (Serafin 2010; Wrobel and Graham 2013), the development of early urban centers (Saul and Saul 1997; Marquez Morfín and Storey 2007), and commoner status (Whittington 1999).

With a few exceptions, bioarchaeological investigation in the Maya area prior to the last few years has been largely limited to one of two types of analysis: descriptive and aggregate. Statistical analyses of large samples focused mainly on identification of broad patterns related to social organization and ecological adaptation at the population level. Analysis of small collections, however, was largely descriptive because of the difficulty and inefficiency of studying and incorporating numerous small collections of skeletons in large-scale studies. One unintended consequence of this practice was to generally overlook specific types of contexts that did not fit easily into established comparative categories. For instance, contexts involving the peri- or postmortem manipulation of bodies are difficult to interpret from a traditional framework relying on social status or population affiliation groupings, and thus were rarely included in bioarchaeological studies (though see Massey and Steele 1997).

Recent studies have benefited from a variety of new methods, a greater number of well-documented skeletons from a diversity of contexts, and perhaps a greater appreciation by archaeologists of the potential research contributions by bioarchaeologists (Cucina and Tiesler 2005; Spence and White 2009; Tiesler and Cucina 2008; Webster 1997). Furthermore, recent bioarchaeological approaches increasingly incorporate historical, archaeological, and theoretical contextualization (Knudson and Stojanowski 2008). In the Maya area, these developments have expanded research topics to include investigation of regional political interactions and migration (Freiwald 2011; Scherer 2007); identification and osteobiographical descriptions of historical individuals (Price et al. 2010; Tiesler and Cucina 2006); recognition of bioarchaeological markers of specific aspects of social identity (Danforth et al. 1997; Geller 2009; White et al. 2009); reconstruction of funerary and sacrificial events (Duncan 2011; Tiesler 2004, 2007); and interpretation of cultural attitudes towards biological variation—both intentional (Duncan and Hofling 2011; Geller 2011; Tiesler 2001, 2013) and unintentional (Wright 2011; Wrobel et al. 2012). This marks an interesting time for bioarchaeology, which as a discipline has begun to embrace a more integrative and culture-sensitive approach towards research. Increasingly, bioarchaeologists actively work to incorporate and balance multiple perspectives from a variety of other disciplines in an effort to recognize the potentials and the limitations of our data for informing models of cultural behavior.

1.3 The Contributions

In order to highlight the variety of ways in which bioarchaeologists in the Maya area have embraced the challenge of working with small, biased samples, contributors to this volume were asked to focus on individuals and small groups identified archaeologically by their inclusion in specific, discrete mortuary contexts or by distinct mortuary treatments. These mortuary variables are assumed to have social or ideological meaning for those who implemented them. Utilizing different combinations of archaeological, biological, iconographic, ethnographic and ethnohistoric,

and taphonomic data, each paper attempts to interpret the underlying meaning of such treatments by contextualizing them both locally and within broader social, political, and economic spheres. The chapters are generally organized from smaller to broader scale of analysis. The first group of three papers comprises case studies, which focus on analysis of specific, discrete mortuary contexts. The second section contains four papers that compare multiple contexts within a single site. The final two papers present surveys of similar mortuary contexts found across a wide variety of sites to discuss broader ideological belief systems.

Pamela Geller (Chap. 2) explores the concept of partibility as practiced and conceptualized by the Maya. Partibility practices include a wide variety of perimortem and postmortem manipulation of bodies, and appear in both reverential and desecratory contexts. Thus, it is often difficult to reconstruct and interpret the intended meaning of specific practices. Geller's contribution presents a bioarchaeological reconstruction of events surrounding the use of a royal tomb from Dos Hombres in northern Belize, in which she demonstrates how particular skeletal elements had been moved and removed over the course of time. Following this, she explores Maya conceptions of the body to demonstrate how specific treatments of bones acted to imbue them with meaning, ultimately contributing to emic models useful to contextualizing partibility practices in the mortuary record.

Davide Domenici (Chap. 3) presents a study of a small cave located in western Chiapas on the periphery of the Maya area. The stunning preservation allows an unparalleled reconstruction of mortuary treatment of 11 children who were deposited as bundles in the cave. Despite the lack of evidence of trauma on the skeletons, Domenici builds a convincing case for these individuals being sacrificial by identifying numerous archaeological parallels with symbolism and behaviors mentioned in ethnographic and ethnohistoric accounts as being associated with human sacrificial ritual. This paper not only presents a particularly good model for applying ethnographic and ethnohistoric analogy to bioarchaeological investigation, but it also highlights an important source of historical data from central Mexico that appears to have many parallels in broader Mesoamerica.

In Chap. 4, I, along with Christophe Helmke and Carolyn Freiwald, present another case study from a small cave. Located in central Belize, Je'reftheel contains the skeletal remains of approximately 25 individuals. We investigate the nature of the cave's use, and seek to assess whether the data are consistent with funerary or sacrificial mortuary behavior as documented in our review of the ethnohistoric and epigraphic record of the Maya. In addition, we discuss and problematize many of the archaeological indicators used recently to identify sacrificial and funerary contexts in cave settings, pointing out that most of these are consistent with both types of behavior and are thus not useful in isolation. Our study utilizes a wide variety of bioarchaeological data and concludes that the combination of these provides enough context to confidently interpret the mortuary use of Je'reftheel as funerary.

Chapter 5, by Carolyn Freiwald, Jason Yaeger, Jaime Awe, and Jenn Piehl, investigates the nature of identity during the Late and Terminal Classic periods in the monumental core of Xunantunich, Belize. The authors use strontium and oxygen isotope data to test whether variations in mortuary treatment of individuals at the

site are related to their local versus nonlocal origins. They find that burials of nonlocal individuals are common at the site and often are not distinguished in death from those of locally born individuals. However, they also find that most of the individuals distinguished in death by atypical burial positions, including those in termination ritual contexts, had nonlocal origins. This study demonstrates the importance of biological data in supplementing traditional archaeological analyses by helping to define the underlying meaning of mortuary variation.

Stanley Serafin, Carlos Peraza Lope, Eunice Uc González, and Pedro Delgado Kú (Chap. 6) also focus on local versus nonlocal identity in mortuary contexts. Their study of shrine ossuaries at the Late Postclassic site of Mayapan, located in the western Yucatan Peninsula of Mexico, utilizes odontometric data to test archaeological and ethnohistoric models of cultural and genetic diversity among elites. Specifically, this paper addresses the recurrent problem in archaeology of assessing whether or not the movement of ideas, as represented by changes in material culture, results from the movement of people. The differences found in dental metrics of individuals interred in freestanding shrine ossuaries compared to those of other groups in the same region suggest that this new burial practice accompanied the incorporation of foreigners into Mayapan's population.

In Chap. 7, Karyn Olsen, Stephanie Cleland, Christine White, and Fred Longstaffe explore dietary variations among groups of individuals placed in various contexts at Altun Ha, Belize. Using microwear and isotopic data, the authors show that while alone neither is able to distinguish individuals from dedicatory and residential contexts, using the approaches together provides a longer life history record. As a result, they were able to demonstrate that unlike the residential burials, individuals found in dedicatory contexts display evidence of dietary shifts prior to their death. Integration of these results with oxygen isotope data further refines explanatory models by showing that many of the individuals were nonlocal, and that dietary shifts likely accompanied a recent relocation to northern Belize. This study exhibits the importance of bioarchaeological data to identify the complex factors related to variability in mortuary and ritual expression.

Chapter 8, by Andrew Scherer, Charles Golden, Ana Lucía Arroyave, and Griselda Pérez Robles, focuses on Late Classic funerary practices at El Kinel, a subordinate center within the Yaxchilan polity. Their approach centers on reconstructing mortuary behavior through direct observations taken during excavation and consideration of taphonomic processes. While often such deliberate approaches are applied to sacrificial or other such sensational mortuary contexts, Scherer and colleagues argue that many of the often subtle variations in mortuary practices among burials in funerary contexts are also deliberate and important. In their study, they link particular aspects of mortuary treatment to demonstrations of local political relationships between El Kinel and Yaxchilan and also to reflections of pan-Maya belief systems. They are able to support their assertions by demonstrating clear parallels between the mortuary practices at El Kinel and data from a variety of related archaeological, iconographic, ethnographic, and ethnohistoric sources.

The final two chapters both focus on surveys of multiple sites, comparing data from similar contexts to make sense of specific practices. In Chap. 9, Andrea

Cucina and Vera Tiesler seek to test whether traditional archaeological classifications of subterranean sites into darkzone caves, lightzone rockshelters, crevices, and cenotes correspond to emic conceptions of these sites by the ancient Maya. They compare mortuary pathways reconstructed from skeletal assemblages representing a wide range of sites and fail to find any specific patterns of use that are consistent among sites from any of these categories. In fact, they find a surprising lack of patterning and argue that each site is unique, and must be understood as representing a distinctive historical trajectory that often incorporates a wide array of behaviors. Importantly, they are able to demonstrate behavioral and taphonomic influences on the movement of artifacts and human bones at cave sites through direct observation of the Lacandon Maya, who still practice rituals at nearby caves that utilize human bone in sacred shrines.

Finally, Chap. 10 by William Duncan explores the concept of mortuary sealing by the Maya, focusing specifically on cases in which bodies were covered in white marl or similar material. Like several other chapters in this volume, Duncan's study points to recurrent problems in distinguishing desecratory and reverential contexts resulting from similarities in the material record of associated ritual behaviors. Using a variety of source material to contextualize ritual acts of wrapping, binding, and sealing, Duncan is able to tease apart sealing from related behaviors that often accompany it. Importantly, he finds that sealing is not necessarily indicative of termination events, as has been suggested previously, but may also be used in reverential contexts. Instead, encasement in white marl is distinguished from other forms of wrapping by its intrinsic meaning, which is the creation of a sacred bundle. Bioarchaeologically, such focused attention to interpreting and defining the relationship of ideological beliefs and specific ritual acts provides invaluable models for understanding and explaining variations in mortuary behaviors.

1.4 Conclusion

In conclusion, the problems facing bioarchaeologists related to small, biased samples are certainly not unique to the Maya area. While many of the strategies for confronting these challenges discussed above are also utilized elsewhere, the exceptionally poor preservation and incredibly complex mortuary program of the ancient Maya have forced researchers to actively engage other lines of evidence to an extent not found in many other areas of the world. Working in our favor are a rich and varied set of complimentary sources and a strong scholarly tradition of studying contextual data, including art, iconography, ethnohistoric documents, ethnographic studies of modern descendant groups, and a particularly active and diverse set of archaeological research agendas. Together, these inform on a wide range of ideological beliefs, political processes, and social behaviors to promote contextually rich analyses. The focus on small, restricted samples is in no way meant to deemphasize the importance of population-level data, which still is a focus for much of the important research conducted today. Instead, the papers in this volume serve to

highlight the creative ways in which bioarchaeologists can generate insights into ancient cultures even when faced with such challenging conditions. The application of new standards and methods has increased accuracy and created opportunities for new avenues of research. Increased collaboration between bioarchaeologists and archaeologists has improved some of the problems related to sampling and contextualization of data. And, finally, the incorporation of iconographic, ethnographic, ethnohistoric, and linguistic data, as well as increased attention to frameworks provided by social theory, has aided in providing important mechanisms for deriving profound insights into the nature and meaning of behaviors that underscore the everyday subtleties, the dynamic changes, and the enormous diversity of culture within and beyond this area.

References

Agarwal, S. C., & Glencross, B. A. (Eds.). (2011). *Social Bioarchaeology*. Chichester: Wiley-Blackwell.

Baadsgaard, A., Boutin, A. T., & Buikstra, J. E. (Eds.). (2011). *Breathing new life into the evidence of death: Contemporary approaches to bioarchaeology*. Santa Fe: School for Advanced Research Press.

Berryman, C. A. (2007). Captive sacrifice and trophy taking among the ancient Maya: Evaluation of the bioarchaeological evidence and its sociopolitical implication. In R. J. Chacon & D. H. Dye (Eds.), *The taking and displaying of human body parts as trophies by Amerindians* (pp. 377–399). New York: Springer Press.

Buikstra, J. E. (1997). Studying Maya bioarchaeology. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 221–228). Washington, D.C: Smithsonian Institution Press.

Chacon, R. J., & Dye, D. H. (Eds.). (2007). *The taking and displaying of human body parts as trophies by Amerindians*. New York: Springer Press.

Cohen, M. N., O'Connor, K., Danforth, M. E., Jacobi, K. P., & Armstrong, C. (1997). Archaeology and osteology of the Tipu site. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 78–88). Washington, D.C: Smithsonian Institution Press.

Cook, D. C. (1999). Physical anthropology in the field: Recognizing cremation, defleshing, exposure and secondary burial. In S. Pike & S. Gitin (Eds.), *The practical impact of science on field archaeology* (pp. 43–46). London: Archetype Press (Wiener Laboratory Publication No. 3.).

Cucina, A., Tiesler, V., & Wrobel, G. D. (2005). Afinidades biologicas y dinamicas poblacionales Mayas desde el preclasico hasta el periodo colonial. *Los Investigadores de la Cultura Maya, 13*(2), 560–567.

Cucina, A., & Tiesler, V. (2005). Past, present and future itineraries in Maya bioarchaeology. *Journal of Anthropological Sciences, 83,* 29–42.

Cucina, A., & Tiesler, V. (2007). Nutrition, lifestyle, and social status of skeletal remains from nonfunerary and "problematical" contexts. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society (pp. 251–262)*. New York: Springer.

Cucina, A., Cantillo, C. P., Sosa, T. S., & Tiesler, V. (2011). Carious lesions and maize consumption among the Prehispanic Maya: An analysis of a coastal community in northern Yucatan. *American Journal of Physical Anthropology, 145*(4), 560–567.

Danforth, M. E. (1989). *A comparison of childhood health patterns in the Late Classic and Colonial Maya using enamel microdefects*. Ph.D. dissertation. Bloomington: Indiana University.

Danforth, M. E., Jacobi, K. P., & Cohen, M. N. (1997). Gender and health among the Colonial Maya of Tipu Belize. *Ancient Mesoamerica, 8,* 13–22.

Danforth, M. E., Wrobel, G., Swanson, D., & Armstrong, C. (2009). Juvenile age estimation using diaphyseal long bone lengths among ancient Maya populations. *Latin American Antiquity, 20*(1), 3–14.

Duday, H. (2009). *The archaeology of the dead* (Trans: A. M. Cipriani & J. Pearce). Oxford: Oxbow Books.

Duncan, W. N. (2011). Bioarchaeological analysis of sacrificial victims from a Postclassic Maya temple from Ixlu, El Peten, Guatemala. *Latin American Antiquity, 22*(4), 549–572.

Duncan, W. N., & Hofling, C. A. (2011). Why the head? Cranial modification as protection and ensoulment among the Maya. *Ancient Mesoamerica, 22,* 199–210.

Freiwald, C. (2011). *Maya migration networks: Reconstructing population movement in the Belize River valley during the Late and Terminal Classic*. Ph.D. dissertation. Madison: University of Wisconsin.

Geller, P. L. (2009). Bodyscapes, biology, and heteronormativity. *American Anthropologist, 111*(4), 504–516.

Geller, P. L. (2011). Getting a head start in life: Pre-Columbian Maya cranial modification from infancy to ancestorhood. In M. Bonogofsky (Ed.), *The bioarchaeology of the human head* (pp. 241–261). Florida: University Press.

Goodman, A. H., & Leatherman, T. L. (1998). Traversing the chasm between biology and culture: An introduction. In A. H. Goodman & T. L. Leatherman (Eds.), *Building a new biocultural synthesis: Political-economic perspectives on human biology* (pp. 3–41). Ann Arbor: University of Michigan Press.

Herrmann, N. P. (2002). GIS applied to bioarchaeology: An example from the Río Talgua caves in Northeast Honduras. *Journal of Cave and Karst Studies, 64*(1), 17–22.

Jacobi, K. P. (2000). *Last rites for the Tipu Maya*: *Genetic structuring in a Colonial cemetery*. Tuscaloosa: University Alabama Press.

Katzenberg, M. A., & Saunders, S. R. (Eds.). (2008). *Biological anthropology of the human skeleton* (2nd ed.). New York: Wiley-Liss.

Knudson, K. J., & Stojanowski, C. M. (2008). New directions in bioarchaeology: Recent contributions to the study of human social identities. *Journal of Archaeological Research, 16,* 397–432.

Knudson, K. J., & Stojanowski, C. M. (Eds.). (2009). *Bioarchaeology and identity in the Americas* (pp. 1–23). Gainesville: The University Press of Florida.

Larsen, C. S. (1999). *Bioarchaeology: Interpreting behavior from the human skeleton*. Cambridge: Cambridge University Press.

Larsen, C. S. (2006). The changing face of bioarchaeology: An emerging interdisciplinary science. In J. E. Buikstra & L. A. Beck (Eds.), *Bioarchaeology: The contextual analysis of human remains* (pp. 359–374). Burlington: Academic Press.

Marquez Morfín, L., & Storey, R. (2007). From early village to regional center in Mesoamerica: An investigation of lifestyles and health. In M. N. Cohen & G. M. M. Crane-Kramer (Eds.), *Ancient health: Skeletal indicators of agricultural and economic intensification* (pp. 80–91). Gainesville: The University Press of Florida.

Martin, D. L., Harrod, R. P., & Pérez, V. R. (Eds.). (2012). *The bioarchaeology of violence*. Gainesville: The University Press of Florida.

Martin, D. L., Harrod, R. P., & Pérez, V. R. (2013). *Bioarchaeology: An integrated approach to working with human remains*. New York: Springer Press.

Massey, V. K., & Steele, D. G. (1997). A Maya skull pit from the Terminal Classic Period, Colha, Belize. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 62–77). Washington, D.C: Smithsonian Institution Press.

McAnany, P. A. (1995). *Living with the ancestors: Kinship and kingship in ancient Maya society*. Austin: University of Texas Press.

Miller, K., & Freiwald, C. (2013). Identifying ancient population movement in Honduras using strontium and oxygen isotopes: New values and interpretations. Paper presented at the American Chemical Society National Meeting. April 9, New Orleans.

Pavón, M. V., Cucina, A., & Tiesler, V. (2010). New formulas to estimate age at death in Maya populations using histomorphological changes in the fourth human rib. *Journal of Forensic Sciences, 55*(2), 473–477.

Price, T. D., Burton, J. H., Sharer, R. J., Buikstra, J. E., Wright, L. E., Traxler, L. P., & Miller, K. A. (2010). Kings and commoners at Copan: Isotopic evidence for origins and movement in the Classic Maya period. *Journal of Anthropological Archaeology, 29*(1), 15–32.

Roberts, C., & Mays, S. (2011). Study and restudy of curated skeletal collections in bioarchaeology: A perspective on the UK and the implications for future curation of human remains. *International Journal of Osteoarchaeology, 21*(5), 626–630.

Saul, F. R. (1973). Disease in the Maya area: The Pre-Columbian evidence. In T. P. Culbert (Ed.), *The Classic Maya collapse* (pp. 301–324). Albuquerque: University of New Mexico Press.

Saul, F. R. (1982). The human skeletal remains from Tancah, Mexico. Appendix II. In A. G. Miller (Ed.), *On the edge of the sea: Mural painting at Tancah-Tulum, Quintana Roo, Mexico*. Washington, D.C: Dumbarton Oaks.

Saul, J. M., & Saul, F. P. (1997). The Preclassic skeletons from Cuello. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 28–50). Washington, D.C: Smithsonian Institution Press.

Scherer, A. K. (2007). Population structure of the Classic period Maya. *American Journal of Physical Anthropology, 132*(3), 367–380.

Serafin, S. (2010). *Bioarchaeological investigation of violence at Mayapan. Ph.D. dissertation*, New Orleans: Tulane University.

Spence, M. W., & White, C. D. (2009). Mesoamerican bioarchaeology: Past and future. *Ancient Mesoamerica, 20,* 233–240.

Stodder, A. L., & Palkovich, A. M. (Eds.). (2012). *The bioarchaeology of individuals*. Gainesville: The University Press of Florida.

Stojanowski, C. M. (2010). *Bioarchaeology of ethnogenesis in the Colonial Southeast*. Gainesville: The University Press of Florida.

Storey, R., Marquez Morfín, L., & Smith, V. (2002). Social disruption and the Maya civilization of Mesoamerica: A study of health and economy of the last thousand years. In R. H. Steckel & J. C. Rose (Eds.), *The backbone of history: Health and nutrition in the western hemisphere* (pp. 283–306). Cambridge: Cambridge University Press.

Tiesler, V. (2001). *Decoraciones dentales entre los antiguos mayas*. Mexico City: Ediciones Euroamericanas/Instituto Nacional de Antropología e Historia.

Tiesler, V. (2004). Maya mortuary treatments of the elite: An osteotaphonomic perspective. In D. G. Behrens, N. Grube, C. M. Prager, F. Sachse, S. Teufel & E. Wagner (Eds.), *Continuity and change: Maya religious practices in temporal perspective*: *Vol. 14*. (pp. 143–156). Markt Schwaben: Verlag Anton Saurwein. (ACTA Mesoamericana).

Tiesler, V. (2007). Funerary or nonfunerary? New references in identifying ancient Maya sacrificial and postsacrificial behaviors from human assemblages. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 14–44). New York: Springer.

Tiesler, V. (2013). *The bioarchaeology of artificial cranial modifications: New approaches to head shaping and its meanings in Pre-Columbian Mesoamerica and beyond*. New York: Springer Press.

Tiesler, V., & Cucina, A. (Eds.). (2006). *Janaab' Pakal of Palenque: Reconstructing the life and death of a Maya ruler*. Tucson: University of Arizona Press.

Tiesler, V., & Cucina, A. (2008). Joint agendas in Maya bioarchaeology. *The SAA Archaeological Record, 8*(2), 12–14.

Tiesler, V., & Jaén, T. (2012). Conducting paleopathology in Mexico: Past, present and future agendas. In J. Buikstra & C. Roberts (Eds.), *The global history of paleopathology. Pioneers and prospects* (pp. 305–311). New York: Oxford University Press.

Tiesler, V., Zabala, P., & Cucina, A. (Eds.). (2010). *Natives, Europeans, and Africans in Colonial Campeche: History and archaeology*. Gainesville: The University Press of Florida.

Tung, T. A. (2012). *Violence, ritual, and the Wari Empire: A social bioarchaeology of imperialism in the ancient Andes*. Gainesville: The University Press of Florida.

Webster, D. (1997). Studying Maya burials. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 3–12). Washington, D.C: Smithsonian Institution Press.

Weiss-Krejci, E. (2011). The formation of mortuary deposits. In S. C. Agarwal & B. A. Glencross (Eds.), *Social bioarchaeology* (pp. 68–106). Oxford: Wiley-Blackwell.

White, C. D. (1986). *Paleodiet and nutrition of the Maya at Lamanai, Belize: A study of trace elements, stable isotopes, nutritional and dental pathology*. M.A. thesis. Peterburough: Trent University.

White, C. D. (1997). Diet at Lamanai and Pacbitun: Implications for the ecological model of Maya collapse. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 171–181). Washington, D.C: Smithsonian Institution Press.

White, C. D., Longstaffe, F. J., Maxwell, J., & Pendergast, D. M. (2009). The Lamanai "loving couple": An ancient Maya identity mystery. In K. J. Knudson & C. Stojanowski (Eds.), *Bioarchaeology and identity in the Americas* (pp. 155–176). Gainesville: The University Press of Florida.

Whittington, S. L. (1999). Caries and antemortem tooth loss at Copán: Implications for commoner diet. In C. D. White (Ed.), *Reconstructing ancient Maya diet* (pp. 151–167). Salt Lake City: University of Utah Press.

Wood, J. W., Milner, G. R., Harpending, H. C., & Weiss, K. M. (1992). The osteological paradox: Problems of inferring prehistoric health from skeletal samples. *Current Anthropology, 33*(4), 343–370.

Wright, L. E. (1990). Stresses of conquest: A study of Wilson bands and enamel hypoplasias in the Maya of Lamanai. Belize. *American Journal of Human Biology, 2,* 25–35.

Wright, L. E. (2006). *Diet, health, and status among the Pasión Maya: A reappraisal of the collapse*. Nashville: Vanderbilt University Press.

Wright, L. E. (2011). Bilateral talipes equinovarus from Tikal, Guatemala. *International Journal of Paleopathology, 1*(1), 55–62.

Wright, L. E., & Vasquez, M. A. (2003). Estimating long bone length from fragmentary remains: Forensic standards from Guatemala. *American Journal of Physical Anthropology, 120*(3), 233–251.

Wright, L. E., & White, C. D. (1996). Human biology in the Classic Maya collapse: Evidence from paleopathology and paleodiet. *Journal of World Prehistory, 10*(2), 147–198.

Wright, L. E., & Yoder, C. J. (2003). Recent progress in bioarchaeology: Approaches to the Osteological Paradox. *Journal of Archaeological Research, 11*(1), 43–70.

Wrobel, G., Danforth, M., & Armstrong, C. (2002). Estimating sex of Maya skeletons by discriminant function analysis of long bone measurements from the Protohistoric Maya site of Tipu, Belize. *Ancient Mesoamerica, 13,* 255–263.

Wrobel, G., & Graham, E. (2013). Los entierros de la fase Buk en Belice: comprobando las relaciones genéticas entre grupos del Posclásico Temprano en Belice a través de la morfología dental. In A. Cucina (Ed.), *Afinidades biológicas y dinámicas poblacionales entre los antiguos mayas* (pp. 19–38). Merida: Una Visión Multidisciplinaria/Universidad Autónoma de Yucatán Press.

Wrobel, G. D., Helmke, C., Nash, L., & Awe, J. (2012). Polydactyly and the Maya: A review and an example from the site of Peligroso, Upper Macal Valley, Belize. *Ancient Mesoamerica, 23*(1), 131–142.

Zuckerman, M. K., & Armelagos, G. J. (2011). The origins of biocultural dimensions in bioarchaeology. In S. C. Agarwal & B. A. Glencross (Eds.), *Social bioarchaeology* (pp. 15–43). Oxford: Wiley-Blackwell.

Chapter 2
Sedimenting Social Identity: The Practice of Pre-Columbian Maya Body Partibility

Pamela L. Geller

Abstract While researchers of the pre-Columbian Maya have recognized that considerable variability characterizes treatment of dead bodies, few have scrutinized the practice of body partibility. The materiality of this practice indicates the ways in which social identities become transposed and then sedimented over generations. As one particularly cogent example, I examine a royal tomb from Dos Hombres, a ceremonial center located in northwestern Belize. The burial is also compared to other royal tombs in the region. While cultural continuities are identifiable, the Dos Hombres tomb is unique given its combination of attributes, namely the residential context into which it was entombed, its associated architecture, the approximately 20,000 obsidian flakes placed atop it, and the two decedents contained within—one of whom exhibited intentional body partibility. To make sense of this complicated burial, I take my cue from scholars who attend to mortuary processes that are materially subtle and often extended. Doing so facilitates distinction between myriad meanings encoded in corporeal manipulations.

2.1 Introduction

Engaging with corpses—sometimes many years or decades after individuals' demises—is one way by which the living remember, reenvision, revere, or revile the dead. Processing bodies is bound intimately to (re)formation of identities, and bioarchaeologists readily recover data about the former in order to illumine the latter. In so doing, they can narrate key aspects of an individual's *death history*. In contrast to life histories, death histories reveal the reasons for, and means by which a community's living members sustained and/or transformed social identities via handling of their biologically dead (Geller 2012b). Cessation of life, in many cultures, does not necessitate social death.

What, then, does postmortem body partibility tell us about a decedent's death history? To familiarize the reader, here I briefly recap key points about partibility,

P. L. Geller (✉)
Department of Anthropology, University of Miami, P.O. Box 248106, Coral Gables, FL 33124, USA
e-mail: p.geller@miami.edu

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_2,

which I have discussed in greater detail elsewhere (2012b). Clearly, body partibility indicates desecration in certain cases, such as violent decapitation and dismemberment. My concern, however, is with those partible practices that sedimented decedents' social identities over generations, and in so doing permitted the living to engage with and venerate their ancestors. In previous discussions, I have treated the marks and meanings of body partibility in burials of Maya commoners, demonstrating a link between certain types of fragmentation and ancestral identities (Geller 2004, 2011, 2012a, b). As a complement to this work, I consider here a stratigraphically complex tomb from Dos Hombres constructed some 1,500 years ago. Taken together, it is possible to determine the extent to which partible practices' religious, existential, and cosmological dimensions crosscut social levels.

Detection of intentional body partibility necessitates a methodology that attends to subtle and multi-staged processes. Unfortunately, the Maya Lowlands' tropical environs often make for very inconsistent and inadequate preservation of human remains. Explaining partibility may seem like an exercise in equifinality. How is a researcher to discern desecration from veneration from natural degeneration? A forensic approach, which some label *l'anthropologie de terrain* or archaeothanatology (Duday 1997, 2006, 2009) and others osteotaphonomy (Cucina and Tiesler 2007; Tiesler 2004), proves effective for circumventing impediments to data collection. Careful in situ documentation of taphonomic alterations, whether by natural processes or human intervention, is stressed.

Those who study the ancient Maya are also blessed with assorted resources that deepen forensic identification. As a complement to skeletal and osteotaphonomic analyses, I find epigraphic translation, iconography, and analogies gleaned from salient ethnohistoric documents and contemporary ethnography about the Maya invaluable. Additionally, seeing that the Maya interred multiple decedents within buildings they continued to occupy and renovate, consideration of architectural context and stratigraphic associations between burials is crucial. Bioarchaeologists' investigation of partibility, then, relies on contextualization of human remains in physical space, historical period, and cultural setting, as well as methodological regard for minutiae.

2.2 Body Partibility: Meaning and Methods

Scholars' investigations of groups ranging wide in time and space—from modern Melanesia (Busby 1997; Strathern 1988) to Medieval Europe (Geary 1986) to Mesolithic Scandinavia (Fowler 2002, 2004) to Neolithic peoples in Southeast Europe (Chapman 2000; Chapman and Gaydarska 2007)—have elucidated the active social lives that body parts led within specific historical and cultural contexts. This growing corpus has provided a framework for exploring partibility as practiced by the pre-Columbian Maya.

Partibility involves the intentional fragmentation of bodies and subsequent curation of distinct parts. This definition does not include random scatters of bone or

the isolated skeletal element unintentionally disturbed during ancient construction episodes. Some partible practices indelibly marked the bodies of the living. Maya mourners, for example, may have amputated select fingers antemortem as an expression of grief following a child's death (Geller 2011).[1] In contrast, decapitation strongly suggests perimortem partibility, while postmortem practices fragmented decomposing or skeletonized bodies. Desecration and dehumanization were surely the motivation behind certain partible acts (Duncan 2005; Mock 1998). Other scholars have determined that posthumous partibility reflects sociopolitical strategizing amongst members of royal lineages (e.g., Harrison-Buck et al. 2007; Weiss-Krejci 2004, 2006, 2011). Yet, human remains are not just objects with tactical value, a conception undergirded by Cartesian dichotomizations like life/death and subject/object. Indeed, belief in a cyclical system of life-death-regeneration has long been a cornerstone of Maya epistemology (Carlsen and Prechtel 1991). For cultures that revere ancestors, as the Maya did, social life often continued despite biological death and anatomical divisibility.

Identification of partibility is difficult given the notoriously poor preservation of human remains from the Maya Lowlands. With investigative hurdles in mind, Frank Saul and Julie Mather Saul have established standards based on their years of fieldwork. They are especially well versed in the impact that Belize's geology and ecology have on human remains (e.g., Saul and Saul 1991, 1997; Saul et al. 2005). Saul and Saul were responsible for analyzing the Three Rivers region skeletal sample, which is central in this chapter.[2] The analysts regard forensic methods and attention to taphonomic processes as fundamental (Saul and Saul 2002). They also subject human remains to careful excavation, in situ examination, measured recording of location and orientation of bones in relation to each other, and curation.

Saul and Saul's standardized treatment of burials has been a key contribution to Maya studies. From the skeletal data collected, they have reconstructed individuals' life histories, or osteobiographies (Saul 1972; Saul and Saul 1989). Yet, their approach also has its limitations. Buikstra and Scott have commented that osteobiography is essentially a forensic methodology that uses data to answer population-based queries about functional adaptations and demography (2009, p. 36; see also Buikstra 2006, pp. 350–351). Moreover, Saul and Saul may invoke information about physical context, but their attention is on the close at hand. The larger spatial context and detailed stratigraphic location of the human remains and

[1] Chase and Chase (1998, p. 319, 2011, p. 84) have unearthed finger bowls at Caracol, which they suggest are offerings to ancestors. Yet, they do not go as far to argue that the ritual events surrounding amputation transformed children into ancestors. For such a suggestion see Geller (2009).

[2] The Three Rivers region is an arbitrarily defined study area in northwestern Belize and northeastern Guatemala (Adams 1995). From 1992 to 2002, excavators unearthed 130 individuals in association with rural house ruins, minor centers, and major centers in the region's Belizean sector (Geller 2004). This work was conducted under the aegis of three different projects—La Milpa Archaeological Project (LaMAP) codirected by Norman Hammond and Gair Tourtellot, Programme for Belize Archaeological Project (PfBAP) directed by Fred Valdez, and Chan Chich Archaeological Project (CCAP) directed by Brett Houk. All three projects followed excavation guidelines established by Saul and Saul.

grave, which I explain below, are not forthcoming. Accordingly, it is possible to detect partible practices in individual cases, but cultural significance is then challenging to address.

Additionally, while their identification of perimortem trauma provides an exception, Saul and Saul's focus on life histories leaves death histories unexamined (cf. Robb 2002).[3] Understating decedents' social vitality seems a sizeable interpretative gap when the people under study engaged ancestors on a daily basis. In the case of the Maya, death histories have much to convey about individuals and the culture at large. To this end, the osteotaphonomic approach used by Vera Tiesler (2004, 2005, 2007; Tiesler et al. 2010) has proved constructive. Similar to Saul and Saul, Tiesler pays heed to the specific taphonomic forces affecting Maya burials. Her investigation of mortuary praxis, however, builds on work by Duday (1997, 2006, 2009; Duday and Guillon 2006). Archaeothanatology,[4] according to Duday, documents burials' taphonomic changes and perishable attributes in order to draw inferences about funeral rites and eschatological beliefs.

Osteotaphonomy and archaeothanatology are perspectives that concentrate on mortuary processing; hence, they are of great utility when considering posthumous partibility. But, it is important to reiterate that bioarchaeology, the larger umbrella under which these approaches are situated, needs to recount life and death histories. By virtue of Maya burials' proximity to buildings—decedents were generally interred beneath structures that the living continued to use and renovate—information about an individual's identity, from birth to beyond one's final breath, is best served by also attending to physical context. Stratigraphic assessment offers a life history of architecture (e.g., Bailey 1990; Nanoglou 2008; Tringham 1991). That is, both people and buildings have biographies, which are often intertwined intimately (Geller 2012b).

Ultimately, contextualizing bodies in physical space, historical period, and cultural setting allows for (and necessitates) bridging of specializations. To effectively investigate burials, physical anthropologists and archaeologists should not have distinct roles. In this regard, I disagree with Saul and Saul (1997, p. 50, 2002, p. 73), who identify the specialized roles as complementary, but mutually distinct. Rather, the complexities of Maya burials, as evidenced by body partibility, require researchers to be equally adept at skeletal analysis and conducting archaeological excavations—of burials and their associated architecture, not just the bodies therein. Indeed, Duday promotes this stance regardless of cultural and geographic context. "Funerary archaeologists," he (2009, p. 6) writes, "should have a training to be applied in the field which is not limited to collecting human bones and taking them to laboratories." A tomb from Dos Hombres in northwestern Belize provides an illustrative example of a bioarchaeological approach's utility and the interpretive problems that result when one is not implemented.

[3] Examination of life and death histories is in accord with Robb's (2002) expanded use of osteobiography (see also Geller 2012b).

[4] Duday finds archaeothanatology preferable to *l'anthropologie de terrain*, an expression he used in publications prior to 2005 but now find semantically inadequate (2009, p. 3).

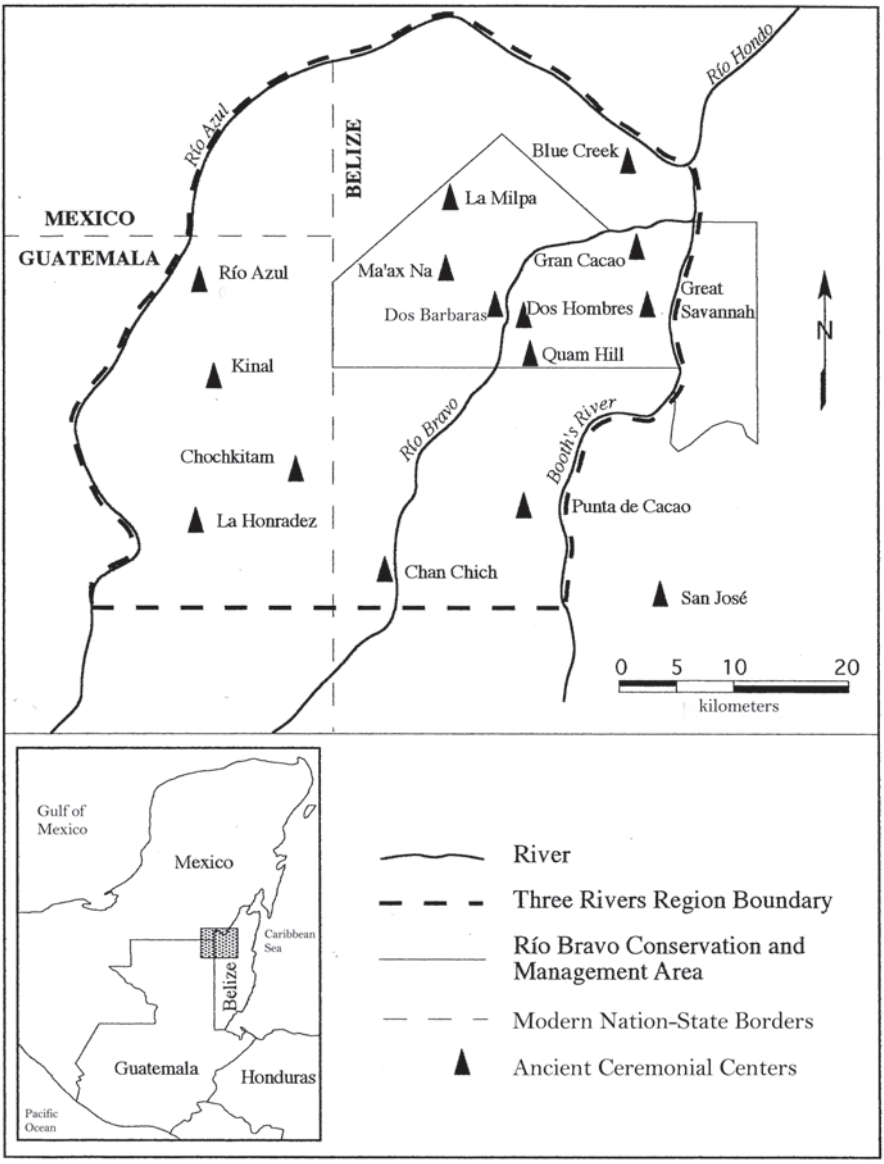

Fig. 2.1 Map of the Three Rivers region, northwestern Belize

2.3 Dos Hombres

Although not quite as sizeable as its neighbor La Milpa, Dos Hombres was a major center in the Three Rivers region (Fig. 2.1). As part of his doctoral work, Houk (1996) investigated Groups A and C, as well as Courtyards B-1, B-2, and B-3. Durst

(1998) excavated Group B's Courtyard B-4 from 1997 to 1998.[5] Aylesworth (2005) investigated Group D during his doctoral research. This collective work has shed light on the culture history of Dos Hombres and its relationship to other communities in the region.

Situated along the Río Bravo, the center was occupied from the Middle Preclassic to the Terminal Classic period. As with many other communities in the area, settlement growth had several cyclical peaks and valleys (Adams et al. 2004; Houk 1996; Sullivan 2002; Sullivan and Sagebiel 2003). Researchers have isolated an initial increase in population at the end of the Late Preclassic period (ca. 400 BC–AD 250), during which occupants erected monumental architecture. A decrease in population occurred, however, at the Late Preclassic–Early Classic period transition. In fact, Adams et al. (2004, pp. 328–329) describe the first part of the Early Classic (AD 250–400) as "a period of population depression," which was followed by increases in the Early Classic period (AD 400 to 550) and mid-Late Classic period (AD 680–810). During the latter period, members of the Dos Hombres community set up house in previously unoccupied hinterland locales (Hageman 2004; Lohse 2001; Trachman 2007), while residential courtyards in the site core underwent architectural renovations. The architectural materializations of these demographic shifts were likely driven by the ebb and flow of sociopolitical events and exchanges throughout the Maya lowlands.

Researchers encountered a total of 14 burials in association with Groups A, B, and C at Dos Hombres. Of pertinence here are the nine burials recovered from Group B. This group is organized into four courtyards, Courtyards B-1, B-2, B-3, and B-4. In comparison to the center's other groups, Group B contained the largest number of burials. Excavators recovered all but one of Group B's nine burials from the buildings of Courtyard B-4. Excavations by Durst revealed an elite residence, replete with several ancillary cooking and storage buildings, as well as multiple construction phases. Located within Courtyard B-4, Structure B-16 yielded an important discovery. Beneath this building's cumulative floors was a stone-lined tomb containing two decedents, Individuals 65 and 132. Based on associated ceramic vessels, the tomb dated to the Early Classic period. Subsequent interment of those who died later in time, as I describe, indicates that proximity was intentional and referential.

2.4 The House-Sepulcher

For the Maya, placing select decedents into buildings that the living continued to utilize was a widespread practice. This link between domicile and death extended across social classes, but differed with respect to scale and elaboration. Monumental

[5] My inferences about Courtyard B-4 and its associated burials are based on Durst's original documents. These materials, which have been in my custody since 2003, include burial forms, skeletal analysis reports from Saul and Saul, lot forms, maps, and drawings of burials. The PfBAP possesses copies of all materials.

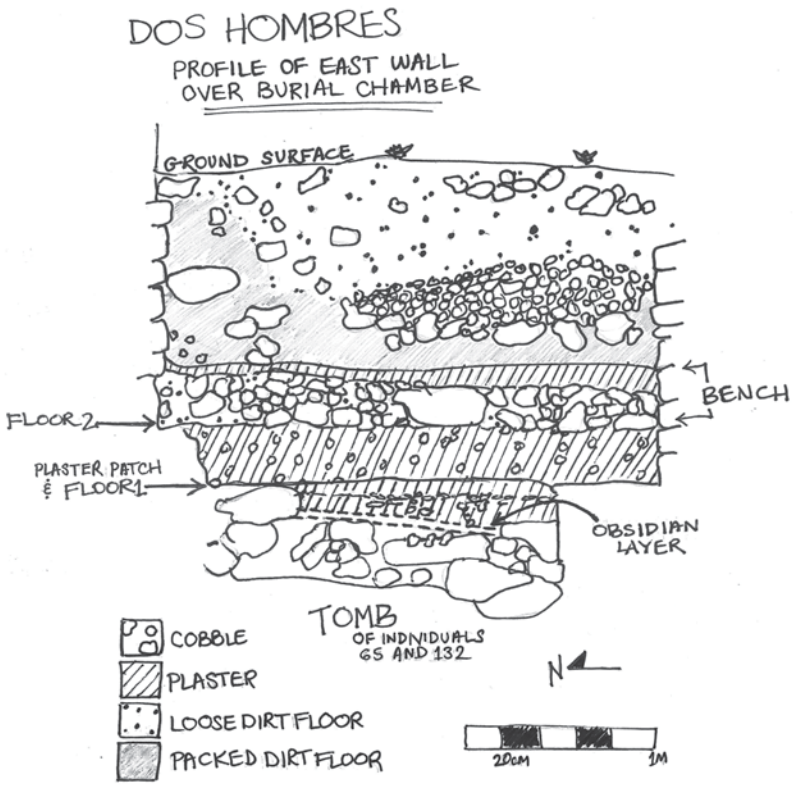

Fig. 2.2 Stratigraphic sequence of building episodes in Structure B-16

funerary temples entombing royal individuals, as Coe suggests, functioned as "house-sepulchers writ large" (1988, p. 235). At Dos Hombres's Courtyard B-4, the house-sepulcher appears to be writ small. Placement of the Early Classic tomb in Courtyard B-4's northeastern building reproduced an architectural variation on a pan-Maya theme. Specifically, archaeologists working throughout the Maya Lowlands have identified residential groups with eastern Structures that functioned as ancestral shrines; Becker (1971) deemed this layout a Plaza Plan 2 (see also Becker 1999; Welsh 1988). In the case of Structure B-16, decedents' interments signal ritual remembrance and social vibrancy despite biological death (Geller 2006b; Gillespie 2001, 2002; McAnany 1995; Webster 1997).

Yet, biographical analysis of Structure B-16 also reveals a stratigraphic sequence of events that is complex, intriguing, and unique to Dos Hombres—a series of building renovations intimately tied to the life and death histories of its specific occupants (Fig. 2.2). Modern excavators first unearthed several layers of Late Classic construction. As one of their final renovations to Structure B-16, ancient occupants had filled in the building's room. The demolition of Structure B-16's western end provided the necessary materials for what was likely the last phase of construction (Jeff Durst,

personal communication 2002). Mourners had placed the simple grave of Individual 62, an adult of unknown sex, directly into the fill of this uppermost room. At the grave's lowest level, a polychrome vessel had been situated beneath the decedent's body. Just to the north of this vessel was an oblong ground stone object, small stone ball, shell bead, and greenstone pieces; a concentration of red paint was found northwest of the vessel. Inverted over the cranial remains was a second ceramic polychrome vessel, which also capped a greenstone bead and obsidian fragment. Very poor preservation, however, precluded a definitive statement about body condition or orientation, and excavators were untrained in skeletal analysis. Two more vessels were found west of the inhumation: an unspecified small vessel stacked inside of a black bowl. An obsidian core was unearthed east of these two vessels. While Individual 62's burial was materially and temporally distinct from the Early Classic tomb, which I describe later, it was spatially linked. These two graves, then, bracket the mortuary events that transpired during Structure B-16's occupation.

As excavators continued down through the strata of Structure B-16—going further back in time—they encountered two additional Late Classic burials (Individuals 61 and 66).[6] In the case of Individual 61, a 30–50-year-old female, a stratigraphically contextualized and osteotaphonomic approach yields important information about this poorly preserved burial.[7] Her simple grave was located above the tomb that housed Individuals 65 and 132. Since no discernible grave cut was associated with Individual 61 and her remains commingled with construction fill, it is possible that her interment provided the motivation for architectural renovation. Amongst this decedent's grave goods were obsidian blades, a shell ornament, and

[6] Excavators also encountered four Late Classic decedents in association with Structure B-12 (Individuals 67, 68, 69, and 70). Of note were the remains of Individuals 67, 68, and 69, clustered together and sandwiched between two floors. While excavators did not recover grave goods, their burial offered a wealth of information. Based on in situ observations, the body of Individual 67, a 30–40-year old of indeterminate sex, appeared flexed and on its right side with head west and hips east. The cranium of Individual 68, also of indeterminate sex but 20–30 years old, had been situated in the torso area of Individual 67. In contrast, Individual 68's body had been flexed and laid on its left side with the head south and hips north. These decedents' crossed bodies may have metaphorically replicated a quincunx, an arrangement that also appears in residential groups at Tikal (Chase and Chase 2004, p. 222). According to Foster (2002, p. 160), "The conceptualization of horizontal space as a quincunx—a quadripartite world plus its center—was a fundamental theme in Maya cosmology." The infant's body position was indeterminate as a consequence of preservation. Excavators did recover deciduous teeth in the area of Individual 67's cranium. Developmental age indicates that this individual had been 2–4 years old. Decedents' proximity and the absence of a discernible grave cut suggest generational concurrence and familial relations. The burial's stratigraphic level also appears to line up with that of Individual 61's grave in Structure B-16, which suggests that all decedents were contemporaries. Similar to Individual 61, the interment(s) of Individuals 67, 68, and 69 may have supplied the impetus for Structure B-12's renovation.

[7] During excavation and skeletal analysis, Individual 61 had been identified as three distinct individuals. My subsequent reassessment of documentation determined that all human remains were located at the same elevation (178 cmbd). And while the burial was scattered throughout four adjacent sub-operations, all of which measured 2 m × 2 m, it was within a constrained space. The human remains were poorly preserved; a circle of darker soil indicated their location. The elements present, especially the teeth, point to a MNI of one.

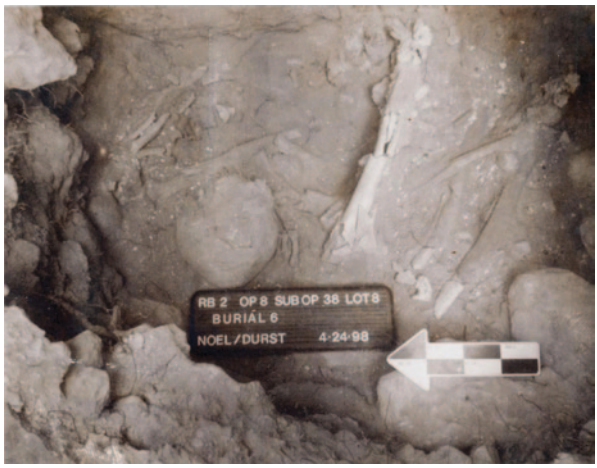

Fig. 2.3 Individual 66 in situ. (Photograph taken by Jeff Durst 1998)

19 pieces of mica. Associated architectural features indicate that later occupants of Structure B-16 (like Individual 62) maintained interactions with the biologically dead but socially vital. Namely, a red plaster bench[8] erected atop floor 2 and to the east of Individual 61's body offers evidence of ancestor veneration (Fig. 2.2). Within domiciles throughout the Maya world, benches, amongst other functions, often served as household shrines, and interment of ancestors within or beneath these architectural features was a common occurrence (Geller 2006b; Gillespie 2002; Welsh 1988, p. 188).

Decedents' deaths did not always prompt major architectural renovations. The burial of Individual 66, for example, signals the complex factors that shaped material choices and mortuary practices. Excavators unearthed this decedent further to the west of and about 60 cm lower than Individual 62. The grave was an intentional pit that cut through the plaster of Floor 2.[9] Mourners had removed construction fill from beneath the floor to accommodate the body. Individual 66, a male 25–30 years of age, had been loosely flexed and laid to rest on his right side, head north and hips south (Fig. 2.3). The exact location of his grave goods went undocumented, but excavators recovered a ceramic sphere (1.5 cm in diameter), ten assorted stone objects (lithic debitage, hammerstones, tool fragments), and about 200 ceramic sherds from within the grave space. At its close, the grave was filled with a fine-grained, light gray, and densely packed soil. A resurfacing of the floor covered the opening. About 36 cm atop the grave, excavators unearthed a well-crafted mano adjacent to a metate.

The graves in Structure B-16, for the most part, remained sealed but with one important exception. Replastering of Floor 1 indicates that an ancient, intrusive cut had been made into this feature during a reentry episode. Below Floor 1, excavators uncovered an uneven layer of obsidian approximately 2 cm thick. Around 21,730

[8] The bench measured about 15 cm in height.

[9] The pit was about 55 cm deep and measured 158 cm N-S and 148 cm E-W.

pieces of obsidian comprised the hoard (Trachman and Titmus 2003, p. 108), which was encased partially within a thin plaster coating and grouped into distinct deposits. Pockets of fine debitage were isolated in one area, blades and bladelets in another area, and cores and core fragments in yet a separate area. There is also evidence that this obsidian layer had been disturbed in antiquity, quite possibly with the intent of reentering the Early Classic tomb (Jeff Durst, personal communication 2002). Underneath the northern edge of the obsidian layer was a layer of chert flakes.

Such strata, while intriguing and a bit perplexing, are not unique. Excavators have encountered layers of chert, flint, and/or obsidian capping tombs at sites throughout the Maya lowlands. We see these configurations at Altun Ha (Pendergast 1979), Caracol (Chase and Chase 1987, p. 15; Chase and Chase 1996), Chau Hiix (Chiarulli and Barrick 1997), La Milpa (Geller 2004; Mongelluzzo 1997), and Lamanai (Pendergast 1981) in Belize; and Río Azul (Hall 1989) and Tikal in Guatemala (Moholy-Nagy 1997; Trik 1963)]. At Tikal, for instance, excavators documented strata of obsidian and flint flakes atop the tomb of Burial 116, "literally thousands" in the words of excavator Aubrey Trik (1963, p. 5). In fact, these deposits were layered over a total of eight Classic period tombs. Not all individuals' tombs at Tikal were capped, however. To explain their presence, Moholy-Nagy (1997, p. 307) has suggested that deposits accumulated when producers of stone tools rid themselves of unneeded refuse—"debitage dumps, presumably rationalized as offerings." Pragmatics seem too simplistic an explanation for the powerful events that certainly surrounded the entombment of a socially significant decedent. Hall (1989, p. 308), on the other hand, has suggested that concentrations of obsidian and chert may have symbolized the physical remnants of lightning strikes down from the heavens. There is also evidence that Post-Classic Cakchiquel Maya fashioned their divine oracle, Chay Abah, from a great block of obsidian, which they believe emerged from Xibalba (Brinton 1969, p. 43). The link between obsidian or chert and cosmological beliefs is underscored in these alternative accounts.

At Dos Hombres, the layers of obsidian and chert were atop additional fill layers comprised of large cobbles, soil, and small rubble. Interspersed sporadically throughout this fill were smaller pockets of obsidian. Capstones formed the penultimate stratum. Excavators then reached the stone-lined, oblong-shaped tomb, which measured roughly 2.7 m from east to west, 1.2 m from north to south, and 60 cm in height.[10] Fill inside of the tomb included large stones, which may have capped the grave when it was originally sealed but were disturbed during reentry.

With regard to human remains entombed within, excavators did work from methodological standards set by Saul and Saul, but they had little prior experience excavating burials or identifying partial skeletal elements. Initially, excavators documented the presence of one primary individual, Individual 65. This possible male, who was 25–34 years at the time of death, was fully articulated and extended; his head situated at the tomb's eastern end and his feet at its western one. The position of this individual's skull, however, perplexed the excavators. They recorded it as

[10] According to Welsh, a tomb's "height is sufficient for a human to stand, i.e. ca. 135 cms. or more" (1988, p. 18). Although such is not the case at Dos Hombres, the architectural complexity, unusual construction fill, and abundant grave goods of the burial in question offer strong evidence for a typological designation of tomb and not crypt.

having been disturbed in antiquity given the presence of cranial fragments at the decedent's feet. Skeletal analysis in a laboratory setting,[11] however, discerned that Individual 65's skull had been in the correct anatomical position, just fragmented and in need of reconstruction. To whom, then, did the cranial fragments at the tomb's western end belong? This question is one to which I will return.

Seeing that they identified him as the primary decedent, excavators presumed that mourners had laid all grave goods to rest with Individual 65. Contained within the tomb were two greenstone ear spools, 11 spondylus shells (some with traces of cinnabar), about 15 chunks of hematite, obsidian, a bone needle, a bone pin, and 11 ceramic objects. The latter included: a Dos Arroyos Orange-polychrome basal flange bowl; Yaloche Cream-polychrome scutate lid with macaw head handle; a red and black mottled slip vessel in the shape of a coatimundi; two black vessels; a black pot stand; two black spouted vessels; an orange spouted vessel; an orange and red vessel; and a black slatted vessel.

The position of Individual 65's human remains and grave goods suggest that the body had been laid atop a perishable feature, likely a litter of organic floral material (i.e., reed, wood) (Geller 2004, p. 486). Decomposition of this litter then caused the decedent's remains to shift. For instance, one of Individual 65's ear spools and several teeth were recovered in association with the thoracic cavity, while the other ear spool drifted down to the legs. *Spondylus* shells, laden with marine and supernatural symbolism, laid along Individual 65's midline remained in primary positions. These funerary offerings ran the length of the body—two at the head, four in the torso area, one at the pelvis, one at the knees, and two at the feet. It is possible that shells' locations acted to protect these regions of the body, as Welsh (1988, pp. 64–66) has suggested is the case for ceramic vessels inverted over decedents' crania. Fitzsimmons (2009, p. 90) describes such arrangements—bodies extended, supine, and "complemented by successive lines of Spondylus valves"—as formulaic in the central Peten. The litter's decomposition, however, seemed to have disturbed one shell, which mourners may have originally positioned at Individual 65's knees. According to excavators' observations, several ceramic vessels were placed atop the body of Individual 65. Mourners had positioned the Dos Arroyos basal flanged bowl, for instance, in the vicinity of Individual 65's pelvic region; situated within were an orange vessel and two black spouted vessels (Fig. 2.4).

That skeletal materials also extended over or were found inside of certain ceramic vessels also suggests that these artifacts were beneath the litter. The right fibula and tibia, for instance, extended over the Yaloche Cream–polychrome lid. The black "slatted" vessel, which itself had been situated within a black monochrome bowl (Vessels 9 and 10 in Fig. 2.4) contained—but did not cover protectively per Welsh (1988, pp. 64–66)—several large cranial fragments. The litter's natural decomposition would have likely disturbed the primary arrangement of skeletal remains and grave goods.

Features and artifacts associated with the tomb appear to be metaphoric references to symbolic and sacred aspects of the cosmos (Geller 2006b). Various shades

[11] Individuals 65's and 132's human remains were exported to Toledo, Ohio where Saul and Saul conducted skeletal analysis.

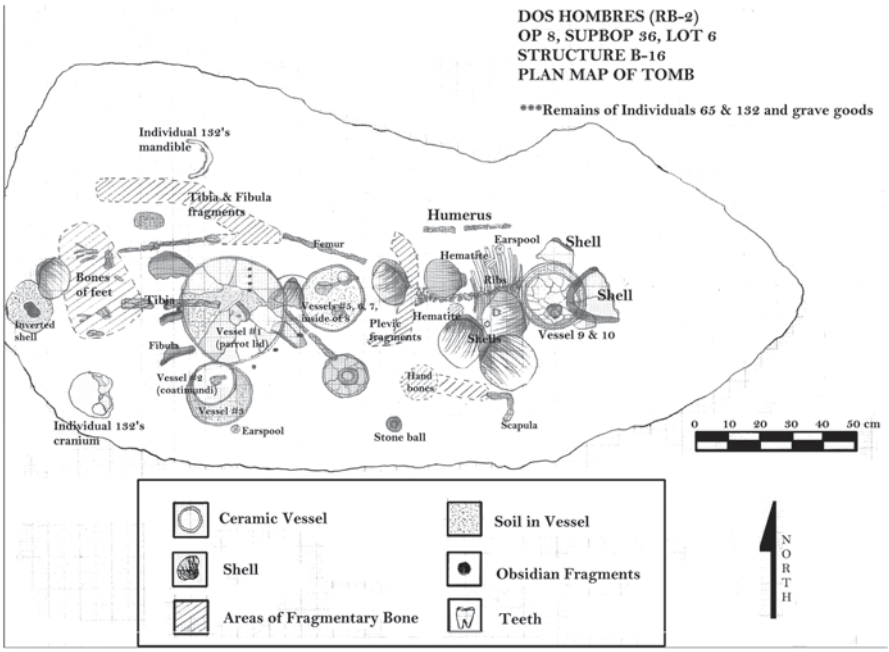

Fig. 2.4 Plan map of Individual 65 with accompanying grave goods

of red, for instance, are visible throughout Structure B-16. Within the Dos Hombres tomb, reddish cinnabar stained grave goods and Individual 65's remains. External to the tomb, the plaster floors and bench stratigraphically atop the grave space retained traces of red paint, as well. For the Maya, red was symbolically associated with the east and signified the rising sun, and as such invoked the cosmological theme of intertwined death and rebirth (Schele and Freidel 1990, p. 66). It may be no coincidence, then, that a high concentration of cinnabar was located at the tomb's eastern end.

Additionally, the eastern portion of the tomb—in the area of Individual 65's chest cavity—contained two zones with hematite. A black gummy material was associated with these hematite pieces, and may have affixed them to perishable backings. Throughout the Maya world and in royal tombs especially, as Fitzsimmons (2009, pp. 96–97) points out, hematite was used to fashion the surfaces of mirrors. Such items, he continues, acted as portals between natural and supernatural realms. This function would have certainly facilitated a decedent's transformation to venerated ancestor.

Architectural replication of natural landscape features also provided metaphoric citation of the supernatural and sacred. Like a mountain and cave, the residential Structure B-16 and tomb situated deep beneath its construction layers may have functioned to link the underworld to middle earth to the celestial.[12] The tomb then

[12] In his analysis of tombs from Río Azul, Guatemala, Grant Hall (1989) makes a similar argument.

would have symbolized a cavernous entrance to Xibalba, the underworld, while grave offerings like spondylus shells evoked bodies of water. All of these attributes would have facilitated Individual 65's journey from liminal corpse to venerated ancestor. As such, the tomb's builders designed this grave as a space for transformation, reverence, and rebirth.

Ceramic evidence suggests that Individual 65's identity reformation was set in motion during the Early Classic period. The Yaloche lid and Dos Arroyos bowl are associated with the Tzakol ceramic sphere (Smith and Gifford 1966, p. 171), which dates between AD 300 and 600 (Hammond 2000, p. 214). Sullivan and Valdez (2006, pp. 81–82) have narrowed the phase to Tzakol 1–2, given the appearance of basal flanges and polychromes. Accordingly, ceramicists working in this corner of northwestern Belize have contended that the tomb is early to mid-Early Classic in date (Sagebiel 2006; Sullivan and Sagebiel 2003; Sullivan and Valdez 2004, 2006). Based on the Dos Arroyos vessel's iconographic imagery, however, the temporal designation may not be so clear cut.

On the vessel's exterior is a person lying prone with bent knees. The interior portrays an active individual in profile, standing and attired with backrack and headdress. With regard to the latter, Lauren Sullivan (2002, p. 204) has identified similar iconographic images at centers neighboring Dos Hombres (i.e., Chan Chich), as well as at some distance outside of the Three Rivers region (i.e., Uaxactún). Although Sullivan does not identify it as such, the figure appears to be painted in the "Tikal Dancer" style—a Young Maize God adorned in an elaborate headdress and feathered backrack with arms outstretched and palms up[13] (Reents-Budet 1994, pp. 196–199, 339). He dances, Reents-Budet notes, "out of the underworld after having defeated the lords of death" (1994, p. 198). Aside from Uaxactún (Hellmuth cited in Coe 1982, p. 88), excavators have unearthed vessels with variations on this theme from tombs at Tikal (Culbert 1993), Ramonal (Reents-Budet 1994, p. 198), El Zotz' (Reents-Budet 1994, p. 198) and more recently Nakum (Zrałka et al. 2011). As Reents-Budet recounts, "Tikal Dancer plates were used both as special service ware and as burial offerings and also are compelling evidence for local sociopolitical integration in the Tikal environs during the early decades of the Late Classic period" (1994, p. 197; see also Looper 2009, p. 127). Perhaps production and entombment of the Dos Hombres vessel occurred during the seventh century, as the Early Classic gave way to the early decades of the Late Classic period. Adams (1999) has argued that a "hiatus" occurred following Tikal's defeat by Caracol and Calakmul in A.D. 562. The Tikal Dancer style bowl may have signaled the end of this hiatus and a recharged regional interaction sphere in which occupants of Structure B-16 functioned as intermediary elites. An alternate explanation is that the vessel's iconography represents an early example of the Tikal Dancer genre. In support, imagery on the exterior of the Dos Hombres vessel also appears on a bowl unearthed at Caracol, the latter of which is early to mid-Early Classic period in date (Chase and Chase 2011, p. 10).

[13] There are numerous examples of Tikal Dancer plates in Justin Kerr's photographic Maya vase database. These include K97, K1271, K2360, K5076, K5358, K5375, K5379, K5528, K5875, K5880, K5881, K6079, and K8593. The proveniences of all vessels, however, are unknown.

2.5 Reassessing and Repositioning

To further legitimate Individual 65's position of power, there is an additional precious and unique item in the Dos Hombres tomb that requires reassessment—the fragmentary skull of Individual 132. Individual 132's cranium faced east and had been situated at the left ankle and foot of Individual 65; the former's mandible was uncovered just north of the latter's right lower leg (Fig. 2.4). As I have discussed elsewhere, the Maya carried out partibility over extended periods to transform individuals' social identities (Geller 2012b). As a result, the living could memorialize, forget, disparage, or venerate decedents. So, who was Individual 132?

Seeing that no other skeletal elements were recovered, it is unlikely that this decedent was a retainer sacrifice. In the case of Palenque's Janaab' Pakal and Red Queen, for instance, interment of entire bodies, not fragmented parts, are suggestive of companions with lives cut short (Cucina and Tiesler 2006); though see Weiss-Krejci (2003) for an alternative interpretation about ancestral identities. Describing Individual 132 as an offering, I believe, confuses the living's engagement with both tomb occupants, and obscures detection of the multiple events and complex processes that surrounded their interments. Indeed, Individual 132's bone texture, thickness, and coloration, which differs from those of Individual 65 (Julie Saul, personal communication 2003), suggests that the two decedents died and/or were interred at separate times.

Given evidence of intentional partibility, could Individual 132 have been a hapless victim—a head hunted or war trophy accompanying a triumphant Individual 65 into the afterlife? For the Maya, trophy taking refers to the violent decapitation, alteration, display, and disposal of an enemy's head, which worked to desecrate personhood (Houston et al. 2006, pp. 70–72). Iconographic images from Classic period ceramic vessels attest to royal actualizations (Fig. 2.5) and mythological justifications for violent trophy-head taking (Fig. 2.6). Sixteenth-century chroniclers of ethnohistoric accounts tell a similar (if not sensationalized) tale (Berryman 2007). Imagery of and discourse about trophy-head taking, however, are far more abundant than is definitive skeletal evidence of such partibility. Preservation confounds, as does the complexity and varieties of corporeal processes performed by the Maya. Indeed, many researchers who have labeled heads as "trophies" in past publications may need to revisit their data and reassess such interpretations. Clearly, it is essential to begin by detecting evidence of trauma and attending to physical context. Skeletal analysts have yet to document shrunken heads although they have identified cut marks on crania and/or articulated cervical vertebrae (Piehl and Awe 2009; Tiesler 2002, 2007). As to their final deposition, trophy heads were collected on a skull rack (Duncan 2005), cached singularly (Becker 1988), deposited collectively [e.g., Colha (Barrett and Scherer 2005; Massey and Steele 1997; Mock 1998); Iximiche (Whittington 2003a, b); Miramar (Agrinier 1978)], or placed as offerings in a primary Interment (Harrison-Buck et al. 2007, p. 8). Unfortunately, insufficient preservation of Individual 132's skull effaced any indicators of decapitation (Julie Saul, personal communication 2003). Yet, markers of trauma are but one line of evidence.

Fig. 2.5 A warrior presents the freshly decapitated head of a slain captive, as indicated by the trail of blood, to his lord. In Kerr's Maya Vase Database, this vessel is numbered K680

Fig. 2.6 This vessel's mythological scene depicts a decomposing and skeletal Death God A with decapitated head in hand. In Kerr's Maya Vase Database, this vessel is numbered K1490

A spatial analysis, within the grave and of the grave's entombing structure(s), is necessary. In the case of the Dos Hombres tomb, arrangement of decedents' bodies does not concur with the evidence we have of violent, perimortem partibility from other Maya sites. Moreover, the tomb's location is a residential one in which access to a larger public would have been strictly regulated. And while reentry may signal desecration (Chase and Chase 2011), evidence associated with the Dos Hombres tomb's possible reopening suggests that veneration catalyzed Individual 132's fragmentation. The undulating layer of obsidian and chert situated above the Dos Hombres tomb coupled with Floor 1's intrusive cut and plaster patch indicate reentry

after the grave's initial construction and closing. And, researchers have argued for the intertwining of grave reentry, skeletal partibility, and ancestral identities at other Maya sites [e.g., Caracol, Belize (Chase and Chase 1996); Pakal Na, Belize (Harrison-Buck et al. 2007); Xuenkal, Mexico (Tiesler et al. 2010)]. The coating of grave goods and Individual 65's human remains with cinnabar may have also occurred during later reentry of the tomb, as in Copan's Margarita Tomb (Sharer et al. 1999, p. 11). If mourners had interred Individuals 65 and 132 concurrently, we would expect to find cinnabar present on all skeletal remains. But, interestingly, neither excavators nor skeletal analysts discerned any trace of cinnabar on the latter's cranium, mandible, or dentition.

Two explanations for the Dos Hombres tomb's interments and arrangement, both of which emphasize extended and complex mortuary processes that involved curation of an ancestor's skull, are plausible. Perhaps, Individual 65 was the tomb's original occupant. Individual 132's skull may be the consequence of selective curation from a spatially disparate grave. There are two possible explanations for aforementioned taphonomic differences between the two: different microenvironmental conditions during decomposition; or, partible practices involving handling, moving, and temporary display of Individual 132. Alternatively, mourners may have created the tomb for Individual 132. A generation or so later, Structure B-16's occupants then reopened the grave space to inter Individual 65. Accessing the tomb for Individual 65 would have necessitated repositioning Individual 132's fragmentary remains, of which only cranial traces survived. Regardless of possible scenarios, the crucial point is that attending to postmortem partibility facilitates understanding of the physical relationship between primary and secondary burials and deepens interpretation about the continued social importance of ancestors.

Following interment of both decedents, the tomb was capped, the floor resealed, and a layer of obsidian gathered. Seeing that the location and layout of the residentially situated tomb made it fairly inaccessible to the wider public, the number of obsidian and chert fragments atop the grave space suggests that Individual 65's death and Individual 132's memorialization may have momentarily negated the normal rules of social engagement. That is, such a collection of obsidian debitage may have likely accumulated above this family sepulcher as part of a community-wide effort.

Mythological narratives offer additional support for familial links realized vis-a-vis position and selection of body parts. According to the Popol Vuh, after falling sacrificial victim to the lords of the underworld, mythical primogenitor Hun Hunahpu finds his decapitated head situated within the fork of a tree (Tedlock 1996). Yet, Hun Hunahpu's fate reminds us that decedents often experienced a vibrant social life. Accordingly, his severed head engenders the growth of the calabash, a fruit that appropriately resembles the human skull (Fig. 2.7). In an additional show of death defying skill, the detached head communicates with, salivates on, and impregnates Blood Moon, the daughter of an underworld lord. Later in the tale, Hun Hunahpu's offspring, the Hero Twins, recover his skull in order to resurrect their father as the Maize God. In doing so, they set an important precedent for the

Fig. 2.7 The mythological scene on this vessel from Nebaj in Guatemala depicts the decapitated head of Hun Hunahpú hanging from a calabash tree. In Kerr's Maya Vase Database, this vessel is numbered K5615

ongoing cycle of death and rebirth. One well-known codex-style vessel depicts the famous resurrection scene in which the Maize God is reborn from a cracked turtle carapace.[14] Other scholars, however, have commented on this deity's emergence from a skull (Freidel et al. 2002, p. 67). As aforementioned, the figure painted within the Dos-Arroyos basal flange bowl also highlights a link between isolated heads and the Maize God.

Although myths relate the trials and tribulations of the supernatural, they offer important insights about beliefs that guided proper processing and preparation of decedents' bodies after death. Clearly, corporeal wholeness was not a precondition for social potency. For the Maya, detached skulls were especially powerful and multi-faceted symbols that anchored souls and successive generations (Duncan and Hofling 2011; Fitzsimmons 2009; Geller 2012b; Houston et al. 2006; Mock 1998). Thus, in the case of Individuals 65 and 132, differential preservation perhaps signaled Individual 132's greater antiquity. In repositioning Individual 132's head in an easterly facing direction at the feet of Individual 65, mourners perhaps were calling attention to a potent primogenitor.

Moreover, mythological narratives stress how body parts retained qualities of decedents' identities and communicated narrative threads of their life histories. In the case of the Dos Hombres' individuals, we recognize that these decedents had

[14] The mythological scene on this codex-style vessel depicts the resurrection of the Maize God from the cracked carapace of a turtle. The Hero Twins flank the carapace. In Kerr's Maya Vase Database (1998), this vessel is numbered K1892.

been prominent figures within their community. While the salient symbols of rulership are absent, dental modifications only sported by tombs' occupants in this region—Romero E-1 inlaid with hematite—suggest these individuals held comparable esteemed statuses in their communities while alive (Geller 2006a).

2.6 Conclusion

To conclude, for the Maya, body parts retained aspects of individuals' identities, and thus represented repositories for potent forces and continued activity despite the biological cessation of life. I believe that Individual 132 is one illustrative example of this notion. Processing of bodies into parts, however, was by no means uniform with regard to technique and significance. Not all Maya decedents recovered from graves were accorded the same treatment and appraisal in antiquity. Some individuals were venerated, while others may have been victimized, vilified, or simply buried. And veneration of decedents was not uniform, as indicated by the variety contained within Dos Hombres's Structure B-16. While stratigraphic verticality forged a link between this group's ancestors, those who resided at the earliest construction phases, namely the occupants of an Early Classic tomb, were clearly accorded greater reverence. Teasing out differences is one way by which we can effectively people the past, whether the modest commoner, the sacrificed warrior, or the community-wide revered ancestor.

Yet, as those who have encountered the fragmented state of human remains can testify, excavating burials from the tropical Maya Lowlands can be a frustrating experience. Analysis and interpretation often seems like an exercise in futility at worst, speculation at best. Such is even more challenging when investigating body partibility with respect to practice and belief. I do, however, remain optimistic about the promise of a bioarchaeological approach—an approach that discerns cultural intent from natural transformation; that contextualizes in physical space, historical period, and social setting; and that draws from multiple lines of evidence if and when available.

Acknowledgments This chapter is based on doctoral research, which was undertaken as a member of the collaborative Programme for Belize Archaeological Project (PfBAP). My gratitude to Fred Valdez, Jr., PfBAP director, for permission to draw on project data. Thank you also to Jeffrey Durst and his team for excavating the Dos Hombres tomb in summer 1997, as well as Frank and Julie Saul for their skeletal analysis and instruction on methodological standards. Follow-up research and writing was conducted at the Library of Congress' John W. Kluge Center as the 2006–2007 Kislak Fellow in American Studies, where then-Kislak curator Arthur Dunkelman was very helpful. Justin Kerr has also graciously provided images of Kislak vessels and made the Maya Vase Database accessible on FAMSI's website. Thank you also to Gabriel D. Wrobel and Arlen Chase for providing thoughtful feedback during the revision process.

References

Adams, R. E. W. (1995). The Programme for Belize Archaeological Project: 1994 interim report, introduction. In R. E. W. Adams & F. Valdez, Jr. (Eds.), *The Programme for Belize Archaeological Project 1994 interim report* (pp. 1–14). San Antonio: The Center for Archaeology and Tropical Studies and the University of Texas at San Antonio.

Adams, R. E. W. (1999). *Rio Azul: An ancient Maya city*. Norman: University of Oklahoma Press.

Adams, R. E. W., Robichaux, H. R., Valdez Jr., F., Houk, B. A., & Mathews. R. (2004). Transformations, periodicity, and urban development in the Three Rivers region. In A. Demarest, P. Rice, & D. Rice (Eds.), *The Terminal Classic in the Maya Lowlands* (pp. 324–341). Boulder: University Press of Colorado.

Agrinier, P. (1978). *A sacrificial mass burial at Miramar, Chiapas, Mexico*. Papers of the New World Archaeological Foundation no.42. Provo: Brigham Young University.

Aylesworth, G. R. (2005). *A science of networks approach to ancient Maya sociopolitical organization*. Ph.D. dissertation. The University of Texas.

Bailey, D. W. (1990). The living house: Signifying continuity. In R. Samson (Ed.), *The social archaeology of houses* (pp. 19–48). Edinburgh: Edinburgh University Press.

Barrett, J., & Scherer, A. (2005). Stones, bones, and crowded plazas: Evidence for Terminal Classic Maya warfare at Colha, Belize. *Ancient Mesoamerica, 16*(1), 101–118.

Becker, M. J. (1971). *The identification of a second plaza plan at Tikal, Guatemala, and its implications for ancient Maya social complexity*. Ph.D. dissertation. Pennsylvania: University of Pennsylvania.

Becker, M. J. (1988). Burials as caches, caches as burials: A new interpretation of the meaning of ritual deposits among the Classic period Lowland Maya. In W. J. Saunders & O. de Montmollin (Eds.), *Recent studies in Pre-Columbian archaeology* (pp. 117–130). Oxford: BAR International Series.

Becker, M. J. (1999). *Excavation in residential areas of Tikal: Groups with shrines*. University Museum Monograph 104, Tikal Report 21. Philadelphia: The University Museum and University of Pennsylvania.

Berryman, C. A. (2007). Captive sacrifice and trophy taking among the ancient Maya: An evaluation of the bioarchaeological evidence and its sociopolitical implications. In R. J. Cachon & D. H. Dye (Eds.), *The taking and displaying of human body parts as trophies by Amerindians* (pp. 377–399). New York: Springer.

Brinton, D., (Trans.) (1969). *The annals of the Cakchiquels*. New York: AMS Press.

Buikstra, J. E. (2006). On to the 21st century. In J. E. Buikstra & L. A. Beck (Eds.), *Bioarchaeology: The contextual analysis of human remains* (pp. 347–357). Burlington: Elsevier.

Buikstra, J. E., & Scott, R. E. (2009). Identity formation: Communities and individuals. In K. J. Knudson & C. M. Stojanowski (Eds.), *Bioarchaeology and identity in the Americas* (pp. 24–58). Gainesville: University Press of Florida.

Busby, C. (1997). Permeable and partible persons: A comparative analysis of gender and the body in South Indian and Melanesia. *Journal of the Royal Anthropological Institute, 3*(2), 261–278.

Carlsen, R., & Prechtel, M. (1991). The flowering of the dead: An interpretation of highland Maya culture. *Man, 26*(1), 23–42.

Chapman, J. (2000). *Fragmentation in archaeology: People, places, and broken objects in the Prehistory of South Eastern Europe*. London: Routledge.

Chapman, J., & Gaydarska, B. (2007). *Parts and wholes: Fragmentation in prehistoric context*. Oxford: Oxbow Books.

Chase, A. F., & Chase, D. Z. (1987). *Investigations at the Classic Maya city of Caracol, Belize: 1985–1987*. Monograph 3. San Francisco: Pre-Columbian Art Research Institute.

Chase, A. F., & Chase, D. Z. (2011). Status and power: Caracol, Teotihuacan, and the Early Classic Maya world. *Research Reports in Belizean Archaeology, 8*, 3–18.

Chase, D. Z., & Chase, A. F. (1996). Maya multiples: Individuals, entries, and tombs in structure A34 of Caracol, Belize. *Latin American Antiquity, 7*(1), 61–79.

Chase, D. Z., & Chase, A. F. (1998). The architectural context of caches, burials, and other ritual activities for the Classic Period Maya (as reflected at Caracol, Belize). In S. D. Houston (Ed.), *Function and meaning in Classic Maya architecture* (pp. 239–332). Washington, D.C.: Dumbarton Oaks.

Chase, D. Z., & Chase, A. F. (2004). Patrones de enterramiento y ciclos residenciales en Caracol, Belice. In R. Cobos (Ed.), *Culto funerario en la sociedad Maya: Memoria de la cuarta mesa redonda de Palenque* (pp. 203–230). Mexico City: Instituto Nacional de Antropologia y Historia.

Chase, D. Z., & Chase, A. F. (2011). Ghosts amid the ruins: Analyzing relationships between the living and the dead among the ancient Maya at Caracol, Belize. In J. L. Fitzsimmons & I. Shimada (Eds.), *Living with the dead: Mortuary ritual in Mesoamerica* (pp. 78–101). Tucson: University of Arizona Press.

Chiarulli, B., & Barrick, S. (1997). *Analysis of lithic material associated with Tomb 1 at Chau Hiix*. Paper presented at the 62nd Annual Meeting of the Society for American Archaeology. Nashville, TN. April, 2–6, 1997.

Coe, M. D. (1982). *Old gods and young heroes: The Pearlman collection of Maya ceramics*. Jerusalem: The Israel Museum.

Coe, M. D. (1988). Ideology of the Maya tomb. In E. P. Benson & G. G. Griffin (Eds.), *Maya iconography* (pp. 222–235). Princeton: Princeton University Press.

Cucina, A., & Tiesler, V. (2006). The companions of Janaab' Pakal and the "Red Queen" from Palenque, Chiapas: Meanings of human companion sacrifice in Classic Maya society. In V. Tiesler & A. Cucina (Eds.), *Janaab' Pakal of Palenque: Reconstructing the life and death of a Maya ruler* (pp. 102–125). Tucson: University of Arizona.

Cucina, A., & Tiesler, V. (2007). New perspectives on human sacrifice and postsacrificial body treatments in ancient Maya society: An introduction. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 1–13). New York: Springer.

Culbert, T. P. (1993). *The ceramics of Tikal: Vessels from the burials, caches, and problematic deposits*. University Museum Monograph 81, Tikal Report 25A. Philadelphia: The University Museum and University of Pennsylvania.

Duday, H. (1997). Antropologia biologica de Campo, tafonomia y arqueologia de le muerte. In E. Malvido, G. Pereira, & V. Tiesler (Eds.), *El cuerpo humano y su tratamiento mortuorio* (pp. 91–126). Mexico City: Instituto Nacional de Antropologia y Historia.

Duday, H. (2006). L'archaeothanatologie ou l'archaeologie de la mort (Archaeoethnoanatology or the archaeology of death.). In C. Knusel & R. Gowland (Eds.), *Social archaeology of funerary remains* (pp. 30–56). Oxford: Oxbow Books.

Duday, H. (2009). *The archaeology of the dead*. (Trans: A. M. Cipriani, & J. Pearce). Oxford: Oxbow Books.

Duday, H., & Guillon, M. (2006). Understanding the circumstances of decomposition when the body is skeletonized. In A. Schmitt, E. Cunha & J. Pinheiro (Eds.), *Forensic anthropology and medicine: Complementary sciences from recovery to cause of death* (pp. 117–158). Totowa: Humana Press.

Duncan, W. N. (2005). Understanding veneration and violation in the archaeological record. In G. F. M. Rakita, J. E. Buikstra, L. A. Beck, & S. R. Williams (Eds.), *Interacting with the dead: Perspectives on mortuary archeology for the new millennium* (pp. 207–227). Gainesville: University Press of Florida.

Duncan, W. N., & Hofling, C. A. (2011). Why the head? Cranial modification as protection and ensoulment among the Maya. *Ancient Mesoamerica, 22*(1), 199–210.

Durst, J. (1998). Early Classic iconographic connections of Dos Hombres and other Lowland Maya sites. Paper presented at the 63rd annual meeting of the Society for American Archaeology. Seattle: 25–29 March 1998

Fitzsimmons, J. (2009). *Death and the Classic Maya kings*. Austin: University of Texas Press.

Foster, L. V. (2002). *Handbook to life in the ancient Maya world*. Oxford: Oxford University Press.

Fowler, C. (2002). Body parts: Personhood and materiality in the earlier Manx Neolithic. In Y. Hamilakis, M. Pluciennik, & S. Tarlow (Eds.), *Thinking through the body: Archeologies of corporeality* (pp. 47–70). New York: Kluwer Academic/Plenum Publishers.

Fowler, C. (2004). *The archaeology of personhood: An anthropological approach*. London: Routledge.

Freidel, D., Reese-Taylor, K., & Mora-Marín, D. (2002). The origins of Maya civilization: The old shell game, commodity, treasure, and kingship. In M. Masson & D. Freidel (Eds.), *Ancient Maya political economies* (pp. 41–86). Walnut Creek: Altamira Press.

Geary, P. J. (1986). Sacred commodities: The circulation of medieval relics. In A. Appadurai (Ed.), *The social life of things: Commodities in cultural perspective* (pp. 169–191). New York: Cambridge University Press.

Geller, P. L. (2004). *Transforming bodies, transforming identities: A consideration of Pre-Columbian Maya corporeal beliefs and practices*. Ph.D. dissertation. Philadelphia: University of Pennsylvania.

Geller, P. L. (2006a). Altering identities: Body modification and the Pre-Columbian Maya. In R. Gowland & C. Knusel (Eds.), *The social archaeology of funerary remains* (pp. 279–291). Oxford: Oxbow Books.

Geller, P. L. (2006b). Maya mortuary spaces as cosmological metaphors. In E. C. Robertson, J. D. Seibert, D. C. Fernandez, & M. U. Zender (Eds.), *Space and spatial analysis in archaeology* (pp. 37–48). Calgary: University of Calgary Press.

Geller, P. L. (2009). *Recycling souls: Ancestors, children, and the Maya*. Paper presented at the 3rd Annual Conference of the Society for the Study of Childhood in the Past. 13–15 Nov 2009. Coral Gables: University of Miami.

Geller, P. L. (2011). Sacrifices we make of and for our children: Making sense of Pre-Columbian Maya practices. In A. Boutin, A. Baadsgaard, & J. Buikstra (Eds.), *Breathing new life into the evidence of death: Contemporary approaches to mortuary analysis* (pp. 79–106). Santa Fe: SAR Press.

Geller, P. L. (2012a). From cradle to grave and beyond: A Maya life and death. In A. L. W. Stodder & A. M. Palkovich (Eds.), *The bioarchaeology of individuals* (pp. 255–270). Gainesville: University Press of Florida.

Geller, P. L. (2012b). Parting (with) the dead: Body partibility as evidence of commoner ancestor veneration. *Ancient Mesoamerica, 23*(1), 115–130.

Gillespie, S. (2001). Personhood, agency, and mortuary ritual: A case study from the ancient Maya. *Journal of Anthropological Archaeology, 20*, 73–112.

Gillespie, S. (2002). Body and soul among the Maya: Keeping the spirits in place. In H. Silverman & D. B. Small (Eds.), *The space and place of death* (pp. 67–78). Arlington: American Anthropological Association.

Hageman, J. B. (2004). *Late Classic Maya social organization: A perspective from northwestern Belize*. Ph.D. dissertation. Carbondale: Southern Illinois University.

Hall, G. (1989). *Realm of death: Royal mortuary customs and polity interaction in the Classic Maya Lowlands*. Ph.D. dissertation. Cambridge: Harvard University.

Hammond, N. (2000). The Maya Lowlands: Pioneer farmers to merchant princes. In R. E. W. Adams & M. J. MacLeod (Eds.), *The Cambridge history of the native peoples of the Americas, Volume II, Mesoamerica, Part 1* (pp. 197–249). Cambridge: Cambridge University Press.

Harrison-Buck, E., McAnany, P. A., & Storey, R. (2007). Empowered and disempowered during the Late to Terminal Classic transition: Maya burial and termination rituals in the Sibun Valley, Belize. In V. Tielser & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 74–101). New York: Springer.

Houk, B. (1996). *The archaeology of site planning: An example from the Maya site of Dos Hombres*. Ph.D. dissertation. Austin: University of Texas.

Houston, S., Stuart, D., & Taube, K. (2006). *The memory of bones: Body, being, and experience among the Classic Maya*. Austin: University of Texas Press.

Kerr, J. (1998). Maya vase Database. http://research.mayavase.com/kerrmaya.html, accessed on 31 July 2012.

Lohse, J. (2001). *The social organization of a Late Classic Maya community: Dos Hombres, northwestern Belize*. Ph.D. dissertation. Austin: University of Texas.

Looper, M. G. (2009). *To be like gods: Dance in ancient Maya civilization*. Austin: University of Texas Press.

Massey, V. K., & Steele, D. G. (1997). A Maya skull pit from the Terminal Classic Period, Colha, Belize. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 62–77). Washington, D.C.: Smithsonian Institute Press.

McAnany, P. A. (1995). *Living with the ancestors*. Austin: University of Texas Press.

Mock, S. B. (1998). The defaced and the forgotten: Decapitation and flaying/mutilation as a termination event at Colha, Belize. In S. B. Mock (Ed.), *The sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record of Mesoamerica* (pp. 113–124). Albuquerque: University of New Mexico Press.

Moholy-Nagy, H. (1997). Middens, construction fill, and offerings: Evidence for the organization of Classic Period craft production at Tikal, Guatemala. *Journal of Field Archaeology, 24*(3), 293–313.

Mongelluzzo, R. W. (1997). *The tomb at La Milpa: A comparative study*. B.A. thesis. Boston: Boston University.

Nanoglou, S. (2008). Building biographies and households: Aspects of community life in Neolithic Northern Greece. *Journal of Social Archaeology, 8*(1), 139–160.

Pendergast, D. M. (1979). *Excavations at Altun Ha, Belize, 1964–1970, v.1*. Toronto: Royal Ontario Museum.

Pendergast, D. M. (1981). Lamanai, Belize: Summary of excavation results, 1974–1980. *Journal of Field Archaeology, 8*(1), 29–53.

Piehl, J. C., & Awe, J. J. (2009). Scalping as a component of terminus structure ritual at the site of Baking Pot, Belize Valley. *Research Reports in Belize Archaeology, 7,* 55–64.

Reents-Budet, D. (1994). *Painting in the Maya universe: Royal ceramics of the Classic Period*. Durham: Duke University Press.

Robb, J. (2002). Time and biography: Osteobiography of the Italian Neolithic lifespan. In Y. Hamilakis, M. Pluciennik, & S. Tarlow (Eds.), *Thinking though the body: Archaeologies of corporeality* (pp. 153–172). New York: Kluwer Academic/Plenum Publishers.

Sagebiel, K. (2006). La Milpa: Shifting alliances, shifting fortunes. *Research Reports in Belizean Archaeology, 3*, 301–312.

Saul, F. P. (1972). *The human skeletal remains of Altar de Sacrificios: An osteobiographic analysis. Papers of the Peabody Museum of Archaeology and Ethnology* (Vol. 63). Cambridge: Harvard University.

Saul, F. P., & Saul, J. M. (1989). Osteobiography: A Maya example. In M. Y. Iscan & K. A. R. Kennedy (Eds.), *Reconstruction of life from the skeleton* (pp. 287–302). New York: Alan R. Liss, Inc.

Saul, F. P., & Saul, J. M. (1991). The Preclassic population of Cuello. In N. Hammond (Ed.), *Cuello: An early Maya community in Belize* (pp. 134–158). Cambridge: Cambridge University Press.

Saul, J. M., Prufer, K., & Saul, F. P. (2005). Nearer to the gods: Rockshelter burials from the Ek Xux Valley, Belize. In K. Prufer & J. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 297–322). Boulder: University Press of Colorado.

Saul, J. M., & Saul, F. P. (1997). The Preclassic skeletons from Cuello. In S. Whittington & D. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 181–195). Washington, D.C.: Smithsonian Institution Press.

Saul, J. M., & Saul, F. P. (2002). Forensics, archaeology, and taphonomy: The symbiotic relationship. In W. Haglund & M. Sorg (Eds.), *Advances in forensic taphonomy method, theory, and archaeological perspectives* (pp. 71–98). Boca Raton: CRC Press.

Schele, L., & Freidel, D. (1990). *A forest of kings: The untold story of the ancient Maya*. New York: William Morrow and Company.

Sharer, R., Traxler, L., Sedat, D., Bell, E., Canuto, M., & Powell, C. (1999). Early Classic architecture beneath the Copan acropolis: A research update. *Ancient Mesoamerica, 10*(1), 3–23.

Smith, R. E., & Gifford, J. C. (1966). *Maya ceramic varieties, types, and wares at Uaxactun: Supplement to "ceramic sequence at Uaxactun, Guatemala"*. Middle American Research Records (Vol. 3 Nos. 1–5). New Orleans: Middle American Research Institute, Tulane University.

Strathern, M. (1988). *The gender of the gift: Problems with women and problems with society in Melanesia*. Berkeley: University of California Press.

Sullivan, L. (2002). Dynamics of the regional integration in Northwestern Belize. In M. Masson & D. Freidel (Eds.), *Ancient Maya political economies* (pp. 197–222). Walnut Creek: Altamira Press.

Sullivan, L., & Sagebiel, K. (2003). Changing political alliances in the Three Rivers region. In V. Scarborough, F. Valdez, & N. Dunning (Eds.), *Heterarchy, political economy, and the ancient Maya: The Three Rivers region of the East-Central Yucatan Peninsula* (pp. 25–36). Tucson: University of Arizona Press.

Sullivan, L., & Valdez, Jr., F. (2004). Northwest Belize: A regional perspective on cultural history. *Research Reports in Belizean Archaeology, 1*, 185–196.

Sullivan, L., & Valdez, Jr., F. (2006). The late preclassic to early classic transition in the Three Rivers region. *Research Reports in Belizean Archaeology, 3,* 79–98.

Tedlock, D., (Trans.) (1996). *Popol Vuh: The definitive edition of the Mayan book of the dawn of life and the glories of gods and kings*. New York: Simon & Schuster.

Tiesler, V. (2002). Un caso de decapitación Prehispánica de Calakmul, Campeche. *Antropología Física Latinoamericana, 3,* 129–142.

Tiesler, V. (2004). Maya mortuary treatments of the elite: An osteotaphonomic perspective. In D. Grana Behrens, N. Grube, C. M. Prager, F. Sachse, S. Teufel, & E. Wagner (Eds.), *Continuity and change: Maya religious practices in temporal perspective* (pp. 143–156). ACTA Mesoamericana Vol. 14. Munich: Verlag Anton Saurwein.

Tiesler, V. (2005). What can the bones really tell us? The study of human skeletal remains from cenotes. In K. Prufer & J. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 341–364). Boulder: University Press of Colorado.

Tiesler, V. (2007). Funerary or nonfunerary? New references in identifying ancient Maya sacrificial and postsacrificial behaviors from human assemblages. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 14–44). New York: Springer.

Tiesler, V., Cucina, A., Kam Manahan, T., Douglas Price, T., Ardren, T., & Burton, J. (2010). A taphonomic approach to Late Classic Maya mortuary practices at Xuenkal, Yucatan, Mexico. *Journal of Field Archaeology, 35*(4), 365–379.

Trachman, C. (2007). *Excavated households excavated lives: Social reproduction, identity, and everyday life for the ancient Maya in Northwestern Belize*. Ph.D. dissertation. Austin: University of Texas.

Trachman, R., & Titmus, G. (2003). Pecked and scored initiations: Early Classic core-blade production in the Central Maya Lowlands. In K. Hirth (Eds.), *Mesoamerican lithics technology: Experimentation and interpretation* (pp. 108–119). Salt Lake City: University of Utah Press.

Trik, A. S. (1963). The splendid tomb of Temple I at Tikal, Guatemala. *Expedition, 6,* 2–18.

Tringham, R. E. (1991). Household with faces: The challenge of gender in Prehistoric architectural remains. In J. M. Gero & M. W. Conkey (Eds.), *Engendering archaeology: Women and prehistory* (pp. 93–131). Cambridge: Blackwell Publishers.

Webster, D. (1997). Studying Maya burials. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 3–14). Washington, D.C.: Smithsonian Institution Press.

Weiss-Krejci, E. (2003). Victims of human sacrifice in multiple tombs of the ancient Maya: A critical review. In A. Ciudad Ruiz, M. H. Ruz Sosa, & M. J. Iglesias Ponce de Leon (Eds.), *Antropologia de la eternidad: La muerte en la cultura Maya* (pp. 355–381). Madrid: Sociedad Española de Estudios Mayas, Centro de Estudios Mayas.

Weiss-Krejci, E. (2004). Mortuary representations of the noble house: A cross-cultural comparison between collective tombs of the ancient Maya and the dynastic Europe. *Journal of Social Archaeology, 4*(3), 368–404.

Weiss-Krejci, E. (2006). The Maya corpse: Body processing from Preclassic to Postclassic times in the Maya Highlands and Lowlands. In P. R. Colas, G. LeFort, & B. L. Persson (Eds.), *Jaws of the underworld: Life, death, and rebirth among the ancient Maya* (pp. 71–86). Munich: Verlag Anton Saurwein.

Weiss-Krejci, E. (2011). The formation of mortuary deposits: Implications for understanding mortuary behavior of past populations. In S. Agarwal & B. Glencross (Eds.), *Social bioarchaeology* (pp. 68–106). Malden: Wiley-Blackwell.

Welsh, W. B. M. (1988). *An analysis of Classic Lowland Maya burials*. International Series 409. Oxford: British Archaeological Reports.

Whittington, S. L. (2003a). Description of human remains and burial structures. In C. Roger Nance, S. L. Whittington, & B. E. Borg (Eds.), *Archaeology and ethnohistory of Iximche* (pp. 205–240). Gainesville: University Press of Florida.

Whittington, S. L. (2003b). Analysis of human skeletal material excavated by Guillemin. In C. Roger Nance, S. L. Whittington, & B. E. Borg (Eds.), *Archaeology and ethnohistory of Iximche* (pp. 241–304). Gainesville: University Press of Florida.

Zrałka, J., Koszkul, W., Martin, S., & Hermes, B. (2011). In the path of the Maize God: A royal tomb at Nakum, Petén, Guatemala. *Antiquity, 85*(329), 890–908.

Chapter 3
Cueva del Lazo: Child Sacrifice or Special Funerary Treatment? Discussion of a Late Classic Context from the Zoque Region of Western Chiapas (Mexico)

Davide Domenici

Abstract In the following chapter we discuss the archaeological remains from Cueva del Lazo (Chiapas, Mexico), a ritual precinct that yielded a group of 11 Late-Terminal Classic children's partially mummified remains. Uncommon and rich contextual information, mainly derived from the exceptional preservation of perishable materials due to the dry climate of the cave, suggests that the interments could be interpreted as postsacrificial deposits or, alternatively, as funerary contexts whose special character could be linked to the specific sociocultural identity of the buried individuals, all of whom are under six years of age. In order to discuss these possibilities, we describe the archaeological context of the cave as well as review the available archaeological and ethnohistorical information on child sacrifices in Mesoamerica, in order to sketch a meaningful framework useful for interpreting the excavated burials.

3.1 Introduction

Since 1997, the Río La Venta Archaeological Project has been working in the Selva El Ocote, western Chiapas (Fig. 3.1; Domenici 2006, 2009a; Domenici and Lee 2009, 2012).[1] The project's research focuses on both settlement patterns and ritual use of caves, and has identified a long hypogean ritual tradition spanning from the Late Preclassic to Late Postclassic (Domenici 2010a). In Cueva del Lazo, 11 Late-Terminal Classic children's burials were found, together with a wide array of

[1] The Río La Venta Archaeological project, directed by Thomas A. Lee Whiting and Davide Domenici since 1999, is organized by the La Venta Exploring Team (Italy), the University of Bologna (Italy) and the Universidad de Ciencias y Artes de Chiapas (Mexico). Since 2002, the Project has been partly financed by the Italian Ministero degli Affari Esteri.

D. Domenici (✉)
Department of History and Cultures, University of Bologna, Bologna, Italy
e-mail: davide.domenici@unibo.it

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_3,

Fig. 3.1 Regional map showing location of Cueva del Lazo

associated perishable materials (Domenici 2013); the age of the individuals, all of them under six years, indicate that they were the result of some form of cultural selection. In order to ascertain if the archaeological context could be interpreted as a postsacrificial deposit or as a special funerary one, a consideration of archaeological and bioarchaeological data is required, as well as a comparison with archaeological and ethnohistorical data concerning child sacrifice in Mesoamerica.

We think that the Late Classic inhabitants of the El Ocote area were Zoque-speaking people, a hypothesis based both on historical linguistics and on archaeological data that confirm the cultural affiliation of the local groups with the wider group of Mixe-Zoquean speakers that in Pre-Hispanic times occupied the Isthmian area and the Chiapas Pacific Coast (Clark and Pye 2011). In fact, the archaeology of most of western Chiapas shows a quite strong cultural affinity with the Zoquean Southern Gulf Coast from Olmec times onward (Domenici 2009b). The inclusion of the present chapter in a volume devoted to the Maya area is thus based not on an assumption of cultural homogeneity but, rather, on the fact that Zoque and Maya often interacted in western Chiapas as "competing neighbors" (Lowe 1977), as well as on the recognition that Maya studies have recently produced important advancements toward a deeper understanding of sacrificial practices and cave-related rituals. The

comparative section of this chapter will thus deal not only with the strictly relevant Mixe-Zoquean cultural sphere but also with the Maya area and other regions where Colonial written documents add another dimension to the interpretation of ancient sacrificial behaviors. Colonial documents also provide a powerful tool to reflect on themes such as the Mesoamerican cultural perception of childhood and its relationships with sacrificial practices or special funerary treatments.

3.2 Cueva del Lazo: A Brief Description[2]

Located on the north cliff of the Río La Venta canyon, 250 m above the river, Cueva del Lazo is reached by an ample ledge descending from the canyon's rim. A short, 5-m climb from the ledge floor is necessary to reach the cave's main access, marked by three red rock paintings representing an unidentified animal, a group of 14 dots, and a square containing an "X" sign. A retaining wall and two partially modified steps allow entrance to the cave's main chamber, approximately 15 m deep, covering an area of roughly 170 m^2. Visible surface deposits included fiber cords, textiles fragments, a fragment of a bifacial chert knife, macrobotanical remains, and Late Classic Mechung pottery fragments, including a modeled jaguar from a censer's lid. On the sides of the main chamber are three alcoves (corresponding to excavation Units 1, 4, and 5), where the most remarkable finds were made; the alcoves corresponding to Units 4 and 5, containing the burials, are located in the deeper and more obscure area of the cave (Fig. 3.2).

The excavation of Unit 1, located in the westernmost alcove and enclosed by a semicircular row of stones, revealed the remains of a hearth, over 200 *jute* (*Pachychilus* sp.) shells, fragments of three coarse paste cooking *ollas* and a hemispherical bowl, two *yahuales* (rounded implements made up of twisted rushes in order to support concave-bottomed *ollas*), a partially burnt tobacco cigar, three perforated circles of dry gourd incised with bird images, human coprolites, textile fragments,

[2] Giuseppe Orefici directed the cave excavation in 1997, while Thomas A. Lee Whiting, Elvina Pieri, Eliseo Linares Villanueva and Carlos Silva Rhoads acted as co-directors. I participated in the excavation as head of one of the excavation units. Eliseo Linares Villanueva (2002) conducted a preliminary ceramic analysis, Luigi Piacenza (2000) conducted the paleobotanical analysis, and Andrea Drusini (1999) conducted a preliminary physical anthropological analysis. Having later assumed the role of the project's co-director together with Thomas A. Lee Whiting, I did the artifact analysis (Domenici 2004) and promoted new studies of specific materials: textile remains were submitted to conservation process by a team of restorers from the Coordinación Nacional de Conservación del Patrimonio Cultural of the Mexican Instituto Nacional de Antropología e Historia coordinated by Gloria Martha Sánchez (2011) who carried out technical analysis as well as fiber and dyes identification, Clara Paz Bautista (2011) carried out the analysis of shell artifacts, while Tiesler and Cucina (2005) conducted a new analysis of the human remains. Textile samples were dated by AMS radiocarbon technique by Beta Analytic Inc. On the basis of the analysis results and Orefici's original report and publications (Orefici 1998, 1999), I have put forth a reinterpretation of the whole context (Domenici et al. 2007; Domenici 2013). Some of the textiles from Cueva del Lazo are now exhibited in the Museo de los Altos de Chiapas, San Cristóbal de las Casas, Chiapas, Mexico.

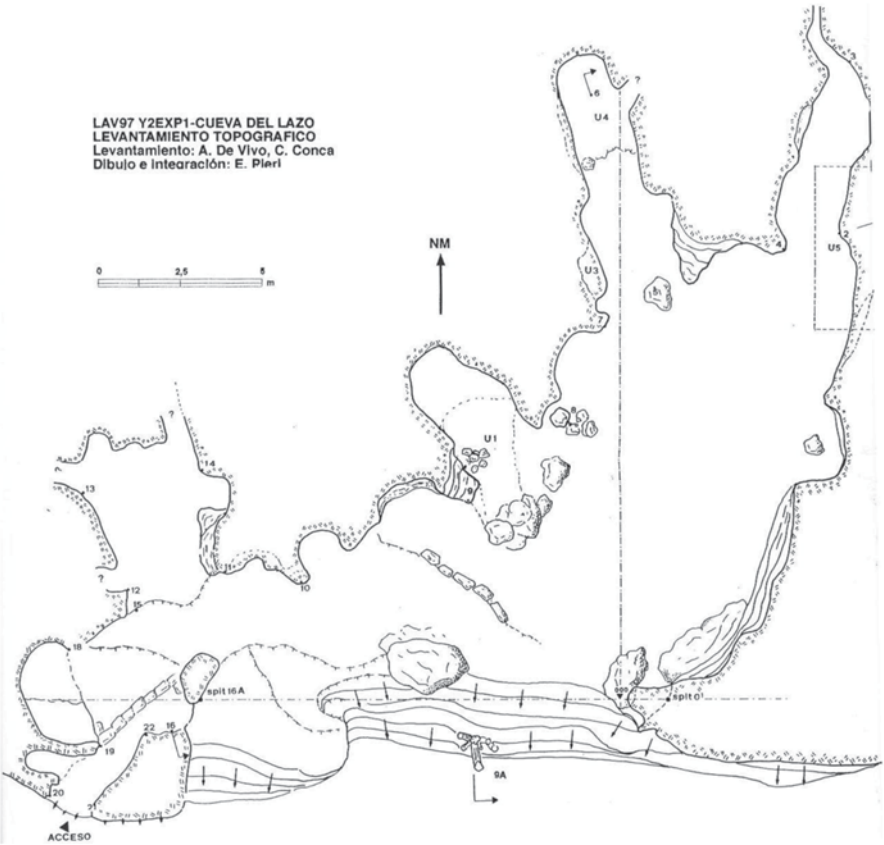

Fig. 3.2 Map of Cueva del Lazo. The remains of the bundled children were located in the two northernmost niches, in excavation Units 4 and 5 (U4–U5). (Drawing by Elvina Pieri)

a perforated seed bead, and two gray obsidian prismatic blades. Macrobotanical remains included corncobs (*Zea mays*), squash (*Cucurbita* sp.), *anona* (*Annona* sp.), *jocote* (*Spondias purpurea*), *coyol* (*Acrocomia mexicana*), *tempisque* (*Mastichendron capiri*), and *totoposte* (*Licania arborea*) (Piacenza 2000). Almost all of the noncoarse paste ceramic fragments were of Fine Orange ware (Tuma Orange) typical of the local Late-Terminal Classic Period.

In Unit 4, the northwestern alcove, the remains of a child burial (Burial 2) were found inside an intrusive pit excavated into an earlier floor. The pit was filled with earth and grass while the alcove access was enclosed by a semicircular row of stones. The child, between four and six years old (Tiesler and Cucina 2005, p. 9), was originally wrapped in a textile bundle whose fragments were found nearby. One of these fragments was decorated with a motif depicting architectonical features. A sample from a second textile from the bundle gave a 2-sigma calibrated AMS radiocarbon result of 650–780 AD (Beta Analytic Inc., sample Beta-285873). The remains of the burial were resting over a grass circle tied with grass fibers. In

proximity to the burial were a partially burnt tobacco cigar, a fragment of an incised and painted gourd, a fragment of a polished and perforated *Spondylus princeps* valve, a small ring of vegetal fibers, a green obsidian prismatic blade, human coprolites, and macrobotanical remains including maize (*Zea mays*), beans (*Phaseolus* sp.), *chile* (*Capsicum* sp.), *jocote* (*Spondias purpurea*), gourd (*Cucurbita* sp.), *tempisque* (*Mastichendron capiri*), *mamey* (*Mammea americana*), *anona* (*Annona* sp.), and *totoposte* (*Licania arborea*) (Piacenza 2000); pottery fragments included Fine Orange ware (Tuma Anaranjado, Yocotocmó type, Yocotocmó var.). In the outer part of the enclosing row of stones, the poorly preserved remains of the burial of a 6- to 18-month-old child (Burial 1B) were associated with textile fragments and fiber cords, obviously the remains of a burial bundle.

Unit 5, within the northeastern alcove, contained the richest remains. An intrusive pit measuring approximately 3 × 2 m had been excavated in antiquity through an earlier ground surface, and was partially covered on its southern side by a thick layer of grass. At the level of the grass covering rested a bone awl, a deer antler, a partially burnt tobacco cigar, a fragment of a vegetal fiber child's sandal, a mat fragment, a small wooden zoomorphic sculpture, a small, child-size bracelet composed of an S-plied cord, seven bird-bone tubular beads, and three stone beads. In addition, an interesting item was a stone plaque with a still unidentified resinous coating holding six small reptile (lizard?) teeth, probably used as a scarification or bloodletting tool.

The intrusive pit was filled with earth containing typical Late-Terminal Classic Mechung pottery fragments, human coprolites, and a huge quantity of macrobotanical remains including maize (*Zea mays*), *jocote* (*Spondias purpurea*), *tempisque* (*Mastichendron capiri*), *mamey* (*Mammea americana*), avocado (*Persea americana*), and *anona* (*Annona* sp.). The maize was found in the form of dry cobs (totaling 1,265 g) and analysis showed that their grains had been eaten when tender, and had probably been boiled (Piacenza 2000, p. 28).

The pit excavation revealed a group of children in very different states of preservation, probably the result of a complex sequence of consecutive burial events in the same pit. Three textile samples from the Unit 5 pit gave the following 2-sigma calibrated AMS results: AD 610–690, AD 680–890, AD 810–1010 (Beta Analytic Inc. samples Beta-285875, Beta-285874, and Beta-285876). The Unit 5 excavation began in the pit area not covered by the grass cap, an operation that led to the discovery of five very superficial and badly disturbed burials (1A, 3, 4, 5A, and 5B) that we describe here moving from north to south.

Burial 3 contained the remains of a 12–18-month-old child, whose skull bears traces of a fistulous lesion caused by an epidural hematoma possibly related to metabolic disease or posttraumatic inflammatory reaction, due to active reduction of the infant's occiput (Fig. 3.3; Tiesler et al. 2010; Tiesler 2012, p. 46). All six teeth remaining in the maxilla showed signs of decay (Tiesler and Cucina 2005, pp. 9–11). The burial was in close proximity to vegetal remains and fragments of two knotted brown textiles (one of them with geometric decoration) containing raw cotton fiber and the skull was located near a very fine mat with a fringed edge and a geometric decoration. All of these artifacts were obviously parts of the original bundle.

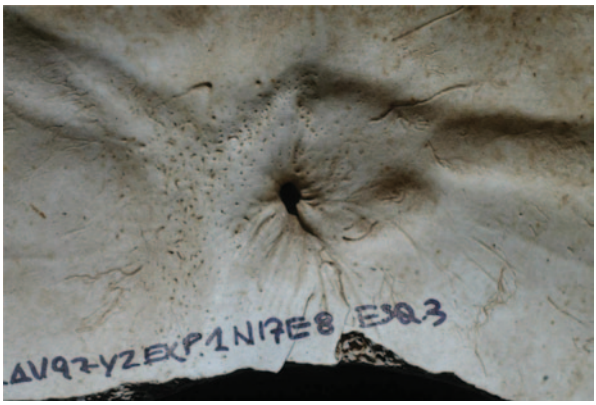

Fig. 3.3 Detail of endocranial surface of Burial 3 skull, with traces of a fistulous lesion possibly related to metabolic disease or posttraumatic inflammatory reaction due to active reduction of the infant's occiput. (Photograph by Vera Tiesler)

The highly perturbed Burial 5A consists of the fragmented skull and mandible of a 3- to 4-year-old child. The cranium, with evidence of tabular oblique modification and traces of porotic hyperostosis and *cribra orbitalia* (Tiesler and Cucina 2005, pp. 11–12), was associated with textiles.

Burial 5B comprised approximately 90 % of the skeleton of a five- to six-year-old child. The cranium was absent, while the mandible was in situ (Tiesler and Cucina 2005, pp. 12–13). The skeleton was partially wrapped in a textile formed by three cream-colored bands sewn together, almost identical to the one associated with Burial 5A. The child was originally placed in a seated position with flexed arms and legs.

Burial 1A is the disturbed body of a one- to two-year-old child whose cranium presented tabular oblique modification (Tiesler and Cucina 2005, pp. 7–8). Fragments of textiles (natural, red, and blue) and fiber cords indicated the existence of a burial bundle.

Burial 4 was composed of approximately 90 % of the skeleton of a one to two-year-old child with the unmodified cranium bearing evidence of pathogenic processes of an inflammatory or hemorrhage, as well as of cicatrizing *cribra orbitalia* (Tiesler and Cucina 2005, p. 11). The remains of cotton textiles nearby the skeleton, obviously part of its burial bundle, contained human coprolites. Given their spatial proximity, it is possible that the above-mentioned bone awl and deer antler were originally associated with this burial.

The grass cap on the northern side of the pit was then removed and two underlying burials (6 and 7) were found. Burial 6 was composed of approximately 90 % of the skeleton of a one-year-old child, including the mandible but not the skull (Tiesler and Cucina 2005, p. 13). The burial was bundled, as demonstrated by the presence of light blue textiles, as well as what appears to be a cotton turban held by a knot, which may have been wrapped around the head.

Burial 7 was composed of 95 % of the skeleton of an 18-month to three-year-old child (Fig. 3.4). The cranium, which still has remains of skin adhering to its surface, presents tabular oblique modification in its intermediate form, and shows evidence of pathological changes on the endocranial surface as areas of confluence of the

Fig. 3.4 Cranium of Burial 7. Note the tabular oblique modification in its intermediate form, as well as the remains of skin and hair. (Photograph by Vera Tiesler)

Fig. 3.5 The mortuary bundle of Burial 9 that—besides the missing cranium—was the best preserved among the excavated burials. (Photograph by Giuseppe Orefici)

venous net and of *cribra orbitalia* on the orbital roofs (Tiesler and Cucina 2005, p. 13). Bones were partially wrapped in a light blue textile and associated with a bracelet composed of an S-plied cord and a tubular shell (*Spondylus princeps*) bead (Paz Bautista 2011).

North of these two burials, in an area originally not covered by the grass, two other individuals (Burials 8 and 9) were found. Burial 8 contained 95 % of the skeleton of a 6-month to one-year-old child whose cranium still shows patches of hair as well as tabular oblique modification in its pseudorounded form; impressions in the temperoparietal areas indicate the use of textile bands to induce the modification (Tiesler and Cucina 2005, pp. 15–16). Bones, partially wrapped in a blue textile, were associated with a necklace composed of an S-plied cord attached to a subrectangular shell pendant (*Pinctada mazatlanica*) by two perforations in its upper corners (Paz Bautista 2011).

Finally, Burial 9 was made up of 90 % of the skeleton of a one- to two-year-old child, which included the mandible but not the skull (Fig. 3.5). The teeth show evidence of a few caries and hypocalcification (Tiesler and Cucina 2005, pp. 16–17).

The remains of the bundle included two textiles (one brown and one blue) and a blue turban, probably originally tied to the child's head. The child wore a necklace almost identical to the one found in Burial 8, but in this case, in addition to the subrectangular shell plaque manufactured with *Spondylus princeps*, three tinklers of cut and polished *Oliva* sp. shells were attached to the main cord (Paz Bautista 2011). The child's body rested on a sediment layer covering a grass circle tied with grass fibers. A hemispherical dried gourd (*jícara*) containing a corncob (whose grain had been eaten when tender) was placed on one side of the bundle.

The characteristics of the burials suggest that they were placed into the intrusive pit on different occasions, leading to various acts of reexcavation and refilling of the pit that caused the disturbance of the earlier burials. The superficial remains of previously displaced burials later suffered additional disturbance by animals that left their traces on the surface of the bones (Tiesler and Cucina 2005, p. 7). A similar situation appears in Unit 4, where Burial 1B was probably disturbed during the disposal of Burial 2. If this hypothesis is correct, the lower and best preserved burials in Unit 5 (Burials 6, 7, 8, and 9) should have been the last to be interred in the pit. The absence of the crania in the otherwise well preserved Burials 5B, 6, 7, and 9 suggests that during later reexcavations of the pit the crania and other bones of earlier burials could have been removed and the fragmented cranium of Burial 5A could have been broken. The extraction of body parts of earlier burials could reflect a widespread Mesoamerican custom (e.g., Lind and Urcid 1983, pp. 80–81).

The spatial pairing of Burials 6–7 and 8–9, as well the similarity between the necklaces of these last two, suggest that in these two cases the children could have been buried in pairs; the strong similarity between the textiles associated with Burials 5A and 5B also suggests the possibility of a double burial. In light of the historical sources mentioning the sacrifice of a boy and a girl (see below), it is unfortunate that we cannot know the sex of the paired children in Cueva del Lazo.

Microscopic analysis carried out on 112 textile samples showed that 36% of them were manufactured with cotton (*Gossypium* sp.), 6% with agave fiber (*Agave* sp.), while a surprising 58% were composed of mixed cotton and agave fibers. Mats were manufactured with reeds of the cypheraceae family and with palm (*Brahea dulcis*) leaves. Scanning electron microscope (SEM) and energy dispersive X-ray (EDS) analyses showed that indigo (*Indigofera tinctoria*), charcoal black, and achiote (*Bixa orellana*) were used as dyeing materials (Sánchez 2011)[3].

Determining the exact chronology of the burial sequence is a difficult task. All ceramics found in the Unit 5 fill date to the Mechung phase of Late-Terminal Classic (Lee 1974a), an unfortunately wide span during which the whole sequence of Unit 5 burials must have been disposed. This chronological attribution fits with the calibrated radiocarbon dates spanning the seventh to tenth centuries, as well as with the presence of tabular oblique cranial modification, which was common in the area during the Late-Terminal Classic, and almost absent in subsequent periods (Tiesler

[3] Interestingly, we found a curious pyramidal textile "bag" or bundle decorated with stylized animals resembling frogs: its shape is very similar to some mat "bags" found by Moser (1975, p. 34) in Ejutla cave, Oaxaca.

and Cucina 2005, p. 18; Tiesler 2005, p. 353). Although there is no direct evidence of perimortem trauma among the skeletons, various elements of the context are consistent with documented sacrificial behavior.

3.3 Child Sacrifice in Mesoamerica: Archaeological and Ethnohistorical Evidence[4]

The following discussion of archaeological examples, historic accounts, and ethnographic studies reviews the practices related to child sacrifice in Mesoamerica in an effort to contextualize the remains from Cueva del Lazo and determine whether they represent evidence of such rituals. The enumeration of contextual details is required in order to identify recurring patterns that could correspond to ritual patterns relevant for interpreting the Cueva del Lazo context.

The earliest possible evidence of child sacrifice in Mesoamerica[5] comes from the deeply stratified Early Olmec (1600–1000 BC) offering area excavated in the pond of Cerro El Manatí, Veracuz (Ortíz and Rodríguez 1999). Within this, the Macayal phase (ca. 1200–1000 BC) offerings, which were probably the result of a single, massive deposition event, contained groups of greenstone celts, as well as hematite balls, obsidian knives, piles of leaves, plant bundles, and a vast array of wooden objects, such as anthropomorphic busts (some wrapped in mats), knives, staffs, and scepters. Dispersed fragments of several infant bones were associated with some of the wooden busts, and bundles of reeds and other plants seem to have been deposited in direct association with at least one child's cranium. Two primary burials of newborn infants were also found. The preliminary bioanthropological analysis revealed that most of the individuals were newborn and that the majority of them were dismembered or cut into sections, albeit no osteological trace of these activities were described (Ortíz and Rodríguez 1999, p. 248; 2000, p. 89). The authors proposed that the children were sacrificed prior to interment or drowned in the pond, and also raised the possibility of episodes of ritual cannibalism (Ortíz and Rodríguez 1999, pp. 248–249; 2000, p. 89; but see Joyce 2006, pp. 294–295; Ladrón de Guevara 2010 p. 68).

[4] In the following overview we did not include data concerning child sacrifice as "funerary companions" for kings and lords, a typology not strictly relevant to the aim of the present study. Since the distinction between cave and noncave contexts could be based on emic categorizations not shared by ancient Mesoamericans, our review will deal with child sacrifices in different locations.

[5] Often mentioned as the earliest evidence of Mesoamerican child sacrifice is from the Archaic period (ca. 7500–5000 B.C) Burials 2 and 3 from Coxcatlán cave (Puebla), whose skulls—according to MacNeish (1962, pp. 8–9; MacNeish and Fowler 1972, pp. 266–270)—were exchanged after decapitation. Piojan and Mansilla (cited in Urcid 2010, p. 122, n. 5) detected osteological evidence of exposure to fire and defleshing on the bones of Burial 3, although they were unable to identify any trace of decapitation. Nevertheless, Urcid (2010, p. 122, n. 5) challenged the whole interpretation, questioning whether the skulls were exchanged at all and observing that the exposure to fire and subsequent defleshing could have been part of a funerary treatment.

The El Manatí children were buried in a deeply stratified deposit similar to other offering areas excavated in Olmec or Olmec-related sites pertaining to the Mixe-Zoquean cultural tradition.[6] San Isidro Mound 20 Dzewa phase (700–500 BC) Burial 9, for example, contained a child seated in a pit and associated with three celts, 18 pseudocelts, and shells (Lowe 1981, pp. 249–252; 1998, pp. 60–62). The burial was identified among a huge sequence of celts caches along the typical east–west offering axis of the so-called Middle Formative Chiapas architectural complexes (MFC; Clark and Hansen 2001). The burial structure and location is quite similar to the adult burial (Burial C-1) found together with more than 100 celts in an offering pit along the MFC axis between Mounds 11 and 12 in Chiapa de Corzo and recently interpreted as the dedicatory burial of a sacrificed victim (Bachand et al. 2008, pp. 113–119; Bachand and Lowe 2011, p. 80). On the same east–west axis of San Isidro Mound 20, during the later Guañoma phase (Late Preclassic- Protoclassic), another burial of a flexed young girl (Burial 6) was interred together with more than 130 vessels (Offering 15) as the initial act of a long sequence of offerings of lip-to-lip or stacked dishes (Lowe 1999, pp. 81–85), probably reflecting a continuation of the traditional association of human sacrifices and offerings along the architectural axis of the MFC complexes[7].

Problematic child burials, interpreted as possible sacrifices, were associated with Olmec thrones at San Lorenzo (Monument 14; Cyphers 1999, p. 164) and Chalcatzingo (Monument 22; Fash 1987; Grove 1984, p. 67); in the patio of Chalcatzingo, a double burial of two children led Grove (1984, p. 67) to suggest "something other than natural causes in order to explain the death."

Despite the lack of any osteological evidence of ritual killing in the mentioned Olmec sites, we can note the recurring association between child burials and offering areas whose relationship with politically meaningful monuments makes clear their nonfunerary primary function. The role of child-like beings in Olmec iconography, where they are related to greenstone celts, maize, water, and mountain/earth monsters and their caves/mouths, suggests that the symbolic association between children and the watery underworld was already established in Preclassic times.

Moving to Preclassic Central Mexico, Piojan (1981; Piojan and Mansilla 1997) identified evidence of stab and cut marks and exposure to fire on a series of Late Preclassic skulls and bones, many of them of infants and subadults, from the site of Tlatelcomila. The author interpreted the osteological evidence as suggestive of

[6] See, for example, Arroyo Pesquero, La Venta Complex A (Drucker et al. 1959, pp. 133–187), La Merced (Rodríguez and Ortíz 2000), San Isidro (Lowe 1981, 1998, 1999), Chiapa de Corzo (Bachand et al. 2008; Bachand and Lowe 2011) and Ceibal (Inomata 2011).

[7] Child burials in urns deposited in monumental structures—in the same areas where huge amounts of offering caches were deposited —were quite common in the Olmec-related zoquean sites of western Chiapas from Late Preclassic to Early Classic times (Lowe 1962, 1964, 1999; Agrinier 1970, 1975a, b; Lee 1974b; see also Domenici 2010b); often they were interpreted as remains of child sacrifices or "dedicatory burials" related to architectural construction episodes, but in a more recent publication Lowe (1999, pp. 50, 64–65), albeit admitting that possibility, prefers to interpret them as naturally dead children that, due to their young age, were buried in "privileged or sacred places."

postsacrificial acts of cannibalism, an activity also detected on skeletons (one of them one infant) from the Preclassic site of Tlatilco.

A well-known case of central Mexican child interments in a clearly nonfunerary context is that of the 12 children deposited at the corners of the Pyramid of the Sun at Teotihuacan (Batres 1906). If dating to Teotihuacan times[8], the burials could be interpreted as dedicatory offerings to the pyramid, an interpretation that could be confirmed by the recent discovery of an offering cist located at the spatial center of the pyramid and interpreted as the original dedicatory offering of the monument; its layered contents included Tlaloc vessels, greenstone, obsidian, conch, and pyrite objects, as well as animal skeletons. Nearby, the archaeologists found seven human interments, three of which were infants, tentatively interpreted as sacrificed individuals (Instituto Nacional de Antropología e Historia *noticias* 2011). If confirmed, this finding could testify to a recurrent association between dedicatory child sacrifices and the Sun Pyramid, perceived as a "watery mountain" whose main temple was dedicated to the Storm God (Manzanilla 1997, p. 137). Another example of dedicatory sacrifice could be the child burial excavated by Cook de Leonard (1957, p. 1; Sugiyama 2010, p. 82) inside the low platform of Oztoyahualco Plaza 1; unfortunately, no osteotaphonomic study is available for this case.

In the Maya area, a Terminal Preclassic cache from La Milpa (Belize) containing a two-year-old infant (Individual 107) interred beneath the floor of the site's Great Plaza on top of an adult burial has been interpreted as a sacrifice (Geller 2011, p. 95); in the absence of any clear evidence, this interpretation remains speculative, and the same can be said for other Classic cases of children buried in ceramic cache vessels (see ref. in Geller 2011, p. 93). Equally weak appears to be the sacrificial interpretation of La Caldera (Belize) burial of Individual 103, a three- to five-year-old child interred in a trash lens in front of a residential platform (Geller 2011, pp. 95–97). More solid evidence from noncave contexts comes from a Terminal Classic pit at Colha (Belize) filled with 30 decapitated skulls of men, women, and children. Many of the individuals in the Colha pits show cut marks on the frontal area of the cervical vertebrae, probably indicating that throat slitting preceded actual decapitation (Massey 1994; Massey and Steele 1997); the same kind of evidence of throat slitting has been detected on the vertebra of a four to eight-year-old child from Burial PNT-150A at Tikal (Houston and Scherer 2010, pp. 182–183).

Cases of possible Classic Maya child sacrifices in caves (see Scott and Brady 2005), include the five to six-year-old child interred in Naj Tunich (Brady 1989 p. 351), and the children interred in Gordon's Cave 3 at Copan, which were speculated to have been sacrificed at the death of an adult (Brady 1995, p. 35). Reents-Budet and MacLeod (1986, pp. 80–81) interpreted as possible sacrifices the inter-

[8] Traditionally, they have been interpreted as sacrificed children, but Sugiyama (2010, pp. 103–104), on the basis of the lack of formal cists, recently suggested that these burials are likely of a very late, or even modern, date. Unfortunately, the construction sequence of the outer layer of the pyramid is far from clear and so it is not easy to ascertain if the children could have been deposited between the surfaces of two different sequential structures, even in the absence of formal cists. I would also add that such a regular spatial arrangement of the burials on all the corners of the pyramid would be quite surprising in Colonial or even Modern times.

ments of nine adults and 13 children in Petroglyph Cave on the basis of their spatial location and absence of grave goods, but with no support of osteological evidence. Owen (2005) also interpreted the bones of at least 31 individuals placed on Barton Creek Cave's ledges, 12 of them infants and children under 12 years, as the remains of sacrificed individuals on the basis of contextual evidence such as lack of grave goods, atypical burial position, spatial relationships with cave features, and age distribution. An interesting context is that of the more than hundred individuals (97 of them subadults) whose disarticulated bones were found in a small cave connected to a partially modified chamber, approximately 300 m E-NE of the Sacred Cenote of Chichen Itza (Márquez and Schmidt 1984; Fernández Souza 2006). Noteworthy is the fact that the disarticulated bones were covered by a layer of pieces of ceiba bark (radiocarbon dated at AD 920 ± 60), a vegetal covering reminiscent of the grass layer on top of the Cueva del Lazo interments.

It is important to note that most postsacrificial deposits of children in the Preclassic and Classic Maya area do not show the complex, stratified structure of ritual deposits of the Mixe-Zoquean area, and usually include both infants and adults, as if the selection of the victims was not strictly related to their age. Nevertheless, Classic Maya iconography shows explicit representations of child sacrifices (Robicsek and Hales 1984, p. 56; Houston and Scherer 2010; Geller 2011).[9] Common forms of child sacrifice depicted in iconography are heart extraction and burning on a censer. On Vessel K1645 from Kerr's Maya Vase Database, a child on a dish atop a wooden tripod, below which a censer is burning, is presented to two bundled gods described as "newborn" by the associated texts. A similar dish can be seen on Vessel K3395, which displays a child with signs of cardiectomy. Houston et al. (2006, Fig. 3.18; Houston and Scherer 2010, p. 173) state that the children were deposited on dishes because they were perceived as "special food" for the *wayob,* or alter egos of the rulers; the association between sacrifice and food offerings is also evident in the fact that the glyph for "heart" *(–ohl)* is the representation of a *tamal*.

In Classic Maya iconography, children are often represented with flexed legs, a position clearly related to the concept of birth or rebirth and also displayed by the so-called Baby Jaguar in recurrent mythical scenes on Classic Maya vessels: the Rain God is usually menacing the Baby Jaguar with its ax, while the Death God throws him on a zoomorphic mountain in order to make him fall into the skeletal maws of the Underworld. Martin (2002; see also Taube 1994) observed in this myth a link between birth, sacrificial death, and resurrection: the Baby Jaguar, or *unen balam*, can overlap or merge with the Maize God and his sacrifice could be an act that gives rise to the newborn Maize God. In a recent interpretation of the same imagery as part of a complex myth, Valencia Rivera and García Capistrán (2011) argued that the Baby Jaguar is a personification of the maize seed that—through

[9] See, for example, the Tohcok jamb, Yaxhá Stela 3 (Houston and Scherer 2010, Fig. 4), and various Late Classic cylindrical vessels such as K1247, K2213, K0928 (Kerr Maya Vase Database); it is interesting to note that in this last case, one of the individuals participating in child sacrifice is holding a musical instrument almost identical to the Aztec *ayauhchicahuaztli*, also played during child sacrifices during the Atlcahualo festival, as shown by in Sahagun's *Primeros Memoriales* (1993, f. 250r).

sacrifice—is thrown onto the sacred mountain, from which he will reemerge as the fully grown Maize God. Martin, noting that the Baby Jaguar also appears in the flexed position on a plate over a censer (i.e., in the same context as the aforementioned sacrificed children represented in Maya iconography), proposed that since Olmec times the sacrifice of the Baby Jaguar functioned as a mythic paradigm for actual child sacrifices performed during kingly accessions.

Postclassic contexts that seem to reflect a wide variety of sacrificial practices have been identified at various Maya sites. Again, in most cases subadult remains are mixed with adult ones, as in the Late Postclassic mass grave at Zacpeten, which had evidence of dismemberment and defleshing on the bones of 11 individuals (Duncan 2005; Pugh 2005, pp. 59–60). Similar Late Postclassic cases include the disarticulated remains of children and adults in a waterhole connected to Cenote X-Coton from Mayapan and in some Topoxte *chultunes* (Pugh 2005, pp. 57, 60).

As recently summarized by Miller (2007, pp. 166–168), dedicatory offerings at Chichen Itza include scattered subadult and young adults bones[10]. In the Sacred Cenote (Tiesler 2005; Anda 2007), subadults (mainly 4–12 years old) constitute the vast majority of identified individuals, many of them showing cut and stab marks suggestive of heart extraction, defleshing, and flaying, as well as signs of exposure to fire; most of their skulls were modified, often showing evidence of porotic hyperostosis. The media recently reported the finding by De Anda of a group of six sacrificed individuals—two of them children—accompanied by jade beads, shells, and stone tools, in another cenote in Chichen Itza (Roach 2011). Other evidences of Postclassic Maya child sacrifice come from Champoton Group X, where various children—one of them with a cut between the last cervical and the first thoracic vertebra, suggesting throat slitting—were buried with some adults; all the subadults were clearly unhealthy, suffering from malnutrition and/or parasitosis (Hurtado Cen et al. 2007, pp. 221–225).

Moving to Postclassic Central Mexico, an Early Postclassic mass grave containing 24 children and subadults, between 5 and 15 years old, has been excavated in Tula and briefly reported to the media. The girl was deposited on an altar, while the males were interred around it. The children, apparently killed by throat slitting and with evidence of skull trepanation, were interred with a Tlaloc figurine and are thought to have been sacrificed to the Rain God (Rodríguez 2007).

In Teotenango, Lagunas and Zacarias identified Late Postclassic "mass graves of decapitated or sacrificed infants" (Piojan 1981, p. 11). Decapitated and dismembered children were also found in Cholula (Lagunas and Serrano 1972; López Alonso et al. 1976). Broda (2001, p. 303) suggested that the burials of children excavated by Charnay in Tenenpanco, on the Popocatepetl volcano, could have been the remains of Aztec sacrifices. The remains of children found in Tezcoco were recently interpreted by Lesbre (2011, p. 101) as remains of dedicatory sacrifices. In

[10] According to Miller, subadult bones were found in the architectural fill of the Caracol, a child's skull on a plate in the Nunnery complex, two subadult burials in the Osario's stairway, various subadult remains in the Venus Platform, and a child buried in a cache in front of the Temple of Cenote Xtoloc.

Tlatelolco, various sacrificial contexts including children have been identified with evidence of beheading, mutilation, throat slitting, defleshing, and maybe cannibalism (Guilliem 2010, pp. 286–288, Fig. 4; Piojan and Mansilla 2010). In the Temple of Ehecatl (Guilliem 1999) 30 subadults constituted the majority of 41 sacrificed individuals buried in ceramic vessels and pits, in association with shells, bird bones, blue pigment, copper tinklers, obsidian blades, pottery figurines, and vessels; Guilliem interpreted this context as evidence of an extraordinary sacrifice carried out during an extreme drought between AD 1454 and 1457. All the individuals were males, and most of the subadults were under 3 years old (De La Cruz et al. 2006; Román Berrelleza 2010, pp. 358–359); many of them had evidence of malnutrition in the form of enamel hypoplasias, gingivitis, and porotic hyperostosis (Román Berrelleza 1991; Román Berrelleza and Rodríguez 1997; Román Berrelleza and Chávez Balderas 2006).

The human remains excavated in the offerings at Templo Mayor of Tenochtitlan included decapitated children (mainly between six and eight years old, with a single case of a four-year-old individual; Chávez Balderas 2010, p. 325). Two of the skull masks found at Templo Mayor were also manufactured with the likely decapitated skulls of four- and six-year-old children (Piojan et al. 2001; Chávez Balderas 2010, p. 334). Three infants were buried in a stone cist found under the Cathedral, with pottery vessels and *comales*, bird bones, blue pigment, and a greenstone bead (Román Berrelleza 1999); an eight-year-old boy was buried in a stone cist associated with the Coyolxauhqui monolith, and the cist burial of a healthy five-year-old child sacrificed to Huitzilopochtli, with osteotaphonomical evidences such as cut marks and *perimortem* fractures of the ribs indicating heart extraction, has been recently excavated and described in full detail (López Luján et al. 2010).

The most outstanding archaeological case of Aztec child sacrifice is the Templo Mayor Offering 48, where 42 children between two and seven years old (most of them between four and six) were buried in a stone cist as part of a stratified deposit also containing 11 Tlaloc stone jars, two turquoise mosaic discs, greenstone beads (in some cases forming necklaces and bracelets), blue pigment, shells, bird bones, gourd fragments, pinewood, and copal (López Luján 1993; Román Berrelleza 1990, 2010; Román Berrelleza and Chávez Balderas 2006). Many of the children presented porotic hyperostosis and cavities, while the absence of cut marks on the bones suggests that the children were killed by throat slitting (Román Berrelleza and Rodríguez 1997; Román Berrelleza and Chávez Balderas 2006; López Austin and López Luján 2008, p. 140).

Documentary evidence of Postclassic and Early Colonial child sacrifices is found throughout Mesoamerica (Graulich 2005 p. 208). In the Maya area, historical sources such as Diego de Landa's *Relacion* (Tozzer 1941) and other Colonial documents (Fuentes y Guzmán 1932; Scholes and Roys 1938; Scholes and Adams 1938; see also Nájera 1987, pp. 128–129) clearly state the continuing relationship between child sacrifice, rain deities, and sacred places such as *cenotes* or caves. De Anda et al. (2004; de Anda 2007) have determined that 69 % of the 196 human sacrificial events recorded in the chronicles refer to infant and juvenile individuals, most of them between 5 and 6 years old. The Colonial Maya ceremony of child

sacrifice, called *Cimchich* ("Kill the Little Ones"), could well be an antecedent of the contemporary *Ch'a Chaak* ceremony, in which the *bacabs* are impersonated by children and petitioned for rain (Scholes and Adams 1938, p. 152; Tozzer 1941, p. 117; Anda 2007, p. 201).

In Oaxaca, early Colonial documents such as the *Proceso inquisitorial de Yanhuitlán* and the *Relaciones geográficas*, include mentions of child sacrifices related to rain deities, often performed in caves and on mountains (Jiménez Moreno 1940, pp. 40–46; Spores 1967, p. 26; Urcid 2010, Tab. 2).

The detailed ethnohistorical documentation of Postclassic child sacrifice from the Nahua region allowed thorough interpretations of Aztec human sacrifice (Duverger 1979; González Torres 1985; Carrasco 1999; Graulich 2005) and of mountain and fertility cults that included child sacrifice (Broda 1971, 1991, 2001; Arnold 1999; Román Berrelleza 2010). According to historical sources, children to be sacrificed were usually slaves bought at the market where they were sold by specialized merchants; Durán (chap. XX) states that they were natives of the same town, sometimes sold by their own parents. In other cases, they were enslaved war prisoners, slaves given as tribute by subjugated provinces, or simply children spontaneously offered by their families, some of which were even of noble rank (Graulich 2005, p. 208).

Aztec child sacrifices described in historical sources can be divided between those that were carried out during the festivals of the annual ritual cycle and those that occurred in exceptional, or noncyclical, occasions. Sahagún (HG, II, 4; 1989, p. 84) states that children were sacrificed during the first four months of the year, until the rain started falling on agricultural fields. In the first month of *Atlcahualo* a child sacrifice was performed as a rain petition to the *Tlaloques*, the child-like Storm God's attendants. Seven children (six males and a female)[11] were sacrificed in seven different places in the basin, mostly mountains and water bodies (CF, II, 20; HG 1989, pp. 104–107; Primeros memoriales 1997, pp. 55–56). The children to be sacrificed were selected on the basis of "signs," such as two cowlicks in their hair or a favorable birth date (CF II, 20; HG 1989, p. 104). Their age was probably not strictly relevant: while Sahagún in his Spanish text described them as "breastfeeding age" (HG, II, 20; 1989, p. 104), Motolinía, speaks of a three to four-year-old boy (Motolinía 1996, p. 193; Las Casas chap. 170, 1992, p. 1166; Torquemada, I, chap. XXI, 1986:vol. II, 119, but see book X, chap. X, 1986:vol. II, 251), and Pomar states that they were seven to eight years old (Pomar and Zurita 1941, p. 17). They were called *tlacateteuh* ("human paper streamers"), thus symbolically associated with the actual paper streamers that were spattered with rubber and tied, together with maize cobs and other foods ("their greenness, their sprouts, their shoots"; CF, II, 20), to the poles raised in order to favor plant regeneration. Sahagún describes in detail the different dresses of the children, full of symbols of water, fertility,

[11] Actually, the number and sex of the children is ambiguous: in his Spanish text Sahagún speaks of "boys or girls" and states that "a huge number of children were killed." Motolinía (chap. VIII, 1996, p. 170)—and Las Casas and Torquemada after him (Las Casas chap. 170, 1992:1166; Torquemada, book VII, chap. XXI, 1986:vol. II, p. 119)—writes about the killing of "a boy and a girl" during the whole festival.

and richness; for instance, quetzal feathers in their headdresses probably symbolized the flowering corn. During the procession of the litters that led them to the *ayauhcalli* ("House of Mist"), the children were adorned with greenstone necklaces and anointed with rubber and amaranth paste: "Various elements of their costume were seen to attract moisture, thus conjoining water and agricultural fertility as the sources of their wealth" (Arnold 2001, p. 84). The children were also renamed after the places where they were going to be sacrificed. The dressing and renaming process was clearly perceived and described as a transformative process that turned (*yetiuh*) them into the places that were going to receive the sacrifice. While the people accompanying the procession cried, the children were also expected to shed tears that would have caused the coming of the rain. As for the method of killing, Sahagún, in his Spanish text (but significantly not in the Nahuatl one), mentions heart extraction, followed by cooking and consumption of the flesh (HG, II, 1, 20; 1989:104), while Motolinía stated that they were not killed by heart extraction, but instead by means of throat slitting after which their bodies were wrapped in clothes and enclosed in a stone box[12] (Motolinía 1996, p. 193; Las Casas, 1992, chap. 170, p. 1166; Torquemada, book VII, chap. XXI, 1986:vol. II, 119).[13] Pomar and Zurita (1941, p. 17) confirms that the children were killed by throat slitting, adding that their corpses were left in a cave. The Spanish text of the Codex Magliabechiano and Cervantes de Salazar (I, 19; 1971, p. 133) speak of "drowning in canoes" (probably a reference to the boy that according to Sahagún was submerged in the Pantitlan whirlpool). However, the pictographic representation of *Atlcahualo* in Sahagún's *Primeros memoriales* shows a child with a quetzal feather on his head and enveloped in a blue cloth carried toward a mountain sanctuary where he is sacrificed, apparently by heart extraction (Codice Matritense fol. 250r). Codex Tudela (fol.11r) generally states that the sacrifices of this festival (including children) were killed by heart extraction.

For the second month of Tlacaxipehualiztli, Sahagún briefly mentions child sacrifices (HG, II, 4; 1989, p. 84), Motolinía (1996, p. 170) also briefly wrote that "they killed the children," and Torquemada (book VII, chap. XXI, 1986, vol. II, p. 120; book X, chap. XII, 1986, vol. II, p. 254) states that children were sacrificed during the first three months. In fact, a child is brought toward the impersonator of Xipe in the depiction of Tlacaxipehualiztli in the Codex Borbonicus. Interestingly, Durán (1995:II, p. 249) stated that the celebrations devoted to the *Tlaloques* continued on mountains and in caves.

In the third month of Tozoztontli, according to Sahagún (HG, II, 2, 4; 1989, pp. 83–84), many children were sacrificed on the mountains to Tlaloc and the *Tlaloques*. Both Motolinía (1996, p. 194) and Torquemada (book VII, chap. XXI, 1986,

[12] It is not clear if Motolinía refers to an underground cist or to a proper stone box. Nonetheless, it is interesting to observe that stone boxes such as the Aztec *tepetlacalli* often contained offerings for the rain and fertility gods (López Luján and López Austin 2010), a practice apparently also shared by Preclassic and Classic Zapotecs that used pottery boxes for the same purpose (Urcid 2011).

[13] In his book VII, chap. XXI, 1986:vol. II, p. 120 and in book X, chap. X, 1986:vol. II, p. 252 Torquemada contradicts himself stating that the children were eaten by nobles.

vol. II, pp. 119–120; book X, chap. XII, 1986, vol. II, p. 254) specify that four slave children were sacrificed to Tlaloc and then deposited in a cave that was closed until the next year.[14] Child sacrifices in this month are also mentioned by Cervantes de Salazar (I, 19; 1971:133) and in the Spanish text of Codex Magliabechiano, stating that the boys, girls, and newborn that were sacrificed were also called *tlacateteuitl* ("Human Paper Streamers").

Child sacrifices during the fourth month of Huey Tozoztli are mentioned by Sahagún (HG, II, 4; 1989, p. 84), and Durán (II, chap. 8; 1995, pp. 89–102), who wrote that a six- or seven-year-old boy was sacrificed on Mount Tlaloc (as also represented in Codex Borbonicus, in which a boy is depicted with a long quetzal feather on his head; see Contel 2008). The boy was killed by throat slitting, and his blood was sprinkled on the Tlaloc idol, on the rich offerings of dresses and food previously left in never before used vessels, and on the small idols representing the mountains of the Basin of Mexico. If the blood was not enough, one or two more little boys were killed. Afterwards, a seven- or eight-year-old girl, dressed in blue clothes and impersonating the goddess Chalchiuhtlicue was sacrificed at the Pantitlan whirlpool: her throat was slashed with a spear for killing ducks, her blood was poured into the water, and the girl's body was then submerged. The deposition of lavish offerings concluded the ceremony. The sacrifices of "breastfeeding age" children in Huey Tozoztli are also mentioned by Cervantes de Salazar (I, 19; 1971, p. 133), as well as in Codex Vaticanus A (fol. 44r) and Codex Magliabechiano (fol. 31v) Spanish texts.[15]

During the festival of Tepeilhuitl[16], anthropomorphic images of the mountains made of *tzoalli* (amaranth dough) were brought to the main mountains. These images, according to Sahagún were called *ecatotonti* ("Little Winds"), and were modeled upon wooden images of children (HG, II, 32; 1989, p. 154; Torquemada, book X, chap. XXIV, 1986, vol. II, p. 279). The *tzoalli* images were built on grass circles (*yahualli*), ritually bathed in water and placed on reeds mats; the images were then dressed with paper and anointed with rubber (CF, II, 20). After some human sacrifices (according to Durán including children and slaves), the *tzoalli* images were

[14] Motolinía also states that child sacrifice began with a four year drought. The same information is mentioned by Las Casas (chap. 170, 1992, p. 1167) and Torquemada (I, chap. XXI, 1986:vol. II, p. 121); the text of the *Anales de Cuauhtitlan* also states that the "human paper streamers" sacrifice had its origin during the drought that hit the Toltecs during the year 7 Rabbit (AD 1018) (Bierhorst 1992, pp. 38–39).

[15] Durán also mentions the sacrifice of four children (two girls and two boys) on the Iztac Cihuatl mountain, but it is not clear in which month these sacrifices were done (Broda 1971, pp. 281–282).

[16] Cervantes de Salazar (I, p. 19; 1971, p. 133) and the Spanish text of Codex Magliabechiano mention sacrifices of children offered to Quetzalcóatl and Tezcatlipoca during the preceeding months of Etzalcualiztli and Miccailhuitl but no other author confirms this information. Torquemada (book VII, chap. XXI, 1986:vol. II, p. 119; book X, chap. XVII, 1986:vol. II, p. 267) erroneously refers to Miccailhuitl when describing the drowning of a boy and a girl with their canoe, a sacrifice that other authors attribute to the month of Atemoztli; the picture of Miccailhuitl in the *Primeros memoriales* shows a figure sitting in a cave with a blue textile turban and paper streamers on the head, apparently an image of the sacrificed adult Tlaloc impersonator left in a cave, as also mentioned in the corresponding text (Codice Matritense fol. 250v; *Primeros memoriales* 1997, pp. 59, 78).

also sacrificed: they were beheaded with a flint knife and their "flesh" was then eaten (Durán II, 8; 1995, p. 278). Sahagún states that after the sacrifice of the *tzoalli* images the grass circles were treated with special care and preserved until the next Tepeilhuitl festival (CF, II, 20; HG 1989, p. 156).

A similar symbolic sacrifice was made during the 16th month of Atemoztli, when *tzoalli* images of the *Tlaloques*-mountains, called *tepictoton* and adorned with rubber-sprinkled paper and green mats, are made offerings of food and then "killed" (an act that the *Primeros memoriales* describes as a debt payment, exactly as the child sacrifice; Sahagún 1997, p. 65) with a weaving stick, called *tzotzopaztli*. They were beheaded and their "hearts" were deposited in a green gourd vessel (CF, II, 35; HG 1989, pp. 166–168). While neither Sahagún nor Durán mention child sacrifices as part of this festival, Motolinía (chap. XIV, 1996, p. 193), and later Las Casas (chap. 170, 1992, p. 1167), Mendieta (II, 26; 1980, p. 102) and Torquemada mention that a boy and a girl were drowned in the lake. This same information is given in the Codex Magliabechiano whose Spanish text mentions the drowning of children in places "where their god would give them water." Even if the following month of Tititl is never mentioned as an occasion of child sacrifice, it is possible that the 16th month of Atemoztli inaugurated a series of seven months, roughly coinciding with the peak of the dry season, in which child sacrifices were performed in order to promote the arrival of the rains. In fact, Durán states that during the last month of Izcalli they used to conduct rituals on the mountains of Tlaloc and Matlacueye by sacrificing a boy and a girl and bringing offering of food and blood (by autosacrifice) to mountains, caves, and crevasses (Durán 1995:II, p. 290)[17].

Even in noncyclical child sacrifices[18], the link with water and rain is predominant: in native histories reported in the *Leyenda de Los Soles* or in the *Anales de Cuauhtitlan*, lords as the Toltec king Huemac and the Mexica chief Tozcuecuex had to drown their own offspring in order to appease the *Tlaloques* and put an end to droughts (Broda 1971, p. 275; Bierhorst 1992, pp. 39, 157; Graulich 2005, p. 209). In Acapiztla (Oaxaca), some children were offered to Tezcatlipoca in exchange for rain (Graulich 2005, p. 10). The most renowned case is probably the one related to the inundation of Mexico caused by the Acuecuexco aqueduct. Four children were sacrificed—one by heart extraction and three by throat slitting—during the dedicatory ceremony in various places of the watercourse. Then, after the inundation, "various children" were sacrificed by heart extraction and offered to the goddess Chalchiuhtlicue, together with lavish offerings of copal, rubber, paper, etc. Finally,

[17] Various authors such as Andrés de Tapia (1988, p. 107), Las Casas (chap. 175, 1992, p. 1182), and Mendieta (II, p. 19; 1980, p. 109) state that the *tzoalli* dough used in the described ceremonies of the annual cycle was mixed with the blood of sacrificed boys and girls, but the information seems to be quite spurious (Graulich 2005, p. 210 n. 153).

[18] Historical sources mention noncyclical child sacrifices at the beginning of a war (López de Gómara 1954, p. 115), or as a gift to Huizilopochtli (Tello 1997, pp. 15–16). In at least one case, a boy was killed by heart extraction to ask Huizilopochtli to divine the outcome of an impending battle (*Relacion de Coatepec y su partido* 1985, p. 164; Graulich 2005, pp. 209–210). The *Anales de Cuauhtitlan* mentions the request of children to be sacrificed as a cause of war between the Mexica and Colhuacan (Bierhorst 1992, p. 54).

two more children were sacrificed by the priests at the end of the ritual (Durán 1995:I, p. 49; Tezozomoc LXXX-LXXXI 1987, pp. 562–566).

The data reviewed so far show that Mesoamerican child sacrifice can hardly be subsumed under a single type. A first distinction can be drawn between mixed sacrificial deposits where children were deposited together with adults—often showing osteotaphonomic evidence of a wide range of perimortem and postmortem manipulation—and those that include only subadult skeletons. Child-focused sacrifices, carried out both in cyclical and noncyclical occasions, can be further divided between those devoted to celestial and war-like deities—often showing evidence of sacrificial techniques such as beheading and heart extraction—and those related to water-earth-fertility deities. In a comparative perspective, this last group seems to be the most relevant for discussing the Cueva del Lazo context. The historical data regarding the Acuecuexco aqueduct and most of the monthly ceremonies, as well as archaeological contexts such as El Manatí, San Isidro Mound 20 Burials 9 and 6, Mexico's Cathedral stone cist, and Templo Mayor Offering 48, seem to share some common traits that could be useful to point out here.

Historical sources and archaeological data are in accord regarding the prevalent age of the sacrificed children, usually under five to six years old and always under eight. Also common is a pattern of disease mainly represented by periostitis/osteomyelitis, porotic hyperostosis, and cribra orbitalia. This pattern, indicating a condition of nutritional insufficiency, could be consistent with the historical data indicating that most sacrificed children originated from the fringes of society, although Tiesler and Cucina (2007; Tiesler 2005) cautioned against any generalization on this matter.[19]

In child sacrifices devoted to water-earth-fertility gods, the most common ways of killing were throat slitting and drowning, with very few mentions of heart extraction. Actually, many of the excavated children do not show any marks of trauma, suggesting that they could have been killed by means of techniques that do not leave marks on the bones, such as drowning, throat slitting, or even diaphragmatic heart extraction (Scott and Brady 2005; Tiesler and Cucina 2006). A similar general "rule" seems to relate sacrificial places to postsacrificial body treatment. According to the historical sources, children offered to water-earth-fertility gods were usually sacrificed in mountainous and watery places; then, they were not eaten but buried in caves or stone "boxes," or submerged in bodies of water. Codex Tudela (fol. 16v), although referring to an adult victim, states that the man sacrificed in Etzalcualiztli was not eaten because he was sacrificed to Tlaloc, to whom they offered sacrifices "in water, earth, mountains, and peaks because he was an earth god." Besides caves and *cenotes*, "watery" (i.e., fertility-related) sacrificial places are found both in El Manatí and Templo Mayor Offering 48, the latter being deposited in a cist in the Tlaloc; I would also suggest that the east–west axis of Middle Formative Chiapas complexes could have been perceived as a locus conceptually related to the primor-

[19] Others (Román Berrelleza 2010, pp. 360–361; Román Berrelleza and Chávez Balderas 2006) have argued that some of the illnesses suffered by the children could have a cultural significance that linked them to the Rain Gods, thus guiding the selection process.

dial sprouting of maize (and kingship), and thus adequate to receive offerings of greenstone celts and sacrificed bodies.

Finally, in the mentioned cases, the children's bodies were buried or drowned without usual grave offerings but with a wide array of materials often with clear "watery" or "earthly" meaning. Historical sources mention feathers, jewels, rubber, paper, etc., while archaeological evidence from El Manatí, various *cenotes*, MFC's axis, the Cathedral's cist, and Offering 48 include rubber, greenstones, wooden objects, Tlaloc vessels, shells, blue pigment, bird bones, a wide array of plants and food remains, etc. I think that these materials should not be considered as offerings buried with the children, but rather that both the materials and the children were buried (or drowned) as offerings in complex and vertically stratified deposits. Following Dehouve (2007), we conceive of these stratified deposits as "ritual deposits", whose contents, including sacrificed children, were offered as a "debt payment" (c.f., the Nahuatl *nextlahualli*) in the context of "communion sacrifices" (Tiesler 2007, p. 19). These offerings were aimed at maintaining a reciprocal relationship between the human society and the extra-human entities related to the water-fertility realm, acting as suppliers of food, and embodied in features of the landscape. *Cenotes*, caves and mountains, either natural or artificial, were thus perceived as adequate places to perform a reciprocal exchange perceived as a mutual consumption: "We eat the Earth, the Earth eats us" (Monaghan 1990; Arnold 2001). But, why were children perceived as "food for the landscape"?

3.4 Why Children?

A key element of human sacrifice is its transformative quality: sacrifice, far from being restricted to the very act of killing, is a process of identity transformation that establishes a chain of "overlapping identities" linking the sacrificer, the victim, and the receiver. This overlapping of identities, obtained by means such as dressing, renaming, the form of killing, postsacrificial body disposal, etc., is often based on an essential affinity between the victim and the receiver. The tradition of Mesoamerican child sacrifices dedicated to water-earth-fertility gods seems thus based on a perceived "similarity" between these gods and children, also confirmed by the child-like appearance of most Mesoamerican Rain God attendants. According to Carrasco (1999, p. 132) children were sacrificed as *ixiptla*, or impersonators of Tlaloc, because of their physical appearance with round faces, round eyes, and small bodies. A similar interpretation is given by Graulich (2005, p. 209), who wrote that they resembled the small and ill-proportioned *Tlaloques*.

Mentions of small or dwarf-like creatures dwelling in caves and controlling rain, fertility, and richness are extremely abundant in Mesoamerican ethnography. I just mention here a few examples from the Zoque area of Chiapas: "The *moyó* are balls of fire that live in caves on the mountains. They are old, but they look as 10 year old children" (Cordry and Cordry 1988, p. 92); the Rain God, or *Lusbel* (Lucifer), is described in a tale as "a small child" (Wonderly 1947, p. 158). The relationship

between children and water is also made explicit in the Laguna de Coapilla legend, where it is said that a young girl was brought to the bottom of a small lagoon by an old man and "when the family went to check what was going on with her, they found that the lagoon had become a big lake (some saying that it was caused by the weeping of the baby)" (Cordry and Cordry 1988, p. 103; Wonderly 1947, pp. 162–163; Thomas 1975, p. 234).

Understanding the affinity between children, water, and sacrifice requires a deeper understanding of the specific Mesoamerican perception of childhood, a sociocultural construct not mechanically deriving from the "natural" or biological realm (James et al. 1998; Ardren 2006; Joyce 2006), whose cross-cultural character cannot be taken for granted even despite the presence of child sacrifices in various ancient societies. Several scholars (Broda 2001, pp. 303–309; Houston and Scherer 2010), for example, have compared Mesoamerican child sacrifice with the similar Andean custom, known in Inka times as *qapaq hucha*. Child sacrifice was in fact a widespread Andean practice documented from the Initial Period onward (Benson 2001, pp. 2, 7; Bourget 2001; Than 2011). The best known case is that of the Inka *qapaq hucha*, thoroughly demonstrated in both archaeological (Reinhard 2005; Besom 2010) and ethnohistorical (Besom 2009) sources. Actually, *qapaq hucha* was hardly a single type of sacrifice. Usually involving male children between four and eight years and girls under 12, it was performed in a *waka*, or sacred place, that could be a mountain, island, river, lake, spring, cave, or any other natural or artificial feature of the landscape. Children were sacrificed both in calendar-related ceremonies and on noncyclical occasions, such as those related to important moments in the king's life, famines, pestilences, and wars. Children were killed by strangulation, suffocation, blows to the head, heart extraction, throat slitting, and drowning. Sillar (1994, p. 59) proposed that the role played by children in the *qapaq hucha* sacrifices was associated with "their premarital 'wild' nature."

Which, then, was the socioculturally significant aspect of childhood among Mesoamericans that grounded the cultural significance of child sacrifice? Joyce (2000) distinguished three different age categories of roughly four years each (see also Ardren 2006, pp. 8–9). In his analysis of Nahua terminology, López Austin (1980, p. 322) noted an important classificatory break at the age of six[20], a limit below which most of the sacrificed children attested both in historical sources and archaeological contexts would fall. Various authors have explained the sacrifice of small children on the basis of concepts such as innocence (e.g., Houston and Scherer 2010, p. 186) and purity (Román Berrelleza 2010, p. 359; Román Berrelleza and Chávez Balderas 2006, pp. 235–236). The term, "innocence," often mentioned by sixteenth century missionaries, seems to me too much grounded in Christian thinking, while the notion of purity is mostly based on Nahua texts devoted to the afterlife of various categories of people (*Primeros memoriales*, 2:151; CF, VI, 21; HG, VI, 21; 1989:380; see López Austin 1980:I, 358); in these texts, the same notion is, nev-

[20] It is interesting to note that Las Casas (chap. 175, 1966, p. 98) and Mendieta (II, p. 19; 1980, p. 108) reported that the Totonac mothers used to deflower their daughters at the age of six; at this same age, Maya princes underwent their first bloodletting rite (Grube 2011 p. 26).

ertheless, not specifically child-related, referring both to children and young boys and girls that still had not experienced sex. On the contrary, what is specific about "those who die in their tender childhood" is that they went to a place called Tonacacuauhtitlan or Chichihualcuauhco, in the house of Tonacatecuhtli ("Lord of Our Sustenance", a reference to Tlaloc), where they suckled from the *tonacacuauhuitl*, "the Tree of Our Sustenance." The Nahuatl text speaks of "precious greenstones, precious turquoises, precious bracelets" (CF, VI, 21; 1969, pp. 115, 116; see also Contel 2008, pp. 174–178), a metaphor that often refers both to newborn children (CF, VI, 32; 1969, p. 176) and to the green vegetation whose sprouting is induced by the rain gods (CF, VI, 8; 1969, p. 35). The symbolic association between green maize and greenstone also has been demonstrated in the Olmec and Maya world by Taube (2000). Interestingly enough, the Codex Florentinus also states that children who died in "tender childhood" were buried near maize bins, "for this signifieth that they go to a good place, a fine place, because they are still as precious green stones, still as precious bracelets; still pure, they become as precious turquoises" (CF, VI, 21; 1969, p. 116).

The analogy between children and green, sprouting vegetation is a recurrent character in Nahua culture (e.g., CF, VI, 25, 31) and was probably a basic element of the Mesoamerican sociocultural perception of childhood, as also suggested by terms such as the Common Ch'olan *ch'ok*, "unripe" (with a specific vegetal reference), for "young," or the Colonial Yucatec *mun*, "young," "tender," "green" (Houston et al. 2006, p. 48).[21] The best synthesis of the relationships linking children and the "watery" and interior of mountains and caves has been sketched by López Austin (1994), who stressed that children shared the same "humid" and "cold" essence of mountains and caves, that the prototypic Mountain of Sustenance could be "replicated" in real mountains and caves, and that the growth cycle of maize had a paradigmatic value for every other life cycle.

The perceived essential affinity between "unripe," "green" children and sprouting vegetation was probably the main reason for the selection of children for sacrifices aimed at favoring the coming of the rains and the regeneration of maize and other plants. The same affinity was probably at the core of many ritual practices associated with child sacrifice, which could be described as a mutual consumption/exchange of "green," "unripe," or "watery" elements between humans and "green," "watery," and thus "child-like" gods, such as the *Tlaloques*. I would suggest, for example, that adorning the children destined to be sacrificed in Atlcahualo with jewels was a clear reference that both children and green vegetation were "greenstones, precious turquoises, bracelets." The transformative value of sacrifice would literally transform the children into those mountains that were perceived as repositories of water and fertility. So, both children and mountains were "green," "unripe," "new," "cold," "watery," a status that was also shared by caves, Rain God temples, and by

[21] A Colonial and modern Maya ritual correlate of this same cultural relation between children and maize is the practice of cutting the umbilical cord of the newborn over a maize ear, thus instituting a close relationship between the child and the ear (Thompson 1970, p. 283; Guiteras Holmes 1960).

the items that were sacrificed or offered with the children. Quetzal feathers, blue textiles, rubber, and new vessels are elements often mentioned in Colonial texts, while greenstone jewels and celts, rubber, blue pigments, shells, bird bones, reeds, and food plants are "watery" items often found in the sacrificial contexts previously described.

An important point to be stressed is that the cultural meanings associated with childhood in Mesoamerica could have guided not only their selection for sacrifice but also specific funerary practices. Such practices could be attested by archaeological examples such as Mixe-Zoquean urn burials in monumental buildings (Lowe 1999, pp. 64–65), infant funerary contexts from Cholula (McCafferty and McCafferty 2006), spatially differentiated burials at the Formative site of Tetimpa, Puebla (Uruñuela and Plunket 2002, p. 29), and the residential compound of Oztoyahualco at Teotihuacan (Manzanilla et al. 1999, p. 255).[22]

3.5 Discussion

The interments excavated in Cueva del Lazo consist of 11 children under six years old (eight of them under two), and thus the ages do not correspond to a normal death curve. Instead, this group of individuals is almost certainly the product of some form of cultural selection likely related to a relevant "under-six" emic age group. Paleopathological evidence identified on the bones of most individuals points to a lifelong history of stress resulting from weaning, food deficiency, and infections (Tiesler and Cucina 2005, p. 18). Such stress indicators are commonly noted among other sacrificed children in Mesoamerica, although unfortunately our complete lack of information on the general health condition of children in Late Classic western Chiapas populations impedes our ability to evaluate whether the poor health of the buried children was extraordinary or, on the contrary, simply reflected widespread nutritional deficiencies. A lack of data regarding the extent of cranial modification in Late Classic Zoque culture also prevents us from knowing whether this trait could be a sign of social rank. Tiesler and Cucina (personal communication) noted that the observed pathologies, particularly chronic meningitis causing neurological changes and high temperatures, could have had some symbolic significance. Though scurvy was identified as a possible cause of death in the case of Burial 3 (Tiesler et al. 2010), it is not clear if the pathologies found among the Cueva del Lazo children were indicative of natural deaths that led to subsequent special Burial treatments or, alternatively, if their occurrence (and by extension the poor health of the individuals) would have guided the selection of these children as sacrificial targets.

It is important to stress that the absence of evidence of violent death on the children's bones does not rule out the possibility of sacrifice because they could

[22] In a comparative perspective, we can note that in the Andean world children who died before being named were buried in selected places where they were "eaten" by mountain spirits (Harris 1980, p. 75).

have been killed in a way that did not leave signs on the skeletons, as was apparently common among fertility-related child sacrifices.[23] Evidence of postdepositional manipulations, such as disturbance and removal of body segments, cannot be considered as clear evidence because these behaviors are typical both of funerary and postsacrificial deposits (Tiesler 2007, Table 2.1; also, see Duncan, Chap. 10, this volume). In the absence of any osteotaphonomic evidence proving sacrifice, we must then turn to a fine-tuned contextual interpretation, luckily aided by the extraordinary preservation of perishable materials.

First of all, we must consider the location of the cave in which they were buried, which is several kilometers away from the nearest settlements. Our research in El Ocote (Domenici 2010a) showed that, during a period of almost two millennia, local caves were used as places of offering, arguably because they were perceived as entrances to the watery underworld. Thus, the child burials could have been emically perceived as offerings, a supposition strengthened by their location in cave alcoves, that is in places usually devoted to offerings and probably perceived as transitional spaces, as shown by their role in the various Chicomoztoc-like Mesoamerican caves (e.g., Aguilar et al. 2005). Unfortunately, there is an almost complete lack of information about the common funerary treatment of children in Late Classic Zoque culture in western Chiapas, when adults were usually buried in funerary chambers or pits in open air sites. The only available evidence is a single Late Classic infant urn burial at Chiapa de Corzo (Burial 125; Agrinier 1964, p. 61) that suggests the continuation of the long-standing local tradition of burying children in ceramic urns, and thus—even if based on limited evidence—the Late Classic Cueva del Lazo interments appear as uncommon even for small children.[24] The unusual character of the burials is also demonstrated by the lack of common grave goods, such as whole vessels, a fact that could also point to sacrificial rather than to funerary interments (c.f., Owen 2005, pp. 329–331, and Tiesler 2007).[25] The children were associated

[23] Interestingly, Houston and Scherer (2010, p. 186) noted that infant and juvenile sacrificial victims accompanying Classic elite burials in the Maya area usually do not show any mark on their bones, suggesting that this absence could indicate a lack of violence, torture, or body violation that the authors relate with the function of the victims as sacred offerings of local origin (opposed to foreign enemies).

[24] A couple of other Late Classic interments of children have been identified in the El Ocote region: the scattered and incomplete remains of three different children (one newborn, one between 4 and 12 months old, and one less than six months old; Tiesler and Cucina 2005, p. 29) were uncovered together with the partial remains of a young adult, three ladle censers, and a basalt tenoned jaguar head, in an offering area in Cueva del Camino Infinito; Thomas Lee also identified fragments of a child's skeleton in Cueva Colmena (Lee 1985, p. 32). While this last case is only cursorily documented, the Camino Infinito deposit also shows characteristics that suggest a nonfunerary, offering-like nature.

[25] Their careful burial in an excavated pit, with no sign of violence on their corpses, seems to rule out the possibility of these being the executions of "guilty people" or "witches," which has been associated with caves in Mesoamerican tradition and specifically with deposition on the surface of cave floors (Lucero and Gibbs 2007); it could be interesting to note here that in the El Ocote area at least two caves have been reported with huge amounts of highly calcified surface deposits of human remains—most of them, if not all, adults.

with ornaments made of shells and bird bones[26], elements that are often associated with sacrificed children in other contexts. The presence of a deer antler is relevant, as deer antlers and bones are a common finding in caves (Pohl 1983), where they could have been deposited as "seeds" aimed at favoring the regeneration of hunted animals (see Olivier 2010, p. 460). Other items associated with the burial pit were obsidian prismatic blades, a bone awl, and a bloodletting implement, likely suggesting the performance of autosacrificial acts.

Another element worth considering here is the bundling of the corpses. In Cueva del Lazo, children were bundled in textiles, and the intact condition of the human coprolites found inside the bundles suggests that the children were bundled before the perimortem or postmortem evacuation of bowels had occurred. Bundling corpses was a common practice in ancient Mesoamerica, both in extended or flexed position (Reese-Taylor et al. 2006; Wrobel et al., Chap. 3, this volume; and see discussion of bundling by Duncan, Chap. 10, this volume).[27] Human bones in Copan's Gordon's Cave 3 were also bundled (Brady 1995). One such example is the image of the two sitting, bundled deities on the Classic Maya Vessel K1081, significantly described in the associated hieroglyphic text as a birth scene (Reents-Budet 2006, Fig. 11a). Interestingly, the man sacrificed to Tlaloc and deposited in a cave during Etzalcualiztli is depicted in the *Primeros Memoriales* as a sitting bundled corpse; moreover, the presence of cotton turbans and the blue color of some of the bundling textiles in Cueva del Lazo is paralleled in the painting of the child sacrificed during the *atlcahualo* festival. The association of at least two Cueva del Lazo bundles with mats is also suggestive of rebirth-related concepts, as mats were associated with sacrifice and rebirth ideas that sustained their use as royal seats (Looper 2006, p. 96).

In Cueva del Lazo, this sacrifice-rebirth symbolism is further strengthened by the location of two of the bundles (Burials 2 and 9) on grass circles. As shown by Olivier (2006), in Aztec rituals the grass (*zacatl*) had a specific telluric symbolic significance and was used as an earthly base for offerings[28]; moreover, the grass circles strongly resemble those used as bases of the previously mentioned *tzoalli* child-mountains "sacrificed" in Tepeilhuitl. Despite the chronological and geographical distance, we thus suggest that the grass circles below the roughly conical bundles of Burials 2 and 9 in Cueva del Lazo could be viewed as earthly, offering-receiving bases on which the bundles rested as symbolic representations of child mountains. A similar earthly significance could probably be attributed to the grass covering of the intrusive pits in Units 4 and 5 enclosing the child burials in a symbolic telluric

[26] Regarding the association between children and bird bones, see Sahagún's Codex Florentinus, VI, 31, where the newborn child is described as a wild bird in a nest.

[27] See, for example, the funerary imagery on the Berlin Vase where the bundled corpse of a noble is located inside the Flowery Mountain prior his rebirth as a tree, or the interpretation of lip-to-lip cache vessels as representations, both material and glyphical, of the rebirth-related concept of the "white soul flower cache" (Freidel and Guenter 2006, pp. 74, 75, Fig. 3).

[28] See Codex Borgia plates 2 and 8, where caves with infixed thorns show the analogy between the cave and the *zacatapayolli*, the grass ball that, as a symbolic earth, received the bloody thorns used in ritual bloodlettings (Olivier 2006, pp. 414, 420, Figs. 9 and 17).

matrix. It is noteworthy that in Cueva de la Media Luna, some of the lip-to-lip pottery caches were placed on "grass circles" and partially covered by mats (Lee 1985, p. 39).[29] If the vertical stratigraphy of the burial pit in Cueva del Lazo reflects the syntactical sequence of ritual action, the deposition of the grass circles would have constituted the first act of the deposition of a layered ritual deposit, which would have been the preparation of an earthly base suitable to sustain the child-mountain corpse as the main offering.

In light of the discussed metaphorical association between children and the fertile content of mountains, it is significant that Cueva del Lazo children were buried together with a huge amount of food remains: maize, squash, beans, chile, *anona, jocote, mamey, coyol, tempisque,* and *totoposte,* among others (see Morehart 2005 for archaeobotanical comparative data from Belizean caves). The presence of tender maize, apparently partly consumed in situ, is interesting because, apart from fitting with the "green," "unripe" semantic sphere, it suggests some form of "first fruit" offering.[30] This evidence must be connected with that coming from Unit 1, where the presence of over 200 *jute* (*Pachylicus* sp.) shells with broken tips indicating their use as food, together with a hearth and cooking pottery remains, suggest the preparation and consumption of a soup or broth. *Jute* shells are quite common in cave archaeological contexts in the Maya area, where ethnographic data testify that *jute* consumption is a common feature of ritual seclusions among the Lacandons and that their ritual use is generally associated with the concepts of water and fertility (Halperin et al. 2003; Glassman and Bonor Villarejo 2005, p. 287; Saul et al. 2005, p. 302). Their proximity to the cooking items and the evidence of in situ maize consumption, the remains of which were buried with the children, suggests the possibility that they were byproducts of episodes of ritual food consumption concurrent with some of the interments.

The presence of five half-burnt tobacco cigars suggests that tobacco smoking or burning was performed both during burial acts and during ritual food consumption.[31] The long-standing pan-Mesoamerican link between caves and tobacco is reflected both in ancient iconography and in the widespread modern ritual use of tobacco of-

[29] A similar pattern has been observed in Cueva Cheve (Oaxaca), where human skeletal remains were bundled in mats, disposed over a grass layer and covered with a second grass layer (González Licón and Márquez Morfín 1994, p. 232). Durán (II, chap. XIV; 1995, p. 146) states that a sacrifice of prisoners dedicated to the fertility goddess Chicomecóatl was performed in the *zacapan* ("Place of Grass"), a room whose floor was covered with grass probably imbued with a similar "earthly" symbolism.

[30] Immature maize cobs also have been found in Naj Tunich (Brady 1989, p. 86), Alta Verapaz (Sharer and Sedat 1987, p. 248), Gordon's Cave 3 (Brady 1995, pp. 34, 36), Cueva de las Pinturas (Brady et al. 1997, p. 95), Actun Chechem Ha (Awe et al. 2005, p. 237) and Actun Chapat, where C. Morehart also interpreted the performance of some kind of "first fruit rites" (Morehart 2005, pp. 171, 175).

[31] We cannot be sure if the cigars were actually smoked or simply left burning during the ceremony, as sometimes occurs in modern ceremonies. James Brady (personal communication) found a tobacco cigar in Gordon's Cave 3 at Copán; it is interesting to note that this same cave contained child burials interpreted as the remains of sacrifice (Brady 1995, p. 35).

ferings.[32] In the Zoque area, we find that the association between tobacco and caves is well attested in ethnographic reports mentioning that cave-dwelling beings called *wayacú* "are addicted to tobacco." For this reason, Zoque Indians offered tobacco on the Mactumactza mountain in order to attract the *wayacú*, who would smell the smoke and then take the people to the cave where they would offer an exchange for gold (Cordry and Cordry 1988, p. 99). Similar conceptions could have been related to the burning of *copal*[33], attested in Cueva del Lazo by the presence of censer fragments (one of them decorated with the strongly underworld-related image of a jaguar) and heavy blackening of the cave's ceiling.

The elements reviewed so far clearly characterize the subadult interments not only as uncommon burials but also as a veritable, cyclically renewed, ritual deposit involving the offering of a complex set of "green" elements. These elements fit closely within the meaningful context of Mesoamerican child sacrifices as transformative processes of mutual consumption/exchange with water-earth-fertility gods. Admittedly, a similar meaningful context could have been associated with a special funerary treatment reserved for children who died when still "green." Probably the two scenarios were not dichotomously perceived in Mesoamerican thinking, and various authors (Becker 1992, 1993; McAnany 1998; Chávez Balderas 2010, p. 319; see also Tiesler 2007) have observed the fallacy of drawing too sharp of a distinction between funerary (e.g., individual = subject) and mortuary (e.g., individual = object) treatments. In fact, many well-documented cases show that natural death was often perceived as a form of "paying the debt" to the Earth, thus characterizing the dead body as an offering (e.g., Monaghan 1990; Graulich 2005, p. 319). An interesting example of this comes from the document called *Las dos cuevas de Jiquipilas*, testifying to an idolatry persecution carried out in 1685 and containing extraordinary information regarding "witchcraft" rituals performed in a cave located less than 3 km from Cueva del Lazo (Aramoni 1992; Domenici 2008). In the document, a 12-year-old girl, daughter of a famous Zoque *brujo*, relates that her father and two other men charged with witchcraft used to bring dead children to the cave, sometimes dug up from the church cemetery, "as a present for the Devil."

Despite these interesting insights into emic Mesoamerican concepts of natural vs. sacrificial death, the distinction between postsacrificial deposits and special funerary contexts remains important from an etic point of view, and, especially in the absence of osteotaphonomic evidence, contextual data are particularly important for identifying sacrifice. From this perspective, it is significant that treatment of the Cueva del Lazo cave burials clearly is distinct from the local tradition of sub-

[32] In Maya iconography, the Underworld God N often smokes tobacco and on Tikal Altar 4 he is depicted inside a quatrefoil shaped, cave-like frame that represents the Cauac Monster mouth, while holding (unclear if offering or receiving) a bowl containing a burning cigar (cfr. Scarborough 1998, p. 153, Fig. 9). Among modern rituals making use of tobacco we can mention the *Ch'a Cháak* rain petition rituals among contemporary Yucatec Maya (Ruz 2009), some Nahua rituals (Sandstrom 2005, p. 44), and the Lacandon Maya cigar offerings left at cave entrances to appease the cave-dwelling *aluxes* (Bonor Villarejo 1989, p. 35).

[33] Cfr. Cline 1944, p. 113 for en ethnographic note linking copal smoke, clouds, and rain among the Lacandon Maya.

adult urn burials. Above all, the suggested interment of at least some of the children (Burials 5A-5B, 6–7, and 8–9) in pairs could be viewed as strong evidence in favor of the sacrifice hypothesis, because it is often mentioned in historical sources, maybe paralleled in the Chalcatzingo case, and an unlikely occurrence in terms of natural death. In sum, even with due caution, I suggest that contextual evidence strongly favors the hypothesis that Cueva del Lazo functioned in Late Classic times as a ritual space devoted to the performance of cyclical child sacrifice in which the mountain-like bundled corpses of children were deposited as offerings to the food-laden interior of mountains, the abode of the "green" and "unripe" gods of rain and fertility.

Acknowledgments The author would like to acknowledge Gabriel D. Wrobel for the meticulous editing of the text that strongly improved its quality, both in content and form, as well as for inviting the author to participate in the session of the 2011 SAA Annual Meeting in Sacramento (CA) where a first version of the paper was presented. Vera Tiesler and Andrea Cucina not only contributed with their analysis of the discussed skeletal material, but also gave continuous support through discussion and reading a previous version of the paper. The text also beneficiated at various stages of critical readings and suggestions by Giuseppe Orefici, Elvina Pieri, Thomas A. Lee, Nicoletta Maestri, Arianna Campiani, Jim Brady, Guilhem Olivier, John E. Clark, Joyce L. de Jong, and Alan Sandstrom. The late Thomas A. Lee, cherished friend and mentor, must also be acknowledged for introducing the author to the archaeology of the Zoque region and for sharing for many years the direction of the Rio La Venta Archaeological Project. The analysis of the discussed materials has been financially supported by the University of Bologna, the Italian Ministry of Foreign Affairs, and the La Venta Exploring team.

References

Agrinier, P. (1964). *The archaeological burials at Chiapa de Corzo and their furniture.* Papers of the New World Archaeological Foundation, n. 16. Provo: Brigham Young University.

Agrinier, P. (1970). *Mound 20, Mirador, Chiapas, Mexico*. Papers of the New World Archaeological Foundation, n. 28. Provo: Brigham Young University.

Agrinier, P. (1975a). *Mound 1A, Chiapa de Corzo, Chiapas, Mexico.* Papers of the New World Archaeological Foundation, n. 37. Provo: Brigham Young University.

Agrinier, P. (1975b). *Mounds 9 and 10 at Mirador, Chiapas, Mexico*. Papers of the New World Archaeological Foundation, n. 39. Provo: Brigham Young University.

Aguilar, M., Medina, J. M., Tucker, T. M., & Brady, J. E. (2005). Constructing mythic space: The significance of a Chicomoztoc Complex at Acatzingo Viejo. In J. E. Brady & K. M. Prufer (Eds.), *In the maw of the earth monster. Mesoamerican ritual cave use* (pp. 69–87). Austin: University of Texas Press.

Anda, G. de, (2007). Sacrifice and ritual body mutilation in Postclassic Maya society. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 190–208). New York: Springer.

Anda, G. de, Tiesler, V., & Zabala, P. (2004). Cenotes, espacios sagrados y la práctica del sacrificio humano en Yucatán. *Los Investigadores de la Cultura Maya, 12*(2), 376–386.

Aramoni Calderón, D. (1992). *Los refugios de lo sagrado. Religiosidad, conflicto y resistencia entre los zoques de Chiapas*. Mexico City: CONACULTA.

Ardren, T. (2006). Setting the table: Why children and childhood are important in an understanding of ancient Mesoamerica. In T. Ardren & S. R. Hutson (Eds.), *The social experience of childhood in ancient Mesoamerica* (pp. 3–22). Boulder: University Press of Colorado.

Arnold, P. P. (1999). *Eating landscape. Aztec and European occupation of Tlalocan*. Boulder: University Press of Colorado.

Awe, J. J., Griffith, C., & Gibbs, S. (2005). Cave stelae and megalithic monuments in western Belize. In J. E. Brady & K. M. Prufer (Eds.), *In the maw of the earth monster. Mesoamerican ritual cave use* (pp. 223–248). Austin: University of Texas Press.

Bachand, B. R., Gallaga Murrieta, E., & Lowe, L. S. (2008). *The Chiapa de Corzo Archaeological Project. Report of the 2008 field season*. Provo: New World Archaeological Foundation.

Bachand, B. R., & Lowe, L. S. (2011). Chiapa de Corzo y los Olmecas. *Arqueologia Mexicana, 207,* 74–83.

Batres, L. (1906). *Teotihuacan o la ciudad sagrada de los toltecas*. Mexico City: Imprenta de Hull.

Becker, M. J. (1992). Burials as caches; caches as burials: A new interpretation of the meaning of ritual deposits among the Classic period Lowland Maya. In E. C. Danien & R. J. Sharer (Eds.), *New theories on the ancient Maya* (pp. 186–196). University Museum Monograph 77. Philadelphia: University of Pennsylvania.

Becker, M. J. (1993). Earth offerings among the Classic period Lowland Maya: Burials and caches as ritual deposits. In M. J. Iglesias & F. Ligorred (Eds.), *Perspectivas antropológicas en el mundo maya* (pp. 45–74). Madrid: Sociedad Española de Estudios Mayas.

Benson, P. E. (2001). Why sacrifice? In E. P. Benson & A. G. Cook (Eds.), *Ritual sacrifice in ancient Peru* (pp. 1–20). Austin: University of Texas Press.

Besom, T. (2009). *Of Summits and Sacrifice. An Ethnohistoric Study of Inka Religious Practices*. Austin: University of Texas Press.

Besom, T. (2010). Inka sacrifice and the mummy of Salinas Grandes. *Latin American Antiquity, 21*(4)*,* 399–422.

Bierhorst, J. (Ed.). (1992). *History and mythology of the Aztecs. The Codex Chimalpopoca*. Tucson: University of Arizona Press.

Bonor Villarejo, J. L. (1989). *Las cuevas mayas: Simbolismo y ritual*. Madrid: Universidad Complutense, Instituto de Cooperación Iberoamericana.

Bourget, S. (2001). Children and ancestors: Ritual practices at the Moche site of Huaca de la Luna, north coast of Peru. In E. P. Benson & A. G. Cook (Eds.), *Ritual Sacrifice in Ancient Peru* (pp. 93–118). Austin: University of Texas Press.

Brady, J. E. (1989). An investigation of Maya ritual cave use with special reference to Naj Tunich, Peten, Guatemala. Ph.D Dissertation, University of California, Los Angeles.

Brady, J. E. (1995) A reassessment of the chronology and function of Gordon's Cave #3, Copan, Honduras. *Ancient Mesoamerica, 6,* 29–38.

Brady, J. E., Scott, A., Cobb, A., Rodas, I., Fogarty, J., & Urquizú Sánchez, M. (1997). Glimpses of the dark side of the Petexbatún Project. The Petexbatún Regional Cave Survey. *Ancient Mesoamerica, 8,* 353–364.

Broda, J. (1971). Las fiestas aztecas de los dioses de la lluvia. *Revista Española de Antropología Americana, 6,* 245–327.

Broda, J. (1991). Cosmovisión y observación de la naturaleza: el ejemplo del culto de los cerros. In J. Broda, S. Iwaniszewski, & L. Maupomé (Eds.), *Arqueoastronomía y etnoastronomía en Mesoamérica* (pp. 461–500). Mexico City: IIH, Universidad Nacional Autónoma de México.

Broda, J. (2001). Ritos Mexicas en los Cerros de la Cuenca: Los sacrificios de niños. In J. Broda, S. Iwaniszewski, & A. Montero (Eds.), *La Montaña en el paisaje ritual* (pp. 295–317). Mexico City: CONACULTA.

Carrasco, D. (1999). *City of sacrifice. The Aztec empire and the role of violence in civilization*. Boston: Beacon Press.

Cervantes de Salazar, F. (1971). *Crónica de la Nueva España*. Madrid: Biblioteca de Autores Españoles.

Chávez Balderas, X. (2010). Decapitación ritual en el Templo Mayor de Tenochtitlan: Estudio tafonómico. In L. López Luján & G. Olivier (Eds.), *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 317–343). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México

Clark, E. J., & Hansen, R. D. (2001). The architecture of early kingship: Comparative perspectives on the origins of the Maya royal court. In T. Inomata & S.D. Houston (Eds.), *Royal courts of the ancient Maya*, vol. 2 (pp. 1–45). Boulder: Westview Press.

Clark, E. J., & Pye, M. (2011). Revisiting the yy: A brief history of the Preclassic peoples of Chiapas. In M. Love & J. Kaplan (Eds.), *The Southern Maya in the Late Preclassic: The rise and fall of an early Mesoamerican civilization* (pp. 25–45). Boulder: University Press of Colorado.

Cline, H. (1944). Lore and deities of the Lacandon Indians, Chiapas, Mexico. *Journal of American Folklore, 57,* 107–115.

Contel, J. (2008). Tlálloc, el cerro, la olla y el chalchihuitl. Una interpretación de la lámina 25 del Códice Borbónico. *Itinerarios, 8,* 153–183.

Cook de Leonard, C. (1957). Proyecto del CIAM en Teotihuacan. *Boletín del Centro de Investigaciones Antropológicas de México, 4,* 1–2.

Cordry, D. B., & Cordry, D. M. (1988). *Trajes y tejidos de los indios zoques de Chiapas*. Mexico City: Gobierno del Estado de Chiapas.

Cyphers, A. (1999). From stone to symbols: Olmec Art in social context at San Lorenzo Tenochtitlan. In D. C. Grove & R. A. Joyce (Eds.), *Social patterns in Pre-Classic Mesoamerica* (pp. 255–299). Washington, DC: Dumbarton Oaks.

Cucina, A., & Tiesler, V. (2007). Nutrition, lifestyle, and social status of skeletal remains from nonfunerary and "problematical" contexts. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 251–262). New York: Springer.

De La Cruz Laina, I., Román Berrelleza, J. A., González Oliver, A., & Torres Blanco, A. (2006). La tecnología del ADN antiguo aplicada al estudio de los niños sacrificados en honor a Tláloc. In L. López Luján, D. Carrasco, & L. Cué (Eds.), *Arqueología e historia del Centro de México. Homenaje a Eduardo Matos Moctezuma* (pp. 433–444). Mexico City: Instituto Nacional de Antropología e Historia.

Dehouve, D. (2007). *La ofrenda sacrificial entre los Tlapanecos de Guerrero*. Mexico City: UAG, CEMCA, Plaza y Valdés.

Domenici, D. (2004). Artefactos y textiles de la Cueva del Lazo. In D. Domenici & T. Lee (Eds.), *Informe final de la temporada 2003*, vol. 2. Proyecto Arqueológico Río La Venta (pp. 1–36). Manuscript in the Instituto Nacional de Antropología e Historia Technical Archive, Mexico City.

Domenici, D. (2006). Investigaciones arqueológicas en el sitio El Higo, Selva El Ocote, Ocozocoautla, Chiapas. In D. Aramoni, T. A. Lee Whiting, & M. Lisbona Guillén (Eds.), *Presencia zoque. Una aproximación multidisciplinaria* (pp. 323–343). Mexico City: UNICACH, UNACH, Universidad Nacional Autónoma de México.

Domenici, D. (2008). Religiosidad popular y brujería en el Chiapas del siglo XVII. *Guaraguao, 28,* 27–49.

Domenici, D. (2009a). Arqueología de la Selva El Ocote, Chiapas. In P. Gorza, D. Domenici, & C. Avitabile (Eds.), *Mundos zoque y mayas. Miradas italianas* (pp. 15–47). Mérida: Centro Peninsular en Humanidades y Ciencias Sociales, Universidad Nacional Autónoma de México.

Domenici, D. (2009b). Continuidades, discontinuidades e interacciones culturales en el desarrollo cultural prehispánico de la Selva El Ocote (Chiapas). In T. A. Lee Whiting, D. Domenici, V. M. Esponda Jimeno, & C. Uriel del Carpio Penagos (Eds.), *Medio ambiente, antropología, historia y poder regional en el occidente de Chiapas y el Istmo de Tehuantepec* (pp. 137–154). Tuxtla Gutiérrez: UNICACH.

Domenici, D. (2010a). Patrones de uso ritual del espacio hipogeo en la Selva El Ocote (Chiapas). In E. Ortíz Díaz (Ed.), *VI Coloquio Bosch Gimpera*, *Lugar, espacio y paisaje en Arqueología. Mesoamérica y otras áreas culturales* (pp. 349–386). Mexico City: IIA, Universidad Nacional Autónoma de México.

Domenici, D. (2010b [pre-dated 2007]). Olmecas y post-Olmecas en el Preclásico del oeste de Chiapas: continuidades y cambios en una tradición ritual. *Thule. Rivista italiana di studi americanistici, 22/23,* 361–410.

Domenici, D. (2013). Un posible caso de sacrificio de niños del Clásico tardío en el área zoque: La Cueva del Lazo (Chiapas). *Estudios de Cultura Maya*, XLI, 61–91.

Domenici, D., & Lee, T. A. (2009). Periodización y desarrollo cultural del área del río La Venta, Chiapas. In A. Daneels (Ed.), *Cronología y periodización en Mesoamérica y el norte de*

México. V Coloquio Pedro Bosch Gimpera (pp. 405–433). Mexico City: IIA, Universidad Nacional Autónoma de México.

Domenici, D., & Lee, T. A. (2012). Classic and Postclassic Zoque Settlement Patterns and Ritual Practices along the Middle La Venta River. In M. Pye & L. Lowe (Eds.), *Arqueología Reciente de Chiapas: Contribuciones del Encuentro Celebrado en el 60° Aniversario de la Fundación Arqueológica del Nuevo Mundo* (pp. 69–86). Papers of the New World Archaeological Foundation, n. 72. Provo: Brigham Young University.

Domenici, D., Orefici, G., Pieri Orefici, E., & Lee Whiting, T. A. (2007). La Cueva del Lazo (Chiapas): Descripción e interpretación de un contexto ritual zoque. Paper presented at *Primer Coloquio de Arqueología y Etnografía Zoque*. Tuxtla Gutiérrez.

Drucker, P., Heizer, R., & Squier, R. J. (1959). *Excavations at La Venta, Tabasco*, *1955*. Bureau of American Ethnology Bulletin 170. Washington, DC: Smithsonian Institution.

Drusini, A. (1999). Los restos esqueléticos humanos de la Cueva del Lazo. In G. Badino et al. (Eds.), *Río La Venta, tesoro de Chiapas* (p. 156). Padova: Associazione La Venta, CONECULTA, Tipolitografia Turra.

Duncan, W. N. (2005). Understanding veneration and violation in the archaeological record. In G. F. M. Rakita, J. E. Buikstra, L. A. Beck, & S. R. Williams (Eds.), *Interacting with the dead: Perspectives on mortuary archaeology for the new millennium* (pp. 207–227). Gainesville: University Press of Florida.

Durán, D. (1995). *Historia de las Indias de Nueva España e Islas de Tierra Firme*. Mexico City: CONACULTA.

Duverger, C. (1979). *La fleur létale. Économie du sacrifice aztéque*. Paris: Éditions du Seuil.

Fash, W., Jr. (1987). The altar and associated features. In D. C. Grove (Ed.), *Ancient Chalcatzingo* (pp. 82–94). Austin: University of Texas Press.

Fernández Souza, L. (2006). Death and memory in Chichen Itza. In P. R. Colas, G. LeFort, & B. Liljefors Persson (Eds.), *Jaws of the underworld: Life, death, and rebirth among the ancient Maya* (pp. 21–34). Acta Mesoamericana,16. Markt Schwaben: Verlag Anton Saurwien.

Fowler, M. L., & MacNeish, R. S. (1972). Excavations in the Coxcatlan Locality in the alluvial slopes. In R. S. MacNeish (Ed.), *The prehistory of the Tehuacan Valley. Excavations and reconnaissance*, vol. 5 (pp. 219–340). Austin: University of Texas Press.

Freidel, D. A., & Guenter, S. P. (2006). Soul bundle caches, tombs, and cenotaphs: Creating the places of resurrection and accession in Maya kingship. In J. Guernsey & F. K. Reilly (Eds.), *Sacred bundles. Ritual acts of wrapping and binding in Mesoamerica* (pp. 59–79). Barnardsville: Boundary End Archaeology Research Center.

Fuentes y Guzmán, F. A. (1932). *Recordación Florida*. Guatemala City: Biblioteca Goathemala, Sociedad de Geografia e Historia de Guatemala.

Geller, P. (2011). The sacrifice we make of and for our children: Making sense of Pre-Columbian Maya practices. In A. Baadsgaard, A. T. Boutin, & J. Buikstra (Eds.), *Breathing new life into the evidence of death. Contemporary approaches to bioarchaeology* (pp. 79–105). Santa Fe: School for Advanced Research Press.

Glassman, D. M., & Bonor Villarejo, J. L. (2005). Mortuary practices of the prehistoric Maya from Caves Branch Rock Shelter, Belize. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords. Maya religion in the cave context* (pp. 285–296). Boulder: University Press of Colorado.

González Licón, E., & Márquez Morfín, L. (1994). Rito y ceremonial prehispánico en las cuevas de la Cañada, Oaxaca. In H. B. Nicholson & E. Quiñones Keber (Eds.), *Mixteca-Puebla. Discoveries and research in Mesoamerican art and archaeology* (pp. 223–234). Culver City: Labyrinthos.

González Torres, Y. (1985). *El sacrificio humano entre los mexicas*. Mexico City: FCE.

Graulich, M. (2005). *Le sacrifice humain chez les Aztèques*. Paris: Fayard.

Grove, D. C. (1984). *Chalcatzingo. Excavations on the Olmec frontier*. London: Thames & Hudson.

Grube, N. (2011). La figura del gobernante entre los Mayas. *Arqueología Mexicana, 110,* 24–29.

Guilliem, S. (1999). *Ofrendas a Ehécatl-Quetzalcoatl en Mexico-Tlatelolco*. Mexico City: Instituto Nacional de Antropología e Historia.

Guilliem, S. (2010). Los contextos sacrificiales de México-Tlatelolco. In L. López Luján & G. Olivier (Eds.) *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 275–300). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

Guiteras Holmes, C. (1960). *La familia tzotzil en la salud y la enfermedad*. Mexico City: Tlatoani.

Halperin, C. T., Garza, S., Prufer, K. M., & Brady, J. E. (2003). Caves and ancient Maya ritual use of jute. *Latin American Antiquity, 14*(2), 207–219.

Harris, O. (1980). The power of signs: Gender, culture and the wild in the Bolivian Andes. In C. MacCormack & M. Strathern (Eds.), *Nature, culture and gender* (pp. 70–94). Cambridge: Cambridge University Press.

Houston, S. D., Stuart, D., & Taube, K. A. (2006). *The memory of bones: Body, being, and experience among the Classic Maya*. Austin: University of Texas Press.

Houston, S. D., & Scherer, A. (2010). La ofrenda máxima: el sacrificio humano en la parte central del área maya. In L. López Luján & G. Olivier (Eds.), *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 169–193). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

Hurtado Cen, A., Cetina Bastida, A., Tiesler, V., & Folan, W. J. (2007). Sacred spaces and human funerary and nonfunerary placements in Champotón, Campeche, during the Postclassic Period. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 209–231). New York: Springer.

Instituto Nacional de Antropología e Historia Noticias (2011). *Hallan ofrenda originaria de la Pirámide del Sol*, n. 415, December 13th.

Inomata, T. (2011). Maya axes, and moles under the pyramid. *NYT blog Scientist at Work. News from the Field*, March 1st.

James, A., Jenks, C., & Prout, A. (Eds.). (1998). *Theorizing childhood*. Cambridge: Polity Press.

Jiménez Moreno, W. (1940). Ambiente histórico del códice. In W. Jiménez Moreno & S. Mateos Higuera (Eds.), *Códice de Yanhuitlan* (pp. 1–51). Mexico City: Museo Nacional, SEP, Instituto Nacional de Antropología e Historia.

Joyce, R. A. (2000). Girling the girl and boying the boy: The production of adulthood in ancient Mesoamerica. *World Archaeology, 31*(3), 473–483.

Joyce, R. A. (2006). Where we all begin. Archaeologies of childhood in the Mesoamerican past. In T. Ardren & S. Hutson (Eds.), *The social experience of childhood in ancient Mesoamerica* (pp. 283–301). Boulder: University Press of Colorado.

Ladrón de Guevara, S. (2010). El sacrificio humano en la Costa del Golfo. In L. López Luján & G. Olivier (Eds.), *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 67–77). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

Lagunas, Z., & Serrano, C. (1972). Decapitación y desmembramiento corporal en Teopanzolco, Morelos. In J. Litvak King & N. Castillo (Eds.), *Religión en Mesoamérica* (pp. 429–443). Mexico City: Sociedad Mexicana de Antropología.

Las Casas, B. (1992). *Apologética historia sumaria*. In Obras completas, vols. 6, 7, 8. Madrid: Alianza Editorial.

Lee Whiting, T. A. (1974a). The Middle Grijalva regional chronology and ceramic relations: A preliminary report. In N. Hammond (Ed.), *Mesoamerican archaeology: New approaches* (pp. 1–20). London: Duckworth.

Lee Whiting, T. A. (1974b). *Mound 4 Excavations at San Isidro, Chiapas, Mexico*. Papers of the New Archaeological Foundation, n. 34. Provo: Brigham Young University.

Lee Whiting, T. A. (1985). Cuevas secas del río La Venta, Chiapas: Informe preliminar. *Revista de la Universidad Autónoma de Chiapas*, 2a época*, 1*, 30–42.

Lesbre, P. (2011). Sacrificios humanos en Tezcoco. In K. Mikulska Dabrowska & J. Contel (Eds.), *De dioses y hombres. Creencias y rituales mesoamericanos y sus supervivencias* (pp. 97–120). Encuentros 2010 vol. V. Warsaw: Asociación Polaca de Hispanistas.

Linares Villanueva, E. (2002). Cerámica arqueológica del río La Venta, Chiapas. *Pueblos y fronteras, 4,* 93–124.

Lind, M., & Urcid, J. (1983). Lords of Lambityeco and their nearest neighbors. *Notas Mesoamericanas, 9,* 78–111.

Looper, M. G. (2006). Fabric structures in Classic Maya art and ritual. In J. Guernsey & F. K. Reilly (Eds.), *Sacred bundles. Ritual acts of wrapping and binding in Mesoamerica* (pp. 80–104). Barnardsville: Boundary End Archaeology Research Center.

López Alonso, S., Lagunas, Z., & Serrano, C. (1976). *Enterramientos humanos de la zona arqueológica de Cholula, Puebla, México*. Mexico City: SEP, Instituto Nacional de Antropología e Historia.

López Austin, A. (1980). *Cuerpo humano e ideología. Las concepciones de los antiguos nahuas*. Mexico City: Universidad Nacional Autónoma de México.

López Austin, A. (1994). *Tamoanchan y Tlalocan*. Mexico City: FCE.

López de Gómara, F. (1954). *Historia general de las Indias*. Barcelona: Iberia.

López Luján, L. (1993). *Las ofrendas del Templo Mayor de Tenochtitlan*. Mexico City: Instituto Nacional de Antropología e Historia.

López Luján, L., Chávez Balderas, X., Valentín, N., & Montufar, A. (2010). Huitzilopochtli y el sacrificio de niños en el Templo Mayor de Tenochtitlan. In L. López Luján & G. Olivier (Eds.), *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 367–394). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

López Luján, L., & López Austin, A. (2010). El Cuartillo de Santo Tomás Ajusco y los cultos agrícolas. *Arqueología Mexicana, 106,* 18–23.

Lowe, G. W. (1962). *Mound 5 and minor excavations, Chiapa de Corzo, Chiapas, Mexico*. Papers of the New World Archaeological Foundation, n. 12. Provo: Brigham Young University.

Lowe, G. W. (1964). Burial customs at Chiapa de Corzo. In P. Agrinier (Ed.), *The archaeological burials at Chiapa de Corzo and their furniture* (pp. 65–75). Papers of the New World Archaeological Foundation, n. 16. Provo: Brigham Young University.

Lowe, G. W. (1977). The Mixe-Zoque as competing neighbors of the early Lowland Maya. In R. E. W. Adams (Ed.), *The origins of Maya civilization*. Albuquerque: University of New Mexico Press.

Lowe, G. W. (1981). Olmec horizons defined in Mound 20, San Isidro, Chiapas. In E. Benson (Ed.), *The Olmec and their neighbors* (pp. 231–255). Washington DC: Dumbarton Oaks.

Lowe, G. W. (1998). *Los olmecas de San Isidro en Malpaso, Chiapas*. Mexico City: Instituto Nacional de Antropología e Historia.

Lowe, G. W. (1999). *Los Zoques antiguos de San Isidro*. Tuxtla Gutiérrez: CONECULTA.

Lucero, L. J., & Gibbs, S. A. (2007). The creation and sacrifice of witches in Classic Maya society. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 45–73). New York: Springer.

MacNeish, R. S. (1962). *Second annual report of the Tehuacan Archaeological-Botanical Project*. Andover: R.S. Peabody Foundation for Archaeology.

Manzanilla, L. (1997). El concepto de inframundo en Teotihuacan. In E. Malvido, G. Pereira, & V. Tiesler (Eds.), *El cuerpo humano y su tratamiento mortuorio* (pp. 127–143). Mexico City: Instituto Nacional de Antropología e Historia.

Manzanilla, L., Millones, M., & Civera, M. (1999). Los entierros de Oztoyahualco 15B.N6W3. In L. Manzanilla & C. Serrano (Eds.), *Prácticas funerarias en la ciudad de los dioses. Los enterramientos humanos de la antigua Teotihuacan* (pp. 247–283). Mexico City: Universidad Nacional Autónoma de México.

Márquez, L., & Schmidt, P. J. (1984). Osario infantil en un chultún en Chichén Itzá. In *Investigaciones recientes en el área maya. XVII Mesa Redonda*, tomo II, (pp. 89–103). San Cristóbal de las Casas: Sociedad Mexicana de Antropología.

Martin, S. (2002). The baby jaguar: An exploration of its identity and origins in Maya art and writing. In V. Tiesler, R. Cobos, & M. Greene Robertson (Eds.), *La organización social entre los mayas prehispánicos, coloniales y modernos* (pp. 49–78). Mexico City: CONACULTA, Instituto Nacional de Antropología e Historia, UADY.

Massey, V. K. (1994). Osteological analysis of the skull pit children. In T. R. Esther, H. Shafer, & J. Eaton (Eds.), *Continuing archaeology at Colha, Belize* (pp. 209–220). Studies in Archaeology 16. Austin: Texas Archaeological Research Laboratory, University of Texas.

Massey, V. K., & Steele G. (1997). A Maya skull pit from the Terminal Classic Period, Colha, Belize. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 62–77). Washington DC: Smithsonian Institution.

McAnany, P. (1998). Ancestors and the Classic Maya built environment. In S. Houston (Ed.), *Function and meaning in Classic Maya architecture* (pp. 271–298). Washington, DC: Dumbarton Oaks.

McCafferty, G. G., & McCafferty, S. D. (2006). Boys and girls interrupted. Mortuary evidence of children from Postclassic Cholula, Puebla. In T. Ardren & S. Hutson (Eds.), *The social experience of childhood in ancient Mesoamerica* (pp. 25–52). Boulder: University Press of Colorado.

Mendieta, G. De (1980). *Historia eclesiástica indiana*. Mexico City: Editorial Porrúa.

Miller, V. (2007). Skeletons, skulls, and bones in the art of Chichén Itzá. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 165–189). New York: Springer.

Monaghan, J. (1990). Sacrifice, death, and the origins of agriculture in the Codex Vienna. *American Antiquity, 55*(3), 559–569.

Morehart, C. T. (2005). Plants and caves in ancient Maya society. In K. M. Prufer & J. E. Brady (eds.), *Stone houses and earth lords. Maya religion in the cave context* (pp. 167–186). Boulder: University Press of Colorado.

Moser, C. L. (1975). Cueva de Ejutla: una cueva funeraria posclásica? *Boletín del Instituto Nacional de Antropología e Historia*, época II, *14,* 25–36.

Motolinía, B. T. de (1996). *Memoriales*. Mexico City: El Colegio de México.

Nájera, I. M. (1987). *El don de la sangre en el equilibrio cósmico*. Mexico City: Universidad Nacional Autónoma de México.

Olivier, G. (2006). El simbolismo de las espinas y del zacate en el México central posclásico. In L. López Luján, D. Carrasco, & L. Cué (Eds.), *Arqueología e historia del Centro de México. Homenaje a Eduardo Matos Moctezuma* (pp. 407–424). Mexico City: Instituto Nacional de Antropología e Historia.

Olivier, G. (2010). El simbolismo sacrificial de los Mimixcoa: cacería, guerra, sacrificio e identidad entre los Mexicas. In L. López Luján & G. Olivier (Eds.), *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 453–482). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

Orefici, G. (1998). Informe final de la campaña 1997. Proyecto La Venta, manuscript in the Instituto Nacional de Antropología e Historia Technical Archive, Mexico City.

Orefici, G. (1999). Excavaciones en las cuevas secas del río La Venta. In G. Badino, A. Belotti, T. Bernabei, A. De Vivo, D. Domenici & I. Giulivo (Eds.), *Río La Venta, tesoro de Chiapas* (pp. 153–174). Padova: Associazione La Venta, CONECULTA, Tipolitografia Turra.

Ortíz, P., & Rodríguez, M. (1999). Olmec ritual behaviour at El Manatí: A sacred space. In D. C. Grove & R. A. Joyce (Eds.), *Social patterns in Pre-Classic Mesoamerica* (pp. 225–254). Washington DC: Dumbarton Oaks.

Ortíz, P., & Rodríguez, M. (2000). The sacred hill of El Manatí: A preliminary discussion of the site's ritual paraphernalia. In J. E. Clark & M. E. Pye (Eds.), *Olmec art and archaeology in Mesoamerica* (pp. 75–93). Washington, DC: National Gallery of Art.

Owen, V. A. (2005). A question of sacrifice. Classic Maya cave mortuary practices at Barton Creek Cave, Belize. In J. E. Brady & K. Prufer (Eds.), *Stone houses and earth lords. Maya religion in the cave context* (pp. 323–340). Boulder: University Press of Colorado.

Paz Bautista, C. (2011). *Informe del estudio taxonómico y tipológico de los ornamentos de concha de la Cueva del Lazo, Proyecto Río La Venta, Chiapas, México*, ms. in possession of the Project's Director.

Piacenza, L. (2000). Los restos botánicos de la Cueva del Lazo, Ocozocoautla, Chiapas. *Investigación. Revista Icach*, *nueva época, 1*(5), 25–38.

Piojan, C. (1981). *Evidencias rituales en restos óseos*. Mexico City: Cuadernos del Museo Nacional de Antropología, Instituto Nacional de Antropología e Historia.

Piojan, C., Bautista, J., & Volcanes, D. (2001). Análisis tafonómico de cuatro máscaras cráneo procedentes del Recinto Sagrado de México Tenochtitlan. In C. Serrano & M. Villanueva (Eds.), *Estudios de Antropología Biológica*, vol. 10 (pp. 503–518). Mexico City: Universidad Nacional Autónoma de México, Instituto Nacional de Antropología e Historia, AMAB.

Piojan, C., & Mansilla, J. (1997). Evidence for human sacrifice, bone modification, and cannibalism in ancient Mexico. In D. L. Martin & D. W. Frayer (Eds.), *Troubled Times: Violence and warfare in the past* (pp. 217–239). Amsterdam: Gordon & Breach.

Piojan, C., & Mansilla, J. (2010). Los cuerpos de los sacrificados: evidencias de rituales. In L. López Luján & G. Olivier (Eds.) *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 301–316). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

Pomar, J. B. de, & Zurita, A. de (1941). *Relaciones de Texcoco y de la Nueva España*. Mexico City: Editorial Salvador Chayez Hayhoe.

Pohl, M. (1983). Maya ritual faunas: Vertebrate remains from burials, caches, caves, and cenotes in the Maya Lowlands. In R. M. Leventhal & A. L. Kolata (Eds.), *Civilization in the ancient Americas* (pp. 55–103). Albuquerque: University of New Mexico Press.

Pugh, T. W. (2005). Caves and artificial caves in Late Postclassic Maya ceremonial groups. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 47–69). Boulder: University of Colorado Press.

Reents-Budet, D. (2006). Power material in ancient Mesoamerica: The roles of cloth among the Classic Maya. In J. Guernsey & F. K. Reilly (Eds.), *Sacred bundles. Ritual acts of wrapping and binding in Mesoamerica* (pp. 105–126). Barnardsville: Boundary End Archaeology Research Center.

Reents-Budet, D., & MacLeod, B. (1986). *The archaeology of Petroglyph Cave, Belize*. Unpublished report submitted to the Department of Archaeology, Belmopan.

Reese-Taylor, K., Zender, M., & Geller, P. (2006). Fit to be tied. Funerary practices among the Prehispanic Maya. In J. Guernsey & F. K. Reilly (Eds.), *Sacred bundles. Ritual acts of wrapping and binding in Mesoamerica* (pp. 40–58). Barnardsville: Boundary End Archaeology Research Center.

Reinhard, J. (2005). *The Ice Maiden: Inca Mummies, Mountain Gods, and Sacred Sites in the Andes*. Washington, DC: National Geographic Society.

Relación de Coatepec y su partido (1985). In R. Acuña (Ed.), *Relaciones geográficas del siglo XVI: México* (pp. 125–178). Mexico City: Universidad Nacional Autónoma de México.

Roach, J. (2011). Maya underworld. National Geographic Online Edition. http://news.nationalgeographic.com/news/2011/07/pictures/110706-human-sacrifice-bones-maya-chichen-itza-ancient-science-mexico-cenote/

Robicsek, F., & Hales, D. (1984). Maya heart sacrifice: Cultural perspective and surgical technique. In E. P. Benson & E. H. Boone (Eds.), *Ritual human sacrifice in Mesoamerica* (pp. 49–90). Washington, DC: Dumbarton Oaks.

Rodríguez, M., & Ortíz, P. (2000). A massive offering of axes at La Merced, Hidalgotitlán, Veracruz, Mexico. In J. E. Clark & M. E. Pye (Eds.), *Olmec art and archaeology in Mesoamerica* (pp. 155–167). Washington, DC: National Gallery of Art.

Rodríguez, A. M. (2007). Tula se inscribiría en la tradición prehispánica de sacrificar niños. *La Jornada*. http://www.jornada.unam.mx/2007/04/21/index.php?section=cultura&article=a02n1cul. Accessed 21 April 2007.

Román Berrelleza, J. A. (1990). *Sacrificio de niños en el Templo Mayor*. Mexico City: Instituto Nacional de Antropología e Historia.

Román Berrelleza, J. A. (1991). A study of skeletal materials from Tlatelolco. In D. Carrasco (Ed.), *Aztec ceremonial landscapes* (pp. 9–19). Niwot: University Press of Colorado.

Román Berrelleza, J. A. (1999). Una ofrenda de niños. In E. Matos Moctezuma (Ed.), *Excavaciones en la Catedral y el Sagrario Metropolitanos* (pp. 99–110). Mexico City: INAH.

Román Berrelleza, J. A. (2010). El papel de los infantes en las prácticas sacrificiales mexicas. In L. López Luján & G. Olivier (Eds.), *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 345–366). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

Román Berrelleza, J. A., & Chávez Balderas, X. (2006). The role of children in the ritual practices of the Great Temple of Tenochtitlan and the Great Temple of Tlatelolco. In T. Arden & S. Hutson (Eds.), *The social experience of childhood in Mesoamerica* (pp. 233–248). Boulder: University Press of Colorado.

Román Berrelleza, J. A., & Rodríguez, M. C. (1997). Las patologías dentales en individuos localizados en ofrendas a los dioses de la lluvia. In E. Malvido, G. Pereira, & V. Tiesler (Eds.), *El cuerpo humano y su tratamiento mortuorio* (pp. 213–240). Mexico City: Instituto Nacional de Antropología e Historia.

Ruz, M. (2009). Ch'a Cháak. Plegaria por la lluvia en el Mayab contemporáneo. *Arqueología Mexicana, 96,* 73–76.

Sánchez, G. M. (2011). *Los procesos de conservación de los materiales de origen orgánico provenientes de la Cueva del Lazo, Chiapas*. Report for the Coordinación Nacional de Conservación del Patrimonio Cultural, Instituto Nacional de Antropología e Historia, Mexico City.

Sahagún, B. de (1989). *Historia general de las cosas de la Nueva España*. Mexico City: CONACULTA.

Sahagún, B. de (1950–1982). *Florentine Codex*. (trans: C. E. Dibble & A. J. O. Anderson). Santa Fe and Salt Lake City: School of American Research and the University of Utah.

Sahagún, B. de (1993). *Primeros memoriales*. Facsimile edition. Norman: University of Oklahoma Press.

Sahagún, B. de (1997). *Primeros Memoriales*. Paleography of Náhuatl text and English translation (trans: T. D. Sullivan). Norman: University of Oklahoma Press.

Sandstrom, A. R. (2005). The cave-pyramid complex among the contemporary Nahua. In J. E. Brady & K. M. Prufer (Eds.), *In the maw of the earth monster. Mesoamerican ritual cave use* (pp. 35–68). Austin: University of Texas Press.

Saul, J. M., Prufer, K. M., & Saul, F. P. (2005). Nearer to the gods: Rockshelter burials From the Ek Xux Valley, Belize. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords. Maya religion in the cave context* (pp. 297–322). Boulder: University Press of Colorado.

Scarborough, V. L. (1998). Ecology and ritual: Water management and the Maya. *Latin American Antiquity, 9*(2), 135–159.

Scholes, F. V., & Adams, E. B. (1938). *Diego Quijada, Alcalde Mayor de Yucatán 1561–1565*. Mexico City: Editorial Porrúa.

Scholes, F. V., & Roys, R. L. (1938). *Fray Diego de Landa and the problem of idolatry in Yucatán*. Washington, DC: Carnegie Institution of Washington.

Scott, A. M., & Brady, J. E. (2005). Human remains in Lowland Maya caves: Problems of interpretation. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords. Maya religion in the cave context* (pp. 263–284). Boulder: University Press of Colorado.

Sharer, R., & Sedat, D. (1987). *Archaeological investigations in the northern Maya Highlands, Guatemala: Interaction and the development of Maya civilization*. Philadelphia: The University Museum, University of Pennsylvania.

Sillar, B. (1994). Playing with God: Cultural Perceptions of Children, Play, and Miniatures in the Andes. *Archaeological Review from Cambridge, 13*(2), 47–63.

Spores, R. (1967). *The Mixtec kings and their people*. Norman: University of Oklahoma Press.

Sugiyama, S. (2010). Sacrificios humanos dedicados a los monumentos principales de Teotihuacan. In L. López Luján & G. Olivier (Eds.), *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 79–114). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

Tapia, A. de (1988). RELACIÓN DE ALGUNAS COSAS DE LAS QUE ACAECIERON AL MUY ILUSTRE SEÑOR DON HERNANDO CORTÉS, MARQUÉS DEL VALLE, DESDE QUE SE DETERMINÓ A IR A DESCUBRIR TIERRA EN LA TIERRA FIRME DEL MAR OCÉANO In G. Vazquez (Ed.), *La conquista de Tenochtitlan* (pp. 59–123). Madrid: Historia 16.

Taube, K. (1994). The birth vase: Natal imagery in ancient Maya myth and ritual. In J. Kerr (Ed.), *The Maya vase book, vol. 4* (pp. 625–685). Princeton: The Art Museum, Princeton University and Harry Abrams.

Taube, K. (2000). Lightning celts and corn fetishes: The Formative Olmec and the development of maize symbolism in Mesoamerica and the American Southwest. In J. E. Clark & M. E. Pye (Eds.), *Olmec art and archaeology in Mesoamerica* (pp. 297–337). Washington DC: National Gallery of Art.

Tello, A. (1997). *Libro segundo de la Crónica miscelánea, en que se trata de la conquista espiritual y temporal de la Santa provincia de Xalisco en el Nuevo Reino de la Galicia y Nueva Vizcaya y descubrimiento del Nuevo México*. Mexico City: Editorial Porrúa.

Tezozomoc, H. A. (1987). *Crónica mexicana*. Mexico City: Editorial Porrúa.

Than, K. (2011). Offering to the ocean? National Geographic Daily News. http://news.nationalgeographic.com/news/2011/09/pictures/110926-child-sacrifice-llamas-science-peru-chimu-inca-burials/. Accessed 26 Sept 2011.

Thomas, N. D. (1975). Elementos pre-colombinos y temas modernos en el folklore de los Zoques de Rayón. In A. Villa Rojas, J. M. Velasco Toro, F. Báez-Jorge, F. Córdoba Olivares, & N. D. Thomas (Eds.), *Los zoques de Chiapas*, (pp. 217–235). Mexico City: Instituto Nacional Indigenista, Secretaría de Educación Pública.

Thompson, E. J. (1970). *Maya history and religion*. Norman: University of Oklahoma Press.

Tiesler, V. (2005). What can the bones really tell us? In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords. Maya religion in the cave context* (pp. 341–363). Boulder: University Press of Colorado.

Tiesler, V. (2007). Funerary or nonfunerary? New references in identifying ancient Maya sacrificial and postsacrificial behaviors from human assemblages. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 14–44). New York: Springer.

Tiesler, V. (2012). *Transformarse en Maya. El modelado cefálico entre los mayas prehispánicos y coloniales*. Mexico City: UNAM, IIA, UADY.

Tiesler, V., & Cucina, A. (2005). *Análisis de los restos óseos y dentales humanos recuperados por el Proyecto Arqueológico Río La Venta, Chis., de la Universidad de Bologna*. Ms report.

Tiesler, V., & Cucina, A. (2006). Procedures in human heart extraction and ritual meaning. A taphonomic assessment of anthropogenic marks in Classic Maya skeletons. *Latin American Antiquity, 17*(4), 493–510.

Tiesler, V., & Cucina, A. (2010). Sacrificio, tratamiento y ofrenda del cuerpo entre los mayas peninsulares. In L. López Luján & G. Olivier (Eds.), *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 195–226). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

Tiesler, V., Suzuki, S., & Chi Keb, J. (2010). *Análisis histológico de tres muestras óseas recuperados por el Proyecto Arqueológico Río La Venta, Chis., Universidad de Bologna, Italia*. Ms. report.

Torquemada, J. de (1986). *Monarquía indiana*. Editorial Porrúa, Mexico City.

Tozzer, A. M. (1941). *Landa's relación de las cosas de Yucatán*. Papers of the Peabody Museum of American Archaeology and Ethnology 18. Cambridge: Harvard University.

Urcid, J. (2010). El sacrificio humano en el Suroeste de Mesoamérica. In L. López Luján & G. Olivier (Eds.), *El sacrificio humano en la tradición religiosa mesoamericana* (pp. 115–168). Mexico City: Instituto Nacional de Antropología e Historia, Universidad Nacional Autónoma de México.

Urcid, J. (2011). Sobre la antigüedad de cofres para augurar y propiciar la lluvia. *Arqueología Mexicana, 110,* 16–21.

Uruñuela, G., & Plunket, P. (2002). Lineage and ancestors: The Formative mortuary assemblages of Tetimpa, Puebla. In P. Plunket (Ed.), *Domestic ritual in ancient Mesoamerica* (pp. 20–30). Cotsen Institute of Archaeology Monograph 46. Los Angeles: University of California.

Valencia Rivera, R., & García Capistrán, H. (2011). In the place of the mist: Analysis of a Maya myth from a Mesoamerican perspective. Paper presented at the Symposium *Religion, Ritual Practices & Mythology*, 16th European Maya Conference, Copenhagen, December 10, 2011.

Wonderly, W. L. (1947). Textos folklóricos en zoque. Tradiciones acerca de los alrededores de Copainalá, Chiapas. *Revista mexicana de estudios antropológicos, 9,* 135–163.

Chapter 4
A Case Study of Funerary Cave Use from Je'reftheel, Central Belize

Gabriel D. Wrobel, Christophe Helmke and Carolyn Freiwald

Abstract Bioarchaeological analysis of mortuary deposits from Je'reftheel, a small cave located in the Roaring Creek Works of central Belize, focused on characterizing the nature of mortuary activities conducted in the cave to determine whether the site was used for funerary or sacrificial purposes. In contrasting caves and cenotes, ethnographic, ethnohistoric, and epigraphic accounts of cave use by the Maya fairly consistently mention mortuary events that occur in caves, as funerary. The combined osteological and isotopic analyses from Je'reftheel are also consistent with models of funerary behavior among the Maya. The skeletal deposits comprise both primary, articulated bodies, and secondary deposits. Other data suggest that most of the individuals were of local origin and may have been closely related. Together, these results provide a strong analogy to funerary behavior documented in tombs throughout the Maya region and beyond.

4.1 Introduction

Maya archaeologists have recently devoted increased attention to caves, which provide a particularly important source of data for investigating the roles of ritual within the broader sociopolitical structure of communities. Archaeological projects increasingly incorporate regional cave surveys in their research designs, integrating these contexts and investigations of other natural and constructed features of

G. D. Wrobel (✉)
Department of Anthropology, Michigan State University,
408 Giltner Hall, East Lansing, MI 48824, USA
e-mail: wrobelg@msu.edu

C. Helmke
Department of American Indian Languages and Cultures, Institute of Cross-cultural and Regional Studies, University of Copenhagen, 2300 Copenhagen S, Denmark
e-mail: cgbh@hum.ku.dk

C. Freiwald
Department of Sociology and Anthropology, University of Mississippi,
Oxford, MS 38677-1848, USA
e-mail: crfreiwa@olemiss.edu

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_4,

the landscape and significantly expanding the overall diversity and number of cave samples. Furthermore, researchers have begun to utilize a wider variety of both methodological and theoretical approaches. As a result, speleoarchaeologists have made great advances in their efforts to differentiate and identify specific rituals by their material culture signatures, to understand the underlying symbolic meaning of caves to the Maya, to reconstruct sets of behaviors associated with cave use, and to document important shifts in the nature of their use over time that denote broader patterns of culture change (see Brady 1989, 1997; Helmke 2009; Moyes 2006; Rissolo 2005; among others).

As part of this intensification of cave research, investigations focused on interpreting the nature of human remains deposited within caves represent an exceptionally promising avenue of study that can bring unique insight to questions about how Maya groups conceptualized and used caves in specific circumstances. In particular, the majority of the studies describing bodies or individual bones found in caves has directly or indirectly described them as representing the remains of one of two broad ritual categories, namely, funerary or sacrificial. In this chapter, we compare these competing hypotheses with a case study of mortuary patterns in Je'reftheel (aka, Franz Harder Cave), a small cave in central Belize, using multiple lines of evidence from archaeological context, taphonomy, biogeochemical assays, and skeletal data to demonstrate that the ritual patterns are consistent with funerary behavior.

4.2 Mortuary Cave Use in Ethnohistoric, Ethnographic, and Epigraphic Records

Most researchers proposing behavioral models for the presence of bones found in Classic period cave contexts have relied heavily on ethnographic and ethnohistoric analogy to argue for both funerary and sacrificial explanations. Until relatively recently, the vast majority of archaeological studies of caves with mortuary deposits have proposed funerary explanations (see Scott and Brady 2005). In his review of ethnographic documentation of cave use, Brown (2005, p. 382) states that "descent groups' worship of lineage ancestors created an association between caves and settlement units related to kinship groups. The use of caves for ancestor worship of corporate or territorial groups appears to be a pan-Maya phenomenon" (also see Brady 1997, p. 28 and Stone 1995, p. 44). This ubiquitous use of caves by lineages extends to the Colonial and pre-Contact periods, during which it is clear that such rituals often involved the deposition and curation of bodies and bones. In seventeenth-century Highland Chiapas, Bishop Nuñez de la Vega described the worship of bones thought to be those of founding ancestors located in caves (Thompson 1975, p. xxxiii). Villa Rojas (1969, p. 215) reported that the Tzeltal Maya placed the remains of important patriarchs in caves even into the twentieth century. Finally, Cucina and Tiesler (Chap. 9, this volume) describe shrines of the modern Lacandon in caves and rockshelters that incorporate human bones likely dating to the Early Colonial period, which they believe are their ancestors.

Because human sacrifice associated with rain ceremonies in and around both cenotes and caves is well documented in Mesoamerica (see Domenici, Chap. 3, this volume), archaeologists have begun to more consistently consider sacrificial ritual as a possible explanation for skeletal deposits in caves. Many ethnohistoric sources mention human sacrifice associated with caves, but the vast majority of these specifically refer to cenotes in the Yucatan (see review by Tiesler 2005, p. 342). Similarly, Vail and Hernández (2007, Fig. 6.3a, Table 6.3) have identified an image depicting a bound live captive above a cenote within the Madrid Codex, which they suggest is an indirect reference to sacrifice (i.e., they presume this is the fate of captive). Similarly, the basal register of Stela 14 at Uxmal shows a pair of naked captives, arms tied behind their backs and paper strips inserted into their earlobes (Graham 1992:108). Significantly, this basal panel is framed by the stylized pincers of a centipede, here possibly denoting a cenote (Taube 2003:413–418). The use of cenotes for human sacrifice has been confirmed by bioarchaeological investigations (Anda Alanís 2007; Beck and Sievert 2005; Rojas Sandoval et al 2008, p. 148; Tiesler 2005) although comparable documentation is limited to only a few sites. While the testimony by Landa (Tozzer 1941, p. 180) suggests that sacrifices associated with a "cenote cult" were relatively common in the northern Yucatan, it is not certain whether these practices had direct antecedents in Classic period Southern Lowlands culture. Ethnohistoric literature that specifically refers to sacrificial ritual associated with caves is relatively scarce (Fuentes y Guzmán 1932, p. 336; Scholes and Roys 1938, pp. 614–615). While the general lack of ethnohistoric references to human sacrifice in caves may mean that it was highly unusual, we must also consider that caves could also have functioned to make such rituals less visible, especially to the Spanish, who actively suppressed sacrificial rituals (Chuchiak 2006). As Scott and Brady (2005, p. 276) have noted, questions still remain regarding the extent of such practices.

Current behavioral models explaining the mortuary use of caves during the Classic period have focused almost entirely on archaeological and ethnohistoric data, largely ignoring the written glyphic corpus. Statements of death and burial related to caves in the Classic period iconographic record are far less common than statements referencing royal accessions and births, but appear in the corpus in the context of funerary rituals and subsequent tomb reentry ceremonies (Stuart 1998, pp. 380–381, 397–399; Fitzsimmons and Fash 2003; Fitzsimmons 2006).

What is significant is that not a single glyphic text makes clear and irrefutable mention to human sacrifice in caves, or to decapitation, the preferred means of executing captives in the Classic period (Helmke 2009). However, references to inhumations are known, involving the verb *muk* 'to bury', which refers to the interment of royal figures. El Cayo Panel 1 dates to AD 763 and records events in the life of *Chan Panak*, lord of Yaxniil, the ancient toponym of the archaeological site of El Cayo (Zender 2002, pp. 167–170; Lacadena and Wichmann, n.d., pp. 16–17, 22):

i-CHAM-mi	**mu-ku-ja**	**tu-CH'EN**	**YAX-ni-la**	[D12–C14]
i-cham-i[']	*mu[h]k-[a]j*	*t-u-ch'e[']n*	*yaxn-iil*	
'and died,	was buried	in the cave of	Yaxniil'	

It is unclear who was buried because sections of the text are eroded. It may refer to the father of the protagonist *Chan Panak*, who, after the interment, "went up" to Piedras Negras in the company of its current king, *Ik'naah Chak ? Yo'nal Ahk(ul)* III (see Stuart 2004, p. 3; Martin and Grube 2008, p. 151).

Another example is found in the text of Dos Pilas Stela 8. After recounting events in the life of "Itzamnaaj" *K'awiil*, the second ruler of the site, the text goes on to record his death on the 22nd of October AD 726 (Mathews 2001, pp. 402–403, 407–414; Martin and Grube 2008, pp. 58–59). Four days later in the night of the 26th:

This additional reference to inhumations taking place in caves, including those of royal individuals, may be supported by a fragmentary ceramic vessel bearing a partial glyphic text found in one of the funerary structures of Naj Tunich,

mu-ka-ja	**TAN-CH'EN-na**	**[CHAHUK]CHAN?-HA'**	**3-WINAK?-HAB-AJAW**	
mu[h]k-aj	*ta[h]n-ch'e'n*	*chahuk-chan?-ha'*	*ux-wina[a]k-ha[a]b-ajaw*	
GOD.D-**K'AWIL**	**yi-IL-ji**	**8-WINAK?**	**a-AJAW[TAK]**	
? k'awi[i]l	*y-i[h]l-[a]j*	*waxak-wina[a]k*	*ajaw-ta[a]k*	[H14-I16a]

'Was buried in the middle of the Dos Pilas cave, the 3 K'atun King, "Itzamnaaj" *K'awiil,* 28 kings witnessed it'

which refers to an individual bearing the title *ajaw* "king" (see Brady 1989, pp. 135–136; Helmke and Brady 2009). Alternatively, the reference on Dos Pilas Stela 8 to the burial of "Itzamnaaj" *K'awiil* within a cave has been argued to be an allusion to a tomb, functioning as a symbolic cave (e.g., Coe 1998; Vogt and Stuart 2005), following the discovery of an elite tomb in the temple in front of which Stela 8 was erected (Demarest 1993). Even if the latter interpretation is correct, it still serves to emphasize the close symbolic relationship between caves and tombs.

Further evidence for inhumations in caves is also found at the end of the text of Ojo de Agua Stela 1, where the father of the local lord is said to:

ha['i]	**pa-sa-wi**	**ka-ba**	**tu-CH'EN-na**	**[?-ka-NAH]AJAW**	[A11–A12]
haa'	*pas-aaw*	*kab*	*t-u-ch'e'n*	*?ka[l]-na[a]h ajaw*	
'he	opens	earth	in the cave of	the *?kal Naah* king'	

The verb *pas-* "open, expose," when used in conjunction with *kab* "earth," is employed here and elsewhere with the sense of "to exhume." Examples are found on Altar 5 at Tikal, Stela 23 at Naranjo, and Altar 1 at Xunantunich, where the *ubaak ujo'l* "skull and bones," which is to say the "skeletons," of various nobles were exhumed (Grube and Schele 1994; Grube 2000, pp. 259–260; Helmke et al. 2010, pp. 118–119). These exhumations appear to have been undertaken with the purpose of desecrating the tombs of antagonists, or of repatriating human remains from territories under hostile control. This suggests that the text of Stela 1 at Ojo de

Agua references an exhumation that took place in the cave of a Lacanha king, based on the emblem glyph title at the end of the clause. However, the emblem glyph in question is also shared at times by Bonampak (see Mathews 1978, pp. 60–61; Palka 1996). In turn, because the exhumation took place in a cave, it follows that human remains were previously interred in that locality, and thereby further corroborates the existence of such funerary practices in emic terms. This is consistent with evidence in the form of speleothem growth atop toppled walls suggesting that the masonry mausoleums in the entrance to Naj Tunich were sacked or looted in antiquity (see Brady and Colas 2005, pp. 152–153, 162; Helmke and Brady 2009). In addition, since exhumations are frequently cited in the context of desecrations, the case of Ojo de Agua Stela 1 appears to continue the militaristic theme in which the ritual propriety of caves was undermined by rival forces. Unfortunately, the consequences of this action went unrecorded, but considering the martial verbs often used (see Helmke 2009, pp. 86–145; Helmke and Brady 2009), it is likely that the repercussions were immediate and dire.

The glyphic texts are significant because they clearly denote the funerary nature of the natural deaths and subsequent interments of the individuals within caves. In contrast, an extensive review of the currently known corpus of glyphic texts shows that references to human sacrifice in caves are notably lacking.

4.3 The Bioarchaeology of Maya Caves

Most studies of caves have relied almost entirely on archaeological context and underutilized or ignored potential data from skeletons in large part because of the inherent difficulties of analyzing bones from caves (see Cucina and Tielser, Chap. 9, this volume), as well as the lack of participation of physical anthropologists in field excavations. Most early studies mentioning Maya bones found in caves suggest that they were funerary in nature, based either on loose analogy with ethnohistoric accounts of ritual activities performed in caves associated with ancestor cults (Thompson 1959, p. 129, 1975) or speculation (Blom and La Farge 1926, p. 157; Ruz Lhuillier 1968, p. 165). Other archaeologists have attempted to identify patterns of mortuary treatments consistent with nonsacrificial funerary behavior in caves (Scott and Brady 2005). For instance, elaborate (although looted) masonry enclosures at Naj Tunich (Brady 1989; Scott and Brady 2005) and Balam Na Cave 4 (Garza et al 2002), which also produced jade, pyrite, and stone beads, have been convincingly identified as elite tombs. Specialized mortuary treatment of individuals or placement within unusual cave settings has been used to identify funerary rites for ritual specialists (Prufer and Dunham 2009; Thompson 1938). Although rare, cremations found in caves are consistently interpreted as funerary in nature (Blom 1954; Thompson 1975, p. 123, Wauchope 1942) on the basis of Colonial sources linking cremation to the funerals of particularly important individuals (Tozzer 1941, p. 130) and ethnographic analogy (Brady 1989, p. 346).

Secondary deposition of bones also has been considered to be deliberate burial in most cases (Halperin 2005, p. 80; Healy et al 1996; Scott and Brady 2005, p. 271), although not all (Scott and Brady 2005, p. 274). Additional contextual data often attributed to funerary status within the Maya cave archaeology literature include orderly body arrangement (Pendergast 1971, p. 17; Scott and Brady 2005, p. 271), burial (as opposed to surface deposition; Lucero and Gibbs 2007, p. 67), and the presence of grave goods (Garza et al. 2002; Lucero and Gibbs 2007, p. 67; Prufer and Dunham 2009).

In contrast, contextual clues often cited as indicative of sacrifice include lack of grave goods (Brady 1989, p. 351,362; Gibbs 2000, p. 147; Kieffer 2009; Owen 2005, p. 331; Peterson 2006, p. 93), presence of offerings not considered to be grave goods (Kieffer 2009; Scott and Brady 2005, p. 278; MacLeod and Puleston 1978), prone body position (Owen 2005, p. 332), disorderly or haphazard body position (Brady 1989, p. 351; Brady and Stone 1986; Gibbs 2000, p. 147; Lucero and Gibbs 2007, p. 60; Owen 2005, p. 332), location of body in wet, muddy, or high-traffic areas (Brady 1989, p. 362; Brady 2010, p. 222; Gibbs 2000, p. 147; Kieffer 2009; Owen 2005, p. 332; Owen and Gibbs 1999, p. 200; Peterson 2006, p. 93; Scott and Brady 2005, p. 278), association with architecture (Pendergast 1971, p. 18; Peterson 2006, p. 93), and "child" age (Brady 1989, p. 363; Brady 2010, p. 222; Brady and Stone 1986; Gibbs 2000, p. 147).

In general, a large percentage of the human remains found in caves do not fit neatly within the categories discussed above and are not often associated with obvious markers indicating the nature of the interment. Furthermore, extensive taphonomic and human disturbances, which are typical in most cave settings, complicate attempts by archaeologists to decipher and reconstruct aspects of primary contexts as they existed immediately following rituals, such as body position (including distinguishing primary vs. secondary burials) and the presence or absence and the location of grave goods. Recently, Scott and Brady (2005, pp. 276–77) have argued for the primacy of context when interpreting human skeletal remains from caves, in part by emphasizing some of the limitations related to the ability to identify physical evidence of sacrifice. They point out that marks of trauma may be obscured because of poor preservation and accumulation of calcium carbonate deposits, and that many potential forms of ritual killing would leave no signs of trauma on the bone. While their argument that "absence of evidence is not evidence of absence" is reasonable, the narrow scope of their discussion about the potential contribution of skeletal data to such research is illustrative of the limited role physical anthropologists traditionally have had in Maya cave archaeology. Studies of Maya mortuary ritual from noncave contexts have increasingly incorporated a wide variety of bioarchaeological methods that have been largely absent from traditional cave studies (see Tiesler 2007).

In the following section, we propose a behavioral reconstruction of bone deposits that combines multiple lines of bioarchaeological evidence derived from archaeological context, taphonomy, biogeochemical assays, and skeletal data. When viewed individually, each source of data could support multiple interpretations.

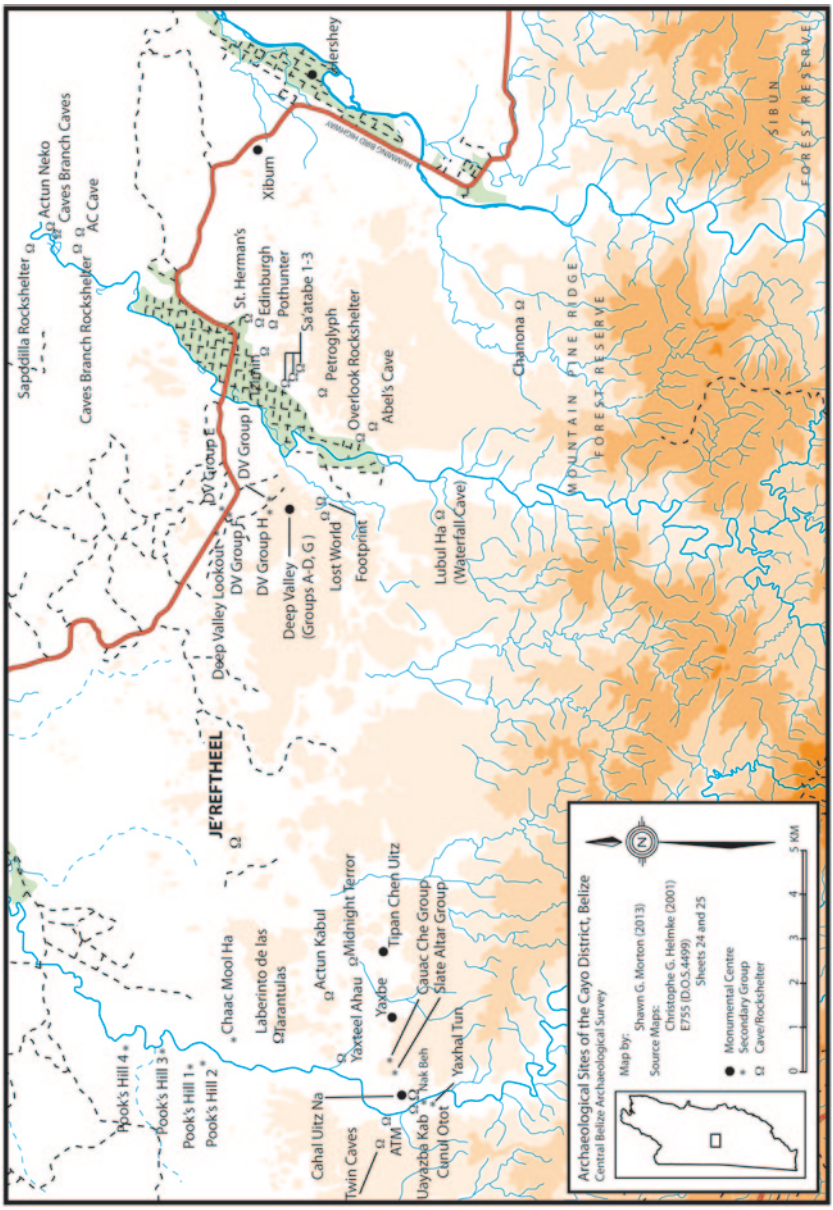

Fig. 4.1 Map of central Belize showing the location of Je'reftheel and surrounding cave and settlement sites

However, together each helps to contextualize the others, forming a coherent picture that is consistent with funerary, rather than sacrificial, ritual.

4.4 Je'reftheel: Description of the Site and Its Regional Context

Je'reftheel is a relatively small cave (less than 30 m in length) located within a karst outcrop known as the Roaring Creek Works, which is bordered by the Caves Branch River and Roaring Creek valleys in central Belize (Fig. 4.1). The limestone bedrock of the outcrop is part of the southern Yucatan Peninsula, which was formed during the Upper Cretaceous period. The outcrop is located just a few kilometers from the late Carboniferous and Permian land forms of the Maya Mountains (Ower 1928), a difference that forms the basis for the use of strontium isotope ratios to identify the origin of individuals living in the region.

It was Mennonites from the nearby village of Springfield who first reported the cave's presence to the Belize Institute of Archaeology in 2003. The Mennonites had only recently moved to the area, and in clearing the land for their settlement and fields they completely dismantled and leveled many ancient house mounds that were in the direct vicinity of the site (Franz Harder pers. comm. 2003). As a result, we do not know much about the size or complexity of the ancient local community. However, recent investigations by the Western Belize Regional Cave Project (Awe et al. 1998) and the Central Belize Archaeological Survey (Andres et al. 2014) have documented the existence of extensive settlement and several large urban cores nearby, with predominant evidence of construction dating to the Late Classic period (AD 600–900).

Helmke (2009; Helmke and Wrobel 2012) mapped Je'reftheel between 2003 and 2004 as part of the Belize Valley Archaeological Reconnaissance project, identifying 12 distinct archaeological features within the dark zone, seven of which contained human remains (Fig. 4.2). Analysis of ceramics found within these features showed that most were deposited as whole vessels, and some were apparently ritually terminated. The consistency of their form suggests that all human activity in the cave was likely restricted in time to a specific facet of the Late Classic period (Helmke 2009, p. 465). This temporal range was recently confirmed with an AMS date taken from a charcoal sample from Feature 5 that produced a 2-sigma range of AD 680–890 (Beta-284077). Later investigations by the Caves Branch Archaeological Survey project during the 2009 and 2010 field seasons focused on recording the spatial distribution of bones within the cave and on subsequent osteological laboratory analyses.

Despite visits by some curious boys from the local community, there appears to have been only minimal recent disturbance of the remains and certainly the cave was found in a pristine and completely unlooted condition when it was first investigated in 2003, a situation which is highly unusual—if not unique—in this area. The seven features containing bones were generally found in terminal spaces in the

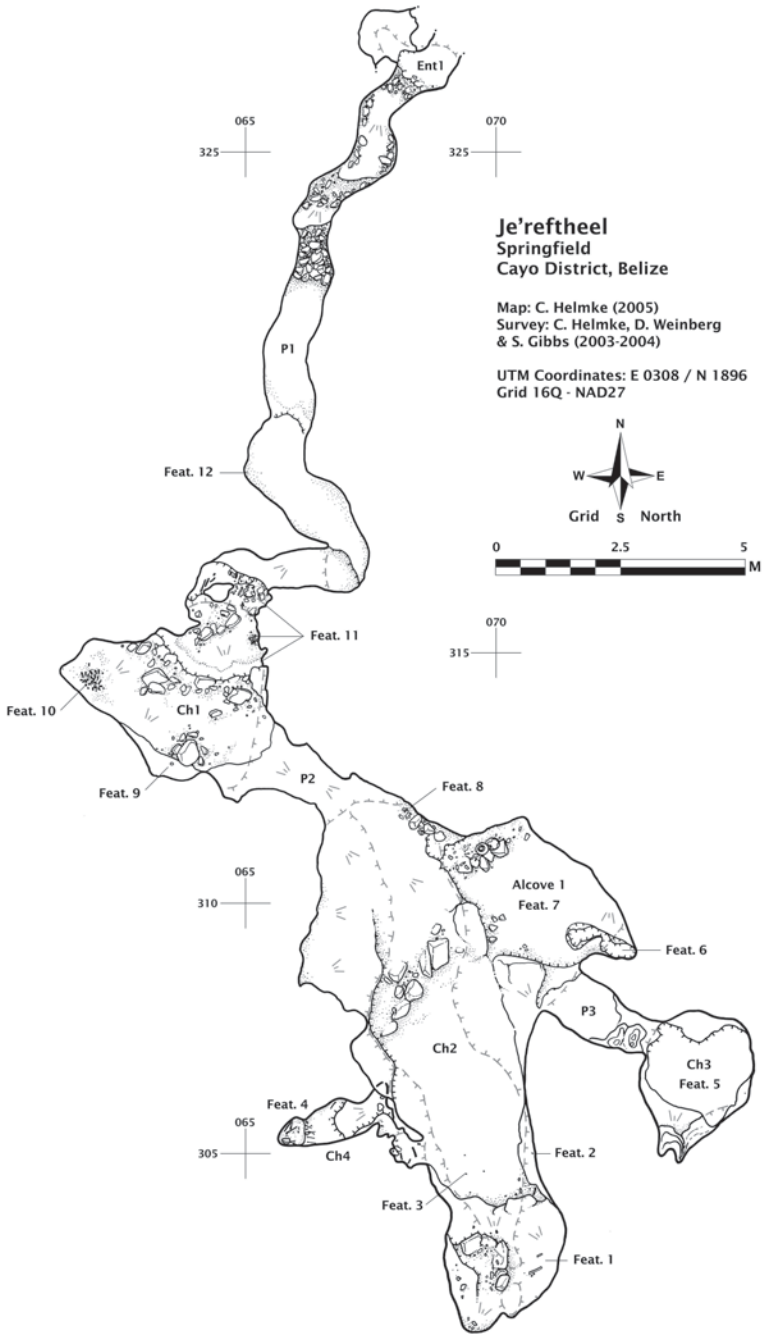

Fig. 4.2 Plan of Je'reftheel showing the location of cultural features. (Plan by Christophe Helmke)

Fig. 4.3 Composite panorama of Feature 5. (Photographs and digital stitching by Christophe Helmke)

cave, and the associated bone assemblages varied in size and composition. Analyses revealed a minimum number of 24 individuals in the cave.

Feature 1 comprised a scatter of disarticulated and broken human remains commingled with minor collapse on the breakdown slope at the southern end of Chamber 2. The bones all seem to belong to a single individual, likely male. Many of the breaks were clearly ancient, although they appear to have occurred long after the individual's death. We believe Feature 1 represents intentional movement and redeposition of skeletal remains in antiquity.

Features 3 and 4 lie adjacent to one another, and both appear to be clusters of the disarticulated, commingled, and incomplete remains of multiple individuals that may originally have been bundled. Feature 3 was situated in Chamber 2, and Feature 4 was located slightly lower on the same, sloped surface and within Chamber 4, a very small cavity connected to Chamber 2. Feature 4 also included a complete, finely knapped, chert lanceolate biface. At the time of our work in 2009, the break between Features 3 and 4 was not well defined. However, based on the photographs taken in 2004 and comparisons with Sherry Gibbs's 2003 in situ analysis (in Helmke 2009, p. 443, Fig. 7.6, Appendix G), the bones in these features have recently suffered significant deterioration and displacement due to the combined effects of gravity, water, bat guano, and human intervention. The 2004 photographs of Feature 4 show two crania, one that was complete with a distinctly flattened occiput, and the other nearly complete, but broken. The complete cranium was missing in 2009, so seems to have been removed from the cave, while the broken cranium appears to have significantly deteriorated.

Feature 11 comprises a cluster of human remains and the fragments of two *ollas* scattered along the northeastern wall of Chamber 1. Similar to Features 3 and 4, Feature 11 was next to and within the opening to a small passage off of a larger Chamber. Many of the human remains appear to have been recently knocked or

washed down the slope into this solution tunnel, and the recovery (and thus the analysis) of the remains from this feature is incomplete. All of the recovered bones appear to belong to a single young male individual.

The most complex deposits of human remains are those of Features 5, 6, and 7. Feature 5 comprises a deposit of well-preserved human remains and associated artifacts that nearly covered the entire surface of Chamber 3 (Fig. 4.3). Artifacts included various items of jewelry, a small ceramic *olla* (Vessel 1), and a stemmed chert biface. The remains appeared to be largely unaffected by recent disturbance, perhaps because of the very narrow entrance passage that limits access. Each element was photographed in situ, and its specific location and position was carefully recorded prior to removal. While some elements were lying directly on the ground surface, it was necessary to excavate others from the shallow, sticky clay matrix that forms much of the chamber's floor. Many of the bones in Feature 5 were still in articulation, indicating the presence of primary interments, although many individual elements were also seemingly scattered within the chamber, suggesting subsequent movement following decomposition. Overall, the bones are in excellent condition, although in some areas drip water cemented bones in place and guano droppings of roosting bats resulted in localized degradation. Lab analysis identified nine individuals based on duplicate cranial elements and teeth, while an inventory of postcranial elements indicates a total of eight relatively complete individuals and some isolated elements.

Feature 7 comprises the fragmentary human remains and ceramic sherds that were widely scattered and partly embedded into the silty floor of Alcove 1. In addition, two *ollas* were set side-by-side at the westernmost extent of this feature, one of which contained a small deposit of colluvium and a human phalanx. Compared to Feature 5, Feature 7 exhibited much poorer preservation, perhaps as a result of higher traffic and/or more water activity in this area. Initially, articulations were not evident among most of the bones on the surface. Following removal of the commingled bones, excavations revealed three distinct layers of clay. The deepest was the natural cave floor, on which a partial, burnt globular vessel had been deposited. Above this was a layer of darker clay (perhaps resulting from the in situ decomposition of bodies) that formed a flat surface on which had been placed bodies, as evidenced by several distinct sets of articulated bones. As in Feature 5, a final layer seems to have washed in slowly over time and covered many of the bones, in some cases preserving their original position.

Feature 6 is a solution funnel that lies at the southeastern edge of Alcove 1 and abuts Feature 7. The hole contained numerous fragmentary and complete human remains and small ceramic sherds, many of which are cemented in place by flowstone. The stone deposits that have formed since the Late Classic period seem to be extensive, so we are unable to get a sense of how much material is within the hole and covered. Furthermore, it is also unclear how many of these remains were intentionally deposited within the hole and how many were secondarily displaced from Feature 7.

4.5 Interpreting the Context of Je'reftheel's Mortuary Deposits

Ultimately, the goal of this study is to provide a behavioral reconstruction of the ancient Maya activities conducted within Je'reftheel. Following Tiesler (2007), we attempt to contextualize the skeletal deposits by providing data related to the identity of the individuals in life, reconstructing their treatment around the time of death, and distinguishing the nature of subsequent physical alterations (cultural or taphonomic) to the bones following death and decomposition. Within each section of this discussion, we provide an interpretation of the potential cultural meanings of the data.

4.5.1 Anthropogenic Marks

We begin with a discussion of anthropogenic marks on the skeleton, which, if present and shown to be perimortem in nature, can be used to infer sacrifice. During the analysis of the Je'reftheel bones, particular attention was paid to vertebrae and ribs, skulls, and the site of tendon attachments on long bones, because marks in these areas have been linked to specific known sacrificial rituals or perimortem processing practices among the Maya (Piehl and Awe 2010; Tiesler and Cucina 2006). A careful visual inspection of all bones identified relatively few modified surfaces, none of which were the direct result of ancient perimortem behavior. Several of these cases were clearly vascular impressions, which are unremarkable, but may be confused with cut marks because they appear as single or multiple striations and are especially common on the cranium and around joints. Interestingly, very few elements in the assemblage showed rodent gnawing, which is unexpected given the relatively shallow depth of the cave.

Bone fractures were also considered, because broken bones can result from perimortem trauma and from rituals in which bones are intentionally fragmented, often as a means of termination (Harrison-Buck et al 2007). There were no obvious examples of green bone fractures that would imply perimortem violence. All of the observable fractures (whose surfaces were not obliterated by poor preservation or obscured by mineral deposits) had obviously occurred when the bone was dry and thus long after the death of the individual. While many of the breaks were recent, many were also clearly ancient. When considering which elements were broken and where on the bones the fractures occurred, it is clear that the pattern within the assemblage is a random one, suggesting that it occurred following natural decomposition and dissociation of elements. While some of these bones may have been intentionally broken as part of secondary mortuary rituals, there is no consistent pattern that would imply that such behaviors were a regular part of the mortuary pathway of the deceased within Je'reftheel. Most of these breaks were very likely the consequence of unintentional destruction by ritual practitioners or other visitors

to the cave who inadvertently damaged elements by stepping on them or displacing them to make room for new bodies.

4.5.2 Body Placement and Position

The placement and position of bodies also have been important criteria for determining the cultural circumstances surrounding mortuary activities. As discussed above, evidence of irregular body position and specific types of restraint binding often are used to argue for sacrifice, along with particular patterns of postmortem movement and redeposition of skeletal elements that have been linked to specific funerary and nonfunerary cultural practices.

Articulated elements were noted only in the largest bone deposits, Features 5 and 7, suggesting that these areas served as locations for the placement of newly deceased individuals directly on the ground surface and that other areas contained secondary deposits. Following decomposition, the effects of gravity, water, and human manipulation (intentional or unintentional) moved the bones to various degrees, which has limited our ability to consistently determine specific aspects of body treatments. The positions of articulated elements were used to infer the original body positions of primary interments whenever possible.

At least two of the individuals appear to have been interred in a seated position in Feature 5, and were almost certainly wrapped. In the southern area of Chamber 3 (Feature 5), most bones belong to a single individual aged between 15 and 20 years on the basis of epiphyseal fusion. The arrangement of the pelvic and leg bones suggests they were still approximately in situ and was consistent with a seated position with crossed legs. The bones of the upper body were scattered in the area around the legs and pelvis rather than south of the pelvis, which is where they would have been if the body had been placed flat. Instead, as the body and the wrappings decomposed, the upper body seems to have slumped forward and collapsed. On the northeastern edge of the Chamber, a nearly articulated pelvis suggests placement of an individual facing west toward the Chamber's entrance. Bones in this area are more disturbed, but the upper body appears to have fallen to the left. Seated positions have also been suggested for individuals found in nearby Petroglyph Cave (Reents and MacLeod 1997, p. 97)

The remains of a juvenile were found along the sloped western edge of Chamber 3. In general, the bones are in approximate anatomical order, and their orientation suggests that he or she was originally laid out in a flexed position on the left side, with head to the south and facing west toward the chamber wall. The arms were still in articulation and were flexed. In the southeastern portion of the chamber, we discovered an articulated left hand and partial forearm of another individual, still wearing a bracelet of carved *Olivella* sp. shells (Fig. 4.4). The closed hand and extreme angle of the wrist strongly suggests binding or wrapping of some kind, and the position of the arm at the edge of the chamber away from other related or articulated elements suggests it was displaced, likely when still wrapped or partially

Fig. 4.4 An articulated wrist and hand, encircled by a bracelet of olivella shells, from Feature 5. (Photos by Gabriel D. Wrobel and Rebecca Shelton)

fleshed, thus preserving the articulation. In other areas, the presence of flexed knees may indicate that individuals were deposited seated or on their sides, and strongly suggests that most or all of the individuals were interred as primary burials.

Because of the excellent preservation of Feature 5, an inventory revealed evidence of secondary movement of bones in and out of the chamber. Nine individuals were identified based on cranial and dental remains. The inventory of postcranial bones identified eight mostly complete individuals that appear to conform to the age and sex estimates of the crania. These individuals were almost certainly placed there as primary burials. The ninth individual was identified by a partial, poorly preserved dentition, and these bones seem to have been moved to the chamber as a secondary deposit. Another such example of the movement of isolated bones to the chamber is a pair of matching radii, which do not belong to any of the primary individuals. Several upper incisors were found in Feature 5 that belonged to a cranium

Table 4.1 Description of individuals identified within Je'reftheel

Feature	MNI	Adults			Subadults		
		male	female	unknown	infant	3–10 yrs	11–18 yrs
1	1	1					
3/4	4	1	2	1			1
5	9	2	2	1	1	2	1
6	5	2	1		1	1	
7	4	1	1		1	1	
11	1	1					

that had been removed from the cave by local Mennonites, who reported that it was found in Chamber 4. While it is possible that they misreported its original location, Feature 5 did not contain a matching mandible, and the large robust cranium likely matches one of the two sets of male postcranial elements from Feature 5. Despite very good preservation of the primary burials, missing elements likely indicate removal of bones following decomposition, presumably for ritual purposes.

Feature 7 also shows both intact articulations and commingled remains, although much poorer preservation and more human disturbance limit our ability to accurately assess the number of individuals or identify secondary movement of the remains to or from this feature. It appears that later interments were at least in part responsible for disrupting articulations of earlier interments. Within Feature 7, an analysis of the articulated (and thus in situ) remains showed that individuals had been interred separately and sequentially over a period of time, with parts of earlier interments being swept aside, probably into a nearby solution funnel (Feature 6), to make room for later ones. The preserved articulations among the portions that remained and had not been swept aside indicate that many of the previous interments were fully decomposed when subsequent individuals were interred. Among the partially articulated individuals identified in Feature 7, two were flexed on the side, and another was placed supine. During excavation, wrapping of some kind prior to deposition was evident by the tightly flexed position of the arms of one of the flexed individuals, and the vertical positioning of the clavicles of the prone individual (see Duday 2009, p. 45).

Other features did not reveal articulations, and were described by Helmke (2009) as clusters. As mentioned previously, the extensive flowstone deposits in Feature 6 made recovery and analysis difficult, but no definite articulations were observed. Preservation in these contexts had deteriorated rapidly prior to the work by CBAS in 2009 and 2010. However, inventories of the preserved elements show that these contain incomplete sets of elements from single (Features 1 and 11) or multiple (Features 3 and 4) individuals, confirming that these had been redeposited secondarily, perhaps as bundles composed primarily of long bones and skulls.

4.5.3 Sex and Age Profiles

Sex and age ratios that differ from expected paleodemographic profiles may be used to infer specific mortuary uses for particular contexts (Tiesler 2005). Because ethnohistoric sources have suggested that children or infants were the preferred victims of sacrifice in caves and cenotes, archaeologists have often interpreted mortuary deposits from caves as being sacrificial on the basis of the presence of subadults (see Gibbs 2000; Scott and Brady 2005, pp. 275–276; Stone 1997). A typical burial profile might contain a high proportion of infants and some mid-aged adults, but also should contain relatively few adolescents and young adults, along with some older adults. Age estimates, displayed in Table 4.1, were based primarily on dental eruption and attrition, epiphyseal fusion, and overall size (Buikstra and Ubelaker 1994).

Feature 1 contains an adult male individual of unknown age. Features 3 and 4 contain a minimum of four individuals based on duplication of elements and variations in the robusticity of leg bones. At least one individual was an adult male. Other individuals in Features 3 and 4 are gracile: at least two are adult and thus likely females, while one is likely an adolescent. A nearly edentulous mandible suggests the presence of an older individual. Feature 5 contained eight primary individuals: two adult males, two adult females, a late adolescent (likely male), and three children aged approximately 10, 7–8, and 2 years old. The adults all appear to be relatively young based on a lack of dental attrition. Feature 5 also included at least one secondary burial of an adult—perhaps a young to middle-aged male based on dental attrition and robusticity of the mandible. Feature 6 contains a minimum number of five individuals, including two adult males, one adult female or late adolescent of unknown sex, one child (~5–10 years old), and an infant. The inventory of Feature 7 provides a minimum number of four individuals, but there were clearly more placed within this area where bones were poorly preserved. Feature 7 contained an 18-month old, a ~3–7-year-old child, a young adult who likely was male, and a young, middle-aged female. Feature 11 contained the incomplete remains of a young adult male—almost certainly a secondary burial.

Determining the number of individuals in Je'reftheel is difficult because of the secondary movement of bones and variable preservation. However, we were able to determine that Je'reftheel contained bones of both male and female individuals in relatively equal proportions, as well as a wide range of ages that includes infants and an old adult. Despite this variability, Je'reftheel has an overabundance of young adults and a lack of infants in comparison to a "typical" paleodemographic distribution. This generally falls within the wide range of age distributions documented in a survey of caves by Cucina and Tiesler (Chap. 9, this volume). They found that caves in general tend to have all age groups represented, and thus are not highly specialized, though like Je'reftheel, subadults are typically underrepresented and there is a scarcity of perinatals, suggesting nonrandom selection of individuals.

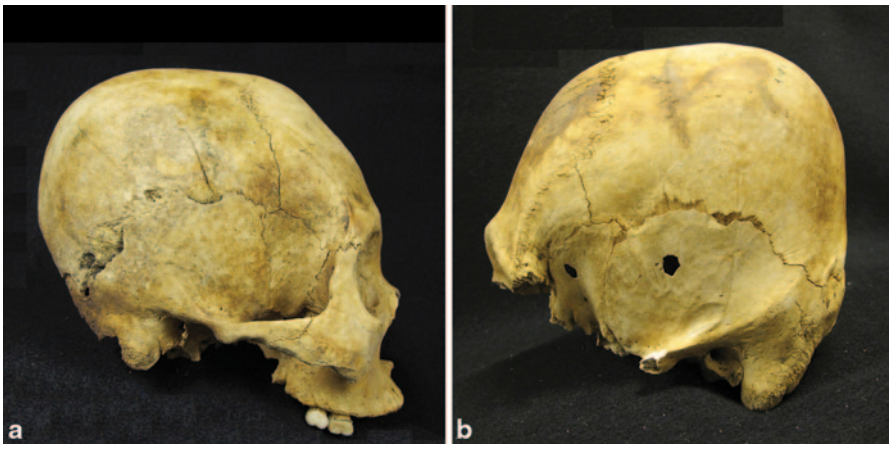

Fig. 4.5 Examples of cranial modifications from Je'reftheel. **a** Feature 5, Skull C, tabular oblique. **b** Feature 5, Skull D, tabular erect. (Photographs by Gabriel D. Wrobel)

4.5.4 Cultural Modifications

Among the Je'reftheel remains were 13 complete or partially reconstructible crania (including the missing cranium from Feature 4), and all but two display intentional shaping (Fig. 4.5). In addition, four frontal bones from commingled contexts were clearly artificially flattened. Of the seven crania that were complete or nearly complete, two of the modifications were tabular erect and the other five were tabular oblique, which is not an uncommon form in the region. However, Tiesler (2013) observed fewer instances of cranial modification in the nearby Belize Valley than elsewhere in the Maya Lowlands. While 88% of 1,515 crania in Mesoamerica she studied showed some measure of cranial modification, this is documented on less than 50% of the Belize Valley burial sample. In addition, an analysis of contemporaneous burials from nearby rockshelters showed very few modifications, and none clearly demonstrating modifications to both the frontal and occipital planes (Wrobel 2012).

Dental modifications appear to be present on all of the adults placed in Je'reftheel. These consisted only of filing, as no teeth had been drilled for inlays. Comparisons with other nearby mortuary sites in the Roaring Creek and Caves Branch River valleys reveal a distinct contrast between dark zone caves, which show high frequencies of dental modifications, and rockshelters, in which dental modifications are almost completely absent (Wrobel 2012). This dichotomy may reflect socioeconomic or ethnic distinctions among Late Classic groups in the area. In a recent study of Late Classic burials from the Belize River Valley, filing and inlays were relatively uncommon, found in only 15 of 64 individuals. More than half of these individuals had origins in the foothills of the Maya Mountains, which are in close proximity to Je'reftheel (Freiwald 2011, p. 335). Groups living in and around the Maya

Mountains may have practiced dental modification more frequently than those living elsewhere in Belize.

4.5.5 Biological Traits

An analysis of dental nonmetric traits also suggests close relatedness between individuals in the form of a relatively high frequency of congenitally absent third molars. In general, rates of congenital absence appear to be relatively low among Maya groups. Jacobi's (2000) study of Colonial Tipu reports third molar agenesis frequencies as 15.1% for the maxilla and 6.4% for the mandible. Among Prehispanic groups, Wrobel (2004) reported rates of 5.4 and 9.6% for Classic and Postclassic groups in Belize and Guatemala, while Scherer (2004, Table 6.5) found 3.5% and 5.7% among Classic period groups in Guatemala, Belize, and Mexico.

Within Feature 5, four of the seven individuals that could be scored displayed congenital absence of at least one molar. Feature 6 contained a nearly complete mandible showing agenesis of both third molars. A small fragment of maxilla, possibly belonging to the same individual, had preserved alveolar bone showing that a third molar with a single extremely small root had erupted. Feature 7 had only a fragment of a right mandible, which displayed an alveolar impression of a third molar. In Feature 11, the complete mandible demonstrated third molar agenesis on the left side, but had a fully erupted molar on the right. Although no maxilla was located, a pegged upper left third molar was identified. Thus, the high prevalence (60%) of a relatively rare trait may indicate that the individuals are closely related. However, a regional study of dental variation is needed to confirm whether or not agenesis is typical within the general local population.

4.5.6 Pathologies

Pathologies within Je'retheel were generally limited to mild porotic hyperostosis, an exceptionally low frequency of caries, and light dental attrition even in older individuals. Linear enamel hypoplasias were typically mild or absent, and evidence for general infections of the skeleton in the form of osteitis (or, periostitis) was similarly rare. While general health data such as these are difficult to interpret in relation to social status, these data appear consistent within the skeletal series, which may be tentatively forwarded as evidence that the individuals shared a similar life experience related to health. Cucina and Tiesler's (2007) analysis of health among individuals found in nonfunerary contexts at Classic sites in the northern Yucatan produced a broad range of health profiles.

4.5.7 Associated Material Culture

Items found in direct association with the skeletal remains within Je'reftheel included L-shaped earspools with jadeite appliqués, complete ceramic vessels, two complete, finely knapped, chert lanceolate bifaces, carved marine shell pendants, and olivella shell adornments that include a bracelet and tinklers for a belt. The earspools were found as a pair in close association with articulated shoulder elements and cervical vertebrae, and would have been positioned on either side of the skull of this individual. One of the bifaces was discovered beneath a small flat stone near the entrance to Chamber 3, while the other was reportedly taken from Feature 3 after which it was delivered to the Institute of Archaeology by members of Springfield Village. No use-wear was evident on either artifact, suggesting that they may have been manufactured specifically for interment. In the Belize Valley, Willey et al. (1965, p. 412) identified examples with the same general form as "tapered stem, long blade" bifaces (see specifically Fig. 261d, p. 413) and date them to the Late Classic period (Tiger Run and Spanish Lookout ceramic complexes). These grave furnishings are consistent with those reported in elite funerary contexts and pictoral representations, and have also been noted at other mortuary caves and rockshelters (see discussion by Helmke 2009, as well as Helmke and Wrobel 2012).

4.5.8 Isotopic Data

Strontium ($^{87}Sr/^{86}Sr$) and oxygen ($^{18}O/^{16}O$) isotope values in the tooth enamel of the nine individuals found in Feature 5 provide information about the geographic origin of each individual. Specifically, we sought to determine whether the individuals had local origins or foreign ones in an effort to draw analogies with similar data from both residential and sacrificial contexts at other sites. While there is no specific isotopic profile of a nonfunerary versus a funerary context, several studies guide our interpretation. Freiwald (2011) found that of 148 human tooth enamel samples from Belize River Valley sites, nearly all types of burial contexts contained nonlocal individuals, including residences (23.4%, $n=47$), eastern shrines (21.8%, $n=55$), and monumental architecture (5.9%, $n=17$). A nonlocal origin was more common in other types of deposits such as ballcourts (37.5%, $n=24$). In contrast, nearly half of the individuals interpreted as sacrificial victims in mass graves at Teotihuacan had diverse, nonlocal origins (Spence et al. 2004; White et al. 2002). Our results show that isotope values of individuals buried in Je'reftheel are similar to the residential burials rather than the nonfunerary contexts.

Strontium isotope values vary according to the composition and the age of the bedrock in different geologic formations, and the values become fixed in human tooth enamel during infancy and early childhood. A recent study of $^{87}Sr/^{86}Sr$ values in central Belize demonstrated measureable differences between several areas: (1) the floodplains along the Mopan, lower Macal, and Belize Rivers, (2) the Vaca Plateau, (3) the Maya Mountains and the Mountain Pine Ridge, and (4) the foothills

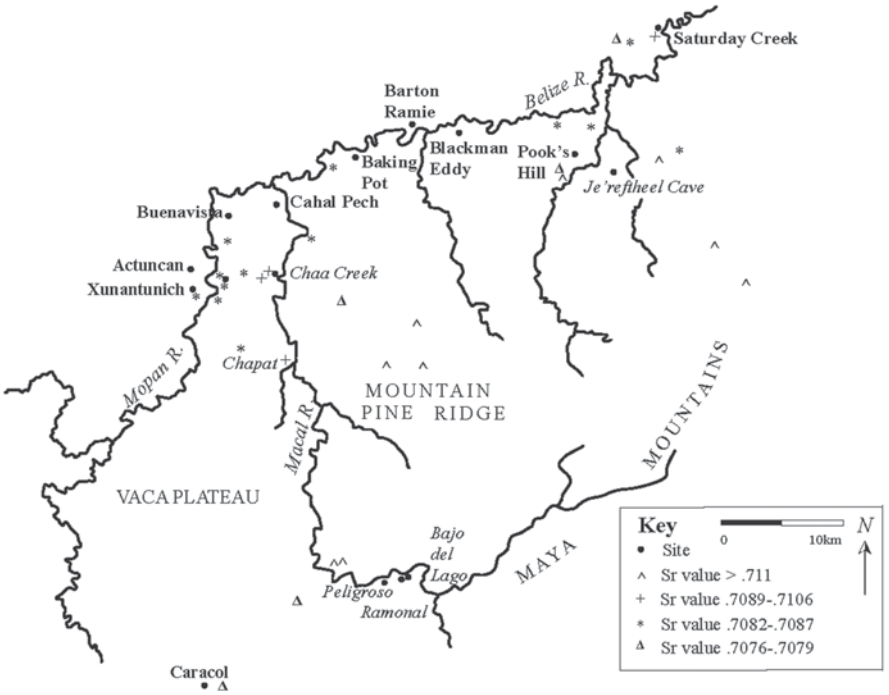

Fig. 4.6 Je'reftheel and strontium isotope values. Human populations in five locations (italicized) have high average strontium isotope values (>0.709) that are consistent with high faunal baseline values. Values in nonitalicized sites match the lower mean (~0.7085) of the Belize River floodplain baseline fauna. (Map by Carolyn Freiwald)

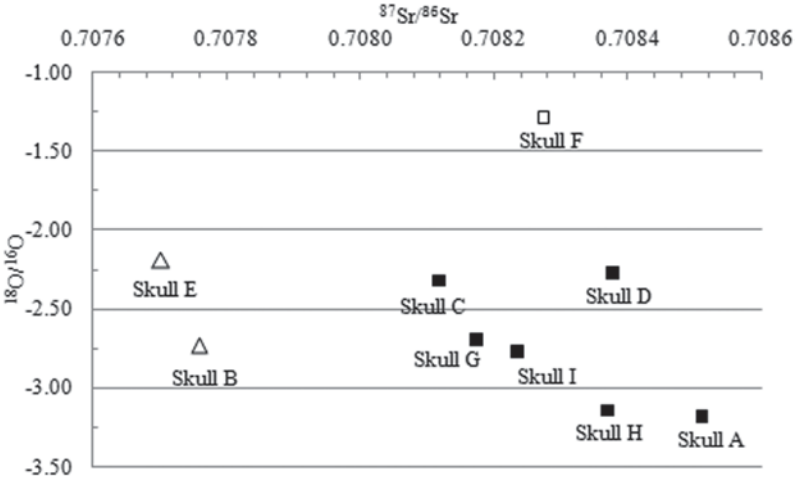

Fig. 4.7 Je'reftheel strontium and oxygen isotope values. *White triangles* represent strontium isotope values interpreted as nonlocal, and the *white square* represents the outlier oxygen isotope value. (Chart by Carolyn Freiwald)

Table 4.2 Strontium and oxygen isotope values for individuals from Feature 5

Individual	Lab #	$^{87}Sr/^{86}Sr$	$^{18}O/^{16}O$
Skull A	F7418	0.708511	−3.18
Skull B	F7419	0.707760	−2.73
Skull C	F7420	0.708118	−2.32
Skull D	F7421	0.708378	−2.27
Skull E	F7422	0.707702	−2.19
Skull F	F7423	0.708274	−1.29
Skull G	F7425	0.708174	−2.69
Skull H	F7424	0.708370	−3.14
Skull I	F7426	0.708234	−2.77

surrounding the mountains (Fig. 4.6). Values in each of these areas are distinct from those identified in the Maya lowland region that borders the Belize Valley to the west and the north (Hodell et al. 2004). Geographically, Je'reftheel is situated at the intersection of the Belize River floodplain and the foothills of the Maya Mountains. Values from Pook's Hill 5 km to the west are similar to those found along the Belize River, but lower and higher values also are found 5 km away near Roaring Creek (Freiwald 2011, p. 223). Variability in oxygen isotope values is less geographically discrete (Marfia et al. 2004; Lachniet and Patterson 2009), but $^{18}O/^{16}O$ isotopes may differ in regions with similar $^{87}Sr/^{86}Sr$ values (for a more detailed discussion of isotopes, see Freiwald 2011; Freiwald et al. Chap. 5, this volume).

The average $^{87}Sr/^{86}Sr$ value for tooth enamel sampled from seven of the nine Feature 5 individuals is 0.70829 ± 0.0001, ranging from 0.770702 to 0.708511 (Fig. 4.7 and Table 4.2). This is similar to baseline values of modern fauna collected along the Belize River floodplain (mean = 0.7085 ± 0.00026, ranging from 0.708208 to 0.709077 $^{87}Sr/^{86}Sr$ in Freiwald 2011, p. 86). The $^{87}Sr/^{86}Sr$ values of the tooth enamel from two individuals, a 10–12-year-old child (0.70776, Skull B) and a young adult male individual (0.707702, Skull E), are statistical outliers and we interpret them as individuals with nonlocal origins.

In addition, one 7–8-year-old child (Skull F) with a local Belize River $^{87}Sr/^{86}Sr$ isotope signature has an enriched oxygen isotope value (−1.29 ‰ $^{18}O/^{16}O$). This is a statistical outlier from the other samples, as well as other values in the valley based on mean values from 16 individuals with Belize River floodplain $^{87}Sr/^{86}Sr$ values (−2.99 ± 0.87‰ $^{18}O/^{16}O$ in Freiwald 2011, p. 268). Enriched values have been identified in surface and ground water samples in parts of the central Peten and in human tissues at sites such as Calakmul (Lachniet and Patterson 2009; Price et al. 2010). Thus, this child may have a nonlocal origin in a part of the central Peten with strontium isotope values similar to those identified along the Belize River.

The most conservative interpretation of the isotope values is that a local population used the cave to inter their dead. The proportion of individuals with nonlocal origins is consistent with residential burial contexts at 13 other sites in the region (Freiwald 2011). Most population movement in the Belize Valley occurred within the region, and values lower than 0.708 $^{87}Sr/^{86}Sr$ were not common. They were identified in only 5% of the sample, almost always as the lone outlier in a particular

burial location (Freiwald 2011; Freiwald et al., Chap. 5, this volume). The groups using the cave to house their dead may have had family origins in the area.

4.6 Discussion

Explaining the large number of human bodies that have been reported in caves in and around central Belize is complicated in large part by the general lack of sociopolitical context surrounding these ritual activities. Recent archaeological investigations indicate sudden and substantial Late Classic construction of a network of large monumental centers connected by sacbeob in this area (Andres et al., 2014). So far, this architecture, as well as portions of two carved stone monuments found at Tipan Chen Uitz, one of which bears an incomplete calendar round date, suggest a significant elite presence in the region began during the Late Classic period. This flurry of construction activity and vastly expanded settlement coincides with a significant increase in cave ritual in this area (Helmke 2009), as well as further afield in the Macal Valley (Moyes 2008).

However, all of this activity seems to abruptly cease at some point in the Terminal Classic period. So far a lack of evidence of Postclassic settlement in the Caves Branch, Lower Sibun, or Roaring Creek drainages, and almost no Postclassic ceramics in caves in this area, strongly suggest a relatively rapid abandonment. Such sudden transitions are fairly common at this time throughout the Maya region, and current research in the area by the Central Belize Archaeological Survey (CBAS) project is aimed at providing explanations for both the surge and the cessation of activity. While ceramic associations and AMS dates on the bones and carbon found in the caves provide Late to Terminal Classic dates for many of the mortuary contexts, including Je'reftheel, thus far they unfortunately have not provided enough resolution to differentiate which ritual events were associated with the rise and peak of this complexity, and which occurred during its decline. The AMS date range of AD 680–890 derived from Je'reftheel likely encompasses all of these events.

This study of the skeletal assemblage from Je'reftheel provides a set of data that directly relates to the identity of those individuals placed within the cave, and aids in interpreting and reconstructing the mortuary program associated with this discrete context. One goal of the study was to compare the bioarchaeological data from Je'reftheel with expectations based on two competing models of Maya mortuary cave use: funerary and sacrificial ritual. When viewed in isolation, some of these results could support either funerary or sacrificial ritual. For instance, artifacts found in association with skeletal remains in caves have been described as grave goods (Garza et al. 2002; Prufer and Dunham 2009), but also as offerings to accompany a sacrifice (Kieffer 2009; Scott and Brady 2005, p. 278), both of which are feasible explanations. Our broader evaluation using a combination of bioarchaeological evidence found clear parallels with mortuary contexts in residential and ceremonial architecture, strongly suggesting that the ritual behavior in Je'reftheel was primarily funerary in nature.

We have identified within Je'reftheel several distinct areas of bone deposition and the presence of both primary and secondary burials. Variability in these deposits suggests that complete bodies were placed in only two areas of the cave, which correspond to large physical spaces that appear to have been intentionally modified. The other mortuary features contained collections of unarticulated and incomplete skeletons that had been deposited secondarily, although we have been unable to determine whether or not these individuals had been initially deposited within the cave immediately following death, or moved there following decomposition elsewhere. Careful examination of all bone surfaces failed to find any examples of perimortem trauma in the form of cuts, chop marks, or fractures, which have been occasionally documented in other mortuary caves. Despite the effects of bioturbation, articulated joints and bones in approximate anatomical position found in Features 5 and 7 allowed the reconstruction of aspects of original body positions and associations with artifacts. In general, these spatial data helped demonstrate that the bodies had been carefully arranged in a variety of positions and were often personally adorned with jewelry. In both Features 5 and 7, it is clear that bones from decomposed bodies in primary burial contexts were moved to make room for new bodies. This specific mortuary behavior, while not previously noted in caves, is commonly reported in tomb contexts (Chase 1994; Chase and Chase 1996; Healy et al. 1998; Nash 2010; Novotny 2012; Weiss-Krejci 2004; see also discussion of shrine ossuaries by Serafin et al., Chap. 6, this volume). The discovery that Feature 5 consisted of complete bodies that had conspicuously missing elements, and also included isolated elements that did not belong to these individuals, presents another clear parallel with mortuary behaviors associated with tombs that are commonly interpreted as extended funerary rituals.

Analysis of the bones demonstrated the presence of both sexes, and ages that ranged from infant to old adult. It is clear that the cave was the final resting place for only a subset of a larger social group or population: Je'reftheel's burial population is small and contains relatively few older adults and infants, thus encavement here was restricted in some way and likely based on aspects of social identity. Some cave studies have inferred nonfunerary practices on the basis of restricted aggregate age profiles (Owen 2005; Tiesler 2005), but data from such discrete contexts must be viewed within the broader chain of mortuary spaces within a ritual landscape in which subadults are commonly underrepresented, including other nearby caves, settlement contexts, and tombs. Thus, while a seeming overabundance of subadults in one cave might indeed be the result of ceremonies involving sacrifice to placate rain deities and propitiate rain, it is equally plausible that this distribution results from the known Maya practice of employing a variety of mortuary spaces, which were often restricted by aspects of social identity (see Weiss-Krejci 2004 for an analogy with European tomb use).

Isotopic data shows that most of the individuals were likely of local origin, a pattern that generally conforms to our initial ongoing isotopic research from other caves and rockshelters in the area and implies mortuary use of these sites by groups that lived in close proximity to them (Table 4.2). The presence of some ($n=3$) nonlocal individuals within the group is consistent with the pattern found

in residential contexts by Freiwald (2011) in her regional survey data of the Belize Valley. In contrast, the presence of dental modifications on all adults and cranial modifications on most individuals within Je'reftheel also seems to fit a broader pattern observed among sites in the vicinity around Je'reftheel, in which groups placed within caves are distinguished from those in rockshelters, who generally do not display such modifications. These differences imply the presence of some sort of social distinction between groups inhabiting the area.

Several lines of biological evidence suggest that these individuals could be members of a family group, including the high frequency of a rare dental trait in the form of third molar agenesis, the presence of a wide range of ages and both sexes, the similarities in cranial and dental modifications, and the relatively consistent local isotope signatures. Furthermore, unlike family groups that have been identified in sacrificial contexts (Duncan 2009; Barrett and Scherer 2005), there is no clear evidence of perimortem or postmortem desecration within Je'reftheel.

The clues provided by each set of data help to demonstrate that the mortuary program within Je'reftheel closely parallels funerary behavior documented in several other contexts in which bodies were interred consecutively, including nearby rockshelters in the Caves Branch River and Roaring Creek Valleys and, more generally, tombs. All of these contexts often contain individuals of all ages and both sexes, as well as varying states of articulation and commingling often resulting from disturbances while new bodies were being deposited.

4.7 Conclusions

Several scholars have pointed to the close conceptual relationship between Classic Maya temple pyramids and mountains (Brady 1997, p. 603; Stuart and Houston 1994, p. 86; Vogt 1964; among others). Further exploration of this analogy naturally leads to potential parallels between the hollow spaces contained by each, both of which often contain human remains (Adams 1999; Carrasco et al. 1998; Coe 1956; Vogt and Stuart 2005). A propensity by Maya groups over time to construct artificial caves in the form of architecture further strengthens the proposed analogy between caves and tombs (Brady 2012). Interestingly, investigations of an extensive looters' trench in one of the elite residential courtyards at the civic ceremonial center of Deep Valley near Je'reftheel revealed that the eastern structure, which often serves as an ancestor shrine, was filled with dry-laid boulder core and did not contain any sort of funerary features. Thus far, other looters' trenches found in monumental architecture at sites in the vicinity also show no concrete evidence for formal tombs. While further investigation is needed to confirm these initial observations, the absence of tombs in places where they are commonly found would necessitate the use of alternative spaces for the interment of elites. This study has shown that the treatment of individuals placed within the small cave site of Je'reftheel is generally consistent with the use of tombs by the Maya. However, we point out that investigations of human remains found in other caves by the CBAS project and others

show an amazing diversity, suggesting that Je'reftheel illustrates only one aspect of ancient Maya mortuary cave use.

Acknowledgements Fieldschool students and staff from the 2009 and 2010 Caves Branch Archaeological Survey project; Jaime Awe, Rafael Guerra, and the Belize Institute of Archaeology; Sherry Gibbs, Julie Nehammer Knub, Marie Danforth, Holley Moyes, Shawn Morton; Drew Coleman, Paul Fullagar, and Jennifer A. Poole of the University of North Carolina Department of Geological Sciences, James H. Burton and T. Douglas Price of the University of Wisconsin—Madison Laboratory for Archaeological Chemistry; Last but not least, Springfield and Armenia villages.

References

Adams, R. E. W. (1999). *Río Azul. An ancient Maya city.* Norman: University of Oklahoma Press.

de Anda Alanís, G. (2007). Sacrifice and ritual body mutilation in postclassical Maya society: Taphonomy of the human remains from Chichen Itzá's Ceonte Sagrado. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 190–208). New York: Springer.

Andres, C., Helmke, C. G., Morton, S. G., Wrobel, G. D., & González, J. J. (2014) Tipan Chen Uitz, Cayo district, Belize: The glyphic texts and their contexts. *Latin American Antiquity* 25(1).

Awe, J. J., Helmke, C. G. B., & Griffith, C. S. (1998). Archaeological reconnaissance in the Roaring Creek Valley: Caves, rockshelters, and settlement architecture. In J. J. Awe (Ed.), *The Western Belize regional cave project, a report of the 1997 field season* (pp. 223–244). Department of Anthropology Occasional Paper No. 1. Durham: University of New Hampshire.

Barrett, J. W., & Scherer, A. K. (2005). Stones, bones, and crowded plazas: Evidence for Terminal Classic Maya warfare at Colha, Belize. *Ancient Mesoamerica, 16,* 101–118.

Beck, L. A., & Sievert, A. (2005). Mortuary pathways leading to the Cenote at Chichén Itzá. In G. F. M. Rakita, J. E. Buikstra, L. A. Beck, & S. R. Williams (Eds.), *Interacting with the dead: Perspectives on mortuary archaeology for the new millennium* (pp. 290–304). Gainesville: University Press of Florida.

Blom, F. (1954). Ossuaries, cremation, and secondary burials among the Maya of Chiapas, Mexico. *Journal de la Société des Américanistes, 43,* 123–135.

Blom, F., & La Farge, O. (1926). *Tribes and temples* (Vol. 1, No 1). New Orleans: Middle American Research Institute, Tulane.

Brady, J. E. (1989). *An investigation of Maya ritual cave use with special reference to Naj Tunich, Petén*, Guatemala. Ph.D. dissertation. Los Angeles: University of California.

Brady, J. (1997). Settlement configuration, cosmology, and caves: The role of caves at Dos Pilas. *American Anthropologist, 99*(3), 602–618.

Brady, J. (2010). Offerings to the rain gods: The archaeology of Maya caves. In D. Finamore & S. D. Houston (Eds.), *Fiery pool: The Maya and the mythic sea* (pp. 220–223). New Haven: Peabody Essex Museum and Yale University Press.

Brady, J. E. (2012). The architectural cave as an early form of artificial cave in the Maya Lowlands. In J. E. Brady (Ed.), *Heart of earth: Studies in Maya ritual cave use* (pp. 61–68). Bulletin 23. Austin: Association of Mexican Cave Studies.

Brady, J. E., & Colas, R. P. (2005). Nikte' Mo' scattered fire in the cave of Kab' Chante': Epigraphic and archaeological evidence for cave desecration in ancient Maya warfare. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 149–166). Boulder: University Press of Colorado.

Brady, J. E., & Stone, A. (1986). Naj Tunich: Entrance to the Maya underworld. *Archaeology, 39*(6), 18–25.

Brown, C. T. (2005). Caves, karst, and settlement at Mayapán, Yucatán. In J. E. Brady & K. M. Prufer (Eds.), *In the maw of the earth monster: Mesoamerican ritual cave use* (pp. 373–402). Austin: University of Texas Press.

Buikstra, J. E., & Ubelaker, D. H. (Eds.). (1994). *Standards for data collection from human skeletal remains: Proceedings of a seminar at the Field Museum of Natural History. Arkansas Archeological Survey Research Series No. 44*. Fayetteville: Arkansas Archaeological Survey.

Carrasco, R., Boucher, S., Álvarez, P., Tiesler, V., García, V., García, R., & Vázquez, J. (1998). A dynastic tomb from Campeche, Mexico: New evidence on Jaguar Paw, a ruler of Calakmul. *Latin American Antiquity, 10*(1), 47–59.

Chase, D. Z. (1994). Human osteology, pathology, and demography as represented in the burials of Caracol, Belize. In D. Chase & A. Chase (Eds.), *Studies in the archaeology of Caracol, Belize (pp. 123–138). Monograph 7*. San Francisco: Pre-Columbian Art Research Institute.

Chase, D. Z., & Chase, A. F. (1996). Maya multiples: Individuals, entries, and tombs in Structure A34 of Caracol, Belize. *Latin American Antiquity, 7*(1), 61–79.

Chuchiak, J.F. IV (2006). U Luumil Ku: Sacred Landscapes and Yucatec Maya Religion and Ritual in Colonial Context, 1542-1812. Paper presented at the *11th European Maya Conference, Ecology, Power, and Religion in Maya Landscapes*. Malmö: Malmö University.

Coe, M. D. (1956). The funerary temple among the Classic Maya. *Southwestern Journal of Anthropology, 12*(4), 387–394.

Coe, M.D. (1988). Ideology of the Maya tomb. In E.P. Benson & G.G. Griffin (Eds.), Maya iconography (pp. 222-235). Princeton: Princeton University Press.

Cucina, A., & Tiesler, V. (2007). Nutrition, lifestyle, and social status of skeletal remains from nonfunerary and "problematical" contexts. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 251–262). New York: Springer.

Demarest, A. A. (1993). The violent saga of a Maya kingdom. *National Geographic, 183*(2), 94–111.

Duday, H. (2009). *The archaeology of the dead: Lectures in Archaeothanatology*. Oxford: Oxbow Books.

Duncan, W. M. (2009). The bioarchaeology of ritual violence at Zacpetén. In P. M. Rice & D. S. Rice (Eds.), *The Kowoj: Identity, migration, and politics in the Postclassic Petén* (pp. 340–367). Boulder: University Press of Colorado.

Fitzsimmons, J. L. (2006). Classic Maya tomb re-entry. In P. R. Colas, G. LeFort, & B. Liljefors Persson (Eds.), *Jaws of the underworld: Life, death, and rebirth among the ancient Maya* (pp. 35–42). Markt Schwaben: Verlag Anton Saurwein (Acta Mesoamericana,16).

Fitzsimmons, J. L., & Fash, W. L. (2003). Susaj B'aak: Muerte y ceremonia mortuoria en la Plaza Mayor de Copán. In A. Ciudad, M. H. Ruz, & M. J. Iglesias (Eds.), *Antropología de la eternidad: La muerte en la cultura maya* (pp. 299–315). Madrid: Sociedad Española de Estudios Mayas y Centro de Estudios Mayas.

Freiwald, C. (2011). *Maya migration networks: Reconstructing population movement in the Upper Belize River Valley during the Late and Terminal Classic*. Ph.D. dissertation, Madison, University of Wisconsin.

Fuentes y Guzmán, F. A. (1932). *Recordación Florida*. Guatemala City: Biblioteca Goathemala, Sociedad de Geografía e Historia de Guatemala.

Garza, S., Brady, J. E., & Christensen, C. (2002). Balam Na Cave 4: Implications for understanding preclassic cave mortuary practices. *California Anthropologist, 28*(1), 15–21.

Gibbs, S. A. (2000). *An interpretation of the significance of the human remains from the caves of the Southern Maya Lowlands*. MA thesis, Peterborough, Trent University.

Graham, I. (1992). *Corpus of Maya hieroglyphic inscriptions vol. 4, part 2: Uxmal.* Cambridge: Peabody Museum of Archaeology, Harvard University.

Grube, N. (2000). Monumentos esculpidos e inscripciones jeroglíficas en el triángulo Yaxhá-Nakum-Naranjo. In W. W. Wurster (Ed.), *El Sitio Maya de Topoxté: Investigaciones en una isla del lago Yaxhá, Petén, Guatemala* (pp. 249–268). Mainz am Rhein: Verlag Philipp von Zabern.

Grube, N., & Schele, L. (1994). Tikal Altar 5. *Texas Notes on Precolumbian Art, Writing and Culture, 66*, 1–6.

Halperin, C. T. (2005). Social power and sacred space at Actun Nak Beh. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 71–90). Boulder: University Press of Colorado.

Harrison-Buck, E., McAnany, P. A., & Storey, R. (2007). Empowered and disempowered during the Late to Terminal Classic transition: Maya burial and termination rituals in the Sibun Valley, Belize. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 74–101). New York: Springer.

Healy, P. F., Song, R., & Conlon, J. M. (1996). Actun Petz: Preliminary survey of a cave near Pacbitun, Belize. In P. F. Healy & J. J. Awe (Eds.), *Belize valley preclassic Maya project: Report on the 1995 field season* (pp. 128–152). Occasional Papers in Anthropology 12. Peterborough: Trent University.

Healy, P. F., Awe, J. J., & Helmuth, H. (1998). An ancient Maya multiple burial at Caledonia, Cayo District, Belize. *Journal of Field Archaeology, 25,* 261–274.

Helmke, C. G. B. (2009). *Ancient Maya cave usage as attested in the glyphic corpus of the Maya Lowlands and the caves of the Roaring Creek Valley, Belize*. Ph.D. thesis, London: University College London.

Helmke, C., & Brady, J. E. (2009). Epigraphic and archaeological evidence for cave desecration in ancient Maya warfare. Paper presented at Maya culture, identity, language and history: A celebration of the life and work of Pierre Robert Colas, Department of Anthropology, Vanderbilt University, Nashville, 26 Sep 2009.

Helmke, C. G. B., & Wrobel, G. D. (2012). Je'reftheel, Roaring Creek Works, Belize. In J. E. Brady (Ed.), *Heart of earth: Studies in Maya ritual cave use* (pp. 69–81). Austin: Association for Mexican Cave Studies (Bulletin 23).

Helmke, C., Awe, J., & Grube, N. (2010). The carved monuments and inscriptions of Xunantunich. In L. J. LeCount & J. Yaeger (Eds.), *Classic Maya provincial politics: Xunantunich and its hinterlands* (pp. 97–121). Tucson: University of Arizona Press.

Hodell, D. A., Quinn, R. L., Brenner, M., & Kamenov, G. D. (2004). Spatial variation of strontium isotopes (87Sr/86Sr) in the Maya region: A tool for tracking ancient human migration. *Journal of Archaeological Science, 31*(5), 585–601.

Jacobi, K. (2000). *Last rites for the Tipu Maya: Genetic structuring in a Colonial cemetery*. Tuscaloosa: University of Alabama Press.

Kieffer, C. L. (2009). Osteological report for the upper level of Actun Yaxteel Ahau. In J.E. Brady (Ed.), *An archaeological survey of the upper passage of Actun Yaxteel Ahau, Belize: 2009 season report* (pp. 55–70). Report on file with the Belize Institute of Archaeology. Belmopan, Belize.

Lacadena, A., & Wichmann S. (n.d.). Harmony rules and the suffix domain: A study of Maya scribal conventions. Manuscript in possession of the authors.

Lachniet, M. S., & Patterson, W. P. (2009). Oxygen isotope values of precipitation and surface waters in northern Central America (Belize and Guatemala) are dominated by temperature and amount effects. *Earth and Planetary Science Letters, 284,* 435–446.

Lucero, L., & Gibbs, S. A. (2007). The creation and sacrifice of witches in Classic Maya society. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 45–73). New York: Springer.

MacLeod, B., & Puleston, D. E. (1978). Pathways into darkness: The search for the road to Xibalbá. In M. G. Robinson & D. C. Jeffers (Eds.), *Tercera Mesa Redonda de Palenque : Vol. 4* (pp. 71–77). Monterey: Herald Printers. http://www.mesoweb.com/pari/publications/rt04/Pathways.pdf. Accessed 7 Aug. 2013.

Marfia, A. M., Krishnamurthya, V., Atekwana, E. A., & Panton, W. F. (2004). Isotopic and geochemical evolution of ground and surface waters in a karst dominated geological setting: A case study from Belize, Central America. *Applied Geochemistry, 19,* 937–946.

Mathews, P. (1978). Notes on the dynastic sequence of Bonampak, Part 1. In M. G. Robertson (Ed.), *Third Palenque Round Table, Part 2* (pp. 60–73). Austin: University of Texas Press.

Mathews, P. (2001). Notes on the inscription on the back of Dos Pilas Stela 8. In S. Houston, O. Chinchilla Mazariegos, & D. Stuart (Eds.), *The decipherment of ancient Maya writing* (pp. 394–415). Norman: University of Oklahoma Press.

Martin, S., & Grube, N. (2008). *Chronicle of the Maya kings and queens: Deciphering the dynasties of the ancient Maya*, (2nd edn.). London: Thames & Hudson.

Moyes, H. (2006). *The sacred landscape as a political resource: a case study of ancient Maya cave use at Chechem Ha Cave, Belize, Central America*. Ph.D. dissertation. Buffalo: State University of New York.

Moyes, H. (2008). Charcoal as a proxy for use-intensity in ancient Maya cave ritual. In L. Fogelin (Ed.), *Religion, archaeology, and the material world* (pp. 139–158). Carbondale: Center for Archaeological Investigations.

Nash, L. M. (2010). *Osteology of the Chalillo Dam Archaeology Salvage Project, Upper Macal River Valley, Belize*. M.A. thesis, Oxford, University of Mississippi.

Novotny, A. (2012). The Chan community: A bioarchaeological perspective. In C. Robin (Ed.), *Chan: An ancient Maya farming community* (pp. 231–252). Gainesville: University Press of Florida.

Owen, V. A. (2005). A question of sacrifice: Classic Maya cave mortuary practices at Barton Creek Cave, Belize. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 323–340). Boulder: University Press of Colorado.

Owen, V., & Gibbs, S. (1999). Preliminary report of investigations on Ledge 2, Actun Yaxteel Ahau. In J. Awe, & D. Lee (Eds.), *The Western Belize Regional Cave Project: A report of the 1998 field season* (pp. 186–204), Department of Anthropology Occasional Paper No. 2, Durham, University of New Hampshire.

Ower, L. H. (1928). Geology of British Honduras. *The Journal of Geology, 36*(6), 494–509.

Palka, J. (1996). Sociopolitical implications of a new emblem glyph and place name in Classic Maya inscriptions. *Latin American Antiquity, 7*(3), 211–227.

Palomo Mijangos, J. M. (2007). *Muerte, cerro y cueva: La bioarqueología en las Grietas de Aguateca*. M.A. thesis. San Carlos: Universidad de San Carlos de Guatemala.

Pendergast, D. H. (1971). *Excavations at Eduardo Quiroz Cave, British Honduras (Belize)*. Occasional Paper 21, Art and Archaeology. Toronto: Royal Ontario Museum.

Peterson, P. A. (2006). *Ancient Maya ritual cave use in the Sibun Valley, Belize.* AMCS Bulletin 16. Austin: Association for Mexican Cave Studies.

Piehl, J. C., & Awe, J. J. (2010). Scalping as a component of terminus structure ritual at the site of Baking Pot, Belize Valley. *Research Reports in Belizean Archaeology, 7,* 55–63.

Prufer, K. M., & Dunham. P. S. (2009). A shaman's burial from an Early Classic cave in the Maya Mountains of Belize, Central America. *World Archaeology, 41*(2), 295–320.

Price, T. D., Burton, J. H., Sharer, R. J., Buikstra, J. E., Wright, L. E., Traxler, L. P., & Miller, K. A. (2010). Kings and commoners at Copán: Isotopic evidence for origins and movement in the Classic Maya period. *Journal of Anthropological Archaeology, 29*(1), 15–32.

Reents-Budet, D., & MacLeod, B. (1997). The archaeology of Petroglyph Cave, Cayo District, Belize. Unpublished manuscript. Copy on file at the Institute of Archaeology, Belmopan.

Rissolo, D. (2005). Beneath the Yalahau: Emerging Patterns of ancient Maya ritual cave use from Northern Quintana, Roo, Mexico. In J. E. Brady & K. M. Prufer (Eds.), *In the maw of the earth monster: Mesoamerican ritual cave use* (pp. 342–372). Austin: University of Texas Press.

Rojas Sandoval, C., González González, A. H., Terrazas Mata, A., & Benavente Sanvicente, M. (2008). Mayan mortuary deposits in the cenotes of Yucatan and Quintana Roo, Mexico. In M. E. Leshikar-Denton & P. Luna Erreguerena (Eds.), *Underwater and maritime archaeology in Latin America and the Carribbean* (pp. 143–155). Walnut Creek: Left Coast Press Inc.

Ruz Lhullier, A. (1968). *Costumbres funerarias de los antiguos mayas*. Mexico City: Universidad Nacional Autónoma de México.

Scherer, A. K. (2004). *Dental analysis of Classic Period population variability in the Maya area*. Ph.D. dissertation, College Station, Texas A & M University.

Scholes, F. V., & Roys, R. L. (1938). *Fray Diego de Landa and the problem of idolatry in Yucatán*. Washington, D.C.: Carnegie Institution of Washington.

Scott, A. M., & Brady, J. E. (2005). Human remains in lowland Maya caves: Problems of interpretation. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 261–284). Boulder: University Press of Colorado.

Spence, M.W., White, C.D., Longstaffe, F.J., & Law, K.R. (2004). Victims of the victims: Human trophies worn by sacrificed soldiers from the Feathered Serpent Pyramid, Teotihuacan. *Ancient Mesoamerica 15,*1-15.

Stone, A. J. (1995). *Images from the underworld: Naj Tunich and the tradition of Maya cave painting*. Austin: University of Texas Press.

Stone, A. (1997). Precolumbian cave utilization in the Maya area. In C. Bonsall & C. Tolan-Smith (Eds.), *The human use of caves* (pp. 201–206), International Series 667. Oxford: British Archaeological Reports.

Stuart, D. (1998). "The fire enters his house": Architecture and ritual in Classic Maya texts. In S. Houston (Ed.), *Function and meaning in Classic Maya architecture* (pp. 373–425). Washington, D.C: Dumbarton Oaks Research Library and Collection.

Stuart, D. (2004). The Paw Stone: The place name of Piedras Negras, Guatemala. *The PARI Journal, 4*(3), 1–6.

Stuart, D., & Houston, S. (1994). Classic Maya place names. Studies in Pre-Columbian Art and Architecture No. 33. Washington, D.C.: Dumbarton Oaks Research Library and Collection.

Taube, K.A. (2003). Maws of heaven and hell: The symbolism of the centipede and serpent in Classic Maya religion. In A. Ciudad Ruiz, M.H. Ruz Sosa, & M.J. Iglesias Ponce de León (Eds.), *Antropología de la eternidad: la muerte en la cultura maya* (405–442). Madrid: Sociedad Española de Estudios Maya and Centro de Estudios Mayas.

Thompson, E. H. (1938). *The high priest's grave, Chichen Itza, Yucatan, Mexico.* Anthropological Series, Field Museum of Natural History, Vol. 27, no. 1. Chicago: Field Museum Press.

Thompson, J. E. (1959). The role of caves in Maya culture. *Mitteilungen aus dem Museum für Völkerkunde in Hamburg, XXV,* 122–129.

Thompson, J. E. (1975). Introduction. In H. C. Mercer (Ed.), *The hill caves of Yucatan* (pp. vii–xliv). Norman: University of Oklahoma.

Tiesler, V. (2005). What can the bones really tell us? In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords. Maya religion in the cave context* (pp. 341–363). Boulder: University Press of Colorado.

Tiesler, V. (2007). Funerary or nonfunerary? New references in identifying ancient Maya sacrificial and postsacrificial behaviors from human assemblages. In V. Tiesler & A. Cucina (Eds.)., *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 14–44). New York: Springer.

Tiesler, V. (2013) *Transformarse en Maya. El modelado cefálico entre los mayas prehispánicos y coloniales*. Mexico City: Instituto Nacional de Antropología e Historia.

Tiesler, V., & Cucina, A. (2006). Procedures in human heart extraction and ritual meaning: A taphonomic assessment of anthropogenic marks in Classic Maya skeletons. *Latin American Antiquity, 17*(4), 493–510.

Tozzer, A. M. (1941). *Landa's relacion de las cosas de Yucatán: A translation. Papers of the Peabody Museum of American Archaeology and Ethnology 18*. Cambridge: Harvard University Press.

Vail, G., & Hernández, C. (2007). Human sacrifice in late postclassic Maya iconography and texts. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 120–164). New York: Springer.

Villa Rojas, A. (1969). The Tzeltal. In E. Z. Vogt (Ed.), *Handbook of Middle American Indians: Vol. 7. Ethnology* (pp. 195–225). Austin: University of Texas Press.

Vogt, E. Z. (1964). Ancient Maya and contemporary Tzotzil cosmology: A comment on some methodological problems. *American Antiquity 30,* 192–195.

Vogt, E. Z., & Stuart, D. (2005). Some notes on ritual caves among the ancient and modern Maya. In J. E. Brady & K. M. Prufer (Eds.), *The maw of the earth monster: Mesoamerican ritual cave use* (pp. 155–222). Austin: University of Texas Press.

Wauchope, R. (1942). Notes on the age of the Cineguilla Cave textiles from Chiapas. *Middle American Research Records, 1*(2), 7–8.

Weiss-Krejci, E. (2004). Mortuary representations of the noble house: A cross-cultural comparison between collective tombs of the ancient Maya and Dynastic Europe. *Journal of Social Archaeology, 4*(3), 368–404.

White, C. D., Spence, M. W., Longstaffe, F. J., Stuart-Williams, H., & Law, K. R. (2002). Geographic identities of the sacrificial victims from the Feathered Serpent Pyramid, Teotihuacan: Implications for the nature of state power. *Latin American Antiquity, 13*(2), 217–236.

Willey, G. R., Bullard, W. R. Jr., Glass, J. B., & Gifford, J. C. (1965). *Prehistoric Maya settlement in the Belize Valley. Papers of the Peabody Museum* (Vol. 54). Cambridge: Harvard University.

Wrobel, G. D. (2004). *Metric and nonmetric dental variation among the ancient Maya of northern Belize*. Ph.D. dissertation. Bloomington: Indiana University.

Wrobel, G. (2012). Context and meaning of cranial modification in central Belize: Interpreting variations among skeletons from caves and rockshelters. Paper presented at the Coloquio Internacional de Bioarqueología en Área Maya, Universidad Autónoma de Yucatán, Mérida, Nov 2012.

Zender, M. (2002). The Toponyms of El Cayo, Piedras Negras, and La Mar. In A. Stone (Ed.), *Heart of creation: The Mesoamerican world and the legacy of Linda Schele* (pp. 166–184). Tuscaloosa: University of Alabama Press.

Chapter 5
Isotopic Insights into Mortuary Treatment and Origin at Xunantunich, Belize

Carolyn Freiwald, Jason Yaeger, Jaime Awe and Jennifer Piehl

Abstract Burial practices can provide insight into the complex and multilayered identities of both individuals and communities. We explore one aspect of identity—an individual's origin—and the way that it was expressed in funerary treatment at Xunantunich in the Belize Valley. Strontium, carbon, and oxygen isotope values in the tooth enamel of 19 individuals show that some individuals with nonlocal origins were buried in the same households, or even the same graves, as locally born individuals. In contrast, most individuals with Central Peten-like isotope values were placed in atypical burial positions and graves, including termination ritual contexts. We discuss the relationship between their origins and burial treatment in relation to major political changes that were occurring during Late and Terminal Classic periods in the Maya lowlands, and show that origin also was important in burial treatment in contemporaneous cultures elsewhere in the Americas.

5.1 Introduction

An individual's identity is fluid and multilayered. Many of the myriad ways it can be expressed—from language and accent to mannerisms, coiffure, and fashion—are ephemeral, leaving few material traces. As a result, archaeologists have typically

C. Freiwald (✉)
Department of Sociology and Anthropology, University of Mississippi,
Oxford, MS 38677-1848, USA
e-mail: crfreiwa@olemiss.edu

J. Yaeger
Department of Anthropology, University of Texas at San Antonio, San Antonio, TX 78249, USA
e-mail: jason.yaeger@utsa.edu

J. Awe
Institute of Archaeology, Belmopan, Belize
e-mail: jaimeawe@yahoo.com

J. Piehl
e-mail: jenniferpiehl@hotmail.com

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_5,

focused on burial treatment to understand identity. However, burials reflect more than an individual's persona during life (Parker Pearson 1999). The wishes, customs, and strategies of kin and community also affect how a person is buried, and the funerary treatment may occur in stages and continue for generations (Weiss-Krejci 2004; Novotny 2012). We combine an analysis of funerary treatment with osteological and biogeochemical data to explore one factor that often strongly shapes an individual's identity: geographic place of origin.

Seven individuals in four Late and Terminal Classic (AD 600–900) burials at Xunantunich, Belize, were interred with a body position and orientation that differed from standard burial treatment in the region. Strontium and oxygen isotope values link five of these individuals to origins in the Central Peten, a region to the west of Xunantunich. While not every migrant's identity was likely defined by his or her origin, we show that burial treatment transformed the living identities of these individuals after their deaths into powerful political statements and that origin was an important factor in burial treatment across the Americas.

5.2 Xunantunich and the Belize Valley

Xunantunich was a major political center located in the upper Belize River valley region of the central Maya lowlands (LeCount and Yaeger 2010a; Leventhal and Ashmore 2004). While even the largest sites within the region, such as Xunantunich, Buenavista del Cayo, Cahal Pech, and Baking Pot, did not approach the scale of supercenters like Tikal and Caracol, the region's major centers were spaced less than 10 km apart (Fig. 5.1). Minor centers and hinterland settlement interspersed between them resulted in a densely populated landscape during the Late Classic (AD 600–800) and Terminal Classic (AD 800–900) periods (Yaeger 2008, 2010a).

These major centers were the capitals of autonomous polities for most of their histories (e.g., Helmke and Awe 2012; Leventhal and Ashmore 2004; cf. Ball and Taschek 1991). However, epigraphic and archaeological evidence suggest that their political histories were shaped by interactions in the form of trade and political alliances with larger polities located to the south and west of the region, specifically Caracol and Naranjo (Helmke and Awe 2012; Leventhal and Ashmore 2004; Taschek and Ball 2004). For example, LeCount and Yaeger (2010a) have argued that although Xunantunich was an autonomous polity during the Samal phase (AD 600–670), the site's rapid growth during the early part of the Hats' Chaak phase (AD 670–780) was due in part to Xunantunich's incorporation as a province of the Naranjo state.

Figure 5.2 shows the compact but impressive monumental center of Xunantunich. The early phases of the acropolis on the southern end of the main plaza, El Castillo, likely served as the residential and administrative complex of the site's rulers during the early Late Classic Samal phase (Leventhal 2010). The western side of the plaza was demarcated by a ballcourt, and the eastern side was framed by a line

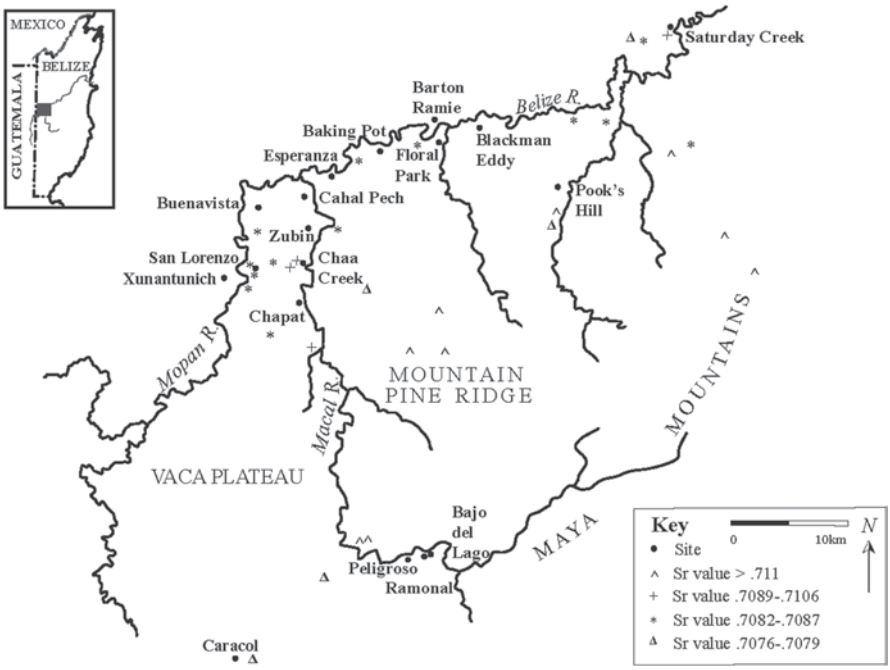

Fig. 5.1 Belize Valley sites and associated strontium isotope values

of three pyramids, one of which contained multiple burials. One of the pyramids, Structure A-4–2nd, held the Samal-phase burial of an individual who may have been one of the site's rulers (Audet 2006).

The site grew rapidly during the late seventh century, including El Castillo, which rose 43 m above the main plaza by the end of the eighth century (Awe 2008:166; Leventhal 2010). Access to its upper zones was controlled via Structure A-32, a long range structure with two galleries located on the medial terrace of the acropolis (Leventhal 2010). At the northern end of the main plaza, the site's architects built a quadrangular palace complex organized around Plaza A-III. Yaeger (2010b) has argued that this complex became the new residential and administrative center for the site's rulers when the site was incorporated into Naranjo's regional state. Construction continued on the funerary pyramids that lined the eastern and western sides of the main plaza, in peripheral residential zones at Groups B and D, and in the nonresidential Group C, located just south of El Castillo.

Later in the Hats' Chaak phase, Structure A-11 and other structures in the palace complex around Plaza A-III were sacked, sealed off, and then abandoned, an event that Yaeger (2010b) believes marked the end of Naranjo's rule over Xunantunich. However, construction continued on El Castillo, and Structure A-1 was built in the center of the plaza, effectively dividing it in half, with Plaza A-I to the south and Plaza A-II to the north. As the Late Classic transitioned into the Terminal Clas-

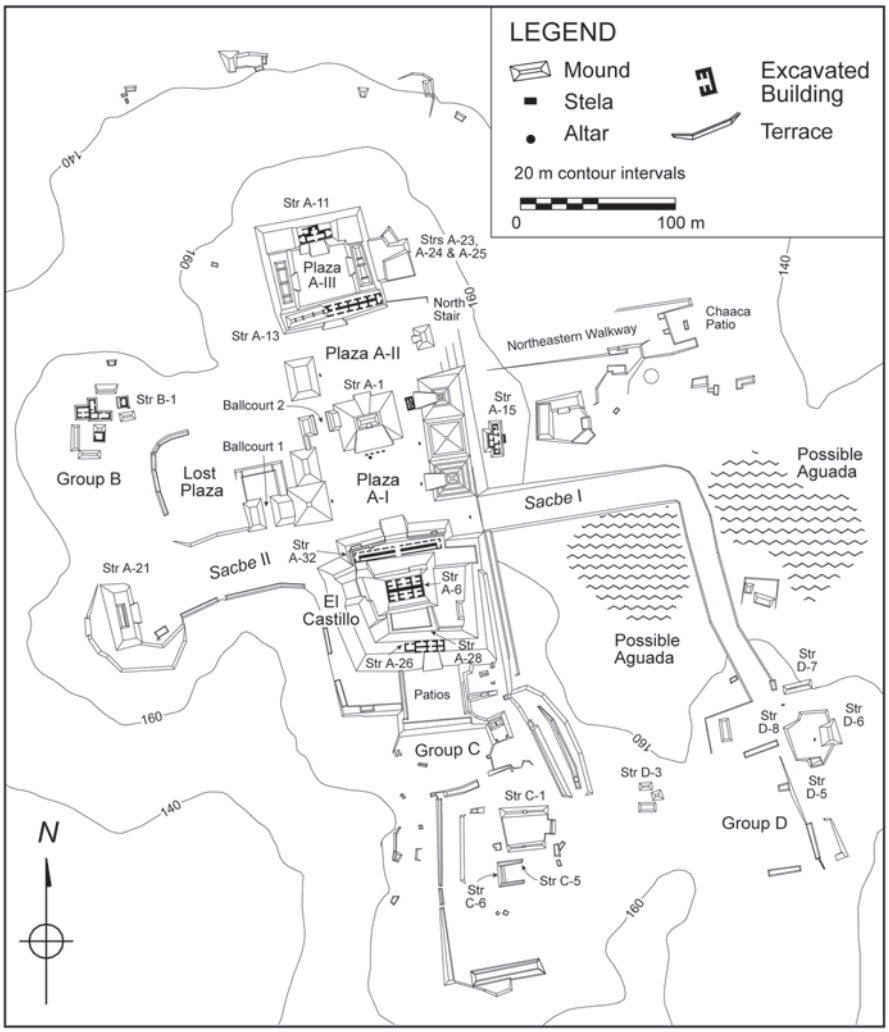

Fig. 5.2 Site map of Xunantunich showing the burial locations discussed in the text. (Map copyright by Angela Keller and Jason Yaeger)

sic, the broader political and social changes that comprised the Maya collapse also transformed the Belize Valley. Populations declined markedly (e.g., Yaeger 2008), and contacts with the northern Maya lowlands increased (Aimers 2004). Local rulers made bolder claims of authority (Helmke and Awe 2012) as the power of neighboring polities like Caracol and Naranjo declined (also see LeCount and Yaeger 2010b).

At Xunantunich, these processes began during the latter half of the eighth century, as settlement surveys document a population decline of more than 75% from the

Late Classic Hats' Chaak phase to the Terminal Classic Tsak' phase (AD 780–890) (Yaeger 2010b). This demographic collapse is reflected in the contemporaneous abandonment of many sectors of the site, as the area of active use was reduced to Plaza A-I and the surrounding structures, including the El Castillo acropolis and residential structures in Group B (Leventhal 2010; Leventhal and Ashmore 2004; Yaeger and LeCount 2010a). At the same time, the rulers of Xunantunich commissioned carved stelae that proclaimed their military prowess and their peer relationship with their former overlords at Naranjo (Helmke et al. 2010). By the end of the tenth century, if not earlier, Xunantunich was abandoned, although people continued to inhabit the region during the Postclassic period (AD 900–1500) and even practiced rituals at some of the site's abandoned buildings (Brown 2011).

Excavations by the Belize Tourism Development Project (TDP), the Xunantunich Archaeological Project (XAP), the Xunantunich Palace Excavations (XPE), and other researchers (e.g., Pendergast and Graham 1981; MacKie 1985) resulted in the discovery of burials in most areas of Xunantunich, including residential zones Groups D and B, one of the ballcourts, Structure A-11 in the palace complex, Structure A-32 on the El Castillo acropolis, and in and around the funerary monument Structure A-4.

Many of the burials did not follow patterns typical elsewhere in the valley, which were highly standardized by the Late Classic period (Schwake 2008; Weiss-Krejci 2006; Welsh 1988; Willey et al. 1965; Yaeger 2003). A prone, extended body position was common (Welsh 1988; Willey et al. 1965, p. 533), and individuals were oriented with the head to the south in more than 75% of the burials analyzed at seven sites (Schwake 2008). Strontium, carbon, and oxygen isotope analysis of 148 individuals buried at 15 Belize Valley sites demonstrates that origin and burial treatment were related: 89% of those with strontium isotope values local to the region were buried with their heads oriented to the south, and mostly in a prone position (Freiwald 2011). This contrasts with the primarily northern or eastern orientation and supine or flexed body position described at sites elsewhere in the Maya lowlands (Schwake 2008; Welsh 1988).

An estimated 23% of the individuals sampled had relocated at least once between birth and burial. However, nearly half of the isotope values of 19 individuals sampled from Xunantunich were not found near the site (Freiwald 2011). Burial position is known for 16 of these individuals: While three individuals have a southern orientation, only one is buried in a prone position with the head oriented to the south. Nearly all individuals with atypical body orientations and positions have isotope values that indicate a nonlocal origin.

Variability in body arrangement at Xunantunich might be explained in multiple ways. The burials of some individuals may have followed the norms of their homelands, even as their burials in the same residential locations—and even the same graves—as locally born individuals suggest that they were incorporated into Maya households and communities (Freiwald 2011). Atypical patterns in three deposits, however, suggest that some migrants were differentiated from others in the community and merited distinct burial treatment. One individual was placed in palace

Structure A-11 in what Yaeger (2010b) interprets as a desecratory termination event following the conquest of the site during the mid-eighth century. Five individuals were placed in a pit in the summit of the funerary monument Structure A-4 during one of the last activities identified in that building (Audet 2006). A third deposit consisted of a single individual placed in Structure A-32, on the El Castillo acropolis. Most of the individuals who received atypical burial treatment had strontium and oxygen isotope values consistent with those identified in the Central Peten, but two other values indicate that locations within the Belize Valley itself may have had associations that were considered "foreign."

5.3 The Method and Theory of Using Isotopes to Understand Population Movement

Strontium (Sr) and oxygen (O) isotope ratios in tooth enamel provide information about an individual's place of birth and early childhood residence. Each element has multiple variations (isotopes) in different proportions, and the isotope values found in major food and water sources become fixed in body tissues as they form (Bentley 2006). $^{87}Sr/^{86}Sr$ isotope ratios vary geographically, depending on the age and composition of geologic formations (Ericson 1985; Faure and Powell 1972; Palmer and Elderfield 1985). Most variation in $^{18}O/^{16}O$ ratios in Mesoamerica relates to elevation and distance from the coast (Lachniet and Patterson 2009; Marfia et al. 2004). Hundreds of rock, water, plant, and faunal samples collected across Mesoamerica show that variation in strontium isotope values corresponds to the broadly defined cultural areas shown in Fig. 5.3 (Hodell et al. 2004; Price et al. 2008, 2010). Differences in oxygen isotope ratios have been identified among several regions, allowing use of a combination of isotopic assays to identify population movement across the Maya region.

Geologic differences near the Belize Valley occur over much shorter distances (Cornec nd; Ower 1921; Wright et al. 1959). The rock formations of the Maya Mountains are significantly older and have higher strontium isotope values that range from $^{87}Sr/^{86}Sr$ 0.711 to greater than 0.725 (Freiwald 2011; Hodell et al. 2004). Freiwald (2011) and Thornton (2011) report intermediate values created by deposition from the streams and rivers flowing from the mountains in its foothills (0.709–0.713), which in turn are higher than the average value of 0.7086 found at sites located along the Belize River (Fig. 5.3).

Much of this variability is not visible on geologic maps. A detailed map of strontium isotope values was constructed using modern faunal samples collected in and around archaeological sites (Freiwald 2011). Animals represent the average biologically available strontium isotope values better than rocks, plants, water, or soils (Price et al. 2002), and use of archaeological fauna was avoided because nonlocal animals have been identified at multiple sites in the study (Yaeger and Freiwald 2009). Diagenesis and consumption of imported foods are potential con-

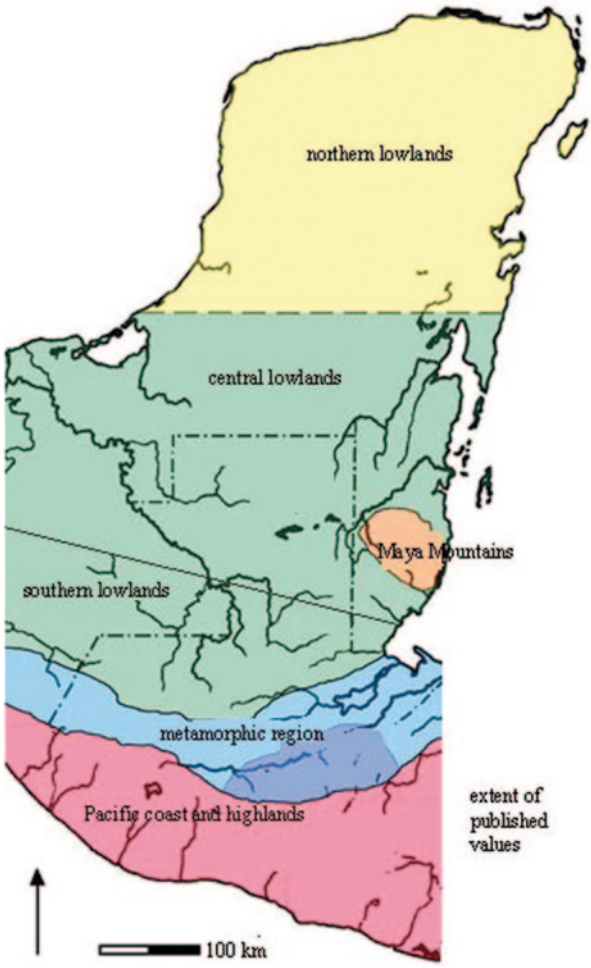

Fig. 5.3 Distinct strontium isotope values correspond to broadly defined cultural divisions. (Map modified from Wright (2005b: Fig. 1). Reprinted from *Journal of Archaeological Sciences*, 32(4), Lori E. Wright, Identifying immigrants to Tikal, Guatemala: Defining local variability in strontium isotope ratios of human tooth enamel, 555–566. Copyright (2005), with permission from Elsevier)

cerns (e.g., Wright 2005b, 2012); however, human populations living in each of the areas shown in Fig. 5.3 have $^{87}Sr/^{86}Sr$ values that reflect those found in the baseline samples (Table 5.1).

The geographic extent of each of these strontium zones is unknown. Hodell and colleagues (2004) report values of ~0.7079 $^{87}Sr/^{86}Sr$ along the Mopan River in the Belize Valley, but the plant, rock, and soil values are significantly lower than those found in modern fauna and the ancient human population. They identified similar rock, water, plant, and soil values (~0.7078 $^{87}Sr/^{86}Sr$) at the site of El Pilar 15 km to the north, suggesting that strontium isotope values may decrease with distance from the Belize Valley. However, we report a new value of 0.70836 $^{87}Sr/^{86}Sr$ from a modern land snail (*Neocyclotus* sp.) at Naranjo just 15 km west of the Belize River, and Davies (2012) has identified similar values from San Bartolo 60 km

Table 5.1 Strontium isotope values. (Sample preparation followed Price et al. 2002 and is described in detail for baseline and human samples in Freiwald 2011)

	Mean value of human tooth enamel (# samples)	Mean value of nonhuman faunal baseline (# samples)	Range of faunal baseline values
Belize River samples	0.7085 ($n=136$)	0.7086 ($n=17$)	0.7082–0.7091
Macal River samples	0.7095 ($n=12$)	0.710 ($n=3$)	0.7089–0.7107
Maya Mountain samples	0.7150 ($n=11$)	0.7179 ($n=9$)	0.7114–0.7255

to the northwest in human samples in her dissertation research. Either the water, rock, and plant samples do not reflect biologically available strontium isotope values, or localized isotopic heterogeneity is not unique to the Belize Valley and Maya Mountains and may be more widespread in the central lowlands. For example, baseline values identified near Palenque, Bonampak, and Yaxchilan show the 0.7077 $^{87}Sr/^{86}Sr$ average values of the central lowlands, but also show higher values between 0.7082 and 0.7087 due to the presence of exposed limestone formed at different times. At Palenque, values in both of these ranges are present in the skeletal sample (Price et al. 2008) because the immediate catchment area of the site was geologically diverse.

Interpreting oxygen isotope values is a more complex endeavor. Environmental variation in $^{18}O/^{16}O$ isotope values is caused by precipitation, elevation, temperature, and relative humidity, and is further complicated by fractionation between the water source and the species ingesting it (Luz and Kolodny 1985; Luz et al. 1984). Fractionation rates are species-specific due to differences in factors such as body temperature, drinking habits, and sweating. Variation within a species due to reproductive status, age, sex, and dietary preference also must be considered (Cormie et al. 1994; Bryant et al. 1996; Kohn 1996; Kohn et al. 1996; Longinelli et al. 2003). However, measurable differences have been identified in water samples in at least five parts of the Maya region, including the Caribbean and Pacific coasts, the Guatemalan highlands, part of the Central Peten, and elsewhere in the Maya lowlands (Lachniet and Patterson 2009; Marfia et al. 2004). These differences also are reflected in human populations (see Freiwald 2011; Price et al. 2010).

5.4 Identifying Migrants

Strontium isotope ratios form the basis for identifying migrants, with oxygen isotope values providing an additional line of evidence. An individual whose tooth enamel has a different value than his or her burial location relocated at least once between birth and burial. Most studies have considered values that fall within two standard deviations of the mean of the baseline fauna to be "local." This statistic includes too many obviously nonlocal values in the Maya Mountains, where the mean and standard deviation of known, local values encompass nearly all known

variability in strontium isotope ratios in Mesoamerica, even while excluding some modern values sampled from locations within the mountain range (Freiwald 2011). Therefore, the range of baseline values also is used to interpret local and nonlocal human values in this study.

A framework for interpreting isotopic values draws from modern and historic studies of migration (Anthony 1990, 1992; Cadwallader 1992; Cameron 1995; Coombs 1979; Finnegan 1976; Geisen 2004; Hoerder 2004). Some archaeological studies have implicitly referenced modern migration theory (Blitz 1999; Ezzo et al. 1997; Varien 1999), but the term residential mobility is used more commonly. However, in modern terms, residential mobility only describes movement within a political entity like a city or town, which might be visible isotopically only under rare circumstances. In contrast, migration is a flexible term that includes myriad types of population movement over both long and short distances, such as international and transoceanic movement (Geisen 2004, p. 54), circular movement (Kiyoshi 2000), or movement between rural communities, both voluntary and involuntary. Migration is a permanent or semipermanent movement across a boundary, which includes movement among Maya cities and communities.

While Classic and Colonial sources document instances of population movement in the Maya region, they provide little information on how it was structured (Martin and Grube 2000; Farriss 1984; Restall 1997; Rice 2009). Observations of modern population movement describe migration as a kin-based phenomenon that occurs primarily for social reasons (Arango 1985; Cadwallader 1992; Koji 2000; Ravenstein 1885, 1889). A number of other observations are useful for interpreting paleomigration. First, most migration occurs over short distances, so we interpret the closest location with a similar isotope value as the homeland for the individual. Second, the return of migrants to their places of origin creates a bidirectional stream of movement that eventually results in networks with great time depth. The concept of return migration allows broader patterns to be inferred from isotope values that only identify individuals moving into a community. Finally, the kin-based nature of modern migration allows us to draw broader conclusions about Maya social organization and the meaning of migration in an individual's and community's identity. The practice of disinterring and reburying bones adds a layer of complexity to interpreting migration in the Maya region (Weiss-Krecji 2004; Chase and Chase 1996), but isotopic assays also are useful in assessing the length of time an individual resided in a particular location.

In sum, we identify migration by comparing the isotope values of tooth enamel formed early in an individual's life to those identified near the burial location: A difference in values shows that an individual moved at least once between birth and burial. While migration occurred between places—cities, communities, and polities—this study identifies relocation between geologic regions with distinct strontium isotope values. It is not possible to associate a nonlocal individual with a specific city or kingdom using isotope values because similar combinations of isotope values occur at multiple locations.

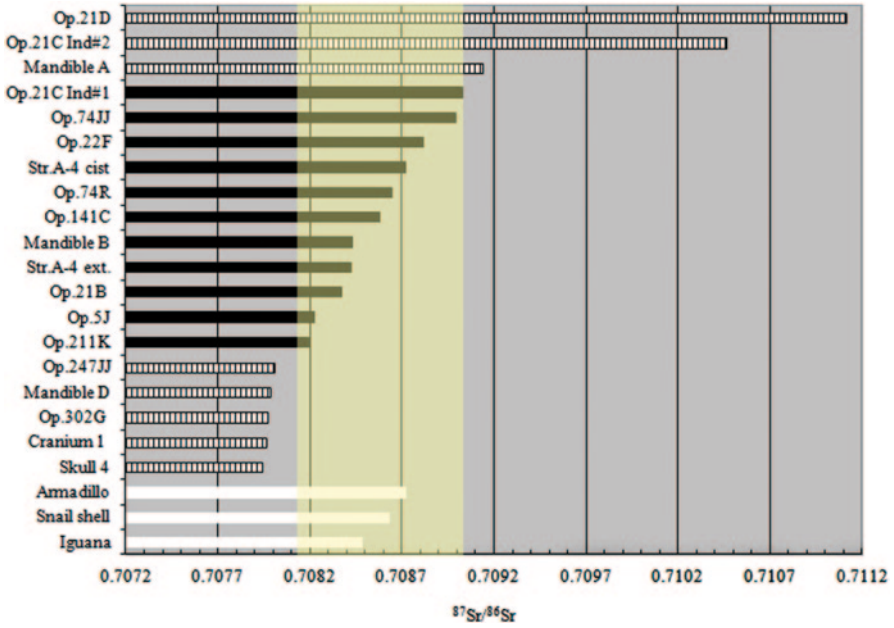

Fig. 5.4 Strontium isotope values in tooth enamel for each individual sampled at Xunantunich. *White bars* show values from baseline fauna collected near the site, and the *shaded area* shows the range of values found along the Belize River. *Black bars* show individuals with local values, and *striped bars* represent those with nonlocal values

5.5 Case Study

Our sample for this study consists of 19 individuals excavated at Xunantunich between 1992 and 2004 by XAP, TDP, and XPE researchers. Analysis of these burials forms part of a larger study of migration, including 148 individuals from 15 sites along the Belize River and its two main tributaries, the Macal and Mopan rivers (Freiwald 2011). Nine individuals in our sample were interred in elite residential groups located near the site core, and ten come from nonresidential structures situated around the plazas in Group A (Table 5.2). Most of the burials date to the Late Classic Hats' Chaak phase (AD 670–780), but the Burial 1 deposit from Structure A-4 and burials from Group D operations 21B, 21C, and 21D date to the Terminal Classic Tsak' phase (AD 780–890).

Three faunal samples collected within 2 km of Xunantunich show the average local isotope value ($^{87}Sr/^{86}Sr$ 0.70861), which is slightly higher than the Belize River average shown in Table 5.1 ($^{87}Sr/^{86}Sr$ 0.7085). Seven individuals in our sample have strontium isotope values that are statistical outliers. Two more individuals have values that are higher or lower than those found along the Belize River (Fig. 5.4, shaded area), and each of these also has an oxygen isotope value that is an outlier of the

Table 5.2 Xunantunich strontium isotope values (including modern baseline faunal samples) and burial information

Burial	$^{87}Sr/^{86}Sr$	$^{18}O/^{16}O_{PDB}$	Sex	Age in years	Sample	Burial information
Structure A-4 Burial 1 deposit Skull 4	*0.70794*	*−1.73*	*I*	*10–12*	upper first molar	Burial location: intrusive pit at summit of Structure A-4, eastern structure on central plaza. Body position disturbed by later interment, originally articulated and flexed?
Structure A-4 Burial 1 deposit Cranium 1	*0.70796*	*−2.36*	*I*	*Adult?*	upper left second incisor	Burial location: intrusive pit at summit of Structure A-4, eastern structure on central plaza. Skull only interment with cervical vertebra
Structure A-11 Operation 302G Burial 1	*0.70797*	*−0.32*	*M*	*20–23*	lower right first molar	Burial location: on floor of east-central room. Flexed body position, head to the north
Structure A-4 Burial 1 deposit Mandible D	*0.70798*	*−1.84*	*F*	*16–18*	lower left third premolar	Burial location: intrusive pit at summit of Structure A-4, eastern structure on central plaza. Articulated and flexed, on left side
Structure A-32 Operation 247JJ Burial 1	*0.70800*	*−0.60*	*M?*	*Adult*[a]	lower right first molar	Burial context: structure on the El Castillo acropolis on southern side of plaza. Semiflexed, on side, head to the west
Group B Operation 211K Burial 1	*0.70819*	*−0.91*	*F*	*Adult*[a]	lower left first molar	Burial location: residential group. Semiflexed, on side, head to the south
Group D Operation 5J Burial 1	0.70822	−2.78	I	7–8[a]	lower right first molar	Burial location: chultun in change group to Group D, elite residential group. Body position not known
Group D Operation 21B Burial 1	0.70837	−3.01	I	Adult[a]	premolar	Burial location: elite residential group. Body position not known
Structure A-4 Burial 1 extension	0.70842	−3.18	M?	Adult?	upper right first molar	Burial location: eastern structure on central plaza. Flexed, head oriented to the south
Structure A-4 Burial 1 deposit Mandible B	0.70843	−3.16	I	Adult	lower right molar (first or second)	Burial location: intrusive pit at summit of Structure A-4, eastern structure on central plaza. Skull only interment

Table 5.2 (continued)

Burial	$^{87}Sr/^{86}Sr$	$^{18}O/^{16}O_{PDB}$	Sex	Age in years	Sample	Burial information
Structure A-17 Operation 141C Burial 1	0.70858	−2.65	I	6–10[a]	upper first molar	Burial location: center of ballcourt. Body position not known
Structure D-6 Operation 74R Burial 1	0.70865	−2.76	I	Adult[a]	lower left first molar	Burial location: pyramid in residential platform complex. Extended, supine position, legs flexed (?), head to the south
Structure A-4 Burial 1 cist	0.70872	−2.89	I	35–50?	lower right premolar	Burial location: Cist in Structure A-4, eastern structure on central plaza. Extended, supine position, head to the south
Structure D-7 Operation 22F Burial 1	0.70882	−3.98	I	2–4[a]	lower second deciduous molar	Burial location: elite residential group. Flexed, on right side, head to the north
Group D Operation 21C Burial 1 Individual 1	0.70903	−1.41	M	25–29[a]	upper premolar	Burial location: chultun in Group D, elite residential group. Extended, prone position, head to the west
Structure D-6 Operation 74JJ Burial 1	0.70899	−3.41	M	30–40[a]	lower left first molar	Burial location: elite residential group. Extended, prone position, head to the south
Structure A-4 Burial 1 deposit Mandible A	*0.70914*	*−2.40*	*I*	*Adult*	lower left second molar	Burial location: intrusive pit at summit of Structure A-4, eastern structure on central plaza. Skull only interment
Group D Operation 21C Burial 1 Individual 2	*0.71046*	*−3.47*	*M*	*>50[a]*	lower right first molar	Burial location: chultun in Group D, elite residential group. Extended (?), supine position, head to the east
Group D Operation 21D Burial 1	*0.71111*	*−3.33*	*M?*	*>35[a]*	premolar	Burial location: chultun in Group D, elite residential group. Extended, supine position, head to the west
F1753 modern iguana	0.70848					Baseline sample: bone
F5275 modern snail	0.70863					Baseline sample: shell

Table 5.2 (continued)

Burial	$^{87}Sr/^{86}Sr$	$^{18}O/^{16}O_{PDB}$	Sex	Age in years	Sample	Burial information
F1752 modern armadillo	0.70872					Baseline sample: bone

Entries arranged from lowest to highest strontium isotope values with those in italics interpreted as nonlocal to Xunantunich. Question marks denote a probable age/sex estimate or burial interpretation. Oxygen isotope values expressed in per mil. Information on the tooth sampled and lab sample numbers in Freiwald (2011, pp. 426–428)

M male, *F* female, *I* not determined

[a] Information on sex and age from Adams (1998) and Boada in Braswell (1998)

Belize Valley mean ($^{18}O/^{16}O$ value = −2.9 ± 0.99‰ in Freiwald 2011). We interpret these individuals as migrants to the Belize Valley.

The isotope values demonstrate that nearly half of the individuals in the Xunantunich sample had a nonlocal origin. This is a conservative estimate of population movement as even the individuals with "local" values—those that fall within the statistical range of the baseline fauna in the region—may have relocated from another site along the Belize River or from another region with similar strontium and oxygen isotope values.

The three highest strontium isotope values in this sample fall within a range identified in only one region in the Maya lowlands, the foothills of the Maya Mountains. In contrast, low strontium isotope values are found across a very large expanse of the Maya lowlands that spans hundreds of kilometers. Enriched oxygen isotope values, however, have only been identified in the Central Peten in both modern precipitation samples (Lachniet and Patterson 2009) and in archaeological samples of human tooth enamel from Calakmul and San Bartolo (Davies 2012; Price et al. 2010). Thus, some individuals in this sample likely had origins in the Central Peten, and others spent their early years in the foothills of the Maya Mountains.

5.6 Burial Treatment and Origin at Xunantunich

The individuals with Central Peten-like isotope values were buried in three nonresidential structures in Group A and in one residential location in Group B (Fig. 5.2). This includes one individual placed in Structure A-11, the probable residence of Xunantunich's rulers during Hats' Chaak phase; three individuals placed in an intrusive burial pit in the summit of Structure A-4, an eastern pyramidal structure; and one individual interred in Structure A-32, a range structure located on El Castillo. One Maya Mountain area value also was identified in a Structure A-4 burial, but the other two high values were identified in two Group D residential zone burials. Individuals interred in residential zones were interred either according to Belize Valley norms or to practices that are common in other areas and thus likely reflect norms of their homelands. The residential burials serve as an interesting comparison with politically charged contexts in Group A.

Fig. 5.5 The royal residence Structure A-11 at Xunantunich, facing north. (Photo by Awe/TDP)

5.7 Group A Structure A-11

Structure A-11 is the northernmost structure of Xunantunich's monumental core, forming the northern edge of the Plaza A-III palace complex (Fig. 5.5). It was built during the Hats' Chaak phase (AD 670–780), possibly under the influence of Naranjo (Yaeger and LeCount 2010c). The two-story structure had a carved limestone frieze and a wall panel carved with a hieroglyphic text (Yaeger 2010b). Only modest modifications were made for decades after its construction. The upper story has been interpreted as the ruler's residence (Leventhal 2010; MacKie 1985; Yaeger 2010b) because of its layout, inaccessibility, and an onfloor assemblage consisting mainly of serving vessels. The lower building was likely used for administration and storage, as it had a much simpler layout, incised patolli boards and graffiti, and an onfloor assemblage consisting almost entirely of large storage vessels (Yaeger 2010b).

Sometime during the middle of the Hats' Chaak phase, Structure A-11 was systematically dismantled. The walls were torn down, in some cases block-by-block almost to floor level, leaving gashes in the plaster remnants that exposed joins in the masonry. The limestone frieze was dismantled, and the hieroglyphic panel was broken into small fragments. Only three fragments of the panel were recovered despite 100% excavation of the area, leading Yaeger (2010b) to suggest that the other fragments were removed, perhaps as mementoes or trophies (e.g., Brittain and Harris 2010; Chapman 2000).

The rooms of the lower building were filled in with white marl to a height of approximately 1.5 m, and two of three doorways were sealed with limestone blocks. Structure A-11 was never rebuilt, and the administrative and residential activities of

Fig. 5.6 The Xunantunich Operation 302G Structure A-11 burial. (Photo copyright by Yaeger/XPE)

the ruling court subsequently shifted back to El Castillo (Leventhal 2010; Yaeger 2010b). Yaeger (2010b) argues that the destruction and associated deposits form part of a desecratory termination ritual (see also Brown and Garber 2003; Stanton and Brown 2003) that was associated with a dramatic political change, such as the end of Naranjo's rulership of the area and the replacement of the ruling family.

The destruction of Structure A-11 shares characteristics with termination events described elsewhere in the lowlands in which (1) structures were intentionally dismantled, (2) elite markers of power were destroyed, (3) some of the pottery was intentionally smashed, (4) preservation of materials indicates rapid deposition, (5) remains were entombed in a layer of white marl, and (6) the structure was abandoned or its function changed after the event (cf. Stanton et al. 2008).

Two deposits associated with the white marl layer shed more light on this event. The first deposit consists of a Garbutt Creek Red bowl and charcoal found near the top of the marl layer in the east-central room. Garbutt Creek Red vessels are very common in the eastern part of the Belize Valley at sites such as Cahal Pech and Baking Pot. However, they are exceedingly rare at Xunantunich, forming less than 1% of the assemblage during the Hats' Chaak phase (LeCount 2010). At Xunantunich, Mount Maloney Black bowls occupy the same formal and functional niche. Yaeger has argued that this bowl is a "signature vessel" (*sensu* Suhler et al. 2004). If it was left by the individuals who destroyed and sealed the palace rooms, they may have come from a location downstream from Xunantunich.

The second deposit (Operation 302G, Burial 1) included the remains of a gracile, young adult male placed on the floor of the same room at the base of the white marl layer. He was not placed deliberately in a prepared grave and had no associated grave goods. Instead, his body lay sprawled parallel to the west wall, covered with the white marl that filled the room (Fig. 5.6). The individual's head was oriented to the north instead of the south, and the position of the lower body was rotated such that the pelvis was in a supine position, while the upper body lay on its left side.

The skeleton was almost completely articulated, but was not placed in a typical burial position. His arms and legs were flexed (Fig. 5.6). His right femur crossed over his body at a 45° angle, parallel to his lower right arm, while the right lower leg lay in parallel with the body. The legs remained in anatomical position: how-

ever, the femur had rotated during decomposition so that the posterior surface faced upward. The left femur was positioned at a 135° angle under the lower right leg. The left lower leg was flexed perpendicular to the body. It was higher than the right leg and pelvis due to an uneven floor surface that may have resulted from the dismantling of the room.

The position in which this body was encountered during excavation was not likely the result of postdepositional movement of the body, aside from the rotation of the right femur and movement of a small number of elements (e.g., small hand and foot bones). Excellent preservation of the bones and other contextual factors suggest that the room was filled in when the body was deposited. This activity may also explain the position of the right foot, which was reversed at the ankle, possibly as a result of the compression by the boulder shown in Fig. 5.6.

Strontium (0.70797) and oxygen (–0.32‰) isotope values obtained from this individual's tooth enamel are statistical outliers in the Belize Valley population, and instead match values identified in the Central Peten (Freiwald 2011; Hodell et al. 2004). While similar strontium isotope values are found across the central lowlands, enriched oxygen isotope values have only been identified in a limited area of the Central Peten (Lachniet and Patterson 2009; Price et al. 2010). Body modification also provides support for a nonlocal origin. The cranium exhibits tabular oblique modification, which is less common in the Belize Valley than elsewhere in the Maya lowlands. More than 80% of the burials studied in the Usumacinta Valley show oblique cranial modification, which also is common in the Central Peten and the eastern Chiapanec Highlands (Tiesler 2013).

A similar combination of strontium and oxygen isotope values is reported for individuals at Calakmul (Price et al. 2010); however, this individual may have spent his early years at any number of sites in the region. This likely did not include Naranjo because its strontium isotope baseline value is similar to those identified in the Belize Valley. However, we do not know if he resided at Naranjo later in his life or represented a different foreign presence at Xunantunich.

Termination events may include a combination of desecratory and reverential treatment of human remains (Navarro Farr et al. 2008). Duncan (Chap. 3, this volume) describes the use of white marl as a means of wrapping the deposits that is separate from the termination ritual. In some cases, it creates a sacred bundle, while in others it seals off the remains in order to isolate their power. Isolating bones in burials or caches was the appropriate treatment for the skeletal remains of some individuals, including some ancestors (Becker 1992; Duncan 2005, 2011).

However, the act of destruction represents a dramatic transformation of materials, including human remains (Medina Martin and Sánchez Vargas (2007, p. 102), and may serve to deactivate a group's ties to specific locations (Pagliaro et al. 2003). Such events seem to mark purposeful destruction of a building, its material culture, and the political institutions that they represented at Yaxuna, Hershey, and Tikal (Ambrosino et al. 2003; Freidel et al. 1998; Harrison-Buck 2007; McAnany et al. 2004; Suhler and Freidel 2003). The activities at Structure A-11 appear to have been the first in a series that culminated in abandonment of parts of the site.

Fig. 5.7 The main plaza at Xunantunich, with the El Castillo structure on the *right* and Structure A-4 on the *left.* (Photo by Awe/TDP)

5.8 Structure A-4: A Mortuary Pyramid

Located on the eastern side of Plaza A-1 (Fig. 5.7), Structure A-4 was an important ancestral mortuary shrine, as shown by the placement of one of the site's early Late Classic rulers in a cist in Structure A-4–2nd. The strontium isotope values of this individual (0.70872) suggest a Belize Valley origin, as do those of another individual (0.70842) buried at the base of the structure during the Late Classic. In contrast, four of five individuals buried during the Terminal Classic in an intrusive pit in the final version of the structure, Structure 4-A-1st, had nonlocal strontium isotope values. Three of these individuals likely had origins in the Central Peten.

Five intact small bowls and two ladle censers were placed on the final floor of the summit building of Structure A-4–1st (Audet 2006). Such censers became more common during the Terminal Classic, so this deposit may be tentatively assigned to the Tsak' phase (AD 780–890). The objects were well preserved, likely due to the deposition of architectural material directly on top of them. No evidence for intentional destruction or burning of the structure was found, and no clear markers of a termination event were observed.

A 60 × 70-cm pit was cut into the plaster floor. The pit was never resurfaced and contained the remains of five individuals buried in at least two separate events. The grave contained the complete remains of a child and an adolescent female, the skulls of two individuals, and the cranium of a fifth individual (Figs. 5.8 and 5.9).

Fig. 5.8 The lower level of the deposit with the articulated burial of the adolescent female and some of the displaced bones of the child, including the cranium

Fig. 5.9 The upper level of Structure A-4 Burial 1, showing the displaced bones of the child on the left and two skulls and cranium interred in a second burial event

Freiwald and Piehl's reanalysis of the materials is presented here and differs in some aspects from the initial analysis (Audet 2006, pp. 138–141).

The first interment included the complete remains of a 16–18-year-old adolescent female (Structure A-4 Burial 1 "mandible D/skull 2" and postcranial remains) and a 10–12-year-old child (Structure A-4 Burial 1 "skull 4" and postcranial remains). The adolescent was placed on her left side in a tightly flexed position. The child was probably buried in a flexed position immediately above the adolescent, but the skeleton was disturbed when the pit was reaccessed to deposit the skulls of two adults and the cranium of a third (Structure A-4 Burial 1 "mandible A," "mandible B," and cranial remains). Figure 5.8 shows the child's cranium on the right, and femora, tibiae, and fibulae that were disturbed, and possibly rearranged, on the left. Figure 5.9 shows the two skulls. A fifth individual (Structure A-4 Burial 1 "cranium 1") is represented by additional cranial elements, but their position in the burial is not clear.

Strontium isotope values for the adolescent (0.70798) and child (0.70794) fall within the range of values found in the central lowlands. Enriched oxygen isotope values in the adolescent (−1.73‰) and child (−1.84‰) suggest that their origins were in the Central Peten, where similar values have been identified in modern water sources (Lachniet and Patterson 2009) and in human tooth enamel (Davies 2012; Price et al. 2010). These values are similar to those identified in the young male placed in Structure A-11. However, oxygen isotopes in the adolescent's bone apatite show that she had resided at Xunantunich long enough to acquire an $\delta^{18}O$ value (27.68‰) that reflects the local average rather than that of her place of birth.

Isotope values from the skulls and cranium interred during the second burial event indicate different origins. The strontium (0.70843) and oxygen (−3.16‰) isotope values for "mandible B" match those found in the Belize Valley. These values may indicate a local origin near Xunantunich or another Belize Valley site. However, similar values have been identified near sites in the Yucatan Peninsula, and at Palenque, San Bartolo, Tikal, and Naranjo (Davies 2012; Price et al. 2008, 2010; Wright 2012). Freiwald wonders if inhabitants of Naranjo might have enriched oxygen isotope values similar to those identified in Lakes Yaxha and Sacnab (Lachniet and Patterson 2009), but negative values that are common across most of the lowlands—like those of "mandible B"—also are possible.

The strontium value for "mandible A" (0.70914) links this individual to an origin in or around the foothills of the Maya Mountains and Mountain Pine Ridge. A connection to this region also is supported by the individual's dental modification, which is significantly more common in individuals who relocated from the foothills of the Maya Mountains to sites along the Belize River (Freiwald 2011). The oxygen isotope value (−2.40‰) provides no additional information: similar values are found elsewhere in the Maya lowlands. The final individual ("cranium 1") yielded a strontium isotope value (0.70796) that indicates an origin in the central lowlands. However, the oxygen isotope value (−2.36‰) suggests that this individual had a different origin, or at least used a different water source, than the juveniles in the burial.

The skulls and cranium were placed in the deposit after the bodies of the two juveniles had decomposed. This is evidenced by the arrangement of the child's legs, which were displaced by the second burial event and then rearranged into a semi-stacked position approximating anatomical alignment, but with the distoproximal orientations of some bones reversed and anatomically impossible associations between the upper and lower leg bones (Fig. 5.8). By this time, the upper and lower leg bones were no longer attached and the ligaments connecting the clavicle, cranium, and portions of the spinal column were no longer present. The displacement of the child's arms also suggests full skeletonization by the time of the second burial (Fig. 5.9).

The interval between the death and burial of the two skulls and cranium is less clear, as these could represent primary or secondary burials. The cranium-only burial ("cranium 1") was likely associated with one cervical vertebra; however, the atlas and occipital articulation are persistent structures that are among the last skeletal elements to decompose (Duday and Guillon (2006). Perimortem damage

or cut marks that might provide a better time frame for the separation of the crania from postcranial elements were not observed on the poorly preserved bone surfaces.

Mayanists often interpret the interment of isolated skeletal elements, especially skulls, as evidence for sacrifice. At Colha, a deposit of 30 skulls, some of which had articulated cervical vertebrae and evidence for flaying, were layered by age in a midden-like deposit with no apparent burial preparation (Mock 1998; Barrett and Scherer 2005). Even in the absence of direct osteological evidence, a specific age/sex category, lack of grave goods, atypical body position, and partial sets of human remains all may connect deposits of skeletal materials to sacrifice (Tiesler 2007). The Structure A-4 burial has some, but not all of these characteristics.

Nor does the burial clearly evidence ancestor veneration. Mayanists also interpret burials of isolated bones, or burials missing specific bone elements, as examples of veneration in which body parts of important ancestors were removed, curated and manipulated, and sometimes reburied (Fitzsimmons 2009; McAnany 1995, 1998). Such exhumations are cited in Classic texts and art (Fitzsimmons 2009). Tikal Altar 5 is the best-known example of the depiction of this practice (Harrison 1997), and Xunantunich Altar 1 also marks the exhumation of an individual, presumably an important ancestor (Helmke et al. 2010; also see Wrobel et al. Chap. 4, this volume). The Maya also maintained connections with ancestral places for generations, or even centuries, to sustain relationships between the living and the remotely deceased (Hansen et al. 2008).

While long bones were often chosen for inclusion in venerative deposits, the skull had special importance. An elite burial in Tikal's North Acropolis, Burial 85, is missing the individual's skull and is interpreted as the interment of Yax Ehb' Xook, the founder of the Tikal royal house. His skull was removed, presumably for veneration, and replaced with a jade mosaic mask. At Xunantunich, Mackie (1985, pp. 75–77) discovered the burials of an adult and a child with complete postcranial remains, but no skulls, in Structure A-15.

A more striking example is described by Garber and Awe (2008) at Cahal Pech, where a headless body and a skull, interpreted as the same individual, were interred in two separate crypts in Platform B. They relate the skull to the Maya creation story and the recurring theme of death and renewal, in which the Hero Twins retrieve the head of their deceased father, which is then resurrected as the maize god. While the strontium isotope values of the remains have local Belize Valley values (0.70862 and 0.70859 in Freiwald 2011, p. 422), nonlocal values do not preclude ancestor veneration (Hansen et al. 2008). Individuals with foreign origins also could be treated with reverence, as is the case with the noblewoman with a nonlocal place of birth at El Peru-Waka'. Piehl and colleagues (in press) describe her treatment as that of a revered ancestor whose skull was removed, leaving only postcranial remains in the burial.

In fact, nonlocal individuals are buried in eastern shrine structures elsewhere in the valley in proportions roughly equal to other burial contexts, suggesting that they were incorporated into local households and communities (Freiwald 2011). This deposit fails to fit neatly within descriptions of ancestor veneration or sacrificial deposits, a dichotomy that may be too simplistic to describe Classic Maya beliefs about the interaction between the living and the dead. Nevertheless, human remains with Central Peten origins appear to have been associated with a political or social

power that needed to be isolated (Duncan 2011). A generation or more after the events at Xunantunich palace Structure A-11, individuals with Central Peten connections were again buried using a distinct set of norms that reflected neither those of the Belize Valley nor their presumed homelands.

5.9 Structure A-32: Range Structure on El Castillo

Another burial in Group A contained an individual with Central Peten-like strontium (0.70800) and oxygen (−0.60‰) isotope values. Burial 1 was located in change structure to Structure A-32, a range structure on the medial terrace of El Castillo that was modified several times during the Late and Terminal Classic periods (Leventhal 2010). The most significant modification entailed the dismantling of the vaulted roof and walls dividing the southern gallery and the reerection of the building's southern wall farther to the south. The result was a building with a wider rear gallery in the form of a long corridor that was covered by a perishable roof (Clancy 1998). The masonry style of the southern wall suggests that this remodeling occurred in the later part of eighth century, consistent with Hats' Chaak phase ceramics found in the fill (Clancy 1998).

Burial 1 was interred during this remodeling episode. A simple pit was cut into the floor of the earlier phase of Structure A-32, and an individual, likely a male, was placed in the pit. The pit was then filled in as part of the new floor surface of the rear gallery (Adams 1998; Clancy 1998). Like Burial 1 in Structure A-11, no grave goods were identified. However, this individual was oriented to the west and interred in a semiflexed position. Oxygen isotope values sampled from bone apatite (27.64‰) fall within the range of the local average, indicating that the individual had lived at Xunantunich a decade or more before his death (e.g., Hedges et al. 2007). Western orientations and flexed body positions have been reported at multiple sites in the central lowlands, so the burial of this individual may reflect nonlocal burial norms. More likely, the individual's Central Peten origin and burial treatment may signal the broader sociopolitical changes occurring at Xunantunich and relate to the activities identified at Structures A-11 and A-4.

5.10 Elite Residential Groups B and D

A number of burials in two elite residential groups also contained the remains of individuals with nonlocal origins that provide a useful comparison for interpreting how burial treatment reflects an individual's origin. Operation 211K Burial 1 in Group B contained the remains of a young adult female buried in a residential group only 150 m from the Structure A-11 palace (Adams 1998; Etheridge 1997). She was buried in a low platform that demarcated the edge of the residential group near at least two other individuals, one of whom was elderly (based on nearly complete alveolar resorption in the mandible).

The strontium isotope value (0.70819) obtained from this individual's remains is lower than most identified in the Belize Valley, but is not a statistical outlier. However, an enriched oxygen isotope value (−0.91‰) and the heavy C4 contribution to her diet—approximately 80% maize or foods with similar isotopic signatures—suggest strongly that she spent her infancy in the Central Peten (see detailed discussion in Freiwald 2011, pp. 298–299; e.g., Gerry and Krueger 1997). She lived in the Belize Valley region long enough for bone apatite oxygen isotope values (27.99‰) to adjust to the local average and was buried with a southern orientation, in the same manner as the locally born population.

Individuals with both local and nonlocal isotope values were found in Group D, a high-status residential center occupied during the Late and Terminal Classic periods (Braswell 1998). Strontium isotope values from two individuals interred in front of pyramidal Structure D-6 fall within the Belize Valley range. Operation 74JJ ($^{87}Sr/^{86}Sr = 0.70899$) and Operation 74R ($^{87}Sr/^{86}Sr = 0.70865$) were buried according to Belize Valley norms, with the head oriented to the south, an extended body position, and a small number of grave goods. Strontium isotope values from other Group D individuals in the sample, including an infant, a child, and an adult of indeterminate age and sex, also fall within the range of samples collected along the Belize River. Body position and orientation are not known for two of these burials, but the infant's body was oriented to the north. Observations of Belize Valley burial norms are based mainly on the adult burial population, so this unexplained variability will not be explored here.

Burial Operation 21D contained a male placed in an extended, supine position, oriented to the west (Adams 1998; Braswell 1998). The strontium isotope value obtained from this individual (0.71111) is similar to those found in the Maya Mountains and their foothills, where east–west orientations have been reported (Awe et al. 2005; Freiwald 2011). A chultun located west of Structure D-6 contained two adult males who were also oriented east–west instead of north–south. These individuals yielded high strontium isotope values, although the values do not necessarily suggest the same place of origin for each of these individuals.

The chultun contained multiple burials, each placed in niches carved into the soft limestone walls. Operation 21C Burial 1 included two adult males placed in a carefully deposited layer of specially prepared white limestone matrix within a group of stones that formed a cist. Each individual was interred with a turtle shell placed on or near his chest (Braswell 1998). Although both skeletons remained mostly in anatomical position, substantial postdepositional movement of bones occurred. The presence of rodent tunnels near the burial, and the complete skeleton of a *tusa*, or pocket gopher, might explain some displacement of bones. Individual 2 from this burial was a gracile young adult male buried in a supine, extended position with his head oriented to the east (Adams 1998; Braswell 1998). The layout of the niche, which is an east–west oblong space just over 2 m in length, may account for the orientation of the interments. The four other burials in the chultun were oriented north–south. However, the strontium isotope value (0.71046) obtained from this individual is similar to those identified in the foothills of the Maya Mountains.

Burial Operation 21C Individual 1 was a robust elderly adult male interred with his head to the west in a prone, extended position. He lay directly on top of

Individual 2, with his upper legs above the lower individual's cranium (Braswell 1998). The strontium isotope value (0.70903) obtained from Individual 1 is considered local to the Belize Valley, but as one of the highest values in the range, it may represent migration from another area. The enriched oxygen isotope value (−1.41‰) also suggests a nonlocal origin.

5.11 Discussion

The sample from Xunantunich demonstrates three types of postmortem treatment. The first is the southern orientation and prone, extended body position, which was most commonly used for individuals with Belize Valley origins. While individuals with nonlocal strontium and oxygen isotope values also were buried according to these norms, indicators of a nonlocal place of birth may have been ephemeral, such as perishable grave offerings or clothing. Subtle variation in body position also may have related to an individual's origin. For example, individuals interred in the patio adjacent to the eastern shrine in Group 1 at Actuncan were buried with the right arm behind the back and the left arm extended (Freiwald 2012). Careful attention to taphonomy in burial excavations might allow these patterns to be discerned.

Burials of individuals with an eastern, northern, or western orientation may have followed more obvious nonlocal norms. Group D residential burials oriented east–west may have been afforded treatment that was standard in another part of the Maya lowlands (e.g., Schwake 2008; White et al. 2004a, 2004b). The flexed body position of the young female in Group B (Operation 211K Burial 1), along with individuals buried in a supine position, may also reflect burial norms elsewhere in the central lowlands even though they are reported at sites in the Belize Valley (Willey et al. 1965). We recognize that differences in body position and orientation may also reflect many other individual and community considerations, including practical ones like available locations and spaces for graves, but the focus of this chapter remains on the potential for origin to be reflected in burial traditions.

We argue that a nonlocal origin was a key factor in the third type of postmortem treatment, in which the interments deviated from known local or foreign norms. The association of ancestor burials with particular locations (McAnany 1995, 1998) meant that human remains formed a critical part of activities meant to establish or isolate the power of a place (Davies 2012; Duncan 2005, 2011). The origin of individuals buried in dedication and termination deposits mattered, and may help us to interpret the meanings of the associated activities.

5.12 Origin and Burial Treatment in the Americas

The Maya were not unique among American cultures to use a nonlocal origin in the public and private statements made by burial practices. Use of bone chemistry to identify the origin of individuals buried at Teotihuacan in Central Mexico, in Wari

and Nasca deposits in Peru, and in Mississippian and Hopewell burials in North America show that origin was an important factor across the Americas in determining how and where people were buried, and the role their burials continued to play long after their interments.

Origin was a critical factor in determining proper burial treatment for foreign-born soldiers and household residents in the city of Teotihuacan in the Valley of Mexico. More than 200 individuals interred in highly patterned graves in the Temple of the Feathered Serpent are interpreted as sacrificial offerings made during the building's construction during AD 150–250 (Sugiyama 2005). Oxygen isotope ratios of individuals, including men who appeared to be soldiers, span nearly the entire range of known Mesoamerican values. White and colleagues (2002) interpret this as an intentional policy of military recruitment of young men from other geographic regions. The layout and symmetrical order of the graves at the base of the monument, and the positions of the men's bodies—with hands crossed behind their backs—made a powerful political statement.

These individuals wore pendants of real or carved-shell representations of human teeth. Oxygen isotope values from these teeth also show diverse origins in the Valley of Mexico and more distant regions (Spence et al. 2004). While the locations of these regions are not known, the diversity of nonlocal origins may have been as important as the specific places in order to link the building's construction to Teotihuacan's relationships with foreign polities across Mesoamerica.

Origin and its relationship to individual and group identity were visible elsewhere at Teotihuacan. Unlike most Maya centers, Teotihuacan had foreign ethnic enclaves with distinct material culture. Burial practices in these residences followed norms known in Oaxaca and on the Gulf Coast rather than those practiced in most household compounds. Archaeological chemistry supports the identification of strong foreign ties in these households. Nearly 80% of the strontium and oxygen isotope values at the Oaxaca and Merchants' Barrio complexes are nonlocal ones (Price et al. 2000; White et al. 2004b).

Nonlocal origin is also linked to burial treatment, including body representation and burial location, in the roughly contemporaneous Wari (AD 600–1000) and Nasca (AD 1–750) cultures in Peru. While none of the six Wari burials in the sample from the burial site Conchopata has a nonlocal strontium isotope value, three of five skull-only interments had origins in a different geographic region. The skulls were interred in limited nonhousehold locations and prepared in a standardized manner, and most were identified as males. Skull-only burials also had more heterogeneous isotope values than complete burials, suggesting that they came from distinct populations (Tung and Knudson 2008).

In contrast, strontium, carbon, and oxygen isotope values indicate that the origins of Nasca trophy skulls were consistent with a local origin and were similar to those of typical burials at five sites in southern Peru (Knudson et al. 2009). There were two trophy skulls with nonlocal strontium isotope values; however, there was no statistically significant difference between the values of the trophy head samples and the burial samples. The skulls have a diverse age and sex distribution and were included in most types of burials (but not commonly in residences), and preparation

of the skeletal material was not standardized. These factors do not preclude a close relationship between origin and burial treatment. Local identity might have been important as a deceased individual was transformed into a ritually prepared skull, and places considered distinct in the Nasca cultural landscape may be indistinguishable isotopically.

Skull-only burials are also more likely to have nonlocal origins in the Belize Valley. Four of six skull-only or cranium-only burials—including the individuals discussed in this study—were found in atypical burials in public locations at three sites in the valley (Freiwald 2011). One of the skulls with "local" strontium isotope values, which are not distinguishable among sites located along the 60-km length of the Belize River, had perimortem trauma suggestive of scalping (Piehl and Awe 2009). Although skull-only burials represent more than one type of mortuary treatment in the Maya region, origin may have been an important factor in the selection of individuals for this type of postmortem processing.

Exhumation, reburial, and intentional disturbance of Maya skeletal remains, both ancestors and enemies, demonstrate the importance of the burial location as well as the placement and displacement of the body. A disproportionate number of nonlocal individuals buried in the Hopewell Mound Group consisted only of secondary remains. Five of 38 individuals in the sample had nonlocal values, and two were represented only by elements of the skull (Beehr 2012; Hedman et al. 2009). Nonlocal individuals in secondary burials also have been identified at Aztalan, an upper Midwest site considered subordinate to the Mississippian center Cahokia 1,000 years ago. Aztalan burial practices resembled those of the Maya in that there were no formal cemeteries. Some individuals were buried in primary inhumations, interred as bundles, or cremated in charnel houses. Others were identified as scattered, disarticulated remains in features or middens with a higher incidence of violent trauma than other burial types (Rudolph 2009). Individuals with nonlocal values were identified in both types of burials (Price et al. 2007), which suggests that it was not a nonlocal origin, but how that origin was perceived that played a key role in burial treatment.

5.13 Conclusion

Archaeologists have long considered origin to be a factor affecting an individual's treatment after death. Material aspects of mortuary contexts, such as uncharacteristic grave construction or nonlocal grave goods, have suggested foreign origins at sites across the Maya lowlands. However, isotopic analyses at Punto de Chimino, Tikal, Copan, and at multiple sites in the Belize Valley show that the individuals in the graves were not always born in the places signaled by their grave goods (Buikstra et al. 2004; Freiwald 2011; Price et al. 2010; Wright et al. 2005a; Wright and Bachand 2009). Instead, body position and orientation appear to be better markers of a nonlocal place of birth and how that place and the individual's association with it were conceptualized.

It is important to note the methodological limits of isotopic analysis, as well as of the theoretical framework used to interpret the results in this study. Similar strontium isotope values often are found in multiple places, so movement between places that have the same range of values cannot be identified. Isotope values are not specific enough to track movement between particular cities, or within them. Nor can most studies, including this one, provide information about the multiple moves an individual might have made during his or her lifetime because we base interpretations about "origin" on a single sample from a tooth formed during childhood.

Identifying potential homelands also is complex from a theoretical point of view. Migration theory posits that most movement occurred between neighboring regions, so a conservative estimate of isotope values that assigns an individual's most likely homeland to the closest possible place of origin underidentifies long-distance movement, which is documented by Classic-era records. Movement from areas with limited isotope mapping, such as non-Maya areas of Honduras, also will be left out of consideration completely, an omission that could drastically alter identification of migrant homelands at sites like Copan (Miller and Freiwald 2013).

Burials at Xunantunich were events linked to larger sociopolitical dynamics in the Belize Valley and elsewhere in the Maya lowlands during the Late and Terminal Classic periods when political alliances shifted, larger polities increasingly fragmented, and smaller ones claimed their independence. The origin of individuals interred during ritual events was not arbitrary. Instead, it was an important aspect of the deceased's identity that shaped the message embodied in the deposit. Origin and identity are deeply intertwined, as seen in the burial of Teotihuacan soldiers from distant lands in civic architecture and deposits of Wari trophy heads. Even without detailed descriptions of Hopewell and Mississippian burial contexts, the movement of human remains to specific places in the landscape for burial demonstrates the importance of origin in treatment of the dead.

Not all migrants were treated differently when they died: A nonlocal origin was not always considered a foreign one. Nor should all skull-only burials or bodies in unusual positions be interpreted as foreigners. Biogeochemical methods only provide numbers, and we have yet to map in detailed baseline isotope values in much of Mesoamerica and adjacent regions. Nuanced interpretation of each deposit within its larger sociopolitical context (e.g., Navarro Farr et al. 2008) is necessary to give meaning to events that took place in the Maya lowlands during Late and Terminal Classic, and more broadly in American cultures.

Acknowledgements We would like to thank our collaborators on the XAP, TDP, and XPE Projects, and emphasize the ongoing collaboration with T. Douglas Price and James Burton at the University of Wisconsin-Madison Laboratory for Archaeological Chemistry (LARCH), Paul Fullagar at the University of North Carolina at Chapel Hill, and David Dettman at the University of Arizona. David Meiggs and Meaghan Peuramaki Brown helped obtain the Naranjo strontium isotope value. We also thank Carolyn Audet, Jennifer Braswell, and Brad Adams for excellent report and dissertation data that contributed to this discussion, and Gabriel D. Wrobel and Bill Duncan for comments and suggestions on ideas and comments on the earlier version of this chapter.

References

Adams, B. J. (1998). *Analysis of the Xunantunich Archaeological Project (XAP) human skeletal remains*. Belmopan: Belize Institute of Archaeology, National Institute of Culture and History.

Aimers, J. (2004). The terminal classic to the postclassic transition in the Belize River Valley. In J. F. Garber (Ed.), *The ancient Maya of the Belize Valley* (pp. 305–319). Gainesville: University Press of Florida.

Ambrosino, J., Ardren, T., & Stanton, T. (2003). The history of warfare at Yaxuná. In M. K. Brown & T. Stanton (Eds.), *Ancient Mesoamerican warfare* (pp. 109–123). Walnut Creek: Altamira Press.

Anthony, D. (1990). Migration in archaeology: The baby with the bathwater. *American Anthropologist, 92*(4), 895–914.

Anthony, D. (1992). Bath refilled: Migration in archaeology again. *American Anthropologist, 94*(1), 174–176.

Arango, J. (1985). Las "Leyes de las migraciones" de E.G. Ravenstein, cien años después. *Reis, 32*(Oct.–Dec.), 7–26.

Audet, C. (2006). *Political organization in the Belize River Valley: Excavations at Baking Pot, Cahal Pech, and Xunantunich*. Ph.D. dissertation, Vanderbilt University, Nashville.

Awe, J. J. (2008). Architectural Manifestations of Power and Prestige: Examples from Classic Period Monumental Architecture at Cahal Pech, Xunantunich and Caracol, Belize. *Research Reports in Belizean Archaeology 5,* 159–174.

Awe, J. J., Weinberg, D. M., Guerra, R., & Schwanke, M. (2005) *Archaeological Mitigation In The Upper Macal River Valley: Final Report Of Investigations Conducted Between June–December 2003, January–March 2004, October–December 2004*.

Ball, J. W., & Taschek, J. T. (1991). Late classic lowland Maya political organization and central-place analysis: New insights from the Upper Belize Valley. *Ancient Mesoamerica, 2*(2), 149–165.

Barrett, J., & Scherer, A. (2005). Stones, bones, and crowded plazas: Evidence for terminal classic Maya warfare at Colha, Belize. *Ancient Mesoamerica, 16*(1), 101–118.

Becker, M. J. (1992). Burials as caches, caches as burials: A new interpretation of the meaning of ritual deposits among the classic period lowland Maya. In E.C. Danien & R. Sharer (Eds.), *New theories on the ancient Maya* (pp. 185–196). Philadelphia: University of Pennsylvania.

Beehr, D. (2012). *Middle Woodland, Utica, and Albany mounds in Ill. Eastern North America and the Hopewell mound group*. PhD. dissertation, University of Illinois, Urbana, Champaign.

Bentley, R. A. (2006). Strontium isotopes from the earth to the archaeological skeleton: A review. *Journal of Archaeological Method and Theory, 13*(3), 135–187.

Blitz, J. (1999). Mississippian chiefdoms and the fission-fusion process. *American Antiquity, 64*(4), 577–592.

Braswell, J. (1998). *Archaeological investigations at Group D, Xunantunich, Belize*. Ph.D. dissertation, Tulane University, New Orleans.

Brittain, M., & Harris, O. (2010). Enchaining arguments and fragmenting assumptions: Reconsidering the fragmentation debate in archaeology. *World Archaeology, 42*(4), 581–594.

Brown, M. K. (2011). Postclassic veneration at Xunantunich, Belize. *Mexicon, XXXIII*,126–131.

Brown, M. K., & Garber, J. F. (2003). Evidence of middle preclassic conflict: A view from Blackman Eddy, Belize. In M. K. Brown & T. W. Stanton (Eds.), *Ancient Mesoamerican warfare* (pp. 91–108). Walnut Creek, CA: Altamira Press.

Bryant, J. D., Koch, P., Froelich, P., Showers, W., & Genna, B. (1996). Oxygen isotope partitioning between phosphate and carbonate in mammalian apatite. *Geochimica et Cosmochimica Acta, 60*(24), 5145–5148.

Buikstra, J., Price, T. D., Wright, L., & Burton, J. (2004). Tombs from the Copán acropolis: A life history approach. In E. Bell, M. Canuto & R. Sharer (Eds.), *Understanding Early Classic Copán* (pp. 191–212). Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Cadwallader, M. (1992). *Migration and residential mobility: Macro and micro approaches*. Madison: The University of Wisconsin Press.

Cameron, C. M. (1995). Migration and the movement of Southwestern peoples. *Journal of Anthropological Archaeology, 14*(2), 104–124.

Chapman, J. (2000). *In fragmentation in archaeology: People, places, and broken objects in the prehistory of South-eastern Europe*. London: Routledge.

Chase, A. F., & Chase, D. Z. (1996). Maya multiples: Individuals, entries, and tombs in Structure A34 of Caracol, Belize. *Latin American Antiquity, 7*(1), 61–79.

Clancy, E. (1998). The 1997 excavation on El Castillo at Structure A-32. In R. Leventhal (Ed.), *Xunantunich Archaeological Project: 1997 field report* (pp. 56–75). Report submitted to the Belize Institute of Archaeology, Belmopan.

Coombs, G. (1979). Opportunities, information networks, and the migration-distance relationship. *Social Networks, 1*(3), 257–276.

Cormie, A., Luz, B., & Schwarcz, H. (1994). Relationship between the hydrogen and oxygen isotopes of deer bone and their use in the estimation of relative humidity. *Geochimica et Cosmochimica Acta, 58*(16), 3439–3449.

Cornec, J. H. (2008) Geology Map of Belize. jcornec@aol.com, Denver CO.

Davies, D. (2012). *Past identities, present legitimation: The reuse of a late preclassic residential group at the Maya Site of San Bartolo, Guatemala*. Ph. D Dissertation, Department of Anthropology, Tulane University.

Duday, H., & Guillon, M. (2006). The role of the forensic specialist on the death scene. Understanding the circumstances of deposition when the body is skeletonized. In A. Schmitt, E. Cunha & J. Pinhero (Eds.), *Forensic anthropology and forensic medicine: Complementary sciences from recovery to cause of death* (pp. 117–158). Totowa: Humana Press.

Duncan, W. (2005). *The bioarchaeology of ritual violence in Postclassic El Petén, Guatemala (AD 950-1524)*. Ph.D. dissertation, Southern Illinois University, Carbondale.

Duncan, W. (2011). Bioarchaeological analysis of sacrificial victims from a Postclassic Maya temple from Ixlú, El Petén, Guatemala. *Latin American Antiquity, 22*(4), 549–572.

Ericson, J. (1985). Strontium isotope characterization in the study of prehistoric human ecology. *Journal of Human Evolution, 14*(5), 503–514.

Etheridge, B. (1997). Excavations at Group B, Structures A-2, A-3, A-4 and the Stela House (A-6). In R. Leventhal (Ed.), *Xunantunich Archaeological Project: 1996 field report* (pp. 71–82). Report submitted to the Belize Institute of Archaeology, Belmopan.

Ezzo, J., Johnson, C., & Price, T. D. (1997). Analytical on prehistoric migration: A case study from East-Central Arizona. *Journal of Archaeological Science, 24*(5), 447–466.

Farriss, N. M. (1984). *Maya society under colonial rule*. Princeton: Princeton University Press.

Faure, G., & Powell, J. L. (1972). *Strontium isotope geology*. New York: Springer-Verlag.

Finnegan, G. (1976). *Population movement, labor migration, and social structure in a Mossi village*. Ph.D.dissertation, Brandeis University, Waltham.

Freidel, D., Suhler, C., & Palma, R. C. (1998). Termination and ritual deposits at Yaxuna: Detecting the historical and archaeological deposits. In S. Mock (Ed.), *The sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record of Mesoamerica* (pp. 135–144). Albuquerque: University of New Mexico Press.

Freiwald, C. (2011). *Reconstructing Maya migration networks: Reconstructing population movement in the Belize River Valley during the late and terminal classic*. Ph.D. dissertation, University of Wisconsin, Madison.

Freiwald, C. (2012). Actuncan burials: The 2011 field season. In L. LeCount & J. Blitz (Eds.), *Actuncan Archaeological Project: Report of the 2011 field season* (pp. 48–59). Report submitted to the Belize Institute of Archaeology, Belmopan.

Fitzsimmons, J. L. (2009). *Death and the classic Maya kings*. Austin: University of Texas Press.

Garber, J. F., & Awe, J. J. (2008). Middle formative architecture and ritual at Cahal Pech. *Research Reports in Belizean Archaeology, 5,* 185–190.

Geisen, T. (2004). Migrants in "labor transfer systems.". In T. Geisen, A. A. Hickey & A. Karcher (Eds.), *Migration, mobility, and borders: Issues of theory and policy* (pp. 35–80). Frankfurt: Verlag für Interculturelle Komminukation.

Gerry, J., & Krueger, H. (1997). Regional diversity in classic Maya diets. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 196–207). Washington, D.C: Smithsonian.

Hansen, R. D., Howell, W. K., & Guenter, S. P. (2008). Chapter 2: Forgotten structures, haunted houses, and occupied hearts: Ancient perspectives and contemporary interpretations of abandoned sites and buildings in the Mirador Basin, Guatemala. In T. W. Stanton & A. Magnoni (Eds.), *Ruins of the past: The use and perception of abandoned structures in the Maya lowlands* (pp. 25–64). Boulder: University Press of Colorado.

Harrison-Buck, E. (2007). Empowered and disempowered during the late to terminal classic transition: Maya burial and termination rituals in the Sibun Valley, Belize. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 74–101). New York: Springer.

Harrison, P. (1997). Triangles of love: A case history from eighth century Tikal. In *Proceedings of the 1995 and 1996 Latin American symposia* (pp. 81–89). Museum Papers Series, no. 34. San Diego: San Diego Museum of Man.

Hedges, R. E. M., Clement, J. G., Thomas, C. D. L., & O'Connell, T. C. (2007). Collagen turnover in the adult femoral mid-shaft: Modeled from anthropogenic radiocarbon tracer measurements. *American Journal of Physical Anthropology, 133*(2), 808–816.

Hedman, K., Curry, B. B., Johnson, T., Fullagar, P., & Emerson, T. (2009). Variation in strontium isotope ratios of archaeological fauna in the midwestern United States: A preliminary study. *Journal of Archaeological Science, 36*(1), 64–73.

Helmke, C. G. B., & Awe, J. J. (2012). ancient Maya territorial organisation of Central Belize: Confluence of archaeological and epigraphic data. *Contributions in New World Archaeology, 4,* 59–90.

Helmke, C. G. B., Awe, J. J., & Grube, N. (2010). The carved monuments and inscriptions of Xunantunich: Implications for terminal classic sociopolitical relationships in the Belize Valley. In L. J. LeCount & J. Yaeger (Eds.), *Classic Maya provincial politics: Xunantunich and its hinterlands* (pp. 97–121). Tucson: The University of Arizona Press.

Hodell, D. A., Quinn, R. L., Brenner, M., & Kamenov, G. (2004). Spatial variation of strontium isotopes ($^{87}Sr/^{86}Sr$) in the Maya region: A tool for tracking ancient human migration. *Journal of Archaeological Science, 31*(5), 585–601.

Hoerder, D. (2004). Migration as balancing process: Individual and societal connections of mobility. In T. Geisen, A. A. Hickey & A. Karcher (Eds.), *Migration, mobility, and borders: Issues of theory and policy* (pp. 15–34). Frankfurt: Verlag für Interculturelle Komminukation.

Kiyoshi, H. (2000). Cross-border networks and tourism: Some aspects of population mobility in Spisong Panna, Yunnan Province, Southwestern China. In K. Abe & M. Ishii (Eds.), *Population movement in Southeast Asia: Changing identities and strategies for survival* (pp. 153–176). Osaka: The Japan Center for Area Studies.

Koji, M. (2000). Culture moves: Contemporary migration in Southeast Asia. In K. Abe & M. Ishii (Eds.), *Population movement in Southeast Asia: Changing identities and strategies for survival* (pp. 9–18). Osaka: The Japan Center for Area Studies.

Knudson, K. J., Williams, S. R., Osborn, R., Forgey, K., & Williams, P. R. (2009). The geographic of Nasca trophy heads using strontium, oxygen, and carbon isotope data. *Journal of Anthropological Archaeology, 28*(2), 244–257.

Kohn, M. J. (1996). Predictiong animal $\delta^{18}O$: Accounting for diet and physiological adaptation. *Geochimica et Cosmochimica Acta, 60*(23), 4811–4829.

Kohn, M. J., Schoeninger, M. J., & Valley, J. W. (1996). Herbivore tooth oxygen isotope composition: Effects of diet and physiology. *Geochimica et Cosmochimica Acta, 60*(20), 3889–3896.

Lachniet, M. S., & Patterson, W. P. (2009). Oxygen isotope values of precipitation and surface waters in northern Central America (Belize and Guatemala) are dominated by temperature and amount effects. *Earth and Planetary Science Letters, 284*(3), 435–446.

LeCount, L. J. (2010). Maya palace kitchens: Suprahousehold food preparation at the Late Classic Maya site of Xunantunich. In E. Klarich (Ed.), *Inside ancient kitchens: New directions in the study of daily meals and feasts* (pp. 133–162). Boulder: University of Colorado Press.

LeCount, L. J., & Yaeger, J. (2010a). A brief description of Xunantunich. In L. J. LeCount & J. Yaeger (Eds.), *Classic Maya provincial politics: Xunantunich and its hinterlands* (pp. 67–78). Tucson: University of Arizona Press.

LeCount, L. J., & Yaeger, J. (2010b). Conclusions: Placing Xunantunich and its hinterland settlements in perspective. In L. J. LeCount & J. Yaeger (Eds.), *Classic Maya provincial politics: Xunantunich and its hinterlands* (pp. 337–369). Tucson: University of Arizona Press.

LeCount, L. J., & Yaeger, J. (2010c). Provincial politics and current models of the Maya State. In L. J. LeCount & J. Yaeger (Eds.), *Classic Maya provincial politics: Xunantunich and its hinterlands* (pp. 21–45). Tucson: University of Arizona Press.

Leventhal, R. C. (2010). Changing places: The Castillo and the structure of power at Xunantunich. In L. J. LeCount & J. Yaeger (Eds.), *Classic Maya provincial politics: Xunantunich and its hinterlands* (pp. 79–96). Tucson: University of Arizona Press.

Leventhal, R., & Ashmore, W. (2004). Xunantunich in a Belize Valley context. In J. F. Garber (Ed.), *The ancient Maya of the Belize Valley* (pp. 70–85). Gainesville: University of Florida Press.

Longinelli, A., Iacumin, P., Davanzo, S., & Nikolaev, V. (2003). Modern reindeer and mice: Revised phosphate-water isotope equations. *Earth and Planetary Science Letters, 214*(3–4), 491–498.

Luz, B., & Kolodny, Y. (1985). Oxygen isotope variations of biogenic apatites, IV. Mammal teeth and bones. *Earth and Planetary Science Letters, 75*(1), 29–36.

Luz, B., Kolodny, Y., & Horowitz, M. (1984). Fractionation of oxygen isotopes between mammalian bone-phosphate and environmental drinking water. *Geochimica et Cosmochimica Acta, 48*(8), 1689–1693.

MacKie, E. W. (1985). *Excavations at Xunantunich and Pomona, Belize, in 1959: A ceremonial center and an earthen mound of the Maya Classic period*. International Series 251. Oxford: British Archaeological Reports.

McAnany, P. A. (1995). *Living with the ancestors: Kinship and kingship in ancient Maya society*. Austin: University of Texas Press.

McAnany, P. A. (1998). Ancestors and the classic Maya built environment. In S. Houston (Ed.), *Function and meaning in classic Maya architecture* (pp. 217–298). Washington, D.C: Dumbarton Oaks.

McAnany, P. A., Murata, S., Thomas, B. S., Lopez Varela, S. L., Finamore, D., & Buck, D. G. (2004). The deep history of the Sibun River Valley. *Research Reports in Belizean Archaeology, 1,* 295–310.

Marfia, A., Krishnamurthya, V., Atekwana, E., & Panton, W. (2004). Isotopic and geochemical evolution of ground and surface waters in a karst dominated geological setting: A case study from Belize, Central America. *Applied Geochemistry, 19*(6), 937–946.

Martin, S., & Grube, N. (2000). *Chronicle of the Maya kings and queens*. New York: Thames & Hudson.

Medina Martin, C., & Sánchez Vargas, M. (2007). Posthumous body treatments and ritual meaning in the classic period northern Petén. A taphonomic approach. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 102–119). New York: Springer.

Miller, K., & Freiwald, C. (2013). *Identifying ancient population movement in Honduras using strontium and oxygen isotopes: New values and interpretations*. Paper presented at the American Chemical Society National Meeting. April 9, New Orleans.

Mock, S. (1998). The defaced and the forgotten: Decapitation and flaying/mutilation as a termination event at Colha, Belize. In S. Mock (Ed.), *The sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record* (pp. 3–18). Albuquerque: University of New Mexico Press.

Navarro Farr, O., Freidel, D., & Arroyave Prera, A. L. (2008). Manipulating memory in the wake of dynastic decline at El Perú-Waka'. In T. Stanton & A. Magnoni (Eds.), *Ruins of the past: The use and perception of abandoned structures in the Maya lowlands* (pp. 113–145). Boulder: University Press of Colorado.

Novotny, A. (2012). The Chan community: A bioarchaeological perspective. In C. Robin (Ed.), *Chan: An ancient Maya farming community* (pp. 231–252). Gainesville: University Press of Florida.

Ower, L. (1921). *The Geology of British Honduras*. Belize: Clarion Limited.

Pagliaro, J. B., Garber, J. F., & Stanton, T. W. (2003). Evaluating the archaeological signatures of Maya ritual and conflict. In M. K. Brown & T. W. Stanton (Eds.), *Ancient Mesoamerican warfare* (pp. 75–89). Walnut Creek, CA: Altamira Press.

Palmer, M., & Elderfield, H. (1985). Sr isotope composition of sea water over the past 75 Myr. *Nature, 314*(6011), 526–528.

Parker Pearson, M. (1999). *The archaeology of death and burial*. Archaeology Series 3. College Station: Texas A & M University.

Pendergast, D., & Graham, E. (1981). Fighting a looting battle. *Archeology, 34*(4), 12–19.

Piehl, J., Lee, D., & Rich, M. (in press). The noblewomen of Waka: Mortuary and osteological insights into the construction of gender, identity, and power. In M. Rich & O. Navarro Farr (Eds.), *Ritual Behavior and Displays of Power at El Perú-Waka'*. Tucson: The University of Arizona Press.

Piehl, J. C., & Awe, J. J. (2009). Scalping as a component of terminus structure ritual at the site of Baking Pot, Belize Valley. *Research Reports in Belize Archaeology, 7,* 55–64.

Price, T. D., Manzanilla, L., & Middleton, W. (2000). Immigration and the ancient city of Teotihuacan in Mexico: A study using strontium isotope ratios in human bone and teeth. *Journal of Archaeological Science, 27*(10), 903–913.

Price, T. D., Burton, J. H., & Bentley, R. A. (2002). Characterization of biologically available strontium isotopes ratios for the study of prehistoric migration. *Archaeometry, 44*(1), 117–135.

Price, T. D., Burton, J. H., & Stoltman, J. (2007). Place of origin of prehistoric inhabitants of Aztalan, Jefferson Co., Wisconsin. *American Antiquity, 72*(3), 524–538.

Price, T. D., Burton, J. H., Fullagar, P., Wright, L., Buikstra, J., & Tiesler, V. (2008). Strontium isotopes and the study of human mobility in ancient Mesoamerica. *Latin American Antiquity, 19*(2), 167–180.

Price, T. D., Burton, J. H., Sharer, R., Buikstra, J., Wright, L., Traxler, L., & Miller, K. (2010). Kings and commoners at Copán: Isotopic evidence for origins and movement in the classic Maya period. *Journal of Anthropological Archaeology, 29*(1), 15–32.

Ravenstein, E. G. (1885). The laws of migration. *Journal of the Royal Statistical Society, 48*(2), 167–235.

Ravenstein, E. G. (1889). The laws of migration. *Journal of the Royal Statistical Society, 52*(2), 241–305.

Restall, M. (1997). *The Maya world: Yucatec culture and society* (pp. 1550–1850). Stanford: Stanford University Press.

Rice, P. (2009). Summary and concluding remarks: Through a glass, darkly. In P. Rice & D. Rice (Eds.), *The Kowoj* (pp. 387–395). Boulder: University Press of Colorado.

Rudolph, K. Z. (2009). *A taphonomic analysis of human skeletal material from Aztalan: Cannibalism, hostility, and mortuary variability*. Ph.D. dissertation, Milwaukee: University of Wisconsin.

Schwake, S. (2008). *The social implications of ritual behavior in the Maya lowlands: A perspective from Minanha, Belize*. Ph.D. dissertation, University of California, San Diego.

Spence, M. W., White, C. D., Longstaffe, F. J., & Law, K. R. (2004). Victims of the victims: Human trophies worn by sacrificed soldiers from the Feathered Serpent Pyramid, Teotihuacan. *Ancient Mesoamerica, 15*(1), 1–15.

Stanton, T. W., & Brown, M. K. (2003). Studying warfare in ancient Mesoamerica. In M. K. Brown & T. W. Stanton (Eds.), *Ancient Mesoamerican warfare* (pp. 1–16). Walnut Creek: Altamira Press.

Stanton, T. W., Brown, M. K., & Pagliaro, J. B. (2008). Garbage of the gods? Squatters, refuse disposal, and termination rituals among the ancient Maya. *Latin American Antiquity, 19*(3), 227–247.

Sugiyama, S. (2005). *Human sacrifice, militarism, and rulership: Materialization of state ideology at the Feathered Serpent Pyramid, Teotihuacan*. Cambridge: Cambridge University Press.

Suhler, C., & Freidel, D. (2003). The tale end of two cities: Tikal, Yaxuna, and abandonment contexts in the lowland Maya archaeological record. In T. Inomata & R. Webb (Eds.), *Archaeology of settlement abandonment in Middle America* (pp. 135–147). Salt Lake City: University of Utah Press.

Suhler, C., Ardren, T., Freidel, D., & Johnstone, D. (2004). The rise and fall of terminal classic Yaxuna, Yucatan, Mexico. In A. Demarest, P. Rice & D. Rice (Eds.), *The terminal classic in the Maya lowlands: Collapse, transition, and transformation* (pp. 450–484). Boulder: University Press of Colorado.

Taschek, J. T., & Ball, J. W. (2004). Buenavist del Cayo, Cahal Pech, and Xunantunich: Three centers, three histories, *one central place*. In J. F. Garber (Ed.), *The ancient Maya of the Belize Valley* (pp. 191–206). Gainesville: University Press of Florida.

Thornton, E. K. (2011). *Animal resources in ancient Maya economy and exchange: Zooarchaeological and isotopic perspectives*. Ph.D. dissertation, University of Florida, Gainesville.

Tiesler, V. (2007). Funerary or nonfunerary? New references in identifying ancient Maya sacrificial and post sacrificial behaviors from human assemblages. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 14–44). New York: Springer.

Tiesler, V. (2013) *Transformarse en Maya. El modelado cefálico entre los mayas prehispánicos y coloniales*. México: Instituto Nacional de Antropología e Historia.

Tung, T., & Knudson, K. J. (2008). Social identities and geographical origins of Wari trophy heads from Conchopata, Peru. *Current Anthropology, 49*(5), 915–925.

Varien, M. D. (1999). *Sedentism and mobility in a social landscape: Mesa Verde and beyond*. Tucson: University of Arizona Press.

Weiss-Krejci, E. (2004). Mortuary representations of the noble house. A cross-cultural comparison between collective tombs of the ancient Maya and dynastic Europe. *Journal of Social Archaeology, 4/3,* 368–404.

Weiss-Krejci, E. (2006). Identifying ethnic affiliation in the Maya mortuary record. In F. Sachse (Ed.), *Maya ethnicity: The construction of ethnic identity from the Preclassic to modern times* (pp. 47–60). Markt Schwaben: Verlag Anton Saurwein (Acta Mesoamericana, vol. 19).

Welsh, W. B. M. (1988). *An analysis of classic lowland Maya burials*. International Series 409. Oxford: British Archaeological Reports.

White, C. D., Spence, M. W., Longstaffe, F. J., Stuart-Williams, H. Q., & Law, K. R. (2002). Geographic identities of the sacrificial victims from the Feathered Serpent Pyramid, Teotihuacan: Implications for the nature of state power. *Latin American Antiquity, 13*(2), 217–236.

White, C. D., Spence, M. W., Longstaffe, F. J., & Law, K. R. (2004a). Demography and ethnic continuity in the Tlailotlacan enclave of Teotihuacan: The evidence from stable oxygen isotopes. *Journal of Anthropological Archaeology, 23*(4), 385–403.

White, C. D., Storey, R., Spence, M. W., & Longstaffe, F. J. (2004b). Immigration, assimilation, and status in the ancient city of Teotihuacan: Isotopic evidence from Tlajinga 33. *Latin American Antiquity, 15*(2), 176–198.

Willey, G. R., Bullard Jr., W. R., Glass, J. B., & Gifford, J. C. (1965). *Prehistoric Maya settlements in the Belize Valley. Cambridge*. MA: Peabody Museum.

Wright, A. C. S., Romney, D. H., Arbuckle, R. H., & Vial, V. E. (1959). *Land in British Honduras: Report of the British Honduras land use survey team. Colonial Research Publication 24*. London: Her Majesty's Stationary Office, The Colonial Office.

Wright, L. E. (2005a). In search of Yax Nuun Ayiin I: Revisiting the Tikal Project's Burial 10. *Ancient Mesoamerica, 16*(1), 89–100.

Wright, L. E. (2005b). Identifying immigrants to Tikal, Guatemala: Defining local variability in strontium isotope ratios of human tooth enamel. *Journal of Archaeological Science, 32*(4), 555–556.

Wright, L. E. (2012). Immigration to Tikal, Guatemala: Evidence from stable strontium and oxygen isotopes. *Journal of Anthropological Archaeology, 31*(3), 334–352.

Wright, L. E., & Bachand, B. (2009). Strontium isotopic identification of an early classic migrant to Punta de Chimino, Guatemala. In C. Golden, S. Houston & J. Skidmore (Eds.), *Maya archaeology 1* (pp. 28–35). San Francisco: Precolumbia Mesoweb Press.

Yaeger, J. (2010a). The landscapes of the Xunantunich hinterland. In L. J. LeCount & J. Yaeger (Eds.), *Classic Maya provincial politics: Xunantunich and its hinterlands* (pp. 233–249). Tucson: University of Arizona Press.

Yaeger, J. (2010b). Shifting political dynamics as seen from the Xunantunich palace. In L. LeCount & J. Yaeger (Eds.), *Classic Maya provincial politics: Xunantunich and its hinterlands* (pp. 145–160). Tucson: The University of Arizona Press.

Yaeger, J. (2008). Charting the collapse: Late classic to postclassic population dynamics in the Mopan Valley, Belize. *Research Reports in Belizean Archaeology, 5,* 13–21.

Yaeger, J. (2003). Small settlements in the upper Belize River valley: Local complexity, household strategies of affiliation, and the changing organization. In G. Iannone & S. V. Connell (Eds.), *Perspectives on ancient Maya complexity* (pp. 42–58). The Cotsen Institute of Archaeology Monograph 49. Los Angeles: University of California Los Angeles.

Yaeger, J., & Freiwald, C. (2009). Complex ecologies: Human and animal responses to ancient landscape change in central Belize. *Research Reports in Belizean Archaeology, 6,* 191–197.

Chapter 6
Odontometric Investigation of the Origin of Freestanding Shrine Ossuaries at Mayapan

Stanley Serafin, Carlos Peraza Lope, Eunice Uc González and Pedro Delgado Kú

Abstract Mayapan was the largest and most densely populated city in the Maya area during the Late Postclassic period (ca. AD 1200–1450), but was it truly cosmopolitan? This question was investigated through biodistance and population genetic analyses of heritable dental metric traits, the first such study conducted at this site. The analyses concentrated on burials excavated from a diverse array of contexts, such as mass graves, residences, and plaza floors, with a particular focus on freestanding shrine ossuaries. The results of both univariate and multivariate analyses suggest individuals interred in freestanding shrine ossuaries are genetically distinct from contemporary and earlier populations from northwestern Yucatan, suggesting this new burial practice was introduced by foreigners. These findings also have implications for the larger question of whether pan-Mesoamerican elite identity formation in the Postclassic period (AD 900–1543) was accompanied by more intense long-distance mixing of populations, rather than just the exchange of goods and ideas. Given the important role played by exchange in the regeneration of sociopolitical complexity in ancient societies from different parts of the world (Schwartz, 2006), this study also contributes to the broader discussion of how cultures survive and respond to upheaval, as well as to a more nuanced consideration of the role of migration in culture change.

S. Serafin (✉)
School of Human, Health & Social Sciences, Central Queensland University, QLD 4702 Rockhampton, Australia
e-mail: s.serafin@cqu.edu.au

Department of Chiropractic, Macquarie University, Sydney NSW 2109, Australia

School of Humanities & Languages University of New South Wales, Sydney NSW 2052, Australia

C. P. Lope · E. U. González · P. D. Kú
Instituto Nacional de Antropología e Historia, Centro INAH Yucatan, Km. 6 ½ Carretera Merida-Progreso S/N, CP 97310, Merida, Yucatan, Mexico

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_6,

Fig. 6.1 Map of Mesoamerica indicating location of sites mentioned in the text. (Modified from Avalon Basemap, copyright 2004)

6.1 Introduction

Mayapan was the capital of the largest regional Maya confederacy in the Late Postclassic period (Fig. 6.1; ca. AD 1200–1450). This success has been attributed to several factors, including its role as a market town, ties to Caribbean and Gulf coast trade networks, serving as a Quetzalcoatl cult center, *mul tepal* or joint rule, and a diverse population. Archaeological research conducted since the 1940s corroborates the existence of a cosmopolitan elite culture, although no conclusive evidence for the presence of foreigners or foreign enclaves has been found.

Although population movements feature prominently in discussions of social, political, and economic developments during the aftermath of the Classic collapse (e.g., Adams et al. 2004; Aimers 2007; Ball and Taschek 1989; Rice 1986; Suhler et al. 2004), the corroborating evidence has been largely limited to aspects of material culture. Analyses of the remains of Mesoamericans themselves traditionally have played only a minor role in this debate, although recent years have seen the appearance of a number of important bioarchaeological studies of migration and movement using diverse methodological approaches focusing on dental morphology (Aubry 2009; Austin 1978; Beekman and Christensen 2003; Cucina and Tiesler 2004; Pompa y Padilla 1984; Scherer 2004, 2007; Wrobel 2004; Wrobel and Graham forthcoming), mitochondrial DNA (González-Oliver et al. 2001; Ibarra-Rivera et al. 2008; Merriwether et al. 1997), isotopes (Freiwald et al., Chap. 5, this volume), and cultural modifications (Tiesler 2012). Integrating the investigation of mortuary practices and biological relationships can be particularly powerful in this

vein, as demonstrated by the emerging bioarchaeology of identity (Knudson and Stojanowski 2009). These studies harness social meanings encoded in treatments of the human body and examine how these are mediated by biological relationships.

Applying this approach to Mayapan's freestanding shrine ossuaries has considerable potential for the study of the formation of cosmopolitan elite identity at the site. This unusual mortuary practice appeared for the first time in the Late Postclassic period and, in the Maya area, was the most common at Mayapan. This study uses biodistance and population genetic analyses of heritable dental metric traits to test the hypothesis that freestanding shrine ossuaries were produced by foreigners—specifically, individuals that are morphologically distinct from others at the site. We begin with a review of the ethnohistoric and archaeological evidence for cosmopolitanism at Mayapan, and then consider the particular case of freestanding shrine ossuaries in detail. The univariate and multivariate methods employed are subsequently detailed, followed by a presentation of the results. Last, we expound upon the implications of these findings, while also highlighting the limitations of this study.

6.2 Cosmopolitanism at Mayapan

In Postclassic period Mesoamerica, interregional interaction, in the form of religious and/or sociopolitical networks and trade, intensified, resulting in the emergence of a pan-regional elite identity (Kepecs et al. 1994; Ringle et al. 1998; Sabloff and Rathje 1975). This may have been facilitated, in part, by greater reliance on efficient maritime transportation. Mayapan played an important role in this intensification of interregional interaction in the Late Postclassic, as exemplified by the appearance of a cosmopolitan elite material culture and colonial documents that specifically describe long-distance interactions by Mayapan's elites. Roys (1965) proposed that the northern Yucatan Peninsula during the Late Postclassic was divided into territorial provinces, the leaders of which resided at Mayapan and participated in *mul tepal*, or "joint rule." More recent interpretations, however, suggest these leaders ruled over towns in northwest Yucatan, and that they formed a ranked confederacy or served as powerful vassals in the city's court under the most powerful families, the Cocom and Xiu (Masson et al. 2010; Ringle and Bey 2001). A Cocom son is said to have mounted a trade expedition for cacao to the Ulua Valley of Honduras in the K'atun 8 Ahau (A.D. 1441–1461; Roys 1962). Individuals with Nahuatl names resided at Mayapan, including Cinteotl Chan, Tzontecome, Tlaxcallan Pantemitl, Xichihuehuetl, Itzcóatl, and Cacalacatl (Masson and Peraza Lope 2010; Tozzer 1941). An even clearer reference to foreigners, however, pertains to the Canul, mercenaries from Tabasco who were invited into the city by the Cocom in K'atun 1 Ahau (A.D. 1382–1401; Tozzer 1941; Masson and Peraza Lope 2010).

Mayapan's archaeological record shows influences of central and western Mexico, Oaxaca, and the Gulf Coast, as well as ties to various parts of the Maya area, including highland and Peten Guatemala, and the Yucatan Peninsula's west and east

coasts. Aside from architectural parallels between Mayapan's Temple of Kukulkan (Q-162) and Round Temple (Q-152), and Chichen Itza's Castillo and Caracol, respectively, these sites also share burial shaft temples, Venus platforms, colonnaded halls, shrines, and sacbes (Masson et al. 2006; Proskouriakoff 1962a). Some of these features are also seen at sites on the east coast of the Yucatan Peninsula. Similar colonnaded halls can be found at Tulum, Cozumel, El Rey, and El Meco; the latter also has the only example of a serpent balustrade outside Mayapan and Chichen Itza (Delgado Kú 2004; Milbrath and Peraza Lope 2003). Similarities have been documented as well in the Peten Lakes region of Guatemala. The site of ZacPeten, in particular, has dual hall temple assemblages similar to those near cenotes Chen Mul and Itzmal Chen at Mayapan (Pugh 2003).

Some aspects of elite residences are shared with those in central Mexico, such as quadrangular patios, various small rooms, and frontal galleries with adjoining courtyards, but are known from earlier Maya sites as well (Masson and Peraza Lope 2010). Domestic architecture shows additional parallels with central Mexico, including single- or double-wall foundations, cobble patio surfaces, clearing of bedrock surfaces, unroofed platforms, and platform houses (Masson and Peraza Lope 2010). House forms previously unknown at the site but common along the coasts stretching from the Caribbean to the Gulf as far north as Veracruz have recently been identified. These include large, square houses and rectangular multiroom alignments lacking benches and massive platforms (Masson and Peraza Lope 2010, p. 82). Of these, massive platform P-114 is the only example with rare pottery, in this case Palmul Incised, which is associated with Caribbean coast sites (Masson and Peraza Lope 2010). Imported ceramics recovered at the site also include Matillas Fine Orange Gulf Coast pottery, which is present in 60% ($N=152$) of house-lot contexts investigated by the Proyecto Económico de Mayapan (Masson and Peraza Lope 2010). The generally low quantities in which it is found, however, suggest some of it was obtained by commoners at the site's marketplace.

Effigy censers inspired by Mayapan's Chen-Mul-Modeled censers are common throughout much of the Maya area in the Late Postclassic period, including sites in northern Belize, such as Lamanai, on the east coast of Yucatan, in the Peten Lakes region of Guatemala, and on the Campeche coast at Champoton (Milbrath et al 2008, p. 110). Central Mexican deities, such as Tlazolteotl and Xipe Totec, seem to be relatively well-represented in censers from Mayapan compared to other Maya sites, although this only amounts to 3.8% of the collection (Masson and Peraza Lope 2010).

Most obsidian at Mayapan (98%) was obtained from highland Guatemalan sources (Ixtepeque, El Chayal, and San Martin Jilotepeque), although a small amount was also imported from Pico de Orizaba, Veracruz and Pachuca, Hidalgo (Escamilla Ojeda 2004). Projectile points and knives are similar throughout much of Postclassic Mesoamerica, although Mayapan's pointed bifacial knives come closer to central Mexican forms than do the knives of the Caribbean coast (Masson and Peraza Lope 2010, p. 97).

Central Mexican inspiration is suggested by several murals and sculptures. The atlantid columns of colonnaded hall Q-163, which is attached to the Temple of Kukulkan, bore life-size-modeled stucco figures depicting a variety of human fig-

ures and deities, including Xipe Totec and a possible representation of Xochipilli (Milbrath and Peraza Lope 2003, p. 26). A tenoned limestone head of Ehecatl was also found in association with this structure. The other large colonnaded hall attached to the Temple of Kukulkan, Q-161 or the Palace of the Solar Symbols, has murals executed in a style similar to that seen in Phase II murals of the Templo Mayor and other early Aztec art (Milbrath and Peraza Lope 2003, p. 29). Carnegie archaeologists uncovered an earth monster sculpture (H-18a) resembling Tlaltecuhtli in the outlying civic-ceremonial center associated with Cenote Itzmal Chen in the site's northeast corner (Taube 1992). More recently, INAH archaeologists excavated a stone sculpture resembling a central Mexican death god, possibly Cihuateteo or Mictlantecuhtli, in Structure Q-95, or the Temple of the Fisherman (Masson and Peraza Lope 2010; Milbrath and Peraza Lope 2003). In addition, polychrome murals from the Temple of the Fisherman may depict Quetzalcoatl, although the style of execution ties it, as well as the murals of the Temple of the Niches (Q-80), to the Postclassic Mixteca-Puebla style (Milbrath and Peraza Lope 2003).

Extensive excavations at Mayapan have identified myriad treatments of the dead (Ruz Lhuiller 1968; Serafin 2010; Serafin and Peraza Lope 2007), which, assuming mortuary practices served as markers of group identity, match expectations for a culturally diverse population. Contexts in which burials have been found include mass graves, temples, plaza floors, chultuns, cenotes, and residences. Many deposits are of a secondary nature. Primary burials are also present, usually tightly flexed on the right or left side, but ventral flexed, dorsal extended, and ventral extended have been encountered as well. Burning of select elements, especially crania, in otherwise unburned deposits was practiced, although actual cremation burials, common in central Mexico, have only been excavated in three contexts; these are X'Coton group oratory T-72 and elite residences Q-165 and Q-172 (Masson and Peraza Lope 2010). Furthermore, the latter two residential groups also utilized other burial practices.

As demonstrated by the preceding review, foreign styles are common among the elites at Mayapan but have dispersed distributions, pointing away from the existence of foreign enclaves and suggesting instead that elites emulated foreign styles. Whether population movements contributed to this diverse material culture has yet to be investigated, however, using the physical remains of the city's ancient inhabitants. Freestanding shrine ossuaries provide an ideal opportunity to do so and are considered in greater detail in the following section.

6.3 Freestanding Shrine Ossuaries

Ossuaries can be defined as reverential funerary treatment involving the collective, secondary deposit of skeletal material that is mostly, but not necessarily completely, disarticulated (Rost 1997). Although Ubelaker (1974, p. 8) specifies that this represents individuals initially stored elsewhere, we define this category more broadly to also include remains that received secondary treatment in their original place of

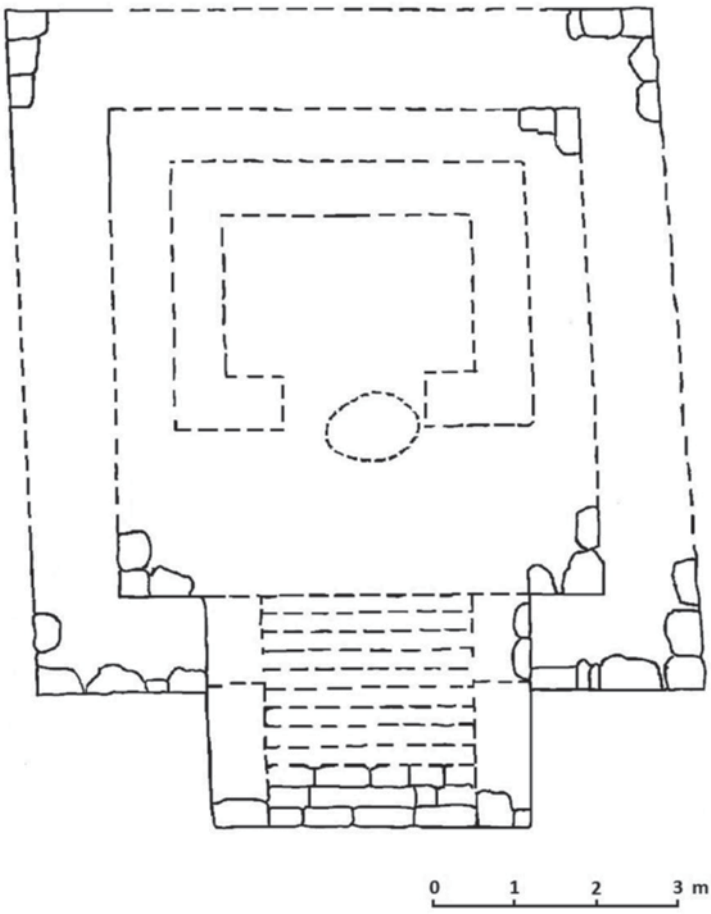

Fig. 6.2 Plan of raised shrine Q-90. (Modified from Adams 1953, Fig. 9.2b)

interment, as would be suggested by prevalence of small bones usually underrepresented in burials that have been transported.

Ossuaries have been encountered in a variety of structures at Mayapan, including residences Q-94 and Y-43b (Peraza Lope et al. 2003), palace R-106 (Peraza Lope et al. 1998), oratory Y-8b (Smith and Ruppert 1956), and raised shrines in the monumental center, although the latter seem to have been expressly built for the purpose of housing this type of deposit (Adams 1953; Delgado Kú 2004). Proskouriakoff (1962a, p. 90) defined shrines as "small cell-like enclosures usually containing an altar or a statue," while raised shrines are those "which stand on independent substructures." Raised shrine substructures are platforms of one or two terraces that are square to subrectangular in outline, vary from 4.5 to 7.5 m on each side and 1.5 to 2.5 m in height, and have a balustraded staircase on one side (Fig. 6.2; Adams 1953; Delgado Kú 2004; Peraza Lope et al. 2005; Proskouriakoff 1962a). The shrines

Fig. 6.3 Eastern view of raised shrine Q-149

themselves occupy the posterior portion of the platform on which they stand, are rectangular, vary from 1 to 2 m in width by 1.5 to 4.75 m in length, and have walls up to a meter high. In general, shrine roofs were probably thatch, although that of Q-149 appears to have been beam-and-mortar (Fig. 6.3; Adams 1953, p. 92; Peraza Lope et al. 2005).

Ossuaries were housed within raised shrine platforms in round or oval, stone-lined cists between 45 and 90 cm wide at the opening, cylindrical or slightly bottle-shaped in cross-section, and from 1.25 to 2 m deep (Fig. 6.4; Adams 1953, p. 92; Delgado Kú 2004). The location of the cist within the platform varies; they have been found near, or in front of, the opening of the shrine room, as well as near the front and rear corners. Two cists were found in Q-89 but other raised shrines contained only one.

In each cist, the skeletal assemblage includes four to nine individuals. Adults of both sexes predominate but subadults are also present. The bones generally bear no trace of anatomical relationship, although the axial skeleton of one out of eight individuals represented in Q-149 was partially articulated. The seven skeletons interred in raised shrine Q-69 were also partially articulated, although this might be explained by the permanent sealing of the cist upon construction of the shrine which would have prevented further manipulation (Adams 1953).

Burial furniture recovered in raised shrine ossuaries is generally sparse or lacking entirely. The exception is Q-71 which had two small effigy censer cups (one of a frog), a fragment of a sculpted greenstone cat, two jade beads, five shell beads, nine fragments of unworked shell, three chert points, three obsidian blade fragments, a rubbing stone, and four bone needles (Adams 1953, p. 105). By contrast, the facades of the raised shrines commonly incorporated stone sculptures. These include three standing human figures, one of which holds a vessel possibly containing maize or copal, in Q-69; a sculpted feline head and foot in Q-71; nine tenoned skulls in Q-89; one unidentified sculpture in Q-90; two figures possibly holding offerings in Q-98; and several anthropomorphic figures, including a tenoned head of Ek Chuah, in Q-149 (Adams 1953; Delgado Kú 2004; Masson and Peraza Lope 2007; Peraza Lope et al. 2005; Proskouriakoff 1962a). Censer sherds are sometimes found within

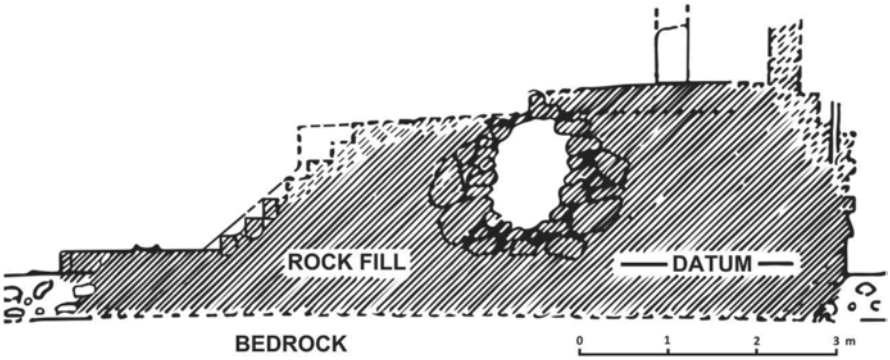

Fig. 6.4 Section of raised shrine Q-71. (Modified from Adams 1953, Fig. 9.3)

these structures and are common in the surface refuse around them, attesting to their ceremonial nature (Adams 1953, p. 93). This, together with their frequent position overlying one or more plaza floors, also suggests they were introduced relatively late in Mayapan's occupation (Adams 1953, p. 97; Proskouriakoff 1962a, p. 130).

Raised shrines often face into colonnaded halls, in which case they form part of a Basic Ceremonial Group (BCG; Proskouriakoff 1962a). It has been suggested that each colonnaded hall was associated with a major family or province under the control of Mayapan's confederacy, as the number of halls approximates the number of provinces in contact-period Yucatan (Proskouriakoff 1962a). Thus, it may also be possible that each raised shrine was associated with a different province. Raised shrines could also form part of a Serpent Temple Group (STG), when facing into a serpent column temple (Proskouriakoff 1962a). Ossuaries have been found within five raised shrines in BCGs (Q-69, Q-71, Q-89, Q-90, Q-98) as well as one raised shrine in an STG (Q-149; Fig. 6.5; Adams 1953; Peraza Lope et al. 2003, 2005). An ossuary was also found within Structure H-13, which appears to have been a raised shrine, in the outlying ceremonial Itzmal Chen group (Chowning 1955; Proskouriakoff 1962a, p. 128). BCGs and STGs may have been associated with different ethnic groups (Ringle and Bey 2001). In particular, Ringle and Bey (2001, p. 286) associate STGs with groups from eastern Yucatan and the Hall of the Chac Masks (Q-151) BCG, which includes raised shrine Q-148, with the Xiu faction, and, by extension, all BCGs with groups from western Yucatan. Q-148 stands out from all other raised shrines in BCGs or STGs, however, in lacking an ossuary (Peraza et al. 2005). Furthermore, as shrines were late additions, the nature of their association with nearby structures is unclear.

An ossuary was also found within annexed shrine Q-88c (Peraza Lope et al. 1999). Although Q-88c abuts two neighboring structures and sits directly on the plaza floor, it is similar to the raised shrines discussed above in being a largely freestanding structure with a small enclosed space located in a public ceremonial context.

Structures similar to raised shrines located in the site's residential zone have been referred to as altar shrines (Smith and Ruppert 1956) or, alternatively, as group

Fig. 6.5 Map of Mayapan's monumental center indicating location of shrines mentioned in the text. *1* Q-71, *2* Q-88c, *3* Q-89, *4* Q-90, *5* Q-98, *6* Q-149. (Modified from Proskouriakoff 1962c, map inset)

shrines (Smith 1962, p. 222). Group shrines tend to have smaller platforms than raised shrines, and their surfaces are largely filled up by the shrine itself. Two group shrines had beam-and-mortar roofs and one had a corbelled roof, but, as with raised shrines, most probably had thatch roofs (Smith 1962, p. 222). Out of the approximately 40 group shrines identified by Carnegie archaeologists, in only one, Structure K-52c, has a burial been reported, in this case a single adult inside a burial vault (Smith 1962). Despite these differences, the distinction between raised shrines, group shrines, and annexed shrines such as Q-88c is largely subjective, echoing the observation by Andrews and Andrews (1975, p. 56) that it is "difficult to draw a distinction between a shrine and a temple on the east coast, and in the literature both terms have often been used for similar kinds of structures." Hanson (2008) addresses this issue by using the general term "shrine" for all such structures; here we use the term "freestanding shrine" to distinguish these structures from the cell-like

enclosures commonly found within residences, oratories, and other structures at Mayapan that also often contained burials.

Interpretation of ossuaries in freestanding shrines is not straight-forward. Even among Carnegie archaeologists there was disagreement. Proskouriakoff (1962a, b) considered raised shrines to be sacrificial based on certain similarities to the burial shafts in Temples Q-58, Q-95, and T-72: The ceremonial nature of the contexts, the round, confined spaces involved, and the paucity of grave goods. Adams (1953), on the other hand, seemed to favor an interpretation of elite funerary behavior. Although Thompson and Thompson (1955) based their argument for ancestor worship on multiple burials in oratories, a similar argument can be made for freestanding shrine ossuaries. Oratory burials and freestanding shrine ossuaries are associated with high proportions of Chen-Mul-Modeled effigy censer sherds and, hence, likely served similar ritual functions. They contained the bones of both sexes and of mainly adult age, thus matching the expected demographic profile for individuals who had attained ancestor status. Furthermore, analysis of skeletal remains from freestanding shrines did not find direct evidence of violence, supporting the interpretation that these deposits represent funerary behavior (Serafin and Peraza Lope 2007). What distinguishes freestanding shrine ossuaries from oratory burials, other than greater evidence for secondary manipulation, is their concentration in the site's monumental center in structures whose main function was funerary. This suggests they resulted from worship of communal or lineage ancestors, who were presumably members of the city's most powerful social groups. Such worship may have involved giving offerings and making petitions, perhaps in agricultural fertility rites (Lorenzen 2003, 2005), although the diversity of associated stone idols suggests more varied rituals took place.

Ossuaries have been found in various regions and time periods in the Maya area, such as cave sites in Moxviquil, Huxjal, Lago Lacandon and San Felipe in Chiapas, Oxkutzkab in the Puuc, and Copan and Talgua in Honduras, the last of which dates the practice back to the Early Preclassic (Blom 1954; Brady et al. 1995; Ruz Lhuillier 1968). Wrobel and colleagues' contribution (Chap. 4) in this volume also discusses recently discovered ossuaries at various caves in central Belize. Ossuaries within structures became common in the Late Postclassic period, particularly at Mayapan and east coast sites, as seen, for example, at Cozumel (Rathje and Phillips 1975) and Tulum (Vargas and Santillán 1990). Shrines are common at contemporaneous sites throughout the Maya area, but again they are the most numerous in northern Yucatan and the east coast (Andrews and Andrews 1975; Delgado Kú 2004, p. 157; Hanson 2008; Pugh 2001). The number and diversity of shrines at east coast sites in particular suggests this is where this type of architecture originated (Hanson 2008). Only one freestanding east coast shrine, however, has been found thus far to contain an ossuary: Structure C-II at Playa del Carmen (Marquéz Morfín et al. 1982). Thus, based on present data for the Maya area, freestanding shrine ossuaries were the most common by far at Mayapan.

Freestanding shrines are common throughout Mesoamerica during the Late Postclassic period but those containing ossuaries are rare, with the exception of central Veracruz where they are typical of Late Postclassic sites associated with the To-

Fig. 6.6 Quiahuiztlan tumba replica in Museo Nacional de Antropología, Mexico

tonac (Izquierdo 1986). Among the numerous sites in central Veracruz where these features have been found are Tacahuite, El Bernalillo, San Isidro, Boca Andrea, Rancho del Niño, Cerro Tres Picos, Arroyo Mariano, Cerro Mariano, Cerro Cercado, Morro, Oceloapan, and Cempoala, although they are the most common at Quiahuiztlan, where 77, referred to as "tumbas con mausoleos," "tumbas miniaturas" or simply "tumbas," have been identified (Izquierdo 1986). As at Mayapan, they are located in Quiahuiztlan's civic-ceremonial center. Their arrangement differs, however, in that they do not face into other structures but instead are clustered into several "cemeteries." The tumbas generally consist of a low platform of one to three terraces with a balustraded staircase on one side and a superstructure with a beam-and-mortar roof (Fig. 6.6). In some cases, the platforms were decorated with stucco sculptures of frogs, felines, or lizards (Izquierdo 1986). Secondary deposits of human remains were placed in rectangular or oval cists located within the platforms. Burial furniture generally consisted of pottery but could also include artifacts of jadeite, obsidian, coral, copper, gold, and other materials (Medellin Zeñil 1951, in Izquierdo 1986). The smaller and more numerous tumbas measure approximately 1.5 m in length, 1 m in width, and 1.5 m in total height, although the most imposing examples, Tumba 1 and Tumba 2, are similar in size to Mayapan's raised shrines but only retain the foundations of a superstructure (Arellanos Melgarejo 1997). The ubiquity of this mortuary practice in central Veracruz suggests that this is where it originated, although radiocarbon dates to confirm this are lacking. It is also possible that future archaeological work will demonstrate it to have been more widely practiced in Mesoamerica than the evidence presently suggests.

The foregoing discussion suggests that freestanding shrine ossuaries can be added to the list of cosmopolitan features in Mayapan's material culture and strengthens the evidence for interaction with the east and Gulf coasts in particular. We do

not yet know, however, if this was due to innovation or emulation by elites local to northwestern Yucatan, or whether it was introduced by foreigners who had immigrated and attained positions of prominence in the city. In the case of the latter, archaeological evidence suggests this mortuary practice could have been brought in from the east or Gulf coasts by Maya or non-Maya. Another possibility is that each freestanding shrine ossuary was associated with a different province or town under the control of Mayapan's confederacy, and that the remains pertain to provincial leaders or their ancestors. It has been suggested that each colonnaded hall represented a different province under the control of Mayapan's confederacy, as the number of halls approximates the number of provinces (Proskouriakoff 1962a), and shrines often face into halls. The fact that shrines seem to postdate the halls they face (Adams 1953 p. 92), however, casts doubt on this possibility. Fortunately, the human remains that form intimate components of these contexts also provide the opportunity to obtain more direct evidence on the origins of this particular aspect of Mayapan's cosmopolitan elite culture. In the case of introduction by foreign, non-Maya immigrants, we would expect individuals interred in freestanding shrine ossuaries to exhibit numerous significant differences in mean tooth size and large biodistances with contemporary as well as earlier populations from the region. In addition, this group should exhibit the greatest extralocal gene flow. On the other hand, if freestanding shrine ossuaries were introduced by nonlocal Maya, we may not necessarily find significant differences; earlier work suggests extensive gene flow among the ancient Maya, which would have served as a homogenizing force that diminished or prevented regional genetic differences from developing (Scherer 2007). The specific materials and methods used to test these hypotheses are discussed below.

6.3.1 Materials

In order to investigate the research question posed above, the Mayapan burial sample was divided into the following subgroups: Shrine Ossuary, Elite Other, Commoner, and Nonfunerary. In addition, a Classic period sample from the northwestern part of the Yucatan Peninsula was included. The contexts making up these subgroups are described below. The sample sizes noted in this section refer to the total MNI for each subgroup. As most individuals were missing at least some teeth, the number of teeth available for each measurement was considerably smaller than this figure. As a result, subgroup sample sizes are provided separately for each statistical analysis.

The Shrine Ossuary subgroup is made up of seven deposits representing the remains of at least 27 individuals. Most are adults, although adolescents are present in three (Q-71, Q-88c, Q-149) and a child with an age-at-death of approximately 6 years is present in one (Q-88c). Six deposits were found in round cists in raised shrines (Q-71, Q-89, Q-90, Q-98, and Q-149), which are located in plaza interiors (Delgado Kú 2004; Peraza Lope et al. 2005). Burial 33 in Shrine Q-98 consists partly of cremated remains. One cranium from the burial cist in Shrine Q-71 excavated by Carnegie archaeologists was available for study. Adams (1953, p. 96) implies

this cist was reentered multiple times but is not specific on the extent to which the remains were articulated. From the burial cist in Shrine Q-90 INAH archaeologists recovered the skeletal remains of Burial 38 (Peraza Lope et al. 2003), representing at least four individuals, one of which is an adolescent. This feature was also excavated earlier by Adams (1953), who reports recovering the remains of three adults and two adolescents. In some cases, Carnegie archaeologists may have reinterred burials where they had been excavated. This may be the case with INAH's Burial 38. Burial 26 was recovered in annexed Shrine Q-88c (Delgado Kú 2004). It consists almost solely of crania ($N=9$) and maxillary teeth, although the presence of four mandibular teeth and a fragmentary humerus, tibia and pelvis suggests that additional parts of the skeleton may have originally been present (Serafin and Peraza Lope 2007). Taphonomic analysis detected cut marks in a subadult temporal bone (ibid.). However, INAH archaeologists interpreted a Mama Red cajete tripod and a grindstone as burial furniture (Peraza Lope et al. 1998). A funerary interpretation of this deposit may be further aided by Friar Diego de Landa's account of the funerary treatment reserved for deceased Cocom lords in which they were decapitated and the back of the head was removed. Although the subadult temporal bone clearly did not belong to a lord, the fine slicing marks on the posterior mastoid process suggest careful removal of the head from a corpse rather than violent decapitation of a living victim (Serafin and Peraza Lope 2007; Tozzer 1941).

The Elite Other subgroup consists of all elite burials other than freestanding shrine ossuaries. This subgroup is made up of 18 deposits representing the remains of at least 44 individuals. Ten of these deposits, representing the remains of at least 30 individuals, were encountered in round or rectangular stone-lined cists in residences outside of the monumental center. Six are multiple, and five of these exhibit postmortem disturbance due to burial reentry and/or protracted funerary rituals. The other multiple burial, from Palace R-106, is an ossuary (Peraza Lope et al. 1998). These burials exhibit the richest and most plentiful grave goods. Also included in this subgroup were eight deposits of human remains representing 14 individuals associated with colonnaded halls in the monumental center; these were generally located off-mound under plaza floors nearby. Six of these are single primary or possibly bundle interments, whereas the two multiple interments exhibit signs of postmortem disturbance from burial reentry.

The Commoner subgroup consists of 27 deposits representing the remains of 39 individuals, all of which were excavated in or near residential structures. Fourteen deposits were excavated in the monumental center near small Structures Q-92, Q-93, Q-94, Q-67, and Q-68, and are single burials. Nearly all are primary, although a small number seem to have been disturbed when additional burials were added. Q-94 also contained an ossuary (Burial 36). The 12 deposits associated with residential structures in outlying areas (K-67a, L-28, R-112, R-199, Y-44, and Milpas 1a, 7, and 11) represent the remains of 19 individuals (Brown 1999; Masson and Serafin 2008; Peraza et al. 1998). Most burials encountered near small residential structures, whether in the monumental center or in outlying areas, were single, primary, and lateral flexed. Two additional lateral flexed burials associated with outlying Structures Y-54 and Y-56 were excavated by Brown (1999) but were not

available for study. Burial 12 from Structure Y-44 consists of partly articulated skeletons that appear to have been primary originally but were later disturbed when additional individuals were interred (Peraza Lope et al. 1998). One of these additional individuals is represented by an adult female skull burned completely black. An additional case of a reentered multiple interment with a burned adult skull was encountered in outlying Structure S-133b (Smith and Ruppert 1956), although the latter was not available for study. As can be seen above, both low and high status burials are within the monumental center as well as outside it. This concurs with Chase's (1992) demonstration of a lack of fit between the concentric model of site organization implied by Landa (Tozzer 1941) and the spatial distribution of large residences and masonry burial vaults identified by archaeologists of the Carnegie Institution of Washington.

The Extrafunerary subgroup consists of 13 deposits representing the remains of at least 69 individuals suspected by the excavators to be victims of violence. This diverse group is composed of deposits from public, ritual contexts associated with Structures Q-79a and Q-162, or the Temple of Kukulkan, as well as the site's second largest concentration of civic and ceremonial architecture near Cenote Itzmal Chen in the site's northeastern corner. The Extrafunerary group includes fully articulated skeletons as well as isolated skulls. What these anomalous burials have in common is that all evidence of perimortem violence and nearly all evidence of postmortem tool marks documented at the site were found in these remains (Serafin 2010; Serafin and Peraza Lope 2007).

A Classic period sample from the northwestern part of the Yucatan Peninsula representing the remains of 18 individuals was also included. Half of the remains in this sample were excavated in an elite residential sector of Oxkintok, while the remainder comes from commoner residential contexts at several small sites in the vicinity of present-day Mérida.

Before describing the methods employed, it is necessary to describe the limitations of this study. No samples from outside northwestern Yucatan are included. As a result, individuals from other parts of the Maya area and non-Maya cannot be distinguished. In addition, no single shrine has produced a burial large enough to be treated separately in statistical analysis, although each may have represented a distinct social group. Despite these shortcomings, determining whether individuals interred in freestanding shrine ossuaries were relative newcomers to northwestern Yucatan represents a significant advancement in our understanding of these enigmatic deposits.

6.4 Methods

Metric dental traits have a high heritable component and can be used to investigate biological relationships at the global, regional, local (intrasite), and familial levels (Adachi et al. 2003; Dempsey and Townsend 2001). Recently, odontometric studies of identity, ethnicity, and ethnogenesis have also appeared (Klaus and Tam 2009;

Nystrom 2009; Stojanowski 2001, 2004, 2005, 2009, 2010). Teeth are particularly useful in the Maya area because they are often preserved, despite the generally poor skeletal preservation. Crania are often in fragmentary condition and/or artificially modified (Tiesler 1998), as is the case at Mayapan. Few ancient DNA analyses have met with success given the generally poor state of preservation (González-Oliver et al. 2001; Merriwether et al. 1997). Odontometric analysis has its own limitations, such as inter- and intraobserver error, preservation, dental pathologies (i.e., caries, attrition, and antemortem tooth loss), and cultural modifications. At present, however, teeth are the best source of data on biological relationships among ancient Maya populations. Isotope analyses complement these studies by identifying migration at the level of the individual. Migration can play an important role in shaping an individual's identity but it is also tied to larger social processes (White et al 2009), some of which are amenable to odontometric investigation. Furthermore, isotope analyses cannot identify descendants of immigrants, whereas odontometric analyses can. Despite this potential, dental metric analyses of biological relationships among the Maya were nonexistent until very recently (Cucina and Tiesler 2004; Jacobi 2000; Rhoads 2002; Scherer 2004, 2007; Scherer and Wright 2010; Wrobel 2004; Wrobel and Graham, forthcoming).

This chapter presents results of the first analysis of metric traits from the human dental remains of Mayapan. T-tests, Mahalanobis's generalized distance (D^2), and Relethford and Blangero's (1990) approach to R matrix analysis were utilized to test the hypothesis that the mortuary practice of shrine ossuaries was introduced by individuals who had immigrated into the region. Expectations were to find significant differences in the means, as well as significant Mahalanobis distances, between the Shrine Ossuary and other subgroups. In addition, R-matrix analysis was expected to reveal higher extralocal gene flow for the Shrine Ossuary subgroup.

Tooth diameters were measured with Paleo-Tech™ Hillson-FitzGerald dental calipers for all permanent and deciduous teeth, although only permanent teeth are discussed here. Mesiodistal crown diameters were measured with the caliper's sharpened tips to fit between teeth still in the jaw (Hillson et al. 2005). For buccolingual crown diameters the caliper's beam was held parallel to the occlusal surface of the tooth while the broad flat caliper arms were applied to the crown's buccal and lingual sides (Hillson 1996). Mesiodistal and buccolingual diameters were measured on all 32 permanent teeth, resulting in a total of 64 measurements. Small sample sizes did not permit the analysis of tooth areas, which is calculated for each tooth by multiplying the mesiodistal and buccolingual diameter.

It was first necessary to test for errors and other confounding factors before analysis of the metric data could be performed. A subset of measurements was taken on two separate occasions to facilitate testing for intraobserver error. T-tests were performed to identify measurements that differed significantly between the two sessions. The average intraobserver error for all measurements combined was 0.00613 mm (SD = 0.34004), which is comparable to that found by other workers (e.g., Scherer 2004; Stojanowski 2001). The mesiodistal diameter of the maxillary first molar exhibited statistically significant intraobserver error and was excluded from further analysis.

Table 6.1 Tooth diameters excluded from analysis and reason for doing so

Diameter	Intraobserver error	Sex	Nonnormal	Age
I^2 b-l			x	
P^2 m-d				x
M^1 m-d	x			
I_2 m-d		x		
I_2 b-l		x		
C_1 b-l		x		
P_2 m-d		x		
P_2 b-l			x	
M_1 m-d			x	

To maximize sample size, measurements for the left and right sides were used. When available, the left side was used, and in cases in which only the right tooth was available, its measurement was used instead. This method assumes that side asymmetry is random. In addition, sexes were pooled for all samples. Four measurements exhibiting statistically significant sex differences were identified using the t-test and excluded from further analysis: mesiodistal and buccolingual diameters of the mandibular lateral incisor, buccolingual diameter of the mandibular canine, and mesiodistal diameter of the mandibular second premolar. The statistics employed here require data exhibiting normal distributions. To identify measurements whose data were not normally distributed, the Kolmogorov-Smirnoff Test was used with Lillifors Significance Correction. Three measurements exhibited nonnormal distributions and were eliminated: buccolingual diameter of the maxillary second incisor, buccolingual diameter of the mandibular second premolar, and mesiodistal diameter of the mandibular first molar.

Measurements that were significantly correlated with age were also eliminated. During data collection, every effort was made not to take measurements that might have been affected by tooth wear, which would be negatively correlated with age. In addition, studies have shown that, in some populations, individuals who died as subadults have smaller teeth (Guagliardo 1982; Simpson et al. 1990). If nutritional status had significantly affected tooth dimensions in the sample under study here, a positive correlation with age would be expected. Pearson's correlation coefficient was used to test for significant correlations between age, scored as subadult or adult, and each of the remaining 56 tooth diameters. The one measurement found to be significantly correlated with age, mesiodistal diameter of the upper second premolar, is negatively correlated indicating that it may be affected by wear. Table 6.1 lists the nine tooth diameters that were excluded from further analysis and the reason for doing so.

The multivariate analyses used in this study require complete datasets. However, in fragmentary and secondary remains, such as those in this study, almost every individual had missing data. As a result, these missing values had to be estimated using the multiple imputation technique following the methodology of Scherer (2007). First, individuals missing most measurements were eliminated from use in the multivariate analyses. Second, the measurements with the smallest sample

sizes were eliminated. This resulted in a dataset in which no individuals were missing more than one third of their data. Third, using this revised dataset, the program NORM was used to create formulae that would estimate missing measurements for each individual based on the measurements that were present (Schafer 1999).

In addition, to minimize size differences due to sexual dimorphism and allometric effects, Q-mode correction of the data was carried out as suggested by Corruccini (1973). This maximizes shape differences and produces more biologically meaningful results. For each skeleton, an individual size reference variable was obtained by calculating the geometric mean of all the dental measurements for that individual. Each measurement was then divided by this reference variable.

6.5 Results

Once the data had been prepared as described above, univariate (t-tests) and multivariate (D^2 and R matrix analysis) statistical analyses could begin. The presence of significant differences between subgroup means were tested for using t-tests. T-tests were conducted for all 55 remaining measurements and for all pairings of subgroups using the entire dataset, allowing for the largest possible sample sizes. As expected, comparisons involving the Shrine Ossuary subgroup exhibited the greatest number of significant differences in measurement means (Table 6.2). By contrast, none of the other comparisons produced more than two significant differences in subgroup means. The sample that revealed the greatest number of significant differences with the Shrine Ossuary subgroup was the Classic subgroup, which differed significantly for seven measurement means.

For multivariate statistics, a complete Q-mode transformed dataset (i.e., with no missing values and size differences minimized) was used consisting of six maxillary tooth diameters measured in 50 individuals. The means and standard deviations of these measurements are provided in Table 6.3. Dividing these 50 individuals among the Shrine Ossuary, Elite Other, Commoner, Extrafunerary, and Classic subgroups produces sample sizes of 9, 14, 9, 8 and 10, respectively. It must be noted that these samples, due to their small size, may not be representative of the archaeologically defined subgroups from which they come. As a result, additional analyses will be needed to corroborate these findings once larger samples become available.

Mahalanobis distances were calculated on this complete, Q-mode transformed dataset between the Shrine Ossuary, Elite Other, Commoner, Extrafunerary, and Classic subgroups. Following the methodology of Defrise-Gussenhoven (1967), distances greater than $\sqrt{(2t-1)}$ are significant, where t = number of variables. Six measurements were used in the final analysis, such that D^2 values $\geq \sqrt{(11)}$, or 3.3, are significant. As demonstrated in Table 6.4, the three largest biological distances involved the Shrine Ossuary subgroup, conforming to our expectations. The only comparison reaching statistical significance, however, is that between the Shrine Ossuary and Commoner subgroups.

Table 6.2 Results of t-tests for tooth diameters that showed a significant difference with the Shrine Ossuary subgroup

Diameter	Comparison (*N*)	*t*	*df*	*p*
I^1 m-d	SO (11) × CO (20)	−2.265	29	0.031
C^1 m-d	SO (12) × CL (14)	−2.131	24	0.044
C^1 b-l	SO (12) × CO (17)	−2.838	27	0.009
C^1 b-l	SO (12) × CL (15)	−2.369	25	0.026
P^1 m-d	SO (14) × EO (16)	−2.885	28	0.007
P^1 m-d	SO (14) × CL (13)	−2.158	25	0.041
P^1 b-l	SO (13) × EO (16)	−3.482	27	0.002
P^1 b-l	SO (13) × CO (20)	−3.698	31	0.001
P^1 b-l	SO (13) × EF (14)	−2.317	25	0.029
P^1 b-l	SO (13) × CL (13)	−3.904	24	0.001
P^2 b-l	SO (8) × CO (15)	−2.196	21	0.039
M^1 b-l	SO (16) × CL (18)	−2.272	32	0.030
M^2 b-l	SO (10) × EO (14)	−2.094	22	0.048
M^2 b-l	SO (10) × CO (12)	−3.537	20	0.002
M^2 b-l	SO (10) × CL (18)	−2.330	26	0.028
C_1 m-d	SO (6) × CL (10)	−3.123	14	0.007

SO Shrine Ossuary, *EO* Elite Other, *CO* Commoner, *EF* Extrafunerary, *CL* Classic

Relethford and Blangero's (1990) approach to R matrix analysis permits the calculation of extralocal gene flow and Wright's F_{ST}, a population genetic statistic for measuring population differentiation, from phenotypic quantitative traits. It is generally applied at the regional level, although it can be instructive for intrapopulational analyses as well. R matrix analysis was performed using the RMET 5.0 computer program, kindly made available by John Relethford (Relethford et al. 1997). To carry out the analysis, a heritability estimate must be provided. Heritability refers to the relative amount of population variation in a particular trait that is due to genetic factors, with 1.0 being the highest possible value and 0.0 the lowest. A heritability estimate of 0.55 was used to enable comparison with the results of Scherer (2007) for Classic period Maya. Effective population sizes for the Shrine Ossuary, Elite Other, Extrafunerary, Commoner, and Classic Period subgroups were posited to be in the ratio of 1:1:1:10:20, respectively. This is in accord with the hypothesized origins of each. The same dataset used for the Mahanlonobis distance computations was used for R matrix analysis.

Calculation of F_{ST} using all five subgroups produced a relatively high value of 0.066. Repeating R matrix analysis after excluding Classic burials produced a higher F_{ST} value of 0.086, indicating that most of the variability at Mayapan is present in this earlier sample.

The residual values from the Relethford-Blangero analysis, which serve to assess extralocal gene flow, are presented in Table 6.5. The Shrine Ossuary subgroup exhibits the largest residual value, whereas the Commoner subgroup exhibits the smallest. This suggests extralocal gene flow is greatest for the Shrine Ossuary subgroup and lowest for the Commoner subgroup. This gene flow could have been from another region, another site within northwestern Yucatan, or from an as yet

Table 6.3 Mean and standard deviation for measurements used in multivariate analyses

Measurement	*N*	Mean	SD
P^1 mesiodistal diameter	50	7.43	0.53
P^1 buccolingual diameter	50	9.30	0.61
P^2 buccolingual diameter	50	9.20	0.44
M^1 buccolingual diameter	50	11.62	0.51
M^2 mesiodistal diameter	50	9.78	0.70
M^2 buccolingual diameter	50	11.52	0.69

Table 6.4 Mahalanobis distances between Shrine Ossuary, Elite Other, Commoner, Extrafunerary, and Classic subgroups

	Shrine Ossuary	Elite Other	Commoner	Extrafunerary
Elite Other	1.8325			
Commoner	4.2047[a]	1.6715		
Extrafunerary	2.9227	0.9178	1.2301	
Classic	2.4245	0.6750	1.6999	2.1899

[a] significant at $p < 0.05$

Table 6.5 Relethford-Blangero analysis results

Subpopulation	r_{ii}	Observed variance	Expected variance	Residual
Shrine Ossuary	0.487806	1.017	0.568	0.449
Elite Other	0.023119	0.923	1.083	−0.160
Commoner	0.035745	0.718	1.069	−0.351
Extrafunerary	0.160095	0.944	0.931	0.013
Classic	0.000000	1.269	1.108	0.160

r_{ii} distance between population i and the regional centroid

unsampled sector of Mayapan. Relethford-Blangero analysis was repeated on measurements that have not been Q-mode transformed to determine whether this procedure was masking genetic variability. This resulted in an even greater residual for the Shrine Ossuary subgroup (0.847). Although these results are intriguing, it is also possible they are unrepresentative of the subgroups from which these samples come, owing to the small sample sizes and differing excavation strategies employed.

6.6 Discussion

Assessing site-wide F_{ST} provides a valuable point of departure for interpreting our findings. An F_{ST} value for the Mayapan sample as a whole of 0.066 was calculated. This is substantially greater than values found for Classic period Maya samples from the Belize (0.019), Pasión (0.018), and Central (0.003) zones, as well as for the Classic Maya as a whole (0.018; Scherer 2007, Table 6.6). Although these find-

ings may not be directly comparable owing to differing levels of analysis, time spans, and measurements, they suggest less among-group gene flow and greater among-group genetic differentiation. These results point toward a relatively heterogeneous population at this site. The fact that excluding the Classic subgroup produced a higher F_{ST} value of 0.086, however, indicates that most of the variability at Mayapan is present in this earlier sample. This argues against wholesale population replacement between the Classic collapse and Mayapan's apogee in the Late Postclassic period.

Univariate analyses allowed the entire dataset to be used, resulting in larger, more representative samples. Comparisons involving the Shrine Ossuary subgroup exhibited the greatest number of significant differences in measurement means. In particular, the comparison between the Shrine Ossuary and Classic subgroups identified seven measurement means that differ significantly. These results suggest the Shrine Ossuary subgroup does in fact represent the remains of immigrants, or their descendants, who arrived in the region at some point after the Classic period collapse.

Mahalanobis distance analysis revealed a statistically significant distance between the Shrine Ossuary and Commoner subgroups. Applying Relethford and Blangero's (1990) approach to R matrix analysis sheds light on the meaning of this difference. The Shrine Ossuary subgroup exhibits the largest residual value, whereas the Commoner subgroup exhibits the smallest residual value. This indicates that extralocal gene flow is greatest for the former and lowest for the latter. These results suggest the new burial practice of freestanding shrine ossuaries was brought in by foreign elites, which is also supported by univariate analyses utilizing larger sample sizes. Thus, elite participation in the Postclassic Mesoamerican world system appears to have involved the actual exchange of people, not just ideas. This may have served to reinforce the power of the city's elites. Although nonelites likely also participated in the intensified interaction sphere in Postclassic Mesoamerica, as indicated for farmers at Laguna de On in northern Belize (Masson 1997), our results suggest that at Mayapan this was largely through emulation.

Interestingly, the comparison between the Elite Other and Classic subgroups produced the smallest Mahalanobis distance. A recent dental nonmetric analysis by Cucina et al. (2010) produced a parallel finding in which a subsample from Mayapan consisting mainly of burials from the Elite Other subgroup clustered with Jaina rather than with other Postclassic sites. These results suggest that elites practicing more traditional funerary rituals had a longer history in the region.

Although this study was focused on a single site, these findings have implications for reconstructions of the Classic-to-Postclassic transition. The greater scale of long-distance exchange in the Postclassic may have been accompanied by greater gene flow with more distant regions. Dental morphological analysis by Austin (1978) found evidence for biological discontinuity at Seibal during the Terminal Classic period. Wrobel's (2004) analysis of dental metric and nonmetric data from northern Belize also found evidence of biological discontinuity, although in this case it occurred in the Early-to-Late Postclassic transition. Using a cranial geometric-morphometric approach to analyze samples from central Mexico,

González-José et al. (2007) found greater than expected genetic variation in the Early Postclassic (AD 900–1200) sample from Azcapotzalco, suggesting population replacement occurred during the Classic-to-Postclassic transition. Beekman and Christensen's (2003) cranial nonmetric study also found evidence for Early Postclassic biological discontinuity in central Mexico, and identify regions to its north and west as sources of gene flow. These findings suggest the Epiclassic initiated a period of "cosmopolitan capitals" and increased extraregional interaction (Kepecs et al 1994, p. 142–143).

Although our findings at Mayapan may be reflecting just such a transformation, it is also possible that they are the result of regional differences. Northwest Yucatan may have had greater gene flow with regions outside the Maya area prior to the onset of the Postclassic. Hutson et al. (2010) suggest the region's large populations and low agricultural potential necessitated extensive long-distance trade, which may have been accompanied by gene flow. In fact, a recent study found greater genetic diversity among present-day Maya of northern Yucatan than among the Quiche or K'aqchikel of Highland Guatemala (Ibarra-Rivera et al. 2008). Odontometric analysis revealing Classic period Xcambo to be a consistent outlier compared to contemporaneous Peten sites may indicate considerable time depth to these regional differences.

In the case of Mayapan, more specific mechanisms for gene flow outside the region may be hypothesized. The greater genetic diversity found in freestanding shrine ossuaries may stem from *mul tepal* political organization, with each deposit representing a different town or province under Mayapan's control. Alternatively, this diversity could derive from immigrants from further afield. The magnitude of the differences encountered more strongly supports the latter scenario, although whether these represent individuals from Yucatan's east coast, the Gulf coast, or elsewhere in Mesoamerica cannot as yet be determined. Ongoing biodistance studies and analyses of strontium and oxygen isotope data will aim to distinguish non-Maya and individuals from other parts of the Maya area.

6.7 Conclusion

Odontometric analysis was performed to investigate population structure at the Late Postclassic regional Maya capital of Mayapan. Although the sample sizes utilized in the multivariate statistics were small, the results are broadly comparable to those produced using univariate statistics with larger sample sizes. These analyses revealed several significant intrasite differences as well as a relatively high value of F_{ST} for the pooled sample, suggesting that social divisions within Mayapan's society did in fact correspond to some degree with biological differences. Relethford-Blangero analysis found that individuals interred in freestanding shrine ossuaries exhibited the most extralocal gene flow, indicating that these elites were cosmopolitan not only in their material culture but in their geographic origins as well. Although the bitter Cocom-Xiu feuds and Kowoj claims of origins at Mayapan attest to the importance of ethnicity and polity (Jones 2009, p. 60; Masson and Peraza

Lope 2010), respectively, participation in the Postclassic Mesoamerican world system also shaped social identity. As demonstrated by our study, this appears to have involved the actual exchange of people, not just ideas. Our findings suggest that the greater scale of long-distance exchange in the Postclassic period was accompanied by greater gene flow with distant corners of the Maya area or possibly even regions outside it. Although much work remains to be done, these findings contribute to a more nuanced view of the complex population movements that occurred in the Postclassic period.

Acknowledgments This study was made possible by funding from the Foundation for the Advancement of Mesoamerican Studies, Inc. grant #05033 and the Middle American Research Institute of Tulane University. Generous permission to study these collections was provided by Marilyn Masson, Clifford Brown, and José Manuel Arias. The RMET 5.0 computer program was kindly made available by John Relethford. Helpful comments on various aspects of this research were provided by Bárbara Escamilla Ojeda, Wilbert Cruz Alvarado, John Verano, E. Wyllys Andrews V, Trenton Holliday, and Clifford Brown.

References

Adachi, N., Dodo, Y., Doi, N., Yoneda, M., & Matsumura, H. (2003). Morphologic and genetic evidence for the kinship of juvenile skeletal specimens from a 2000 year-old double burial of the Usu-Moshiri site, Hokkaido, Japan. *Anthropological Science, 111*(3), 347–363.

Adams, R. E. W., Robichaux, H. R., Valdez, F. Jr., Houk, B. A., & Mathews, R. (2004). Transformations, periodicity, and urban development in the Three Rivers region. In A. A. Demarest, P. M. Rice, & D. S. Rice (Eds.), *The Terminal Classic in the Maya Lowlands: Collapse, transition, and transformation* (pp. 324–341). Boulder: University Press of Colorado.

Adams, R. M. Jr. (1953). *Some small ceremonial structures of Mayapán*. Department of Archaeology, Current Reports, No. 9. Washington, D.C.: Carnegie Institution of Washington.

Aimers, J. J. (2007). What Maya collapse? Terminal Classic variation in the Maya Lowlands. *Journal of Archaeological Research, 15*(4), 329–377.

Andrews, E. W. I. V., & Andrews, A. P. (1975). *A preliminary study of the ruins of Xcaret, Quintana Roo, Mexico, with notes on other archaeological remains on the central east coast of the Yucatan peninsula*. Middle American Research Institute Publication 40. New Orleans: Tulane University.

Arellanos Melgarejo, R. (1997). *La arquitectura monumental Postclásica de Quiahuiztlan: Estudio monográfico.* Xalapa: Universidad Veracruzana.

Aubry, B. S. (2009). *Population structure and interregional interaction in prehispanic Mesoamerica: A biodistance study*. Ph.D. dissertation, Ohio State University, Columbus.

Austin, D. M. (1978). The biological affinities of the ancient populations of altar de sacrificios and seibal. *Estudios de Cultura Maya, 11,* 57–73.

Ball, J. W., & Taschek, J. T. (1989). Teotihuacan's fall and the rise of the Itza: Realignments and role changes in the Terminal Classic Maya Lowlands. In R. A. Diehl & J. C. Berlo (Eds.), *Mesoamerica after the decline of Teotihuacan AD 700-900* (pp. 187–200). Washington, D.C.: Dumbarton Oaks.

Beekman, C. S., & Christensen, A. F. (2003). Controlling for doubt and uncertainty through multiple lines of evidence: A new look at the Mesoamerican Nahua migrations. *Journal of Archaeological Method and Theory, 10*(2), 111–164.

Blom, F. (1954). Ossuaries, cremation, and secondary burials among the Maya of Chiapas, Mexico. *Journal de la Société des Américanistes, 43*(43), 123–135.

Brady, J. E., Hasemann, G., & Fogarty, J. (1995). Harvest of skulls and bones. *Archaeology, 48*(3), 36–40.

Brown, C. T. (1999). *Mayapán society and ancient Maya social organization.* Ph.D. Dissertation, Tulane University, New Orleans.

Chase, D. Z. (1992). Postclassic Maya elites: Ethnohistory and archaeology. In D. Z. Chase & A. F. Chase (Eds.), *Mesoamerican elites: An archaeological assessment* (pp. 118–134). Norman: University of Oklahoma Press.

Chase-Dunn, C. K., & Hall, T. D. (1997). *Rise and demise: Comparing world-systems*. Boulder: Westview Press.

Chowning, A. (1955). Excavations in the Itzmal Ch'en ceremonial group at Mayapan. *Carnegie Institution of Washington Year Book, 54,* 280–283.

Corruccini, R. S. (1973). Size and shape in similarity coefficients based on metric characters. *American Journal of Physical Anthropology, 38*(3), 743–754.

Cucina, A., & Tiesler, V. (2004). Dental morphometry and biological affinity in pre-contact and contact Maya populations from the peninsula of Yucatan. *Mexicon, 26,* 14–19.

Cucina, A., Ortega, A., Serafin, S., & Blos, V. T. (2010). Las poblaciones del Posclásico en la península de Yucatán: Afinidades biológicas y patrones poblacionales. *Los Investigadores de la Cultura Maya, 18,* 219–230.

Defrise-Gussenhoven, E. (1967). Generalized distance in genetic studies. *Acta Genetica et Statisica Medica, 17*(3), 275–288.

Delgado Kú, P. (2004). *Estudio de la Arquitectura Publica del Núcleo Principal de Mayapan, Yucatán*. M.A. thesis, Universidad Autónoma de Yucatán, Mérida.

Dempsey, P. J., & Townsend, G. C. (2001). Genetic and environmental contributions to variation in human tooth size. *Heredity, 86*(6), 685–693.

Escamilla Ojeda, B. (2004). *Los artefactos de obsidiana de Mayapán, Yutcatán*. M.A.thesis, Universidad Autónoma de Yucatán, Mérida.

González-José, R., Martinez-Abadías, N., González-Martín, A., Bautista-Martínez, J., Gómez-Valdés, J., Quinto, M., & Hernández, M. (2007). Detection of a population replacement at the Classic-Postclassic transition in Mexico. *Proceedings of the Royal Society B: Biological Sciences, 274*(1610), 681–688.

González-Oliver, A., Márquez-Morfín, L., Jiménez, J. C., & Torre-Blanco, A. (2001). Founding Amerindian mitochondrial DNA lineages in ancient Maya from Xcaret, Quintana Roo. *American Journal of Physical Anthropology, 116*(3), 230–235.

Guagliardo, M. F. (1982). Tooth crown size differences between age groups: A possible new indicator of stress in skeletal samples. *American Journal of Physical Anthropology, 58*(4), 383–389.

Hanson, C. A. (2008). *The late Mesoamerican village*. Ph.D. dissertation, Tulane University, New Orleans.

Hillson, S. (1996). *Dental anthropology*. Cambridge: Cambridge University Press.

Hillson, S., FitzGerald, C., & Flinn, H. (2005). Alternative dental measurements: Proposals and relationships with other measurements. *American Journal of Physical Anthropology, 126*(4), 413–426.

Hutson, S. R., Dahlin, B. H., & Mazeau, D. (2010). Commerce and cooperation among the Classic Maya: The Chunchucmil case. In R. Marshall (Ed.), *Cooperation in social and economic life* (pp. 81–103). Lanham: Altamira Press.

Ibarra-Rivera, L., Mirabal, S., Regueiro, M. M., & Herrera, R. J. (2008). Delineating genetic relationships among the Maya. *American Journal of Physical Anthropology, 135*(3), 329–347.

Izquierdo, A. L. (1986). La arquitectura funeraria de Quiahuiztlan. *Cuadernos de Arquitectura Mesoamericana, 8,* 3–23.

Jacobi, K. P. (2000). *Last rites for the Tipu Maya: Genetic structuring in a Colonial cemetery*. Tuscaloosa: University of Alabama Press.

Jones, G. D. (2009). The Kowoj in ethnohistorical perspective. In P. M. Rice & D. S. Rice (Eds.), *The Kowoj: Identity, migration, and geopolitics in Late Postclassic Peten, Guatemala* (pp. 55–69). Boulder: University Press of Colorado.

Kepecs, S., Feinman, G., & Boucher, S. (1994). Chichen Itza and its hinterland. *Ancient Mesamerica, 5*(2), 141–158.

Klaus, H. D., & Tam, M. E. (2009). Surviving contact: biological transformation, burial, and ethnogenesis in the colonial Lambayeque Valley, north coast of Peru. In K. J. Knudson & C. M. Stojanowski (Eds.), *Bioarchaeology of identity in the Americas* (pp. 126–154). Gainesville: University Press of Florida.

Knudson, K. J., & Stojanowski, C. M. (Eds.). (2009). *Bioarchaeology of identity in the Americas*. Gainesville: University Press of Florida.

Lorenzen, K. J. (2003). *Miniature masonry shrines of the Yucatan Peninsula: Ancestor deification in late Postclassic Maya ritual and religion*. Ph.D. dissertation, University of California, Riverside.

Lorenzen, K. J. (2005). Ancestor deification in ancient Maya ritual and religion. *Journal of the Washington Academy of Sciences, 91*(4), 25–52.

Marquéz Morfín, L., Peraza, M. E., Miranda, M. T., & Gamboa, J. (1982). *Playa del Carmen, una población de la costa oriental en el Postclásico: (Un estudio osteológico)*. Mexico City: Instituto Nacional de Antropología e Historia.

Masson, M. A. (1997). Cultural transformation at the Maya Postclassic community of Laguna de On, Belize. *Latin American Antiquity, 8*(4), 293–316.

Masson, M. A., & Peraza Lope, C. (2007). Kukulkan/Quetzalcoatl, death god, and creation mythology of burial shaft temples at Mayapan. *Mexicon*, XXIX, 77–85.

Masson, M. A., & Peraza Lope, C. (2010). Evidence for Maya-Mexican interaction in the archaeological record of Mayapan. In G. Vail & C. Hernandez (Eds.), *Astronomers, scribes, and priests: Intellectual interchange between the northern Maya Lowlands and highland Mexico in the late Postclassic period* (pp. 77–114). Washington, D.C.: Dumbarton Oaks.

Masson, M. A., & Peraza Lope, C. (2014). *Kukulkan's realm: Urban life at ancient Mayapan*. Boulder: University Press of Colorado.

Masson, M. A., & Serafin, S. (2008). The human osteological remains. In M. A. Masson, C. Peraza Lope, & T. S. Hare (Eds.), *The economic foundations of Mayapan project: Field seasons 2001–2004* (pp. 925–930). Mérida: Instituto Nacional de Antropología e Historia.

Masson, M. A., Hare, T. S., & Peraza Lope, C. (2006). Postclassic Maya society regenerated at Mayapan. In G. M. Schwartz & J. J. Nichols (Eds.), *After collapse: The regeneration of complex societies* (pp. 188–207). Tucson: University of Arizona Press.

Medellin Zeñil, A. (1951). *Informe de las exploraciones arqueológicas en Quiahuiztlan, Villa Rica, Viejón y Cacalotlan*. Mexico: Archivo del Departamento de Monumentos Prehispánicos del Instituto Nacional de Antropología e Historia.

Merriwether, D. A., Reed, D. M., & Ferrell, R. E. (1997). Ancient and contemporary mitochondrial DNA variation in the Maya. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 208–217). Washington, D.C.: Smithsonian Institution Press.

Milbrath, S., & Peraza Lope, C. (2003). Revisiting Mayapan: Mexico's last Maya capital. *Ancient Mesoamerica, 14*(1), 1–46.

Milbrath, S., Aimers, J., Peraza Lope, C., & Folan, L. F. (2008). Effigy censers of the Chen Mul modeled ceramic system and their implications for late Postclassic Maya interregional interaction. *Mexicon* XXX, 93–96.

Nystrom, K. C. (2009). The reconstruction of identity: A case study from Chachapoya, Peru. In K. J. Knudson & C. M. Stojanowski (Eds.), *Bioarchaeology of identity in the Americas* (pp. 82–102). Gainesville: University Press of Florida.

Peraza Lope, C., Delgado Kú, P., & Escamilla Ojeda, B. (1998). *Salvamento arqueológico en la modernización de la carretera Mérida-Mayapán-Oxkutzcab (Tramo Mayapán-Teabo). Segunda temporada: 1998*. Mérida: Instituto Nacional de Antropología e Historia.

Peraza Lope, C., Delgado Kú, P., & Escamilla Ojeda, B. (2003). *Trabajos de mantenimiento y conservación arquitectónica en Mayapán, Yucatán. Informe de la cuarta temporada: 1999 y 2000*. Mérida: Instituto Nacional de Antropología e Historia.

Peraza Lope, C., Escamilla Ojeda, B., & Delgado Kú, P. (2005). *Trabajos de mantenimiento y conservación arquitectónica en Mayapán, Yucatán. Informe de la octava temporada: 2004 y 2005*. Mérida: Instituto Nacional de Antropología e Historia.

Peraza Lope, C., Delgado Kú, P., Escamilla Ojeda, B., & Garrido Euan, M. (1999). *Trabajos de mantenimiento y conservación arquitectónica en Mayapán, Yucatán. Informe de la segunda temporada: 1997*. Mérida: Instituto Nacional de Antropología e Historia.

Pompa y Podilla, J. A. (1984). Jaina y Chichen Itza: Morfología dentaria normal de dos muestras de la población Maya prehispánica. *Investigaciones recientes en el área Maya*, Tomo II, 481–489.

Proskouriakoff, T. (1962a). Civic and religious structures of Mayapan. In H. E. D. Pollock, R. L. Roys, T. Proskouriakoff, & A. L. Smith (Eds.), *Mayapan, Yucatan, Mexico* (pp. 87–164). Publication No. 619. Washington, D.C.: Carnegie Institution of Washington.

Prokouriakoff, T. (1962b). The artifacts of Mayapan. In H. E. D. Pollock, R. L. Roys, T. Prokouriakoff, & A. L. Smith (Eds.), *Mayapan, Yucatan, Mexico* (pp. 321–442). Publication No. 619. Washington, D.C.: Carnegie Institution of Washington.

Prokouiakoff, T. (1962c). Plan of the main group of ruins. In H. E. D. Pollock, R. L. Roys, T. Prokouriakoff, & A. L. Smith (Eds.), *Mayapan, Yucatan, Mexico* (pp. rear inset Publication No. 619). Washington, D.C.: Carnegie Institution of Washington.

Pugh, T. W. (2001). *Architecture, ritual, and social identity at late Postclassic Zacpetén*. Ph.D. dissertation, Southern Illinois University, Carbondale.

Pugh, T. W. (2003). The exemplary center of the Late Postclassic Kowoj Maya. *Latin American Antiquity, 14*(4), 408–430.

Rathje, W. L., & Phillips, D. A. (1975). The ruins of Buenavista. In J. A. Sabloff & W. L. Rathje (Eds.), *A study of changing pre-Columbian commercial systems, the 1972–1973 seasons at Cozumel, Mexico* (pp. 77–87). Monographs of the Peabody Museum No. 3. Boston: Harvard University.

Relethford, J. H., & Blangero, J. (1990). Detection of differential gene flow from patterns of quantitative variation. *Human Biology, 62*(1), 5–25.

Relethford, J. H., Crawford, M. H., & Blangero, J. (1997). Genetic drift and gene flow in post-famine Ireland. *Human Biology, 69*(4), 443–465.

Rhoads, M. L. (2002). *Population dynamics at the southern periphery of the ancient Maya world: Kinship at Copan*. Ph.D. dissertation, University of New Mexico, Albuquerque.

Rice, P. M. (1986). The Peten Postclassic: Perspectives from the central Peten lakes. In J. A. Sabloff & E. W. Andrews V (Eds.), *Late Lowland Maya civilization: Classic to Postclassic* (pp. 251–299). Albuquerque: University of New Mexico Press.

Ringle, W. M., & Bey, G. J. III (2001). Postclassic and Terminal Classic courts of the Northern Maya Lowlands. In T. Inomata & S. D. Houston (Eds.), *Royal courts of the ancient Maya: Data and case studies* (pp. 266–307). Boulder: Westview Press.

Ringle, W. M., Negrón, T. G., & Bey, G. J. III (1998). The return of Quetzalcoatl: Evidence for the spread of a world religion during the Epiclassic period. *Ancient Mesoamerica, 9*(2), 183–232.

Rost, R. (1997). Ossuary internments as a framework for osteological analysis: A critical approach to paleodemography and biological affinity. *Totem, 3*(2), 16–24.

Roys, R. L. (1962). Literary sources for the history of Mayapan. In H. E. D. Pollock, R. E. Roys, T. Prokouriakoff, & A. L. Smith (Eds.), *Mayapan, Yucatan, Mexico* (pp. 25–86). Publication No 619. Washington, D.C.: Carnegie Institution of Washington.

Roys, R. L. (1965). Lowland Maya Native Society at Spanish Contact. In G. R. Willey (Ed.), *Handbook of Middle American Indians, Volume 3: Archaeology of Southern Mesoamerica, part 2* (pp. 659–678). Austing: University of Texas Press.

Ruz Lhuillier, A. (1968). *Costumbres funerarias de los antiguos mayas*. Seminario de Cultura Maya. Mexico City: Universidad Nacional Autónoma de México.

Sabloff, J. A., & Rathje, W. L. (1975). The rise of a Maya merchant class. *Scientific American, 233*(4), 72–82.

Schafer, J. L. (1999). Norm: Multiple imputation of incomplete multivariate data under a normal model. http://www.stat.psu.edu/~jls/misoftwa.html. Accessed 27 Jan 2012.

Scherer, A. K. (2004). *Dental analysis of Classic period population variability in the Maya area*. Ph.D. dissertation. Texas A & M University, College Station.

Scherer, A. K. (2007). Population structure of the classic period Maya. *American Journal of Physical Anthropology, 132*(3), 367–380.

Scherer, A. K., & Wright, L. E. (2010). Movilidad e historia de población en Tikal. Guatemala: Perspectivas desde la biodistancia y el análisis de los isótopos de estroncio. Paper presented at the Coloquio Internacional de Bioarqueología en Área Maya: Afinidades Biológicas, Etnicidad y Dinámicas Poblacionales, Mérida , Mexico.

Schwartz, G. M. (2006). From collapse to regeneration. In G. M. Schwartz & J. J. Nichols (Eds.), *After collapse: The regeneration of complex societies* (pp. 3–17). Tucson: University of Arizona Press.

Serafin, S. (2010). *Bioarchaeological investigation of violence at Mayapan*. Ph.D. dissertation, Tulane University, New Orleans.

Serafin, S., & Peraza Lope, C. (2007). Human sacrificial rites among the Maya of Mayapan. In V. T. Blos & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 232–250). New York: Springer.

Simpson, S. W., Hutchinson, D. L., & Larsen, C. S. (1990). Coping with stress: Tooth size, dental defects, and age-at-death. In C. S. Larsen (Ed.), *The archaeology of Mission Santa Catalina de Guale* (pp. 66–21). Anthropological Papers, No. 68. New York: American Museum of Natural History.

Smith, A. L. (1962). Residential and associated structures at Mayapan. In H. E. D. Pollock, R. E. Roys, T. Prokouriakoff, & A. L. Smith (Eds.), *Mayapan, Yucatan, Mexico* (pp. 165–320). Publication No. 619. Washington, D.C.: Carnegie Institution of Washington.

Smith, A. L., & Ruppert, K. (1956). *Excavations in house mounds at Mayapan: IV*. Department of Archaeology Current Reports, 36 (pp. 471–528). Washington, D.C.: Carnegie Institution of Washington.

Stojanowski, C. M. (2001). *Cemetery structure, population aggregation, and biological variability in the mission centers of La Florida*. Ph.D. dissertation, University of New Mexico, Albuquerque.

Stojanowski, C. M. (2004). Population history of native groups in Pre- and Post-contact Spanish Florida: Aggregation, gene flow, and genetic drift on the Southeastern US Atlantic coast. *American Journal of Physical Anthropology, 123*(4), 316–332.

Stojanowski, C. M. (2005). The bioarchaeology of identity in Spanish Colonial Florida: Social and evolutionary transformation before, during, and after demographic collapse. *American Anthropologist, 107*(3), 417–431.

Stojanowski, C. M. (2009). Bridging histories: The bioarchaeology of identity in post-Contact Florida. In K. J. Knudson & C. M. Stojanowski (Eds.), *Bioarchaeology of identity in the Americas* (pp. 59–81). Gainesville: University Press of Florida.

Stojanowski, C. M. (2010). *Bioarchaeology of ethnogenesis in the Colonial Southeast*. Gainesville: University Press of Florida.

Suhler, C. K., Ardren, T., Freidel, D., & Johnstone, D. (2004). The rise and fall of Terminal Classic Yaxuna, Yucatan, Mexico. In A. A. Demarest, P. M. Rice, & D. S. Rice (Eds.), *The Terminal Classic in the Maya Lowlands: Collapse, transition, and transformation* (pp. 450–484). Boulder: University Press of Colorado.

Taube, K. A. (1992). *The major gods of the ancient Yucatan. Studies in Pre-Columbian Art and Archaeology 32*. Washington, D.C.: Dumbarton Oaks.

Thompson, D. E., & Thompson, J. E. S. (1955). A noble's residence and its dependencies at Mayapan. Department of Archaeology, Current Reports, 25 (pp. 225–251). Washington, D.C.: Carnegie Institution of Washington.

Tiesler Blos, V. (1998). *La costumbre de la deformacion cefalica entre los antiguos mayas: Aspectos morfologicos y culturales*. Mexico City: Instituto Nacional de Antropología e Historia.

Tiesler Blos, V. (2012). *Transformarse en Maya. El modelado cefálico entre los Mayas Prehispánicos y Coloniales*. Mexico City: Instituto Nacional de Antropología e Historia.

Tozzer, A. M. (1941). *Landa's relación de las cosas de Yucatán. Papers of the Peabody Museum of American Archaeology and Ethnology* (Vol. 18). Cambridge: Harvard University.

Ubelaker, D. H. (1974). *Reconstruction of demographic profiles from ossuary skeletal samples: A case study from the Tidewater Potomac.* Smithsonian Contributions to Anthropology, No. 18. Washington, D.C.: Smithsonian Institution Press.

Vargas Pacheco, E., & Santillán S. P. (1990). Las tumbas osarios de Tulum. *Anales de Antropologia, 27*(1), 201–213.

White, C. D., Longstaffe, F. J., Pendergast, D. M., & Maxwell, J. (2009). Cultural embodiment and the enigmatic identity of the lovers from Lamanai. In K. J. Knudson & C. M. Stojanowski (Eds.), *Bioarchaeology and Identity in the Americas* (pp. 155–176). Gainesville: University Press of Florida.

Wrobel, G. D. (2004). Metric and nonmetric dental variation among the ancient Maya of northern Belize. Ph.D. dissertation, Indiana University, Bloomington.

Wrobel, G. D., & Graham, E. (Forthcoming). Entierros de la Fase Buk en Belice: Un analysis de relaciones genéticas entre grupos Pertenecientes al Postclásico Temprano a traves de morfologia dental. In V. T. Blos & A. Cucina (Eds.), *Afinidades biológicas, etnicidad y dinámicas poblacionales en el área Maya y territorios Circun-Vecinos*. Mérida: Universidad Autonoma de Yucatán, Departamento de Extensión.

Yoffee, N. (2006). Notes on regeneration. In G. M. Schwartz & J. J. Nichols (Eds.), *After collapse: The regeneration of complex societies* (pp. 222–227). Tucson: University of Arizona Press.

Chapter 7
Human Dedicatory Burials from Altun Ha, Belize: Exploring Residential History Through Enamel Microwear and Tissue Isotopic Compositions

Karyn C. Olsen, Stephanie A. Cleland, Christine D. White and Fred J. Longstaffe

Abstract Recent studies of dietary behavior have combined dental microwear and isotopic analyses in their investigation of both animal (Palombo et al. 2005) and human populations (Hogue and Melsheimer 2008; Pérez-Pérez et al. 2003). The purpose of this investigation is to determine the residential history of dedicatory burials from two nonresidential structures at the Maya site of Altun Ha, Belize, by integrating isotopic and dental microwear records. This approach brings together complementary data reflecting several periods in the life of an individual and thus provides a way to explore personal and group histories more thoroughly. Carbon- and nitrogen-isotope compositions ($\delta^{13}C$ and $\delta^{15}N$) of bone collagen have been used previously to identify dietary differences between: (1) the two groups of dedicatory burials and (2) the dedicatory groups and known residents of the site (White et al. 2001a). Although striation microwear data also revealed differences in food consumption between the two sets of dedicatory burials, they were unable to distinguish dietary differences between the dedicatory burials and known residents of the site. When interpreted together, however, the isotopic and microwear data suggest that the diets of the dedicatory individuals changed shortly before their

K. C. Olsen (✉) · S. A. Cleland · C. D. White
Department of Anthropology, The University of Western Ontario, London, Ontario, Canada
e-mail: kolsen5@uwo.ca

S. A. Cleland
e-mail: stephanie.a.cleland@gmail.com

C. D. White
e-mail: white2@uwo.ca

F. J. Longstaffe
Department of Earth Sciences, The University of Western Ontario, London, Ontario, Canada
e-mail: flongsta@uwo.ca

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_7,

deaths. Although distinct diet and recent change in food consumption indirectly imply that these individuals had only recently become residents of the site, oxygen-isotope results ($\delta^{18}O_p$) indicate that both local and nonlocal individuals are among the burials.

Placement of human burials in public architecture is not a practice unique to Altun Ha. Accordingly, we develop through this study a more general understanding of the Maya practice of human bone use in dedicatory contexts within public architecture. In addition to reviewing previous accounts of dedicatory practice within the Maya area, we also briefly explore various theoretical approaches used to explain the meaning and significance of this type of context in other cultures.

7.1 Introduction

Excavations at Altun Ha were carried out by the Royal Ontario Museum between 1964 and 1970 under the direction of David M. Pendergast (Pendergast 1979, 1982, 1990). Located in northern Belize (Fig. 7.1), 12 km west of the Caribbean Sea, Altun Ha was a relatively small but wealthy community (Pendergast 1979). The site was initially settled in the Preclassic period (<600 BC) and abandoned in the Early Postclassic period (AD 1000). although limited reoccupation occurred around AD 1400–1500; Pendergast 1979).

Altun Ha is composed of several loose clusters of construction that reflect the site's core (Zones A–E) and periphery (Zones F, H, J, and K; Fig. 7.2). A number of interments were recovered from various structures in each of the site's zones during the course of excavation. Although many burials were recovered from intrusive graves in residential architecture, some graves were purposefully placed inside civic structures as they were constructed or modified. These interments are referred to as *dedicatory burials* (Pendergast 1982, 1990). Understanding the personal pasts of the individuals buried in such buildings could answer questions about who among the community were interred in this context, why they were buried there, and the social relationships between the deceased and the community they left behind.

The term "dedicatory" is used ambiguously in Maya literature and may refer to the interment of human remains, material deposits (caches), or some combination of the two. Becker (1992) labeled burials found at Classic period Tikal directly beneath or within phases of construction of structures with ritual functions as dedicatory interments. In contrast, Welsh (1988) used "dedicatory cache burials" to refer to the sacrificial burials of infants or adult skulls near altars, stelae, temple stairs, and in structural foundations as votive offerings. Pendergast (1982, 1990) does not connect dedicatory burials at Altun Ha to sacrifice, and others have also argued against the idea that dedicatory burials are necessarily sacrificial, further suggesting that human burials and caches are part of the same ritual continuum (Becker 1992; Kunen et al. 2002). Finally, Chase and Chase (1998) suggest that the term "dedicatory" may be an overused Western concept that does not adequately reflect the complexity and dynamic nature of ritual in Maya civilization. Although the dedica-

Fig. 7.1 Map of Belize. (Grid: UTM Zone 16N, NAD 1927; created using Esri ArcGIS and source layers from Belize Tropical Forest Studies (ND), ESRI Data & Maps (2008), and Meerman (2013))

tory label may be somewhat perplexing, mortuary practices related to dedication are now a part of larger discussions within Maya archaeology that explore, for example, sacred landscapes (Chase and Chase 1998), social memory (Kunen et al. 2002), and political economy (Lucero 2003).

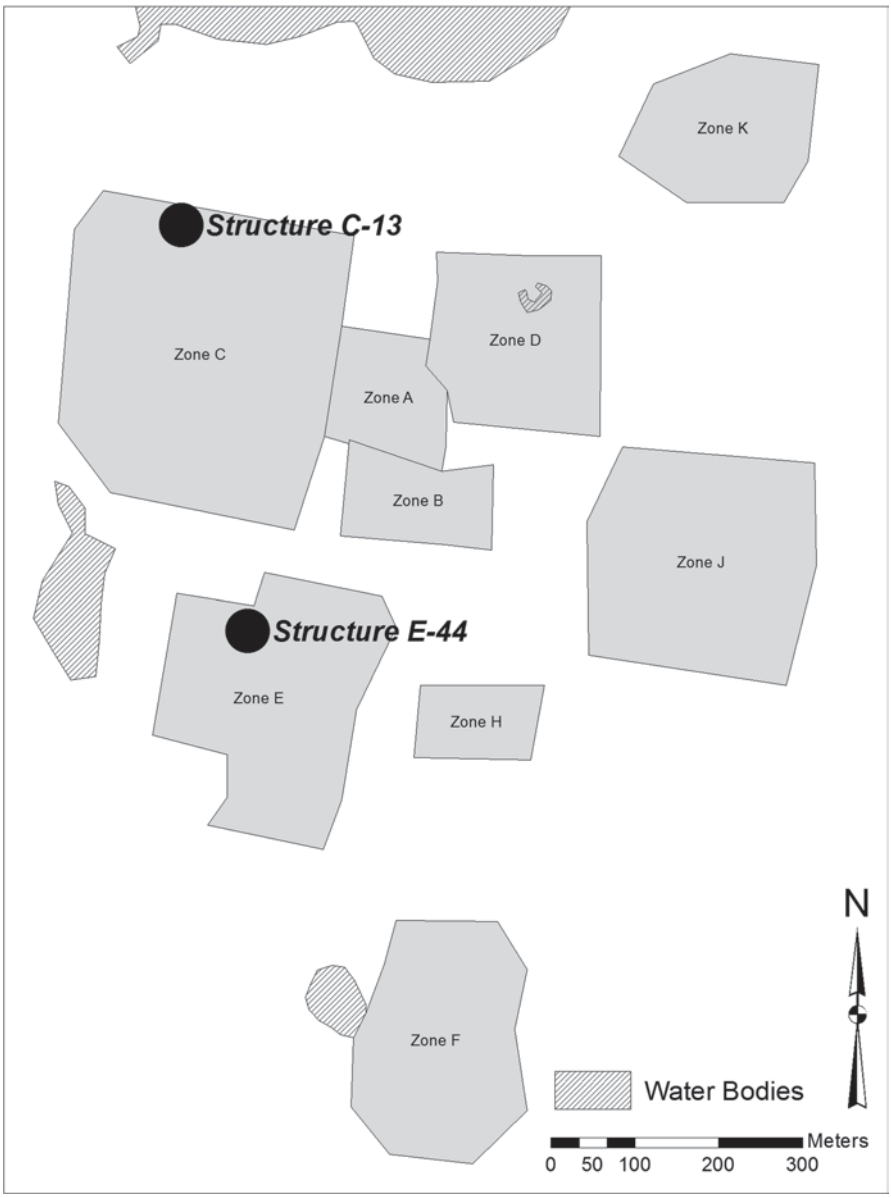

Fig. 7.2 Site map of Altun Ha indicating the locations of structures C-13 and E-44. (Grid: UTM Zone 16N, NAD 1927; created using Esri ArcGIS; see Pendergast 1976, 1979, 1982, 1990 for detailed site maps)

This study focuses on special burials from a Preclassic period ceremonial platform in Zone C (Structure C-13) and a structure in Zone E that functioned both as an administrative/ceremonial center and domestic residence in the Terminal Classic period (Structure E-44; Fig. 7.2). Pendergast (1982, 1990) suggests that as

dedicatory burials, they must have fulfilled some kind of ceremonial role prior to or during the construction period. Elsewhere, he argues that burials in nonresidential architecture represent elite individuals, whose rank or status was high enough to assure them special graves at death, speculating that an elite structural burial may or may not reflect a functional tie between the deceased and the building (Pendergast 1992). Together, however, his arguments suggest that the burials played a double role, as sacred dedications, and as claims to the power inherent in the social and political control of civic/ritual structures. In fact, emerging Maya rulers at a number of other lowland sites (e.g., Cuello, Saturday Creek, Barton Ramie,Tikal, etc.) controlled economic resources and fostered political integration through traditional ritual practices, which included the manipulation of human remains (Lucero 2003).

Among the modern K'iche' Maya, the social significance of everyday items is transformed by how and *where* they are deposited as offerings during ritual practices (Brown 2004). Thus, the precise location of an offering is key to interpreting its meaning. Osborne (2004) suggests foundation deposits, or the deliberate incorporation of material offerings into structural foundations, are an indicator of that building's significance and represent an established and *privileged* link between the structure and transcendent beings or forces.

Interpretations of analogous practices in other cultures bolster the idea that dedicatory burials played dual religious and sociopolitical roles at Altun Ha. In addition to religion, Blom and Janusek (2004) argue that dedicatory deposits involve more practical interests, including the negotiation of status and identity. They use dedicatory burials at the site of Tiwanaku, a prehispanic political and ceremonial center in the south central Andes (AD 500–1150), to argue that human remains were a valued type of dedicatory offering and their interment in ritual structures helped to shape the meaning and significance of these spaces. In one context, sacrificial burials represent the fortification of elite power, while carefully curated ancestors in another context reflect the common social identity of a local residential group (Blom and Janusek 2004).

The dual function of human remains in religious and sociopolitical roles is also evident in the veneration of saint relics in early Christian Europe. Crook (2000) documents how the architecture of Christian churches (AD 300–1200) was modified over time in order to increasingly emphasize the presence of "holy" human remains on the premises. The bones of saints were considered by early Christians as having the ability to influence the lives of the devout in miraculous ways and thus were placed prominently in tombs, altars, or shrines (Crook 2000). In addition to lending religious legitimacy to churches, the possessors of such relics maintained elite political status. The movement and/or dismemberment and distribution of saintly remains, as gifts or through theft, reflect shifting political powers and affiliations throughout Europe during the Medieval period (Crook 2000; Osborne 1999).

The examples from Tiwanaku and early Christian Europe both illustrate how the interment of human remains in built ritual environments fulfills more than one purpose, thus aiding our interpretations of dedicatory practice at Altun Ha.

In addition to drawing on theory from analogous areas of study, our investigation brings dental microwear and stable isotopic measurements to the analysis of

Altun Ha's dedicatory burials. Recent research on dietary behavior has used this methodology on both animal (Palombo et al. 2005) and human populations (Hogue and Melsheimer 2008; Pérez-Pérez et al. 2003) but until now, this approach has not been applied to Maya research. This method brings together complementary data, which reflect several periods in the life of an individual, providing a way to explore individual and group histories more thoroughly. Place of residence in childhood and adulthood can be identified through isotopic analyses of tissues formed during these periods based on the assumption that consumed food and water reflect environmental differences. The oxygen-isotope composition of drinking water is affected by variables such as distance from the sea, latitude, altitude, temperature, and humidity (Ayliffe and Chivas 1990; Yurtsever and Gat 1981). Food consumption can also indicate geographic origin if the comparative regions involved have distinctive food webs, or when dietary choices reflect cultural preferences rather than distinct menus. Isotopic data for bone collagen and microwear patterns on tooth enamel record dietary differences within and between populations, and hence can be used to reconstruct long-term and short-term food consumption. Complete turnover of bone collagen may take up to 25 years or longer (Hedges et al. 2007), while dental microwear records the effects of the most recently eaten foods (Grine 1986).

By combining the above lines of evidence, several periods in the life of an individual can be examined. If microwear and dietary isotope data are similar, diet was probably consistent over time, whereas conflicting data would suggest a change in food consumption shortly before death. Such "recent" dietary changes would be visible in microwear patterns but not yet discernable in the carbon- or nitrogen-isotope compositions of bone collagen. This picture can be further augmented by oxygen-isotope data, which are useful in identifying relationships between dietary changes and geographic relocation. Such an integrated data set has the potential to provide a better understanding of individual histories than typically discernable using any one type of analysis.

7.2 The Sample

The sample investigated here includes 15 dedicatory burials from Structures C-13 and E-44 and a comparative sample of 26 nondedicatory burials recovered from house mounds located in Zones B–E, H, J, and K (Table 7.1). The dedicatory burials include men, women, and children. In Structure C-13, skeletal material was generally recovered directly from construction fill, whereas the E-44 burials were more often associated with lined and capped graves (Pendergast 1982, 1990).

Structures C-13 and E-44 are both located at the site's core but they date to different time periods and had different functions. Structure C-13 is a Preclassic period structure that underwent multiple modifications and was an epicenter of ritual activity for several hundred years (Pendergast 1982). More than 20 caches, which contained combinations of ceramic vessel of varying types, chert blades, jade beads, shells, and one instance of carved human bone, were recovered from various levels

Table 7.1 Striation microwear results for the Altun Ha sample

	Burial ID	Time period	Age	Sex	Tooth	Striation density (#)	Striation length (μm)	Striation breadth (μm)
Dedicatory burials (Structure C-13)	C-13/5A	PrC	~8 yrs	?	M2 LL	135	129.8	4.6
	C-13/7	PrC	Adult	M	M2 UR	205	66.2	4.0
	C-13/14	PrC	Adult	F	M2 LR	236	86.2	4.1
	C-13/17A	PrC	~2 yrs	?	–	–	–	–
	C-13/17B	PrC	Adult	M	M2 LR	226	161.0	3.9
	C-13/20	PrC	Adult	F	M2 UL	108	100.4	3.6
	C-13/27	PrC	Adult	M	M1 UR	169	105.2	4.4
	C-13/X	PrC	Adult	F	M2 LR	191	97.2	3.5
Mean						181.4	106.6	4.0
Standard deviation						±47.1	±30.8	±0.4
Dedicatory burials (Structure E-44)	E-44/2	TC	Adult	F	M2 UL	140	139.9	5.1
	E-44/3	TC	Adult	M	Pm1 UL	175	92.2	4.4
	E-44/5	TC	Adult	F	M2 LR	140	50.7	4.5
	E-44/7	TC	Adult	M	M2 UL	40	57.6	3.6
	E-44/8	TC	~10 yrs	?	M2 LR	100	178.4	5.8
	E-44/9	TC	Adult	F	M2 LR	57	48.9	5.2
	E-44/13	TC	Adult	F	M2 LL	145	195.6	5.0
Mean						113.9	109.1	4.8
Standard deviation						±49.9	±62.2	±0.7
Non-dedicatory burials	B-3/1B	PC?	Adult	F	M2 LL	151	84.7	3.7
	B-3/2	PC?	Adult	F	M2 LL	109	82.2	4.7
	C-10/18A	LC	Adult	F	M2 LL	82	11.6	3.9
	C-16/20	LC	Adult	M	M2 UR	107	33.0	3.2
	C-16/21	LC	Adult	M	M2 UL	100	152.7	6.0
	C-18/2B	LC	10-12 yrs	?	M2 LL	223	121.9	3.9
	C-18/13B	EC	Adult	M	M2 UR	40	163.6	6.9
	C-22/3	TC	Adult	F	M2 LR	185	122.1	4.9
	C-22/5	TC	Adult	F	M2 UR	156	152.6	4.5
	C-43/6	LC	Adult	F	M2 LL	164	121.2	4.6
	C-44/1	LC	Adult	M	M2 LR	110	102.6	5.8
	D-10/1	EC	Adult	F	M2 LR	136	121.5	4.4
	D-10/3	EC	Adult	M	M2 UL	144	105.5	6.0
	E-7/4	TC	Adult	M	M2 UR	139	150.2	5.9
	H-1/3B	LC	Adult	F	M2 LR	87	129.3	5.6
	H-1/22	LC	7-9 yrs	?	M2 LL	29	73.0	8.4
	J-4/1	LC	Adult	F	M2 LL	276	154.8	3.8
	J-4/2	LC	Adult	M	M2 UL	204	198.4	3.0
	J-4/3	LC	Adult	F	M2 UR	282	192.6	3.4
	J-4/5	LC	Adult	F	M2 LL	214	120.3	4.6
	K-29/6	LC	Adult	F	M2 LR	171	110.6	4.9
	K-29/7	LC	Adult	M	M2 LL	291	134.6	3.6
	K-29/8	LC?	Adult	F	M2 LL	321	164.6	3.6
	K-32/6	EC/LC	Adult	M	M2 UL	230	170.4	4.3

Table 7.1 (continued)

	Burial ID	Time period	Age	Sex	Tooth	Striation density (#)	Striation length (μm)	Striation breadth (μm)
	K-35/3B	LC	Adult	F	M2 LR	280	115.1	4.7
	K-35/10	EC	Adult	F	M2 LR	183	117.1	5.1
Mean						169.8	123.3	4.8
Standard deviation						±78.5	±43.3	±1.2

Burial data from Pendergast (1979, 1982, 1990)
PrC Pre-Classic period, *EC* Early Classic period, *LC* Late Classic period, *TC* Terminal Classic period, *PC* Post-Classic period
LL lower left, *LR* lower right, *UL* upper left, *UR* upper right

of construction (Pendergast 1982). At one level, there is also evidence for controlled fires in the form of assemblages of burnt stones in circular formations (Pendergast 1982).

Interments at Structure C-13 include both primary and secondary burials. Although isolated primary burials were present at the structure (e.g., individual C-13/14), secondary burials were also found in association with primary burials. Such was the case for Burial C-13/17, which included the primary interment of an adult and secondary burial of a child (Pendergast 1982). In addition, individual C-13/5A was found in association with a second primary burial and five completely disarticulated adult skeletons (not tested here; Pendergast 1982). Some primary burials were missing skeletal elements. For example, the torso and cranium of individual C-13/27 were missing, likely as a result of a later burial (Pendergast 1982). However, body parts appear to have been removed intentionally in other cases. The lower legs and feet of individual C-13/20 were absent from the burial, and the remains of individual C-13/7 did not include a skull (Pendergast 1982). It is not entirely clear when these skeletal elements were removed, although there is no evidence to suggest that the graves were accessed postinterment.

Pendergast (1992) suggests that the C-13 dedicatory burials represent elite members of Altun Ha society. However, more recent evidence indicates that C-13 individuals suffered high rates of dental pathology in comparison with the rest of the site's population, suggesting an overall lower socioeconomic status for this group (Song 1997). A lack of grave architecture and associated artifacts may also point to a lower social status among the C-13 burials, though alternatively it is also possible that the deficiency of grave goods and the absence of formal grave construction are reflections of standard burial practice in the period.

In contrast to Structure C-13, Structure E-44 likely served both administrative/ceremonial and domestic functions throughout the Terminal Classic period in Zone E (Pendergast 1990). At the end of the Terminal Classic, much of the site center had fallen into decline but Zone E continued to see growth, including the construction and modification of Structure E-44 over a period of 200 years (Pendergast 1990). Hence, a semblance of community must have existed here even as other parts of the site were abandoned. The fact that occupants of Zone E were able to maintain the

status quo in the face of ruin suggests a certain level of wealth lacking in contemporary neighborhoods (Pendergast 1990).

Dedicatory activity at Structure E-44 included two caches from separate levels that consisted primarily of flakes, blades, and other stone tools (Pendergast 1990). The dedicatory burials at Structure E-44 were primary burials, although the calvarium of individual E-44 was missing, and not as a result of disruption by a later burial (Pendergast 1990). Thus, secondary movement of bone occurred in at least one instance at Structure E-44. The feet, tibias, and fibulas of individual E-44/5 were also absent but this is likely due to the intrusion of burial E-44/3 (Pendergast 1990). The attention paid to grave construction and the quality of grave goods (including a puma or jaguar skin in the case of individual E-44-/7) implies that the people interred in Structure E-44 were elite members of Altun Ha society (Pendergast 1990). In addition, unique vessels buried with individual E-44/13 have no other counterparts at Altun Ha, which suggests that they were imported from elsewhere (Pendergast 1990) and indirectly indicates a foreign connection to Structure E-44.

7.3 Methods

7.3.1 Dental Microwear

Dental microwear refers to tiny pits and striations (scratches) on tooth enamel that form as a result of contact between food particles and the surfaces of teeth. Both the occlusal and nonocclusal surfaces of teeth exhibit characteristic microwear patterns, which provide insight into patterns of food consumption for animal and human populations (Teaford 2007). Paleodiet studies of human groups have involved examination of both the occlusal surfaces (see Bullington 1991; El-Zaatari 2008; Gügel et al. 2001; Harmon and Rose 1988; Molleson et al. 1993; Organ et al. 2005; Schmidt 2001; Teaford 1991; Teaford et al. 2001; Ungar et al. 2006) and the nonocclusal buccal surfaces (see Fine and Craig 1981; Lalueza et al. 1996; Pérez-Pérez et al. 1994, 2003; Polo-Cerdá et al. 2007).

The microwear analysis conducted as part of this study focused on buccal tooth surfaces. The buccal surface is often the preferred region of examination when high rates of dental attrition result in extremely worn occlusal surfaces (Pérez-Pérez et al. 1994). Pit microwear is caused by crushing food particles between the teeth and, given that buccal surfaces do not experience tooth-to-tooth contact, pit damage is absent in this area of enamel (Estebaranz et al. 2007). The abrasives present in food can cause striation microwear damage to nonocclusal surfaces (Fine and Craig 1981). Although phytoliths, the silica bodies found in plant tissues, are a major cause of striation wear on enamel (Baker et al. 1959; Ciochon et al. 1990; Lalueza Fox et al. 1994), other inclusions such as extraneous grit, dust, or ash also produce striations on teeth (Fine and Craig 1981; Lalueza et al. 1996; Teaford et al. 2001; Ungar et al. 1995). Methods of processing foods (e.g., cooking, grinding) influence

the degree of exogenous abrasives added to the diet and thus contribute to the overall pattern of enamel microwear (Gügel et al. 2001; Lalueza et al. 1996; Molleson et al. 1993; Pastor 1992; Teaford and Lytle 1996).

Teaford and Lytle (1996) demonstrated that complete microwear turnover can occur within weeks on occlusal tooth surfaces by introducing stone-ground maize into the diet of a laboratory volunteer. Although the same test has not been applied to buccal microwear, others have suggested that complete turnover may be slower (possibly several years) on nonocclusal tooth surfaces (Pérez-Pérez et al. 1994). Nevertheless, the rate of turnover relative to that of bone collagen is minor, making buccal microwear a suitable indicator of short-term food consumption. Mandibular and maxillary second molars were selected for microwear investigations. Tooth selection was based on good enamel preservation. Teeth with enamel defects, dental pathology, or evidence of postmortem damage were avoided. In two cases, a maxillary first molar (C-13/27) and first premolar (E-44/3) were substituted for second molars (Table 7.1).

The intermediate third of each tooth's buccal surface was scanned using a Hitachi S-2600 VP Scanning Electron Microscope under the following conditions: (1) high vacuum mode with a standardized voltage of 15 kV and (2) magnification of 200× resulting in images that covered a 0.24 mm^2 surface area. The images were analyzed using the semiautomated Microware 4.01 software provided by Ungar (1997) and recommended by Grine et al. (2002) to identify and measure microwear features. The striations in each micrograph were counted, and the length and breadth of each feature were recorded in micrometer. Striation orientation was not recorded because striation size and density appear to be the most informative variables in human dietary analyses (Pérez-Pérez 2004; Pérez-Pérez et al. 1994). High intra- and interobserver mean error rates for SEM analysis of dental microwear have been reported by others (Galbany et al. 2005; Grine et al. 2002) but in our study, intra- and interobserver error rates were 1% and 1.5%, suggesting that the microwear observations are reliable (Goodfellow 2006).

7.3.2 Oxygen-Isotope Compositions

The oxygen-isotope ratios are expressed in the usual delta (δ) notation:

$\delta^{18}O = [(^{18}O/^{16}O_{sample} - ^{18}O/^{16}O_{standard}) \div ^{18}O/^{16}O_{standard}]$, in parts per thousand (‰).

Environmental variables create regional differences in the oxygen-isotope composition of water and these signatures are passed on to individuals who drink the local water. Drinking water is the dominant influence on the oxygen-isotope composition of humans (Longinelli and Paladino 1980). The oxygen-isotope composition of environmental water is reflected in body water and skeletal phosphate and then reflects that composition through equilibration with body water (Longinelli 1984). Oxygen-isotope analysis is, therefore, a means of determining relative geographic identity, provided that the environmental water oxygen isotopic compositions are known for the regions of potential interest. In most cases, geographic foreigners can

be identified within archaeological populations via oxygen-isotope compositions that lie outside the local range.

The isotopic composition of body water is also affected by metabolic rate and the expulsion of physiologically produced water-based substances such as breath vapor, perspiration, urine, and feces (Bryant and Froelich 1995; Kohn 1996; Kohn et al. 1996). However, we assume no significant difference in the effects of these variables among the individuals in our sample because intraspecies variation in oxygen-isotope compositions is low (~1‰; Longinelli 1984). Intrapopulational variability for previously analyzed local controls in archaeological populations in Mesoamerica is about 2‰ (White et al. 1998, 2000a, b).

During mineralization, water oxygen-isotope compositions are incorporated into both bones and teeth. Tooth enamel forms at different ages beginning at ~4 months in utero and completing by about age 16 (Massler and Schour 1958). Because enamel does not remodel, it contains a permanent isotopic record of its environment of formation. In contrast to enamel, bone is remodeled throughout life by cells that continuously break down and reform the tissue. As a consequence, the oxygen-isotope composition of bone is not permanent; it resets to reflect a new living environment when a person moves from one region to another. Thus, comparing tooth and bone oxygen-isotope ratios can reveal changes of residence between youth and adulthood.

Linking the oxygen-isotope compositions of drinking water with bone or tooth enamel is complex. For example, in a recent animal study, Warinner and Tuross (2009) demonstrated that, for pigs, oxygen derived from enamel carbonate (CO_3) is enriched in ^{18}O by 1.7‰ relative to bone carbonate. Our study examines oxygen derived from enamel and bone phosphate (PO_4), which has not yet been assessed isotopically for systematic tissue differences. Accordingly, caution is warranted in interpreting small enamel-to-bone differences in oxygen-isotope ratios as evidence of human migration.

Following microwear assessment, phosphate oxygen isotopic compositions were determined for tooth enamel and cortical bone from the 14 dedicatory burials. The two exceptions to this sampling design were juveniles from Structure C-13 (C-13/5A and C-13/17A; Table 7.2) for whom only bone was analyzed. Prior to preparing the samples for isotopic analysis, however, the likelihood that original compositions had been preserved was evaluated using the Crystallinity Index (CI), as obtained through Fourier Transform Infrared (FTIR) spectroscopy (Shemesh 1990; Surovell and Stiner 2001; Weiner and Bar-Yosef 1990; Wright and Schwarcz 1996). When water is present in the burial environment, dissolution and recrystallization of skeletal and dental mineral can occur, resulting in modified isotopic compositions (Sillen 1989). CI values (Table 7.2) allowed us to test for systematic patterns between CI and $\delta^{18}O_p$ values that might be a consequence of postmortem recrystallization. No correlation was observed (Pearson's $r = 0.365$, $df = 23$), which suggests that the original isotopic ratios were preserved.

To prepare for analysis, calcium and organic matter were removed from approximately 30–35 mg of each sample following the method of Stuart-Williams and Schwarcz (1995). Silver phosphate (Ag_3PO_4) was then precipitated for each

Table 7.2 Oxygen-isotope results for dedicatory burials

Burial ID	Sample type	$\delta^{18}O$ (‰) VSMOW	CO_2 yield[a]	Ag_3PO_4 yield[b]	CI
C-13/5A	M2 enamel	–	–	–	–
	Cortical bone	17.7	5.15	1.17	2.75
C-13/7	M2 enamel	19.4	5.06	1.58	3.40
	Cortical bone	18.3	5.16	1.17	3.12
C-13/14	M2 enamel	19.8	4.72	1.36	3.01
	Cortical bone	17.6	5.03	1.14	2.67
C-13/17A	M2 enamel	–	–	–	–
	Cortical bone	16.9	5.36	1.23	2.99
C-13/17B	M2 enamel	–	–	–	–
	Cortical bone	–	–	–	–
C-13/20	M2 enamel	18.9	4.30	1.72	3.00
	Cortical bone	18.5	4.95	0.90	2.69
C-13/27	M1 enamel	*20.0*	4.78	1.35	3.21
	Cortical bone	18.0	4.94	1.23	2.63
C-13/X	M2 enamel	17.7	4.61	1.49	2.83
	Cortical bone	17.7	4.94	1.19	2.95
E-44/2	M2 enamel	20.1	4.65	1.67	3.32
	Cortical bone	18.4	5.12	1.08	3.29
E-44/3	Pm1 enamel	18.9	4.75	1.50	2.68
	Cortical bone	17.8	5.16	1.07	2.75
E-44/5	M2 enamel	18.4	5.24	1.67	3.49
	Cortical bone	17.6	5.11	1.34	2.65
E-44/7	M2 enamel	18.6	4.73	1.61	2.64
	Cortical bone	15.9	4.94	1.36	2.83
E-44/8	M2 enamel	19.6	4.67	1.50	2.80
	Cortical bone	18.1	5.62	1.34	3.06
E-44/9	M2 enamel	19.1	4.81	1.58	2.96
	Cortical bone	18.4	4.97	1.04	3.22
E-44/13	M2 enamel	20.6	4.84	1.53	3.34
	Cortical bone	17.3	5.39	1.45	3.45
Mean		18.4	4.96	1.36	2.99
Standard Deviation		1.07	0.28	0.22	0.28

Values in *italics* are higher than otherwise expected by 0.5–0.7‰, as a result of the breast milk trophic level effect

VSMOW Vienna standard mean ocean water, *CI* Crystallinity index

[a] CO_2 yield = μmol/mg Ag_3PO_4

[b] Ag_3PO_4 yield = mg produced/mg sample

sample using Firsching's (1961) method of ammonia volatization. Extraction of oxygen from Ag_3PO_4 followed procedures adapted from Clayton and Mayeda (1963), Crowson et al. (1991), and Stuart-Williams and Schwarcz (1995). Approximately 25–30 mg of each Ag_3PO_4 sample was loaded into a nickel vessel and reacted with bromine pentafluoride (BrF_5) at 600°C for approximately 18 h. This reaction released oxygen, which was then converted to carbon dioxide (CO_2) through a reaction with heated graphite. A manometer was used to measure CO_2 yield and each

Table 7.3. Microwear T-test results for dedicatory and non-dedicatory groups

Groups	Degrees of freedom	*p* striation density	*p* striation length	*p* striation breadth
1. (a) C-13 dedicatory burials ($n=7$) (b) E-44 dedicatory burials ($n=7$)	12	0.02[a]	0.93	0.02[a]
2. (a) Site total dedicatory burials ($n=14$) (b) Site total non-dedicatory burials ($n=26$)	38	0.36	0.30	0.36
3. (a) C-13 dedicatory burials ($n=7$) (b) Site total non-dedicatory burials ($n=26$)	31	0.71	0.35	0.14
4. (a) E-44 dedicatory burials ($n=7$) (b) Site total non-dedicatory burials ($n=26$)	31	0.08[b]	0.49	0.90
5. (a) C-13 dedicatory burials ($n=7$) (b) Zone C non-dedicatory burials ($n=9$)	14	0.07[b]	0.91	0.10

[a] Results are significant ($p<0.05$)
[b] Results approach significance

sample of gas was subsequently analyzed for its oxygen-isotope composition using a VG Optima, dual-inlet, triple-collecting, stable-isotope-ratio mass spectrometer.

Over the course of these analyses, the $\delta^{18}O$ value of the Ag_3PO_4 standard (Aldrich 33,738–2; 10.79 ± 0.11‰; $n=17$) matched within error its accepted value of 10.84‰. Low correlations between $\delta^{18}O_p$ values and: (1) Ag_3PO_4 yields (Pearson's $r=0.385$, $df=23$) and (2) CO_2 yields (Pearson's $r=-0.434$, $df=23$) indicate representative extraction of phosphate oxygen during the laboratory procedures. Average yields of CO_2 from the Ag_3PO_4 samples (4.96 ± 0.28 μmol/mg; $n=26$) also compared well with the theoretical value of 4.78 μmol/mg. Duplicate oxygen isotopic analyses of samples had an average reproducibility of ±0.25‰.

7.4 Results

7.4.1 Dental Microwear Data

Striation measurements and summary data are listed in Table 7.1. T-tests showed significant differences between the two dedicatory groups. The C-13 group had greater striation densities ($p=0.02$, $df=12$) and narrower striation breadths ($p=0.02$, $df=12$) than the group from Structure E-44 (Table 7.3). Higher striation densities among the C-13 group may be related to a greater reliance on marine resources and the consumption of exogenous sand or grit associated with such foods (El-Zaatari 2008; Organ et al. 2005; Teaford 1991; Teaford et al. 2001). Larger abrasives were probably present in the foods consumed by the E-44 group given that striation breadth reflects the size and shape of the particles contacting the teeth (Teaford et al. 2001; Ungar 1994). It is not clear, however, whether the abrasives were an intrinsic quality of the food (e.g., phytoliths) or exogenous contaminants. Maize- and marine-based diets have been linked to wide and narrow scratches respectively

(Gordon 1986), and sand particles are known to produce broader striations than clay particles (Teaford et al. 2001).

T-tests were also used to compare the total set of dedicatory burials (C-13 + E-44) to the group of nondedicatory burials. No statistically significant differences were found for striation density, length, or breadth (Table 7.3). The C-13 and E-44 dedicatory groups were also compared independently to the group of nondedicatory burials and again, no significant differences in microwear patterns were found (Table 7.3). The E-44 group did tend to have lower striation densities than the nondedicatory individuals but this difference only approached significance ($p = 0.08$, $df = 31$; Table 7.3).

Microwear data for the C-13 group were also compared to a subset of nondedicatory burials that included individuals from other Zone C structures located around Structure C-13 (C-10, -16, -18, -22, -43, and -44; Table 7.1). Although no statistical differences were identified, striation density did approach significance ($p = 0.07$, $df = 14$; Table 7.3), suggesting a trend toward higher scratch densities among the dedicatory burials. The E-44 group was not compared to nondedicatory burials from Zone E because only one individual from that area of the site was included in the sample (E-7/4; Table 7.1).

7.4.2 Oxygen-Isotope Results

The oxygen-isotope compositions obtained for the bone and enamel samples are listed in Table 7.2 and illustrated in Fig. 7.3. Three $\delta^{18}O_p$ values in the sample (two teeth, one bone) are likely higher than expected because of the breast milk trophic level effect (open shapes, Fig. 7.3). Breast milk is enriched in ^{18}O relative to water sources imbibed by mothers and, as a result, tissue $\delta^{18}O$ values of breast-feeding infants are also higher than their mothers (White et al. 2000b; Wright and Schwarcz 1998, 1999). The first molar (C-13/27) and first premolar (E-44/3) analyzed in this study mineralized during the breast-feeding stage and have $\delta^{18}O_p$ values that are ~0.5–0.7‰ higher than teeth formed after weaning (White et al. 2000b). The one ^{18}O-enriched bone sample (C-13/17A) belongs to a 2-year-old child who would not have been weaned prior to death. The impact of breast milk on the $\delta^{18}O_p$ values of the remaining enamel and bone samples is minimal because second molar mineralization occurs primarily after the end of the weaning period and bone remodeling resets the composition of the tissue to reflect that of environmental water after weaning.

Local individuals have enamel and bone $\delta^{18}O_p$ values within the local range (17.7–19.9‰) established using bone and enamel samples recovered from domestic burial contexts at the site (see Olsen 2006; White et al. 2001b). The bone $\delta^{18}O_p$ values of three individuals in the sample (C-13/17A, E-44/7, and E-44/13; Fig. 7.3) suggest that they were not local to the site at death. Given that several other bone $\delta^{18}O_p$ values fall at the limits of or just outside of the local range, some of these individuals may be from places where the drinking water $\delta^{18}O_w$ value was similar to that at Altun Ha. Alternatively, foreigners who had resided at the site for several years before death would have been acquiring bone $\delta^{18}O_p$ values derived from local

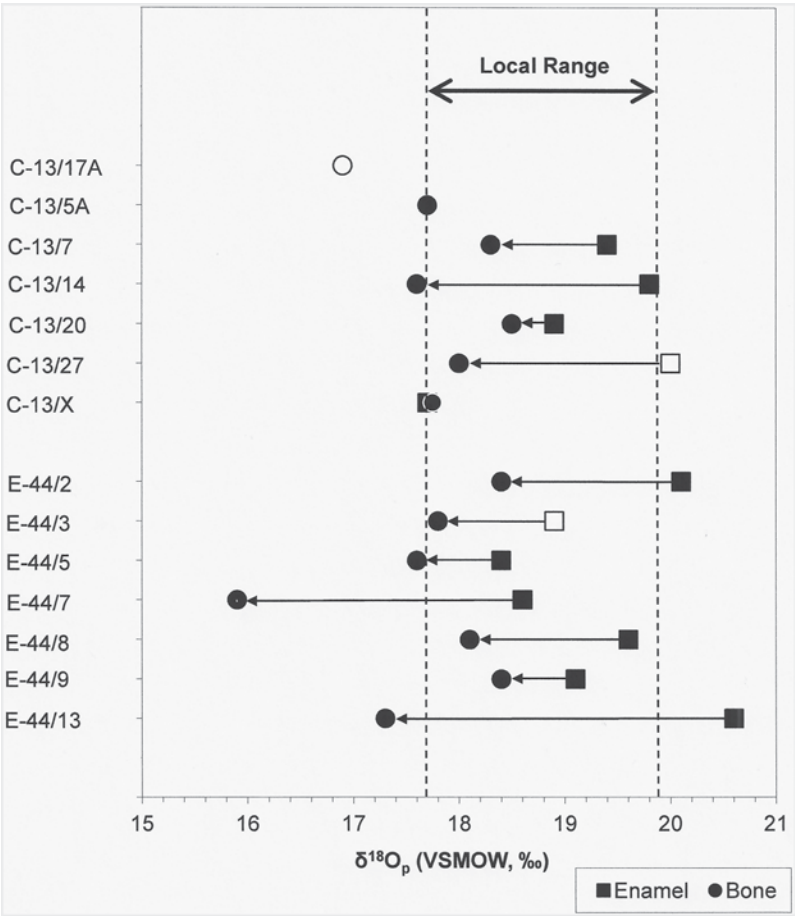

Fig. 7.3 Bone and enamel $\delta^{18}O$ values for the C-13 and E-44 dedicatory burials. Enamel was not analyzed for burials C-13/5A and C-13/17A. *Open* symbols represent values that are 0.5–0.7‰ higher than otherwise expected, as a result of the breast milk trophic level effect

drinking water, but because bone turnover is slow, tissues formed prior to arriving at Altun Ha may not have been completely reset.

The isotopic compositions of enamel and bone indicate place of residence for two different periods during an individual's life. Teeth mineralize during childhood and thus enamel isotopic compositions reflect geographic location during this period. Bone compositions, in comparison, remodel with time and characterize place of residence during the last several years of life. That said, because of the possible influence of tissue physiology on oxygen-isotope ratios, only large enamel-to-bone differences (>2‰) are considered here as evidence of human migration. Three of the dedicatory burials (C-13/14, E-44/7, and E-44/13; Fig. 7.3) have enamel-to-bone spacings larger than 2‰, which suggest that these individuals spent childhood and adulthood in different locations.

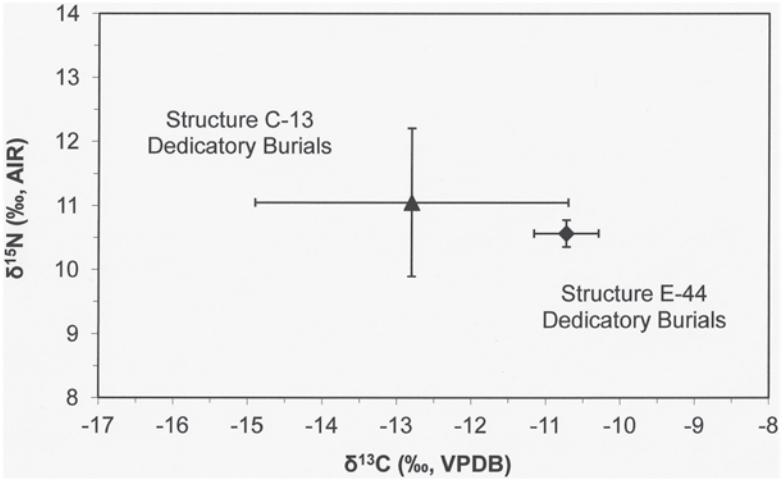

Fig. 7.4. Carbon- and nitrogen-isotope results (mean and standard deviation) for dedicatory burial groups. (Data from White et al. 2001a)

7.5 Discussion

7.5.1 Correlating Dietary Data

The microwear results indicated that the two sets of dedicatory burials did not consume the same diets, confirming the findings of White et al. (2001a) who identified differences in diet between the two groups using the carbon- and nitrogen-isotope compositions of bone collagen (Fig. 7.4). Both dedicatory groups had comparable mean $\delta^{15}N$ values that are indicative of a similar reliance on marine foods, although the C-13 group exhibits much more variability. A difference between the groups is evident in the $\delta^{13}C$ values, which represent the plant component of the diet. Most ancient plants in the Maya region had $\delta^{13}C$ values around −25 ‰. Maize is an important exception because it had a more positive average of about −11 ‰ (O'Leary 1988; Smith and Epstein 1971). Ancient plants generally have $\delta^{13}C$ values that are ~1.5 ‰ more positive than modern plants because of the atmospheric contribution of CO_2 from fossil fuel burning (Friedli et al. 1986; Keeling et al. 1979; Marino and McElroy 1991). Plant $\delta^{13}C$ values are reflected in the bone collagen of human consumers with an approximate increase of 5 ‰ (van der Merwe and Vogel 1978). In this light, maize appears to have been an important staple for both dedicatory groups (Fig. 7.4) but higher $\delta^{13}C$ values among the E-44 group suggest that its members included more maize or maize-consuming animals in their diet. The groups are not contemporaneous, however, and thus differences in diet may reflect changes in food preference with time.

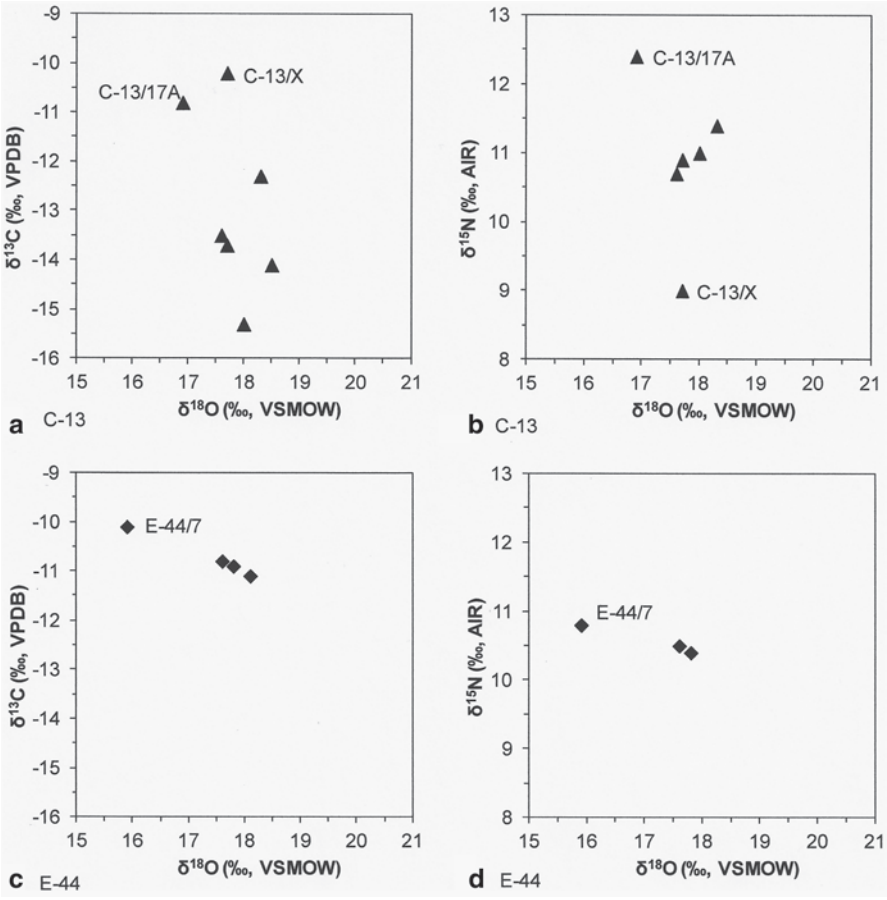

Fig. 7.5 Bone oxygen-isotope compositions for C-13 burials (*triangles*) and E-44 burials (*diamonds*) compared with collagen-derived carbon- (**a** and **c**) and nitrogen-isotope (**b** and **d**) compositions. Outliers are noted by burial identification numbers. Carbon- and nitrogen-isotope results from White et al. (2001a)

7.5.2 Intragroup Variability

The C-13 and E-44 burials do not represent homogenous groups. Burials with available oxygen-, carbon-, and nitrogen-isotope data derived from bone are used here to illustrate intragroup variability (Fig. 7.5a–d). Individual C-13/17A has higher-than-average $\delta^{13}C$ and $\delta^{15}N$ values (Fig. 7.5a and b), which indicate that this child was breast feeding at the time of death. The 2-year old also has a nonlocal bone $\delta^{18}O_p$ value. This sample is likely enriched in ^{18}O in part because of the breast milk trophic level effect, but our interpretation of nonlocal status would not change even if the $\delta^{18}O_p$ value were adjusted downward to account for breast feeding.

The $\delta^{13}C$ and $\delta^{15}N$ values of individual C-13/X suggest that this adult female's diet was different from other C-13 group members (Fig. 7.5a and b) but, at the same time, her oxygen-isotope composition and microwear pattern (Table 7.1) fail to separate her from the group. Thus, individual C-13/X could have been local to Altun Ha but consumed a different diet than her contemporaries. It is also possible that she was from another geographic location where the drinking water oxygen isotopic composition was similar to Altun Ha.

Among the E-44 burials, individual E-44/7 has the most obvious nonlocal bone $\delta^{18}O_p$ value (Fig. 7.5c and d). The $\delta^{13}C$ and $\delta^{15}N$ values for this adult male are slightly higher than other E-44 individuals but his enamel microwear pattern is very different from other members of the group. Individual E-44/7 has the lowest striation density and the narrowest set of striations in the E-44 burials (Table 7.1). He may have been consuming different or differently prepared foods than contemporary individuals at the site. An anomalous diet is not surprising given that he appears to have been of nonlocal origin.

7.5.3 Short-term Changes in Diet

The dietary isotope data of White et al. (2001a) indicated that the dedicatory individuals consumed different foods than other residents at the site whereas the enamel microwear analysis did not detect such differences. Given that the isotopic composition of bone collagen has a considerably longer rate of turnover relative to microwear damage, the striation patterns on the teeth reflect an individual's most recent diet. Therefore, the lack of congruence in the isotope and microwear data could be explained by a change in food consumption shortly before death.

According to the carbon- and nitrogen-isotope data, the C-13 group consumed less maize and more marine resources than nondedicatory individuals, while the diet of the E-44 group was richer in maize relative to contemporary residents of the site (White et al. 2001a). One might expect to see a higher density of narrow striations among the C-13 burials because the diet included more marine resources (i.e., flesh), which are commonly associated with fine abrasives (El-Zaatari 2008; Gordon 1986; Organ et al. 2005; Teaford 1991; Teaford et al. 2001). In addition, comparatively high microwear densities and broad striations would be expected in the E-44 group because vegetable-based diets are more abrasive than flesh-based diets (Lalueza et al. 1996; Pérez-Pérez et al. 1994; Ungar and Spencer 1999) and methods for processing maize have the potential to introduce hard exogenous particles into the food (Gordon 1986; Teaford and Lytle 1996). Although the microwear data do not reflect the expected differences in either dedicatory group, it remains possible that the diets of the dedicatory individuals changed shortly before their deaths.

7.5.4 Dedicatory Burials at Altun Ha

If the individuals involved in structure dedication were recent arrivals to the site, they could have adopted diets similar to those of contemporaneous Altun Ha residents, which would explain their atypical carbon- and nitrogen-isotope compositions yet nondistinctive microwear patterns. However, the oxygen-isotope data do not firmly link many of the dedicatory burials to a foreign origin. Even though there are some nonlocals among the burials, the clearest indication that the dedicatory individuals differed in some way from other residents of the site is provided by the dietary isotope data. The two sets of dedicatory burials may therefore represent socially distinct subpopulations at the site.

During the Preclassic period, Structure C-13 served the ceremonial needs of the neighborhood from its inception (Pendergast 1982). The primary burials recovered from the structure were local residents at the time of death. Although dental pathology indicates a lower socioeconomic status for this group (Song 1997), it remains possible that these individuals were important members of Altun Ha society honored at death with special burials (Pendergast 1992). The only secondary burial (a child) analyzed here also exhibited the group's only nonlocal oxygen-isotope composition, which suggests that the child's body was transported from elsewhere for interment at Structure C-13. Together, the burials likely embodied the sociopolitical identity of the community they served. Their placement in a significant ceremonial platform could have acted not only as a means of ritually securing the continued well-being of a newly thriving neighborhood but also as a way of cementing the political power of the people who orchestrated their interment (Pendergast 1992).

By comparison, Altun Ha was a very different place during the Terminal Classic period. Construction continued in Zone E even as other parts of the site were abandoned, suggesting that the residents of this neighborhood managed to maintain a relative level of wealth (Pendergast 1990). The presence of at least two nonlocal adults among the dedicatory burials indicates a relationship to the world beyond Altun Ha, and the continued vitality of Zone E may in some way have been the result of this connection. Could locals have buried foreigners, or were the foreigners new residents of Altun Ha, staking a claim to their neighborhood by burying their own within key structures? Either way, the interments reflect the community's latest political establishment. Even if the ultimate purpose of dedicatory burial remained unchanged over time, the pool from which dedicatory individuals were selected is very likely to have changed as the greater community at Altun Ha became increasingly disordered. The possibility of an uncertain future may have permeated the outlook of Zone E occupants and resulted in more elaborate dedication rituals, including a greater attention paid to grave construction and the quality of grave goods.

7.6 Conclusions

The residential histories of dedicatory burials at Altun Ha have been explored in order to address issues of individual identities, reasons for burial in special contexts, and the nature of the relationships between the living and the dead. The combination of isotopic and microwear measures has produced a complex data set that illustrates diversity in both diet and geographic origins at Altun Ha. Although the striation microwear data revealed differences in diet between the two groups of dedicatory burials, they did not differentiate the individuals from other residents of the site. White et al. (2001a), in contrast, identified unique diets among the dedicatory groups using carbon- and nitrogen-isotope compositions of bone collagen. It is possible that more subtle intrapopulation differences in diet are not discernable using microwear comparisons. However, when interpreted together, the two sets of dietary data could suggest that the diets of the dedicatory individuals changed shortly before their deaths. A distinctive diet earlier in life and later changes in food consumption both indirectly imply that the dedicatory individuals were recent arrivals to the site. Nevertheless, the oxygen-isotope data can confirm the presence of only a few foreigners among the dedicatory groups. As offerings, the dedicatory burials likely fulfilled a ceremonial role, but the social identities of the burials likely reflected the site's political contexts during its early years and then during its decline.

Acknowledgments This research was supported by two Ontario Graduate Scholarships, the Social Sciences and Humanities Research Council, The Natural Science and Engineering Research Council of Canada, and the Canada Research Chairs program. The authors thank David Pendergast and Linda Howie for their valuable comments on an earlier version of this manuscript. We are grateful to Kim Law, Grace Yau, and Li Huang at the Laboratory for Stable Isotope Science and M. Mogharab-Rahbari at Particle Technology Research Western for their technical assistance. We also thank Peter Ungar for providing the Microware 4.01 image analysis software. This is Laboratory for Stable Isotope Science Contribution #249. The maps of Belize and Altun Ha were created using Esri ArcGIS, version 10. Thank you to Zoe Morris at The University of Western Ontario for generating the maps used in this article.

References

Ayliffe, L. K., & Chivas, A. R. (1990). Oxygen isotope composition of the bone phosphate of Australian kangaroos: Potential as a paleoenvironmental recorder. *Geochimica et Cosmochimica Acta, 54*(9), 2603–2609.

Baker, G., Jones, L. H. P., & Wardrop, I. D. (1959). Cause of wear in sheep's teeth. *Nature, 184*(4698), 1583–1584.

Becker, M. J. (1992). Burials as caches; caches as burials: A new interpretation of the meaning of ritual deposits among the classic Lowland Maya. In E. C. Danien & R. J. Sharer (Eds.), *New theories on the ancient Maya*. *University Museum Monograph 77* (pp. 185–196). Philadephia: University of Pennsylvania.

Belize Tropical Forest Studies (ND). Biodiversity and Environmental Resource Data System of Belize. *Elevation*, created by J. Meerman; *Belize Aquatic Streams and Rivers*, created by P. Esselman. http://www.biodiversity.bz/ (accessed September 2013).

Blom, D. E., & Janusek, J. W. (2004). Making place: Humans as dedications in Tiwanaku. *World Archaeology, 36*(1), 123–141.

Brown, L. A. (2004). Dangerous places and wild spaces: Creating meaning with materials and space at contemporary Maya shrines on El Duende mountain. *Journal of Archaeological Method and Theory, 11*(1), 31–58.

Bryant, J. D., & Froelich, P. N. (1995). A model of oxygen isotope fractionation in body water of large mammals. *Geochimica et Cosmochimica Acta, 59*(21), 4523–4537.

Bullington, J. (1991). Deciduous dental microwear of prehistoric juveniles from the lower Illinois River Valley. *American Journal of Physical Anthropology, 84*(1), 59–73.

Chase, D. Z., & Chase, A. F. (1998). The archaeological context of caches, burials, and other ritual activities for the Classic period Maya (as reflected at Caracol, Belize). In S. D. Houston (Ed.), *Function and meaning in Classic Maya architecture (pp. 299–332)*. Washington, DC: Dumbarton Oaks.

Ciochon, R. L., Piperno, D. R., & Thompson, R. G. (1990). Opal phytoliths found on the teeth of the extinct ape *Gigantopithecus blacki*: Implications for paleodietary studies. *Proceedings of the National Academy of Sciences*, *87*(20), 8120–8124.

Clayton, R. N., & Mayeda, T. K. (1963). The use of bromine pentafluoride in the extraction of oxygen from oxides and silicate for isotopic analysis. *Geochimica et Cosmochimica Acta, 27*(1), 43–52.

Crowson, R. A., Showers, W. J., Wright, E. K., & Hoering, T. C. (1991). Preparation of phosphate samples for oxygen isotope analysis. *Analytical Chemistry, 63*(20), 2397–2400.

Crook, J. (2000). *The architectural setting of the Cult of Saints in the early Christian West c. 300–1200*. Oxford: Clarendon.

El-Zaatari, S. (2008). Occlusal molar microwear and the diets of the Ipiutak and Tigara populations (Point Hope) with comparisons to the Aleut and Arikara. *Journal of Archaeological Science, 35*(9), 2517–2522.

ESRI Data & Maps (2008). ArcWorld Supplement. *World Country Boundaries*. Created by ESRI Data and Maps. http://www.arcgis.com/ (accessed September 2013).

Estebaranz, F., Galbany, J., Martínez, L. M., & Pérez-Pérez, A. (2007). 3-D microscopy applied to the study of buccal enamel microwear. In S. E. Bailey & J. Hublin (Eds.), *Dental perspectives on human evolution (pp. 391–403)*. Dordrecht: Springer.

Fine, D., & Craig, G. T. (1981). Buccal surface wear of human premolar and molar teeth: a potential indicator of dietary and social differentiation. *Journal of Human Evolution, 10*(4), 335–344.

Firsching, F. H. (1961). Precipitation of silver phosphate from homogeneous solution. *Analytical Chemistry, 33*(7), 873–887.

Friedli, H., Lötscher, H., Oeschger, H., Siegenthaler, U., & Stauffer, B. (1986). Ice core record of the $^{13}C/^{12}C$ ratio of atmospheric CO_2 in the past two centuries. *Nature, 324*(6094), 237–238.

Galbany, J., Martínez, L. M., Lopez-Amor, H. M., Espurz, V., Hiraldo, O., Romero, A., De Juan, J., & Pérez-Pérez, A. (2005). Error rates in buccal-dental microwear quantification using scanning electron microscopy. *Scanning, 27*(1), 23–29.

Goodfellow, S. (2006). *Dental enamel microwear at Altun Ha, Belize*. MA thesis, The University of Western Ontario, London.

Gordon, K. D. (1986). Dental microwear analysis to detect human diet. *American Journal of Physical Anthropology*, *69*(Supplement), 206–207.

Grine, F. E. (1986). Dental evidence for dietary differences in Australopithecus and Paranthropus: A quantitative analysis of permanent molar microwear. *Journal of Human Evolution, 15*(8), 783–822.

Grine, F. E., Ungar, P. S., & Teaford, M. F. (2002). Error rates in dental microwear quantification using scanning electron microscopy. *Scanning, 24*(3), 144–153.

Gügel, I. L., Grupe, G., & Kunzelmann, K. (2001). Simulation of dental microwear: characteristic traces by opal phytoliths give clues to ancient human behavior. *American Journal of Physical Anthropology, 114*(2), 124–138.

Harmon, A. M., & Rose, J. C. (1988). The role of dental microwear analysis in the reconstruction of prehistoric diet. In B. V. Kennedy & G. M. LeMoine (Eds.), *Diet and subsistence: Current*

archaeological perspectives (pp. 267–272). Calgary: University of Calgary Archaeological Association.

Hedges, R. E. M., Clement, J. G., Thomas, C. D. L., & O'Connell, T. C. (2007). Collagen turnover in the adult femoral mid-shaft: Modeled from anthropogenic radiocarbon tracer measurements. *American Journal of Physical Anthropology, 133*(2), 808–816.

Hogue, S. H., & Melsheimer, R. (2008). Integrating dental microwear and isotopic analyses to understand dietary change in East-Central Mississippi. *Journal of Archaeological Science, 35*(2), 228–238.

Keeling, C. D., Mook, W. G., & Tans, P. P. (1979). Recent trends in the $^{13}C/^{12}C$ ratio of atmospheric carbon dioxide. *Nature, 277,* 121–123.

Kohn, M. J. (1996). Predicting animal $\delta\ ^{18}O$: Accounting for diet and physiological adaptation. *Geochimica et Cosmochimica Acta, 60*(23), 4811–4829.

Kohn, M. J., Schoeninger, M. J., & Valley, J. W. (1996). Herbivore tooth oxygen isotope compositions: Effects of diet and physiology. *Geochimica et Cosmochimica Acta, 60*(20), 3889–3896.

Kunen, J. L., Galindo, M. J., & Chase, E. (2002). Pits and bones: Identifying Maya ritual behavior in the archaeological record. *Ancient Mesoamerica, 13*(2), 197–211.

Lalueza, C., Pérez-Pérez, A., & Turbón, D. (1996). Dietary inferences through buccal microwear analysis of middle and upper Pleistocene human fossils. *American Journal of Physical Anthropology, 100*(3), 367–387.

Lalueza Fox, C., Pérez-Pérez, A., & Juan, J. (1994). Dietary information through the examination of plant phytoliths on the enamel surface of human dentition. *Journal of Archaeological Science, 21*(1), 29–34.

Longinelli, A. (1984). Oxygen isotopes in mammal bone phosphate: A new tool for paleohydrological and paleoclimatological research? *Geochimica et Cosmochimica Acta, 48*(2), 385–390.

Longinelli, A., & Paladino, A. P. (1980). Oxygen isotope composition of water from mammal blood: First results. *Mass Spectrometry in Biochemical Medical and Environmental Research, 1,* 135–139.

Lucero, L. J. (2003). The politics of ritual: The emergence of Classic Maya rulers. *Current Anthropology, 44*(4), 523–558.

Marino, B. D., & McElroy, M. B. (1991). Isotopic composition of atmospheric CO_2 inferred from carbon in C4 plant cellulose. *Nature, 349*(6305), 127–131.

Massler, M., & Schour, I. (1958). *Atlas of the mouth in health and disease*. Chicago: American Dental Association.

Meerman, J. (2013). Biodiversity and Environmental Resource Data System of Belize. *Belize Inland Waterbodies*, created by P. Esselman & S. Rickets, modified by J. Meerman; *Belize Basemap*, created by J. Meerman. http://www.biodiversity.bz/ (accessed September 2013).

Molleson, T., Jones, K., & Jones, S. (1993). Dietary change and the effects of food preparation on microwear patterns in the Late Neolithic of Abu Hureyra, northern Syria. *Journal of Human Evolution, 24*(6), 455–468.

O'Leary, M. H. (1988). Carbon isotopes in photosynthesis: Fractionation techniques may reveal new aspects of carbon dynamics in plants. *Bioscience, 38*(5), 328–336.

Olsen, K. C. (2006). *Dedication and sacrifice: An oxygen isotope study of human remains from Altun Ha, Belize and Iximché, Guatemala*. MA thesis, The University of Western Ontario, London.

Organ, J. M., Teaford, M. F., & Larsen, C. S. (2005). Dietary inferences from dental occlusal microwear at Mission San Luis de Apalachee. *American Journal of Physical Anthropology, 128*(4), 801–811.

Osborne, J. (1999). Politics, diplomacy, and the cult of relics in Venice and the Northern Adriatic in the first half of the ninth century. *Early Medieval Europe, 8*(3), 369–386.

Osborne, R. (2004). Hoards, votives, offerings: The archaeology of the dedicated object. *World Archaeology, 36*(1), 1–10.

Palombo, M. R., Filippi, M. L., Iacumin, P., Longinelli, A., Barbieri, M., & Maras, A. (2005). Coupling tooth microwear and stable isotope analyses for palaeodiet reconstruction: The case

study of Late Middle Pleistocene *Elephas (Palaeoloxodon) antiquus* teeth from central Italy (Rome area). *Quaternary International, 126–128*, 153–170.

Pastor, R. F. (1992). Dietary adaptations and dental microwear in Mesolithic and Chalcolithic South Asia. *Journal of Human Ecology*. *Special Issue. 2,* 215–228.

Pendergast, D. M. (1976). *Altun Ha: A guidebook to the ancient Maya ruins*. Toronto: The University of Toronto Press.

Pendergast, D. M. (1979). *Excavations at Altun Ha, Belize, 1964–1970* (vol. 1). Toronto: Royal Ontario Museum.

Pendergast, D. M. (1982). *Excavations at Altun Ha, Belize, 1964–1970* (vol. 2). Toronto: Royal Ontario Museum.

Pendergast, D. M. (1990). *Excavations at Altun Ha, Belize, 1964–1970* (vol. 3). Toronto: Royal Ontario Museum.

Pendergast, D. M. (1992). Noblesse oblige: The elites of Altun Ha and Lamanai, Belize. In D. Z. Chase & A. F. Chase (Eds.), *Mesoamerican elites: An archaeological assessment* (pp. 61–79). Norman: University of Oklahoma Press.

Pérez-Pérez, A. (2004). Why buccal microwear? *Anthropologie, 42*(1), 1–3.

Pérez-Pérez, A., Espurz, V., Bermúdez de Castro, J. M., de Lumley, M. A., & Turbón, D. (2003). Non-occulsal dental microwear variability in a sample of Middle and Late Pleistocene human populations from Europe and the Near East. *Journal of Human Evolution, 44*(4), 497–513.

Pérez-Pérez, A., Lalueza, C., & Turbón, D. (1994). Intraindividual and intragroup variability of buccal tooth striation pattern. *American Journal of Physical Anthropology, 94*(2), 175–187.

Polo-Cerdá, M., Romero, A., Casabó, J., & De Juan, J. (2007). The Bronze Age burials from Cova Dels Blaus (Vall d'Uixó, Castelló, Spain): An approach to palaeodietary reconstruction through dental pathology, occlusal wear, and buccal microwear patterns. *HOMO Journal of Comparative Human Biology, 58*(4), 297–307.

Schmidt, C. W. (2001). Dental microwear evidence for a dietary shift between two nonmaize-reliant prehistoric human populations from Indiana. *American Journal of Physical Anthropology, 114*(2), 139–145.

Shemesh, A. (1990). Crystallinity and diagenesis of sedimentary apatites. *Geochimica et Cosmochimica Acta, 54*(9), 2433–2438.

Sillen, A. (1989). Diagenesis of the inorganic phase of cortical bone. In T. D. Price (Ed.), *The chemistry of prehistoric human bone (pp. 211–229)*. Cambridge: Cambridge University Press.

Smith, B. N., & Epstein, S. (1971). Two categories of $^{13}C/^{12}C$ ratios for higher plants. *Plant Physiology, 47*(3), 380–384.

Song, R. (1997). *Developmental defects of enamel in the Maya of Altun Ha, Belize: Implications for ancient Maya childhood*. MA thesis, Trent University, Peterborough.

Stuart-Williams, H. L. Q., & Schwarcz, H. P. (1995). Oxygen isotope analysis of silver orthophosphate using a reaction with bromine. *Geochimica et Cosmochimica Acta, 59*(18), 3837–3841.

Surovell, T. A., & Stiner, M. C. (2001). Standardizing infrared measures of bone mineral crystallinity: An experimental approach. *Journal of Archaeological Science, 28,* 633–642.

Teaford, M. F. (1991). Dental microwear: What can it tell us about diet and dental function? In M. A. Kelley & C. S. Larsen (Eds.), *Advances in dental anthropology* (pp. 341–356). New York: Wiley-Liss.

Teaford, M. F. (2007). Dental microwear and paleoanthropology: Cautions and possibilities. In S. E. Bailey & J. Hublin (Eds.), *Dental perspectives in human evolution* (pp. 345–368). Dordrecht: Springer.

Teaford, M. F., Larsen, C. S., Pastor, R. F., & Noble, V. E. (2001). Pits and scratches: Microscopic evidence of tooth use and masticatory behavior in La Florida. In C. S. Larsen (Ed.), *Bioarchaeology of Spanish Florida: The impact of colonialism* (pp. 82–112). Gainesville: University Press of Florida.

Teaford, M. F., & Lytle, J. D. (1996). Brief communication: Diet-induced changes in rates of human tooth microwear: A case study involving stone-ground maize. *American Journal of Physical Anthropology, 100*(1), 143–147.

Ungar, P. S. (1994). Incisor microwear of Sumatran anthropoid primates. *American Journal of Physical Anthropology, 94*(3), 339–363.

Ungar, P. S. (1997). *Microware software, version 4.01 a semi-automated image analysis system for the quantification of dental microware*. Fayetteville: Unpublished.

Ungar, P. S., Grine, F. E., Teaford, M. F., & El Zaatari, S. (2006). Dental microwear and diets of African and early *Homo*. *Journal of Human Evolution, 50*(1), 78–95.

Ungar, P. S., & Spencer, M. A. (1999). Incisor microwear, diet, and tooth use in three Amerindian populations. *American Journal of Physical Anthropology, 109*(3), 387–396.

Ungar, P. S., Teaford, M. F., Glander, K. E., & Pastor, R. F. (1995). Dust accumulation in the canopy: A potential cause of dental microwear in primates. *American Journal of Physical Anthropology, 97*(2), 93–99.

van der Merwe, N. J., & Vogel, J. C. (1978). ^{13}C content of human collagen as a measure of prehistoric diet in Woodland North America. *Nature, 276*(5690), 815–816.

Warinner, C., & Tuross, N. (2009). Alkaline cooking and stable isotope tissue-diet spacing in swine: Archaeological implications. *Journal of Archaeological Science, 36*(8), 1690–1697.

Weiner, S., & Bar-Yosef, O. (1990). States of preservation of bones from prehistoric sites in the Near East: A survey. *Journal of Archaeological Science, 17*(2), 187–196.

Welsh, W. B. M. (1988). *An analysis of Classic Lowland Maya burials. International Series 409*. Oxford: British Archaeological Reports.

White, C. D., Spence, M. W., Stuart-Williams, H. L. Q., & Schwarcz, H. P. (1998). Oxygen isotopes and the identification of geographical origins: The Valley of Oaxaca versus the Valley of Mexico. *Journal of Archaeological Science, 25*(7), 643–655.

White, C. D., Spence, M. W., & Longstaffe, F. J. (2000a). *The identification of foreigners in mortuary contexts using oxygen-isotope ratios: Some Mesoamerican examples*. Paper presented at the 69th Annual Meeting of the American Association of Physical Anthropologists, San Antonio, TX.

White, C. D., Longstaffe, F. J., Spence, M. W., & Law, K. R. (2000b). Testing the nature of Teotihuacan imperialism at Kaminaljuyú using phosphate oxygen-isotope ratios. *Journal of Anthropological Research, 56*(4), 535–558.

White, C. D., Pendergast, D. M., Longstaffe, F. J., & Law, K. R. (2001a). Social complexity and food systems at Altun Ha, Belize: The isotopic evidence. *Latin American Antiquity, 12*(4), 371–393.

White, C. D., Longstaffe, F. J., & Law, K. R. (2001b). Revisiting the Teotihuacan connection at Altun Ha: Oxygen isotope analysis of Tomb F-8/1. *Ancient Mesoamerica, 12*(1), 65–72.

Wright, L. E., & Schwarcz, H. P. (1996). Infrared and isotopic evidence for diagenesis of bone apatite at Dos Pilas, Guatemala: Paleodietary implications. *Journal of Archaeological Science, 23*(6), 933–944.

Wright, L. E., & Schwarcz, H. P. (1998). Stable carbon and oxygen isotopes in human tooth enamel: Identifying breastfeeding and weaning in prehistory. *American Journal of Physical Anthropology, 106*(1), 1–18.

Wright, L. E., & Schwarcz, H. P. (1999). Correspondence between stable carbon, oxygen, and nitrogen isotopes in human tooth enamel and dentine: Infant diets and weaning at Kaminaljuyú. *Journal of Archaeological Science, 26*(9), 1159–1170.

Yurtsever, Y., & Gat, J. R. (1981). Atmospheric waters. In J. R. Gat, & R. Gonfiantini (Eds.), *Stable isotope hydrology: Deuterium and oxygen-18 in the water cycle. Technical report series No. 210*. (pp. 103–142). Vienna: International Atomic Energy Agency.

Chapter 8
Danse Macabre: Death, Community, and Kingdom at El Kinel, Guatemala

Andrew K. Scherer, Charles Golden, Ana Lucía Arroyave and Griselda Pérez Robles

Abstract We explore the inhumation (and occasional exhumation) of the dead within the framework of ritual practice at El Kinel, Guatemala. Over the course of this chapter, we argue that mortuary rites served to both (re)constitute society at El Kinel and reified that community's participation within the greater Yaxchilan polity of the eighth century AD. To make our case, we reconstruct the ideology of these mortuary practices through the study of 12 burials from El Kinel. In our analysis, we draw on data from archaeology, osteology, taphonomy, iconography, ethnohistory, and ethnography. Although the veneration of ancestors and perhaps the validation of lineage are evident in our analysis, more salient in our results is a ritual tradition that reflected localized (at the level of kingdom) interpretations of pan-Maya beliefs regarding the treatment of the dead. We conclude that in the eighth century AD, funerary rites served as an integrative mechanism within the Yaxchilan kingdom, uniting king and commoner through shared ritual practice.

8.1 Introduction

Patricia McAnany's (1995) landmark volume, *Living with the Ancestors*, established mortuary contexts as essential for advancing our understanding of Classic Maya society. According to McAnany (1995, p. 9), Classic Maya society was

A. K. Scherer (✉)
Department of Anthropology, Brown University, Box 1921, Providence, RI 02912, USA
e-mail: andrew_scherer@brown.edu

C. Golden
Department of Anthropology, Brandeis University, MS006, 415 South Street, Waltham, MA 02454, USA
e-mail: cgolden@brandeis.edu

A. L. Arroyave · G. P. Robles
Universidad de San Carlos de Guatemala, 12 avenida 11-11, Zona 1, Guatemala City, Guatemala
e-mail: ana_arro2@hotmail.com

G. P. Robles
e-mail: grisroble@yahoo.com

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_8,

characterized by a "persistent tension between 'kingship' and 'kinship'" leading to "the distinctive role of ancestor veneration within royal dynasties." For McAnany, the elaborate and highly public royal mortuary rites of the Classic period emerged as "an appropriation of Formative social practice that emerged within an agrarian milieu." Since the publication of *Living with the Ancestors*, a significant body of literature has engaged with deposits of Maya human remains. However, despite McAnany's insightfully holistic approach, much of the past two decades of research on Maya funerary deposits and ancestor veneration has bifurcated; most scholars have focused either on the ideology of royal mortuary ritual as constitutive of kingship (Bell et al. 2004; Buikstra et al. 2004; Eberl 2005; Fitzsimmons 1998, 2006, 2009; Houk et al. 2010; Weiss-Krejci 2009, 2011) or domestic mortuary rites as reaffirmations of lineage and household (Barnhart 2002; Chase and Chase 2011; Gillespie 2001, 2002; McAnany 1998; McAnany et al. 1999). As a result, there has been little testing of McAnany's hypothesis pertaining to the tension surrounding Classic Maya ancestor veneration, in large part because there has been a lack of research that relates domestic burial practices to other local and regional ritual traditions. This chapter is as an attempt to fill that void.

We explore the inhumation (and occasional exhumation) of the dead within the framework of ritual practice at El Kinel, Guatemala. Over the course of this chapter, we argue that mortuary rites served to both (re)constitute society at El Kinel and reified that community's participation within the greater Yaxchilan polity of the eighth century AD. To make our case, we reconstruct the ideology of these mortuary practices through the study of 12 burials from El Kinel. In our analysis, we draw on data from archaeology, osteology, taphonomy, iconography, ethnohistory, and ethnography. Although the veneration of ancestors and perhaps the validation of lineage are evident in our analysis, more salient in our results is a ritual tradition that reflected localized (at the level of kingdom) interpretations of pan-Maya beliefs regarding the treatment of the dead. We conclude that in the eighth century AD, funerary rites served as an integrative mechanism within the Yaxchilan kingdom, uniting king and commoner through shared ritual practice.

8.2 The Kingdom of Yaxchilan

The royal court at Yaxchilan was one of the dominant powers of the western Maya Lowlands. From our archaeological survey in the vicinity of Yaxchilan, it appears that much of the surrounding landscape was abandoned with the founding of the court sometime in the fourth century AD (Martin and Grube 2008, p. 118), presumably as populations aggregated around the court (García Moll 2003, 2004b; Golden et al. 2008, p. 252). Starting in the seventh century, the formerly vacant landscape was repopulated as communities (over 20 documented to date) sprung up within a 20 km radius of Yaxchilan (Anaya Hernandez 2001; Golden and Scherer 2013; Golden et al. 2008, Fig. 8.1). El Kinel appears to have been founded as part of this process (Golden and Scherer 2006; Golden et al. 2005).

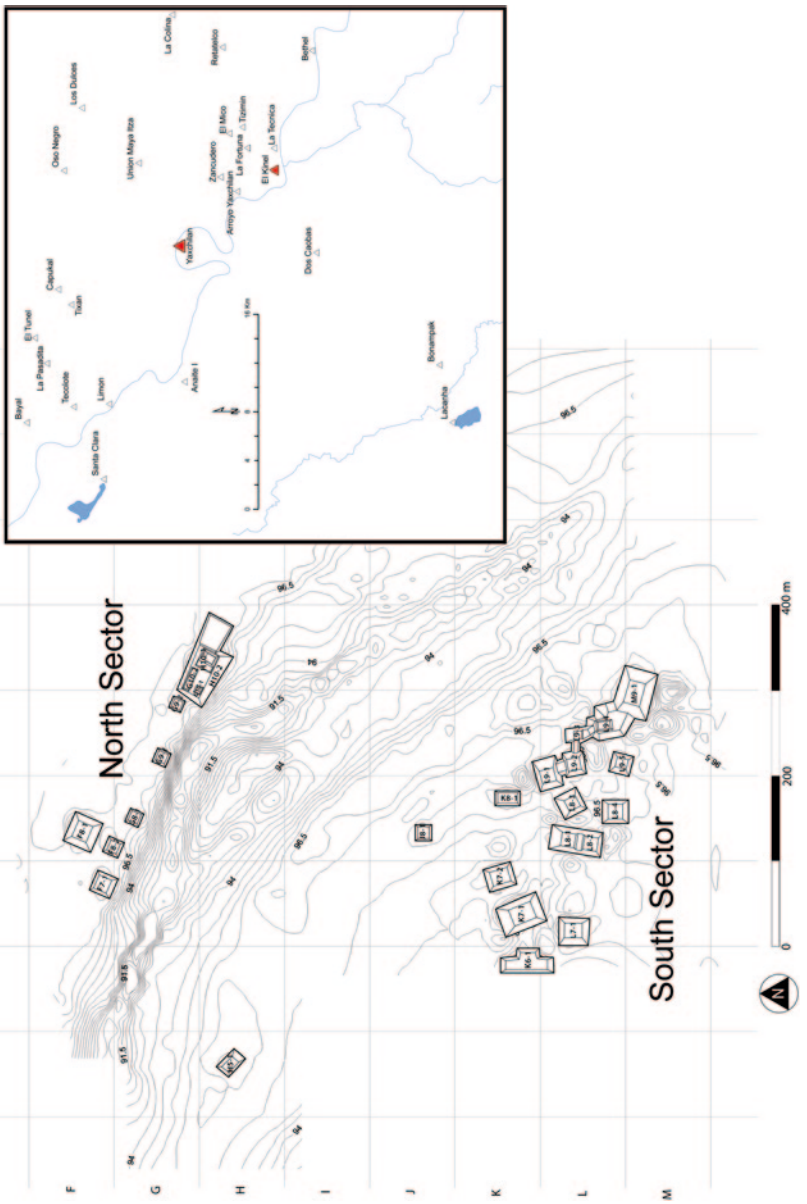

Fig. 8.1 El Kinel, Guatemala, and the greater Yaxchilan polity (*inset*) c. AD 800. (Maps by C. Golden)

The rough limits of the Yaxchilan polity in the eighth century can be reconstructed based on the location of monuments at secondary centers where inscriptions describe local lords that were subordinate to the king of Yaxchilan (Martin and Grube 2008; Mathews 1988; Safronov 2005; Tokovinine 2005). These hieroglyphically identified subordinate centers include El Chicozapote, La Pasadita, Dos Caobas, and Bonampak. Unprovenienced and questionably provenienced monuments indicate that other subordinate centers existed but remain to be identified through archaeological methods. Other Yaxchilan-affiliated centers, such as Tecolote, can be identified based on attributes of material culture and monumental architecture that are shared with Yaxchilan and distinct from other polities (Golden et al. 2008; Scherer and Golden 2009, 2012). Defensive features at La Pasadita, Tecolote, and other border sites indicate that stretches of the polity limit were collectively fortified and imply a shared body politic in the eighth century (Scherer and Golden 2009, 2014). From this we infer that significant portions of the landscape between the hieroglyphically identifiable subordinate centers and the site of Yaxchilan, the seat of its court, were politically unified as a kingdom in the eighth century.

The history and material culture of the Yaxchilan polity prior to the late seventh century remains poorly understood. Starting, however, with the reign of Shield Jaguar III in AD 681 and continuing with the reigns of Bird Jaguar IV (AD 752–768) and Shield Jaguar IV (c. AD 769–800), over 80 hieroglyphic monuments were commissioned at both Yaxchilan and its subordinate centers, affording an unprecedented look into the machinations of this Classic Maya court (Martin and Grube 2008, pp. 123–137; Mathews 1988). Warfare is a dominant theme of this sculptural program and we argue that much of these efforts were directed at controlling both the immediate landscape around Yaxchilan and access to resources and routes of travel throughout the western Maya Lowlands (Scherer and Golden 2014).

The style of the Yaxchilan monuments is one of a variety of manifestations of the distinct material culture and practices pursued within the Yaxchilan court relative to other courts in the western Lowlands (Piedras Negras, Palenque, Tonina, Sak Tz'i', and Pomona; for further discussion of these patterns, see Golden and Scherer 2013; Golden et al. 2008; Scherer and Golden 2012, 2014). As we will argue over the course of this chapter, the particularities of the material culture of the Late Classic period (AD 600–c. 810) court at Yaxchilan are merely the most obvious examples of distinct cultural practices within the greater kingdom. Elite ritual action reveals an underlying ideology that, though built upon pan-Maya tropes, reflects distinct practices within the Yaxchilan court.

Among its ritual practices, the celebration of dance was given particular prominence in the monumental corpus of Yaxchilan (Fig. 8.2). In Maya art, dance is easily recognized by the iconic bent knee pose, fluid hand gestures, and elaborate costumes (Looper 2009; Miller 1981). Textual references to dance occur widely across the Maya Lowlands during the seventh and eighth centuries (Grube 1992) and many of the costumed depictions of kings on Maya stelae likely show those kings engaged in dance or similar performance (Houston 1993, p. 92). Yaxchilan stands apart from other kingdoms, however, in the frequency of hieroglyphically

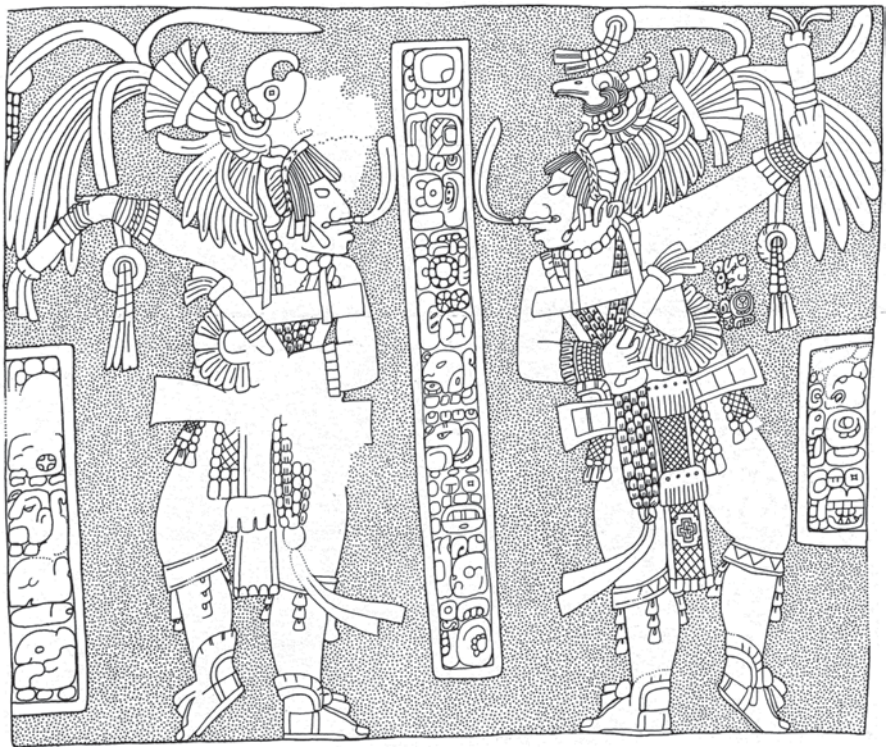

Fig. 8.2 Site R Linel 5 (drawing courtesy of Berthold Riese). Bird Jaguar IV of Yaxchilan dances at *right,* accompanied by his subordinate lord at *left*

recorded dance events, the unambiguity of dance in the iconography (in Fig. 8.2, the actors are shown engaged in dance, as opposed to standing still in costume), and the significance of dance as public ritual at both the polity capital and the subordinate centers (Helmke 2010; Looper 2009, p. 28; Tokovinine 2005).

All of the known epigraphic and iconographic references to dance at Yaxchilan are associated with the reigns of just two kings: Bird Jaguar IV and Shield Jaguar IV. Although the earliest depiction of dance at Yaxchilan is on a stela (Stela 11), most dance monuments are lintels and depict pairs of dancers: the king and his successor, the king and one of his wives, or the king and one of his subordinate lords (*sajal*). This emphasis on partnership underscores that dancing at Yaxchilan was, among other things, a process of social construction in which political relationships were reified through shared performance before an audience of fellow elites, if not the broader Yaxchilan society (Helmke 2010; Tokovinine 2005).

The dances themselves are poorly understood and involved deity impersonation (usually by the king) and the use of a variety of objects including the "flap-staff," "basket-staff," "bird-staff," jaguar paw scepter, *k'awiil* (God K) scepter, and snakes (Grube 1992; Looper 2009, p. 28–44). The dances were associated with important

events (accessions, solstices, and period ending celebrations) and were textually identified by the objects that were held (Grube 1992), underscoring both the specificity and diversity of meaning for dance performances. Some of the dances involved bloodletting which, combined with the act of deity impersonation, indicate that dance could be used to access or conjure supernatural beings and ancestors. Matthew Looper (2009, p. 28–44) provides the most complete synthesis of the Yaxchilan dance monuments, calling special attention to the triad of dance lintels that appear in each of Structures 1, 33, and 42. As Looper shows, these lintels were all commissioned during the reign of Bird Jaguar IV and operated in concert with one another as part of a grand performed narrative that involved the king, his successor, his wives, and his most loyal sublords. Structures 1 and 42 flank Structure 33, the principal construction in Bird Jaguar IV's reign, and together form a line oriented 120° east of north.

The alignment of buildings to 120° along with 30°, 210°, and 300° east of north were the primary cardinal orientations employed in settlement design along the Usumacinta River (Scherer and Golden 2012, p. 28). These architectural orientations are otherwise uncommon in the southern Maya Lowlands during the Classic period where orientations closer to true north, south, east, and west were preferred (Ashmore 1991; Ashmore and Sabloff 2002). The 120° axis was especially favored at Yaxchilan and its subordinate communities. The Main Plaza of Yaxchilan exhibits this orientation, as does the playing alley of one of Yaxchilan's two ballcourts (Structure 67). The 120° orientation had ritual significance as indicated by its favored use in the orientation of burials at the site. The two royal burials excavated from below the floor of Structure 23, likely Shield Jaguar III and his wife Lady K'abal Xook, were oriented with their heads to the northeast (120°; García Moll 2004a). Although data are still forthcoming, a review of the preliminary site reports indicates that the majority of Yaxchilan's burials were also oriented 120° (García Moll and Juárez Cosío 1986).

Other characteristics of interments at Yaxchilan include: (1) the placement of inverted, perforated tripod dishes over the faces of the decedents, (2) the placement of additional bowls, dishes, and cylinder vases upright at the head-end of the burials, and (3) burial architecture consisting of finely made, masonry tombs and crypts, located below the floors and stairways of multidoored temples. The placement of royal burials below the floors of temples, as opposed to within or in front of pyramids, is especially distinctive of Yaxchilan mortuary tradition in the Late Classic period relative to other Maya kingdoms.

8.3 Beyond the Court: El Kinel, Guatemala

Until future publication and fieldwork are completed at Yaxchilan, our understanding of the site beyond its royal court remains limited. Nevertheless, as a result of archaeological fieldwork elsewhere in the polity, a broader image of Late Classic period material culture and practice is emerging (Golden 2003; Golden and Scherer 2006, in review; Golden et al. 2008, 2005; Scherer and Golden 2009, 2012, 2014;

Tovalín Ahumada and Ortiz Villarreal 1999, 2006). Among the most thoroughly investigated of Yaxchilan's subsidiary communities is the site of El Kinel, located 14.5 km upstream from Yaxchilan on the Usumacinta River (9.6 km in a straight overland route).

El Kinel was first reported by Paulino Morales (Morales 2000a, b, 2001; Morales and Ramos 2002) and later a team led by Scherer, Golden, and Rosaura Vásquez mapped and excavated the site (Fig. 8.1, Golden and Scherer 2006; Golden et al. 2006; Golden et al. 2007; Houston et al. 2006; Scherer et al. 2007; Vásquez et al. 2005, 2006). El Kinel is located in the agricultural fields of the modern community of La Técnica, Guatemala, about 2.4 km west of the town center. Occupation at El Kinel dates predominantly to the Late and Terminal Classic periods, whereas settlement at the nearby site of La Técnica (located underneath the modern community) is Late Preclassic. Settlement at El Kinel is clustered into two groups: the North and South Sectors.

The North Sector of El Kinel is located on a low bluff over a kilometer away from the Usumacinta River. The South Sector sits closer to the river on its floodplain. The alignment of the structures in the North Sector is typical of communities elsewhere in the Yaxchilan polity and favors the 120° orientation. The South Sector, however, is more densely clustered and lacks the rectilinear arrangement of structures in the North Sector. Architecture in the South Sector consists of large platforms constructed from artificially mounded floodplain sediments. The South Sector platform superstructures had stone foundations and the mound's facades were likely covered in stone, though much of the surface stone has been removed for modern construction. Excavations into the platforms revealed buried substructures with stone wall foundations. A number of the South Sector platforms are connected by walkways, also built of riverine sediment. The North Sector buildings are more typical of Maya constructions in that they do not have large sediment-filled platforms and instead consisted of low platforms with irregular stone fill.

The two sectors are divided by an artificial ditch-and-berm feature. Informants from the local community indicate the ditch was present prior to the settlement of the town in the 1970s. Today, the ditch regularly floods, separating the South Sector from the mainland to the north. Excavations into the berm in 2006 revealed postholes that may be the remnants of an ancient palisade, though we cannot rule out a modern fence line.

The most significant find from El Kinel was a stone monument (Monument 1, most likely a small stela) that was recovered by members of the community when road construction clipped part of Structure H10–2 in the North Sector (Escobedo 2001; Houston et al. 2006, Fig. 5). The text of Monument 1 indicates the protagonist is the penultimate Yaxchilan king, Shield Jaguar IV, and the calendar round date appears to correspond to the year AD 790 (Houston et al. 2006, p. 91). The ruler carries a spear and fan and is dressed in what appears to be a paper cloak, quite unusual for regal costuming; typically only captives are shown garbed in paper. The text indicates that the scene depicts a period ending dance that was, as with other Yaxchilan dance monuments, associated with the act of bloodletting. The small size of the monument, the manner in which the king is depicted, and the sculpture's

location at such an apparently minor site as El Kinel, are all highly unusual relative to other sculpture in the Yaxchilan kingdom.

Ceramics recovered from the two sectors of El Kinel suggest overlapping dates of occupation with different periods of abandonment. The materials recovered thus far from the South Sector date exclusively to the Late Classic period (c. AD 600–830). In contrast, an abundance of Terminal Classic trade wares (c. AD 830–930), including Altar Fine Orange and Tres Naciones Fine Gray materials, were recovered from the North Sector, indicating that occupation persisted there for decades after the abandonment of the South Sector.

Two scenarios thus seem feasible for the settlement history of El Kinel. One possibility is that El Kinel was occupied by two distinct groups of inhabitants who may have coexisted for only part of the site's history. The ditch-and-berm that separates the two sectors may indicate conflict between the occupants of the North and South Sectors. The presence of Monument 1 in the North Sector may suggest that it had more direct ties to Yaxchilan. Alternatively, the two sectors may reflect different settlement foci of the same community. The movement away from the river and onto the bluff coupled with the construction of the ditch-and-berm may have related to escalating conflict in the late eighth and early ninth centuries, coincident with the collapse of the royal court at Yaxchilan (Scherer and Golden 2009, 2013, 2014). To test these scenarios and to better understand the nature of community and kingdom at El Kinel, we turn to data from the excavation and analysis of burials at El Kinel.

8.4 Mortuary Archaeology and Human Osteology at El Kinel

Twelve burials have been excavated at El Kinel (Table 8.1). Burial 1 was recovered by Paulino Morales in 2001. The remaining 11 burials were excavated by the authors during the 2006 and 2007 field seasons. Burial excavation was overseen by Scherer who conducted all field and laboratory skeletal analyses. Skeletal analyses were performed using standard osteological procedure (Buikstra and Ubelaker 1994). Burials 1, 11, and 12 were recovered from the North Sector of El Kinel. Burials 2, 3, 5, 6, 7, 8, 9, and 10 were excavated in the South Sector. What follows is a brief summary of those burials, beginning with the earlier-dated South Sector. For more information, including detailed skeletal inventories, a complete pathological summary for each individual, and data pertaining to cranial and dental modification, see the original osteology reports that are available online (Scherer 2006, 2007).

8.4.1 South Sector

Excavations in the South Sector focused on the L9–3 platform. Unfortunately, the surface of the platform was not preserved so we cannot comment on the nature of its superstructure, though we assume it was a residence or a related domestic structure.

Table 8.1 Burials of El Kinel, Guatemala

Burial	Location	Sex	Age
1	North sector: unmapped (Morales' group C)	Female?	20–50 years
2	South sector: Structure L9–3	Indeterminate	2–4 years
3	South sector: Structure L9–3	Indeterminate	6–12 months
4	South sector: Near Structure L9–3	Male?	35–50 years
5	South sector: Structure L9–3	Male	20–30 years
6	South sector: Structure L9–3	Male?	30–40 years
7	South sector: Structure L9–3	Indeterminate	2–4 years
8	South sector: Structure L9–3	Indeterminate	6–12 months
9	South sector: Structure L9–3	Indeterminate	8–16 months
10	South sector: Structure L9–3	Male	16–20 years
11	North sector: Structure H10–1	Indeterminate	Adult
12	North sector: Structure G9–2	Female	16–20 years

Seven burials were recovered from within the L9–3 platform: Burials 2, 3, 5, 6, 7, 8, and 9. An additional interment, Burial 4, was excavated from the raised walkway that connects L9–3 to the adjacent L9–4 platform.

Burial 3 (Fig. 8.3) was located about 60 cm below the floor of the superstructure and contained the remains of a 6- to 12-month-old infant. The child was placed in a well-made masonry crypt with walls of vertically set stones that was capped by a limestone *metate* (grinding stone) fragment. The body was placed in an extended supine position with the arms extended and the head oriented to the southeast (120°). The left leg, though missing the feet and the lower portions of the tibia and fibula due to poor preservation, appears to have been extended. The right leg was flexed over one of stone slabs that capped another burial (Burial 2) that was located directly below Burial 3. There were no burial offerings. Woven periostitis is present on the endocranial surface of both parietals and lesions consistent with active porotic hyperostosis are visible on the squama of the occipital.

Burial 2 (Fig. 8.4) was located immediately below Burial 3. The limestone slabs that comprised portions of the floor of Burial 3 constituted the roof of Burial 2. The remainder of the cist consisted of a space hollowed out from the earthen matrix of the L9–3 platform. The grave contained the remains of a two to four-year-old child. The body was placed in an extended supine position, the head oriented toward the southeast (120°), and the left leg was slightly flexed with the knee "pointing" laterally and the plantar aspect of the left foot facing the right ankle. There were no burial offerings. The distal portion of the right tibia exhibits a thin layer of woven periostitis.

Burial 5 (Fig. 8.5) was located approximately 1 m to the south of Burials 2 and 3. The body of a 20- to 30-year-old male individual was interred in an extended supine position with each arm placed over the corresponding pelvis. The left and right medial malleoli and feet were in contact, suggesting the body may have been wrapped in a burial shroud. The body was oriented with the head to the southeast (120°). The young man was placed in a depression excavated in the L9–3 sediment

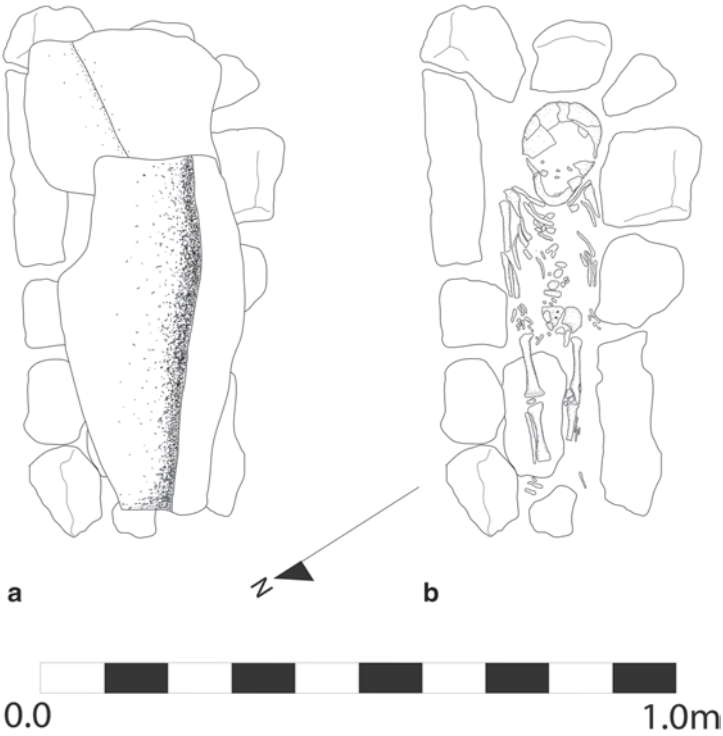

Fig. 8.3 El Kinel Burial 3; with metate fragment lid (**a**) and after the removal of the lid (**b**). (Drawings by A. Scherer and G. Pérez Robles)

fill and covered by a series of irregular limestone cobbles. An inverted tripod plate with a perforated base (Zopilote Smudged Black, Late Classic period) was placed over the face of the individual. Two resist-reserve-painted polychrome bowls were placed just to the southeast of the head. Other possible burial goods include a large chert flake located over the thorax, a quartz cobble found near the left os coxa, and a black river stone near the right distal femur, though these objects may have been intrusive from sediments above. All of the diaphyses of the long bones of the legs exhibit symmetrical areas of mixed woven and sclerotic periostitis, suggestive of a systemic infection.

Burial 6 was located half a meter north of Burials 2 and 3 within Structure L9–3. Unfortunately, the burial was looted a few years prior to our work. The presence of disturbed limestone slabs indicates Burial 6 was either a cist or a crypt interment. Among the human remains, we found fragments of three complete Late Classic vessels (including one Tinaja Red bowl) that were once part of the burial assemblage. It is unknown if any other objects were included in the burial. Human remains consisted of a badly fragmented, partially complete skeleton of a 30- to 40-year-old probable male individual. The diaphyseal surfaces of the femora, tibiae, and humeri exhibit mixed woven and sclerotic periostitis (the fibulae are absent). Thickening

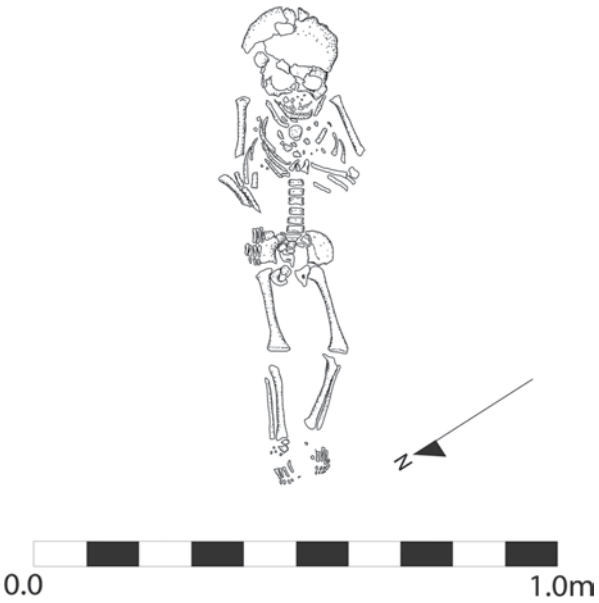

Fig. 8.4 El Kinel Burial 2. (Drawing by A. Scherer and G. Pérez Robles)

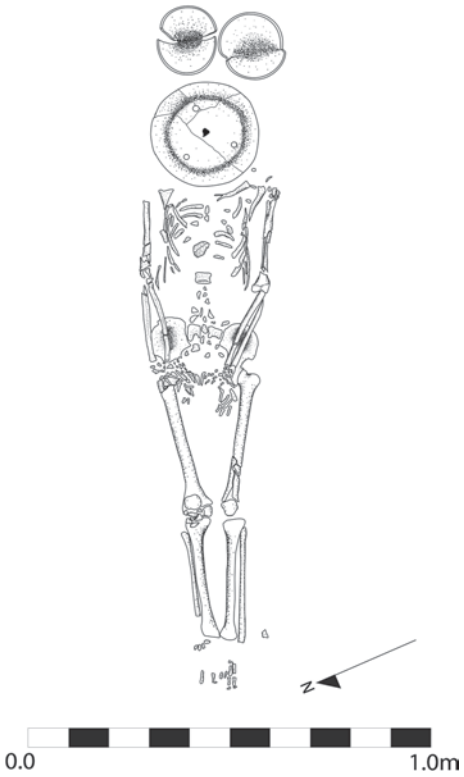

Fig. 8.5 El Kinel Burial 5. (Drawing by A. Scherer and G. Pérez Robles)

of the periosteal and endosteal surfaces (with visible vessel tracks) is apparent on both femora. A rib fragment also exhibits sclerotic periostitis. The diffuse presence of periostitis suggests a systemic infection.

Burial 7 was located less than a meter east of Burials 2 and 3 but just below the surface and at a much higher stratigraphic level within the L9–3 platform fill. All that was recovered were some of the teeth and a cranial fragment of a two to four-year-old child below a fragmented overturned tripod dish. A small bowl and wide mouth vessel were placed next to the overturned dish. The entire assemblage was capped by a large fragmented overturned bowl. The remainder of the burial, including the rest of the skeleton and any burial architecture, was destroyed as a result of looting and mining of the surface of L9–3 for usable stone in modern construction. Although the original burial orientation is unknown, the placement of the ceramic vessels suggests the head was likely in the southeast (as with most other burials at El Kinel).

Burial 8 was encountered about 1.5 m to the northwest of Burials 2 and 3 and was located near the surface of the platform in the same stratigraphic layer as Burial 7. The body consists only of the teeth, mandible, and cranial fragments of a 6- to 12-month-old infant. Again, the absence of the skeleton is likely due to recent disturbance as a result of the burial's proximity to the surface, in this case compounded by gopher activity as evidenced by a series of burrows that cut through the burial. Similar to Burial 7, the teeth were covered by a fragmented tripod dish. Adjacent to the dish was a small bowl. The fragmentary remains of at least one or possibly two large bowls covered the entire assemblage. Again, the arrangement of the vessels is suggestive of a southeast orientation for the burial.

Burial 9 (Fig. 8.6) was located just below the surface of the L9–3 platform, to the northeast of Burial 8. The body was placed into the sediment fill of the platform and covered by small limestone blocks that likely comprised part of the floor of the final superstructure. Unfortunately, a bulbous tuber grew through the center of the burial and destroyed portions of the skeleton. The body was placed in a supine position with the head to the southeast (120°). The right leg may have been flexed similar to the left leg in Burial 2, though it was impossible to determine with certainty due to the disturbance. An overturned fragmented polychrome bowl was placed over the thorax. Underneath the bowl, resting near the left os coxa was a basalt grinding stone (*mano*). The cranial vault fragments exhibit active porotic hyperostosis and two parietal fragments exhibit reactive bone on their endocranial surfaces.

Burial 10 (Fig. 8.7) was found within a buried substructure (L9–3-sub 1) within the L9–3 platform. Unfortunately, we only had the opportunity to uncover a stone wall of that substructure and its form and extent are unknown. What is clear, however, is that the face of the substructure was oriented 120° and likely formed the basal wall for a structure built primarily of perishable material. Burial 10 appears to have been placed on the floor of an interior room of L9–3-sub 1 before the L9–3 platform was raised over the dismantled and buried structure. The crypt was constructed with walls of vertically set small stone slabs and was capped by larger stone slabs. The crypt floor was sediment. Burial 10 predates all of the other burials that we recovered in L9–3. The crypt contained the body of a 16- to 20-year-old male individual, interred in an extended supine position with the arms crossed over the body. The

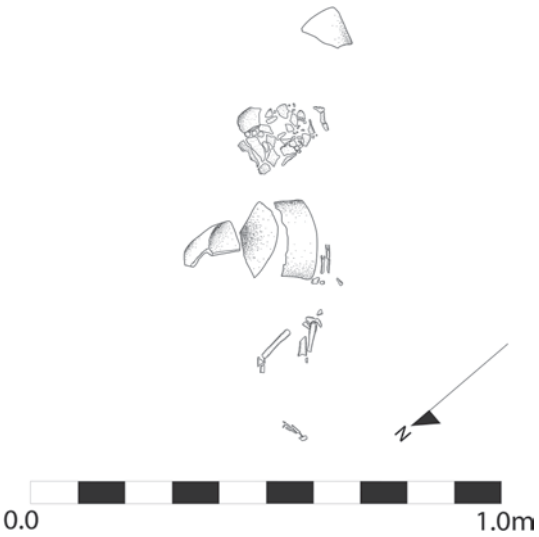

Fig. 8.6 El Kinel Burial 9. (Drawing by A. Scherer and G. Pérez Robles). A *mano* was located underneath the smashed vessel, near the thorax

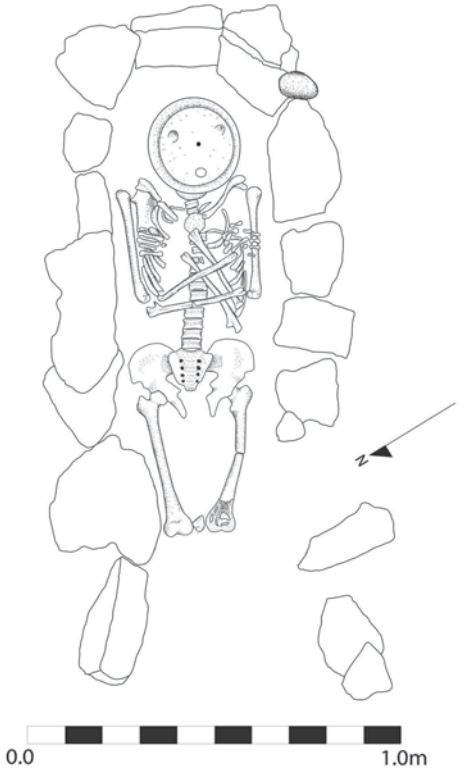

Fig. 8.7 El Kinel Burial 10. (Drawing by A. Scherer and A. L. Arroyave)

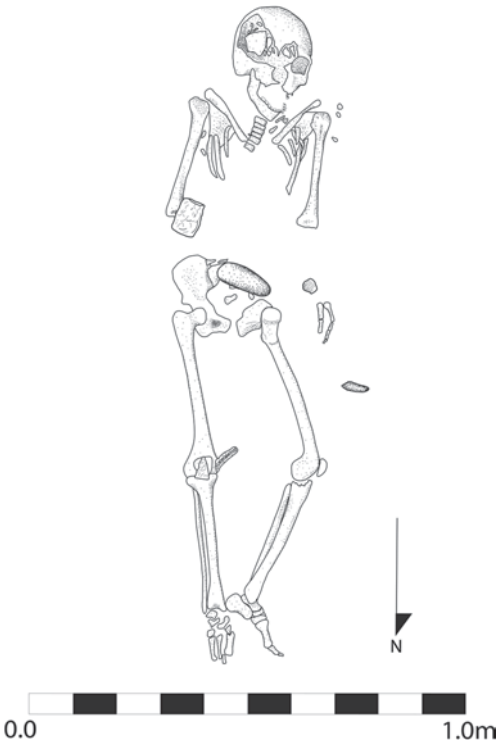

Fig. 8.8 El Kinel Burial 4. (Drawing by A. Scherer and A. L. Arroyave)

head was oriented to the southeast (120°). The position and tight articulation of the skeletal elements suggest that the body was wrapped in a shroud. A Late Classic period eroded polychrome tripod dish (from the Palmar-Saxche ceramic group) with a perforated base was placed over the face of the individual. The supports of the vessel had been snapped off prior to interment. The roof and walls of the lower portion of the crypt were missing, though a few blocks of the wall remain to suggest that it once existed. Also missing are the tibiae, fibulae, bones of the feet, and the left patella (the right patella was recovered between the two distal femora). The lack of cut marks on the distal femora indicates that the body was interred complete and that the lower legs were removed when the crypt was disturbed. This raises the possibility that the burial initially existed as an above-ground crypt, similar to above-ground crypts at Palenque (Scherer 2012), before the entire building (with crypt) was covered by the later construction. Both femora exhibit well-healed periostitis. The mesial half of the crown of the right first mandibular molar was destroyed by a large caries, exposing the pulp chamber. Associated with this tooth is a large abscess with significant alveolar resorption. Combined, these oral pathologies may relate to the cause of death.

Burial 4 (Fig. 8.8) was located in the walkway between the L9–3 and L9–4 platforms, below a floor that consisted of a mix of river cobbles and smaller stones. An abundance of pottery sherds and other domestic debris was located above the floor, perhaps deposited coevally with the abandonment of the structure. The body of a 35-

to 50-year-old probable male individual was placed directly within the sediments of the walkway without a formal burial facility. The individual was placed in a supine position, though the body was not lying flat. Rather, the lumbar and pelvic regions were at a greater depth than the upper torso, head, and legs. The right leg was extended and the foot was resting flat on its plantar surface (presumably shifting forward following decomposition of the soft tissue of the ankle joint and compression of the sediments). The left leg was flexed, with the knee "pointing" laterally and the plantar surface of the left foot facing the right ankle. The deeper location of the lower back and pelvis appears to have accommodated flexion of the left elbow with the left hand resting lateral to the left os coxa. The right arm seems to have been flexed with the right hand placed over the pelvis. Both radii and ulnae are missing as are the carpals (except the right hamate and capitate), the sternum, the lower vertebral column, and the left ilium. The metacarpals and phalanges of both hands were, however, present and articulated. The lack of cut marks on the skeleton indicates these bones were removed after the initial interment.

Unlike most other burials at El Kinel, the body was oriented with the head to the south (180°). A cluster of objects was found in the sediment just above the bones of the lower abdomen and included a *mano*, a chert axe, a large chert flake (near the left hand), and large ceramic sherds. Other objects found around and in the sediments directly above the body include two bone needle fragments, a figurine head, a chert projectile point (over the right knee), two small speolethems, a bone tool (possibly for weaving; next to the right leg), a polished river stone (likely used in ceramic manufacture; lateral to the left femur), a piece of pumice, two ocarina fragments, a worked flat stone, and additional large ceramic fragments. The bone needles may have been part of the garments worn by the individual. However, we do not believe the body was wrapped and, as we will discuss in the section that follows, we believe the limbs were intentionally arranged more or less in the position described here. Most of the other burial goods, particularly those clustered in the sediments above the abdomen, were likely placed after the burial was reexposed and the bones of the radii and ulnae were removed. The femora, tibiae, and fibulae exhibit striate, sclerotic bone across significant portions of their diaphyseal surfaces consistent with a healed bacterial infection.

8.4.2 North Sector

Only three burials were recovered from the North Sector: Burial 1, 11, and 12. Burial 1 was excavated from a group east of the mapped portion of the site, southeast of the H10–2 platform (Morales labeled this architectural complex Group C). The body was placed in an extended supine position, with arms at the side. Aside from a cist around the head, there was no formal burial facility (Morales and Ramos 2002, p. 159). The body was oriented with the head to the southeast (120°). The adult skeleton is perhaps female, though the poor preservation prohibits a definitive sex determination. An inverted tripod dish (Infierno Negro; Late Classic period) was placed over the head and four other vessels were placed in the pectoral region. Although clearly a primary interment, the skeleton was only partially complete and

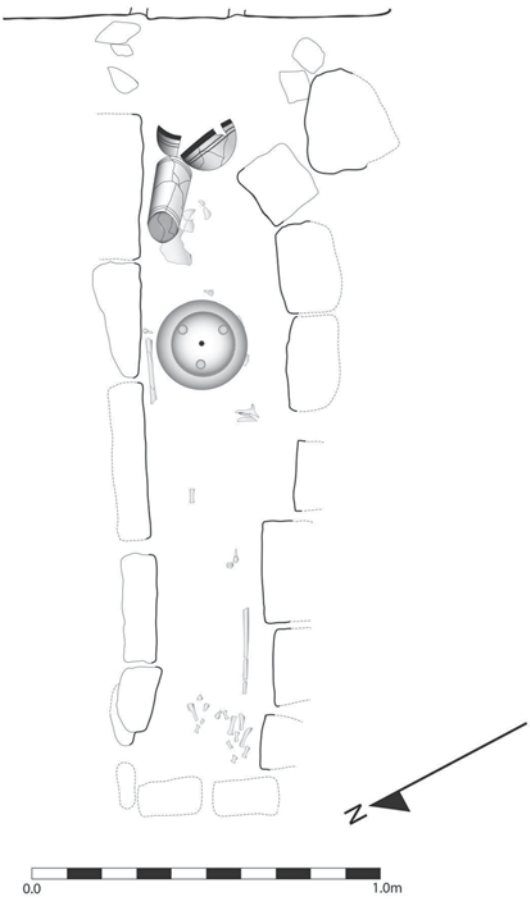

Fig. 8.9 El Kinel Burial 11. (Drawing by C. Golden)

the excavators noted the absence of the teeth, tibia, and bones of the feet. Scherer confirmed the absence of these elements as well as the fibulae during his osteological analysis. Both femora exhibit well-healed, sclerotic periostitis.

Buria1 11 (Fig. 8.9) was interred below the floor of Structure H10–1. The burial consisted of a masonry crypt with vertically set, cut limestone blocks, capped by a series of four limestone slabs, and with a floor of rough plaster. Unfortunately, the skeleton was largely disintegrated, which is a common problem with many of the well-made crypts in the Yaxchilan polity that retain an open space even centuries after their construction. The contents of such burial chambers are subject to annual cycles of inundation (rainy season) and desiccation (dry season), which promotes the fragmentation of the bone. In contrast, skeletal preservation is much better for bodies interred directly into sediments, as in the South Sector, where levels of humidity are more constant over the year. Complicating matters, well-made crypts like Burial 11 were attractive places for rodents who built nests within, gnawed on the deceased, and perhaps dined on the food that presumably occupied the bowls

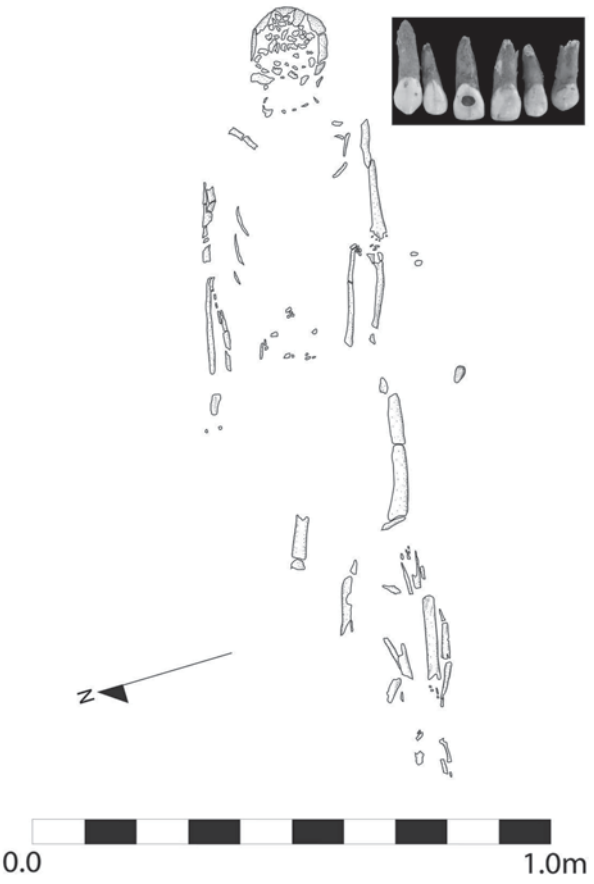

Fig. 8.10 El Kinel Burial 12. (Drawing by A. Scherer and F. Quiroa). *Inset photograph* of maxillary anterior teeth (by A. Scherer). The drawing does not include the perforated dish that was located over the head

and dishes inside of the crypts. In Burial 11, we recovered an abundance of Toltec cotton rat (*Sigmodon toltecus*) remains corresponding to a minimum of 81 individuals (based on a count of left mandibles; Ashley Sharpe, personal communication, 2012). Despite the disturbance and poor preservation, portions of the cranium, dentition, right humerus, left os coxa, left fibula, hands, and feet were recovered. The distribution of the skeletal fragments of this adult of unknown sex indicates the body was interred in an extended position with the head oriented toward the southeast (120°). An inverted perforated tripod dish (Zopilote Smudged Black; two tripods removed, similar to Burial 10) was recovered in the center of the burial. Two stacked polychrome bowls and a highly eroded polychrome cylinder vase were recovered from the southeastern (head) end of the burial.

Burial 12 (Fig. 8.10) was identified during the excavation of a test pit into the G9–2 platform. The burial facility was an irregular crypt that consisted of a series of stone blocks placed around the body and covered by stone slabs that formed part of the floor of the G9–2 superstructure. Two metate fragments, one of limestone and the other of basalt, were found near the "foot end" of the crypt. The body of a

16–20-year-old female individual was interred in an extended supine position; the arms were at the individual's sides and the head was to the southeast (110–120°). Unfortunately, the legs were badly disturbed by what appears to have been the activity of tree roots, though human agency cannot be ruled out. A perforated inverted tripod dish with a red-slipped and smudged interior was placed over the face. A carnivore (canid or felid) tooth was found among the bones of the right hand and a polished river stone was located lateral to the left femur (similar to Burial 4). Striate periostitis consistent with a healed bacterial infection was visible on both femora and tibae. The right maxillary incisor exhibits a hole drilled in its labial surface for an inlay (Fig. 8.10 inset). However, no inlay was recovered and the perforation is large and irregular as a result of cariogenic activity within the perforation. All of the other anterior teeth are present but no other teeth were modified. Classic Maya dental modifications are invariably symmetric with antimeres modified in a similar fashion. That the other teeth are unmodified may indicate that dental modification was a sequential process at El Kinel and that this person died before later alterations could be made. Alternatively, the drilling of the central incisor may have gone awry; the artisans perforating too deeply into the root chamber such that the modification of the other teeth was aborted. Certainly, it is telling that this individual died at an age when dental modification is typically performed—late adolescence or early adulthood. The infected tooth may relate to the cause of death for this individual.

8.5 From Community to Kingdom

Over the past few decades, bioarchaeology in the Maya area has been predominantly focused on issues of subsistence and health, particularly as they relate to social inequality and questions of the Classic period political collapse (e.g., Cucina and Tiesler 2003; Saul 1972; Storey 1997, 1999; White 1997; White et al. 2001; Whittington 1992, 1999; Whittington and Reed 1997; Wright 1997a, b, 2004; Wright and White 1996). A study of just 12 skeletons can contribute little to that discourse where large, diverse samples are needed. The data presented here are suggestive of widespread morbidity at El Kinel, as evidenced by the ubiquity of periostitis and porotic hyperostosis in the skeletal sample. Nevertheless, the prevalence of these disease processes is of little surprise for this preindustrial society and we can say little regarding the relationship of morbidity to mortality, inequality, and changing social processes at El Kinel. On one hand, the evidence of skeletal infection in all of the burials at El Kinel, with its low population size and density, should prompt us to question the association between morbidity and urbanism among the Maya. On the other hand, most cases were of *healed* pathologies unrelated to death. Only in the cases of Burial 10 and 11, where significant dental pathologies were observed, can we even hazard a guess as to what behaviors and conditions may relate to the death of the individuals.

Questions of morbidity, social inequality, and population dynamics aside, the excavation and analysis of the 12 burials at El Kinel provide an unprecedented glimpse

Table 8.2 Attributes of mortuary practice at El Kinel, Guatemala

Burial	Sector	Orientation	Treatment of the body	Inverted vessel	Other notable burial objects
1	North	120°	Lower legs removed	X	Four vessels placed around the pectoral region
2	South	120°	Flexed left leg		–
3	South	120°	Flexed right leg		Metate lid
4	South		Lower arms removed		Mano, chert flake, and other objects placed near pelvis
5	South	120°	Wrapped?	X	Two bowls at head; chert flake at thorax
6	South	?	?	?	Multiple ceramic vessels
7	South	120°?	?	X	Two ceramic vessels near head
8	South	120°?	?	X	Small bowl near head
9	South	120°	?	X	Mano near pelvis
10	South	120°	Lower legs removed, wrapped?	X	Mano or hammerstone in crypt wall
11	North	120°	?	X	Three ceramic vessels near the head
12	North	120°	?	X	Metate fragments near legs

into aspects of Classic Maya ideology, ritual practice, and social construction at both the level of community and kingdom. Though the sample is small, the demographic profile includes male and female individuals, and adults and children. The nonadult sample is high: 41.7% (5/12) of the burial sample, which could relate to poor early childhood health or an uneven distribution of child burials across the site, or is simply an artifact of the small burial sample size at El Kinel. Whatever the case, it is revealing that the mortuary rites at El Kinel show little bias by sex or age.

Indeed, when we begin to synthesize the mortuary data at El Kinel what emerges is an assemblage of practices that cross-cut distinctions of status, age, and sex (Table 8.2, see also Table 8.1). These persistent ritual actions underscore a perpetuated tradition of community practice and ideology at El Kinel. It is, however, insufficient to simply outline the shared practices and assume that the ancient Maya of El Kinel were social automatons, interring their dead in the "El Kinel way." Rather, we must contextualize these actions and probe their meaning, especially in light of El Kinel's position within the Yaxchilan kingdom.

For example, the use of masonry crypts at El Kinel recalls the more elaborate crypts and tombs of Yaxchilan noted earlier. More important, however, was the pervasive ritual practice at El Kinel of orienting bodies to a ritual axis of 120° east of north, a tradition clearly inspired by the polity capital of Yaxchilan and one that linked the community of El Kinel to the greater kingdom. The 120° ritual axis was employed not only at Yaxchilan but at many of its subordinate sites (e.g., Tecolote) and was also used at El Kinel to orient architecture in both the North Sector and the South Sector, the latter evident by the uncovered wall of Structure L9–3-sub 1. At El Kinel, the bodies of all but one of the South Sector burials, Burial 4, were oriented 120°.

Carolyn Tate (1992, p. 112) notes that the 120° orientation (or more accurately, 115–6°) at Yaxchilan marks the position at which the sun rises on the eastern horizon on the winter solstice. Tate suggests that the "winter solstice was the time and direction for the commemoration of the deceased" at Yaxchilan (Tate 1992, p. 114). Surprisingly, Tate generated her hypothesis without any reference to burials at the site but instead relied on the orientation of buildings and sculpture at Yaxchilan that pertained to the veneration of ancestors. For the Classic Maya, east was associated with the color red, the sun (denoted by the *k'in* sign in text and image), and the Sun God, especially his emergence at dawn from the Underworld (Stone and Zender 2011, p. 62). Among the modern Yucatec Maya, the souls of the deceased are believed to follow the pathway of the sun on its journey to paradise (Sosa 1985, p. 430), specifically a flowery place that Karl Taube (2004, p. 70–73) sees as pervasive in Classic Maya perceptions of the afterlife. In the iconography of the Yaxchilan kingdom, ancestors appear as celestial beings (the ancestor cartouches) on Yaxchilan stelae (Tate 1992, pp. 59–62) and in the murals at Bonampak. Like the sun, ancestors did not dwell permanently in the darkness of the Underworld but rose to the celestial paradise above. The winter solstice, as the shortest day of the year, marked an especially auspicious day to celebrate such transformations; the day was a turning point when the Sun God began to spend less time in the Underworld and more time in the solar paradise above. That the 120° ritual axis was built into the design of communities throughout the Yaxchilan polity underscores the importance of ancestors in place-making and the degree to which communities were organized around shared ritual action.

The notion of the soul descending into the Underworld to rise again as a celestial body finds obvious parallel with the mythological narrative of the death and rebirth of the Maize God, as illustrated on the sarcophagus lid of K'inich Janaab Pakal at Palenque and described in the K'iche' *Popol Vuh* (Christenson 2007). This myth, and more broadly the life cycle of maize and plants in general, ordered the Maya's understanding of life, death, and the afterlife (e.g., Christenson 2010; Fitzsimmons 2009; Martin 2006; Quenon and Le Fort 1997; Taube 1985, 2004, 2010; Źrałka et al. 2011). In Classic Maya art, this myth is commonly depicted as the Maize God's resurrection through a crack in the earth, most often stylized as a turtle shell (e.g., the "Resurrection Plate" from the Museum of Fine Arts, Boston, K1892). The Classic Maya variably understood the surface of the earth as either a turtle carapace, the back of a crocodile, or a quadrilateral space oriented to the cardinal directions. The latter perspective pertains to the Maya conception of space as either ordered, as embodied by the *milpa* (maize field), or wilderness, as exemplified by the forest (Gossen 1974; Taube 2003; Vogt 1992, pp. 58–59).

Many of the distinct aspects of the El Kinel burials reflect localized interpretation of these Maya beliefs. Maya milpas and houses (with their central hearths) were and are ritually centered with a quadripartite division of space (Redfield and Villa Rojas 1962, p. 114; Taube 2003, 2012). Inverted perforated dishes within Maya burials followed the same logic. Popular belief holds that such objects among the Maya and other Amerindian societies are the remains of "ritually killed" ceramics (e.g., Lucero 2010, p. 142). This assumption, however, does not explain why in-

verted vessels are more often perforated while other ceramics within the graves are typically untouched. Rather, the perforated ceramic vessels that were placed over the heads of the deceased (Burials 1, 5, 7–10, 12) or in the middle of graves (e.g., Burial 11) operated to ritually center the burial space and established an *axis mundi* linking the dead to the celestial realms (see Taube 1998, 2005; 2010 for general discussions of Maya center-making and supernatural passageways). The Classic Maya *axis mundi* was often conceptualized as a world tree, maize, the Maize God, or conflations of the three (Taube 2005, pp. 25–29). That the inverted, perforated vessels are all tripod dishes is not coincidence; the three vessel pedestals recall another aspect of center-making in Maya worldview: the three-stone hearth (Taube 1998, pp. 432–446). A remarkable variant of the use of a ceramic vessel for center-making was recovered in a Late Preclassic burial at K'axob, Belize. Rather than perforated, the interior of the K'axob dish was painted with a *k'an* cross, denoting the quadripartite division of space, and was marked by a red dot in its center (Headrick 2004, Fig. 16.2).

At El Kinel, the inverted orientation of the vessels recalls the turtle carapace as surface of the earth, much as the center perforation is reminiscent of the crack from which the Maize God emerged. However, the dish may also have solar connotations relating to underworld emergence in the sacred ideology at El Kinel. Recall that the vessels, overlaying the heads of the deceased, were placed in the east. *Elk'in* is the Classic Maya word for east, the "sun's exit," and is written as the composite of the sun-marked incense bowl (*EL*), the sun sign (*K'IN*) and, frequently, the phonetic complement *ni* (Stone and Zender 2011, p. 63). Iconographically, the *k'in* bowl (and similar solar receptacles) was associated with censing, offering, and sacrifice. Functionally, dishes in Maya iconography were equally employed for ritual as they are for holding foods. The word for plate or dish in the Classic Maya inscriptions, *lak* (Houston et al. 1989, p. 91), may have been incorporated with the word for sun, *k'in*, to become the Yucatec Maya word for east, *lak'in* (Bricker 1983, p. 347). Alternatively, the Yucatec *lak'in* may be derived from *elak'in*, in which case the association with ceramic vessels and east may again originate with the use of the *EL* incense bowl. Whatever the case, it is unlikely that the iconographic and epigraphic association of sun-marked ceramic receptacles with east and the Yaxchilan practice of orientating dish-covered heads to the rising sun on the winter solstice is coincidence. Such conflation of symbolism and similar wording relates to the Maya predilection for punning—creating multiple layers of meaning that link the immediately visible (e.g., a plate) to the comic, arcane, and abstract. In this context, the association of ceramic vessels with the solar east may relate to a general association between ceramics and fire: they are forged in flame, placed over fire during cooking, and used to serve hot foods.

The practice of placing inverted perforated vessels over the faces of the deceased, oriented to 120°, is not unique to El Kinel and has been noted elsewhere in the polity, at both Yaxchilan and at Tecolote. Though this burial orientation is distinct to the Yaxchilan kingdom, perforated inverted dishes were used in burials elsewhere in the Maya lowlands. Nevertheless, the use of perforated inverted dishes is particular to the Yaxchilan polity relative to other western kingdoms. Of the

122 burials excavated at Piedras Negras (many by Scherer), such an offering was never encountered (Escobedo and Houston 1997, 1998, 1999, 2001, 2005). No such burial has been reported from the domain of either Palenque (Ruz Lhuillier 1991) or Chinikiha (Núñez Enríquez 2012). An interesting variant of the practice was found in the Yaxchilan Structure 23 tombs attributed to Shield Jaguar III and Lady K'abal Xook; instead of a perforated bowl, a large perforated mollusk shell was placed over the face of the king and queen (García Moll 2004a, pp. 269–270).

As at El Kinel, vessels tend to be clustered near the eastern end of the burials at Yaxchilan and may have contained food to accompany the dead on their celestial journey, as practiced by some modern Maya communities (Vogt 1969, p. 218). The inclusion of food within the interments would help explain the rodent problem in Burial 11 at El Kinel and elsewhere in the Yaxchilan polity. Another commonality between the El Kinel burials and the royal tombs at Yaxchilan is the type of vessels placed in the grave, which are most frequently black tripod dishes (especially the type Zopilote Smudged Black). Such vessels were recovered from a number of the burials at El Kinel and the tombs from Yaxchilan Structure 23, and can also be seen on display in the museum at Frontera Corozal, Mexico, presumably from burials excavated in the region. The dark color may be meant to signify either the earth or underworld from which the deceased will emerge.

The recovery of *manos* and *metates* in Burials 3, 4, 9, and 12 (and perhaps the ground stone implement from Burial 10) had little to do with the occupational identities of the individuals (babies do not usually grind maize in Maya society). Instead, the objects are likely meant to relate to the widespread Maya belief that they are the "true people," made from maize (Christenson 2010) and that the cycle of their lives can be equated with that of maize (Carlsen and Prechtel 1997; Christenson 2007, p. 130). The notion of grinding the dead at El Kinel recalls a passage from the K'iche' *Popol Vuh*: "It is good that they [the brothers, Hunahpu and Xbalenque] should die. And it would be good if their bones were ground upon the face of stone like finely ground maize flour" (Christenson 2007, pp. 177).

By being ground like maize, the brothers ensured their rebirth and were thus able to return to defeat the lords of the underworld and enact the rebirth and resurrection of their father, One Hunahpu, the K'iche' equivalent of the Classic period Maize God. In the K'iche' myth, the brothers foreshadowed their death and made explicit this metaphor of maize when they said to their grandmother, "This is the sign of our word that we will leave behind. Each of us shall first plant an unripe maize in the *center* of the house. If they dry up, this is a sign of our death. 'They have died' you will say when they dry up. If then they sprout again, 'They are alive,' you will say, our grandmother and our mother" (Christenson 2007, p. 160, emphasis added). The symbolic linkage of the life and death of people with maize is widespread, today as it was in the Classic period (Carlsen and Prechtel 1997). As an interesting parallel, a sculpture on display at the Baluarte de San Miguel, Campeche shows a sacrificial victim splayed on a *metate* (Houston and Scherer 2010, Fig. 6).

The axe found in Burial 4 may also pertain to belief in Maya mythologies of life and death. Iconographically, axes are associated with the deity Chahk, bringer of rain and lightning. Referencing a series of vessel scenes in which the Maize God,

accompanied by a lightning wielding Chahk, rises from the turtle carapace, Karl Taube (2009, p. 48) points out "that the act of lightning striking the earth is music making on a cosmic scale, with thunder resounding from the carapace of the earth turtle. When the maize god emerges, he rises out of the thundering earth in dance." Michel Quenon and Geneviève Le Fort (1997, p. 898) suggest that it is the axe/lightning wielding Chahk that cracks the turtle carapace from which the Maize God emerges or, as in some scenes, dances forth (Taube 2009:Fig. 5e). The placement of axes within Maya burials is rare, though not without precedent. At Yaxchilan, the tomb attributed to Shield Jaguar III contained an impressive axe with a monolithic blade and handle knapped from Central Mexican obsidian (García Moll 2004a). The large chert flakes recovered in Burials 4 and 5 may have had similar connotations.

In most modern Maya languages, skulls and bones are referred to as seeds (and vice versa; Christenson 2007, p. 129) and, as demonstrated in the K'iche' myth above, there was a particular connection between bones and maize. In Classic Maya art, the fertility of bones is underscored by depictions of the Maize God resurrecting from inside of a skull (again, see, e.g., the "Resurrection Plate" from the Museum of Fine Arts, Boston, K1892). However, skulls and bones are polyvalent in Maya worldview and operated as symbols of death, embodiments of ancestors, trophies of enemies, ritually charged objects, and raw materials for the manufacture of tools and other objects (Fitzsimmons 2011).

Thus, understanding the missing bones in Burials 1, 4, and 10 is no easy matter. Considering that the bodies are from formalized interments with no evidence for perimortem violence, we rule out trophy-taking or similar matters of war. Furthermore, it is unlikely the bones were retained from a particularly socially significant member of the household (i.e., a lineage head) considering that one of the individuals from whom bones were retained was only 16 to 20 years old (Burial 10). Rather, we suspect that the retention of bones at El Kinel relates to the notion that bones were spiritually charged objects that could be emblematic of rebirth/resurrection. Nevertheless, a concern with respect is evident in the manner by which the bones were carefully removed so as to leave the rest of the burial intact. The power of the bones may relate to conceptions of liminality; they were elements that were brought back to the world of the living from the realm of the dead. Yaxchilan Lintel 25 (c. AD 723) provides an important royal precedent for such practice; Lady K'abal Xook uses an unidentified skull to conjure a Yaxchilan patron, Aj K'ahk' O' Chahk, who may be a manifestation of her husband, the king, Shield Jaguar III (Martin and Grube 2008, p. 125; Mathews 1988, p. 169). Elsewhere in the kingdom, a missing cranium (of a later date) was noted in a 2010 Instituto Nacional de Antropología e Historia press report of an elite burial from Bonampak. That the mandible was still in place within the Bonampak burial indicates the likelihood the cranium was removed after the original internment, similar to the process at El Kinel. As another possible parallel, two dancers from Room 3 of the Bonampak murals each hold an axe with a handle that appears to be a human long bone, possibly a femur (Looper 2009, plate 2).

At least two of the dead from El Kinel, from Burials 5 and 10, appear to have been wrapped in burial shrouds. The body in Burial 10 was wrapped with the arms

crossed over the chest. The crossed arm posture is common in Maya iconography, perhaps relating to submission or deference. Nevertheless, we do not believe it has the same connotations here. Evidence for burial wrapping has been found on occasion elsewhere in the Maya Lowlands and a significant parallel of a skeleton with crossed arms is the body attributed to Lady K'abal Xook of Yaxchilan (García Moll 2004a, p. 269). Rather, the bundling of Maya corpses likely relates to broader Mesoamerican tradition of wrapping and containing spiritually charged objects, including human remains (Guernsey and Reilly 2006).

Perhaps the most enigmatic trend in the burials of El Kinel is the flexed legs of Burials 2, 3, and 4. Although the flexure in Burial 3 may have been unintentional, caused by the placement of the leg over the lid of Burial 2, the mirror posture of Burials 2 and 4 is not a coincidence as it replicates the iconic position for dance in Classic Maya art (Looper 2009, p. 88; Maler 1911, pp. 134–135; Miller 1981). The child in Burial 2 had his or her left knee slightly flexed and left toe pointing "down." The child's right hand rested on the hip while the left hand was brought to the chest. As a point of contrast, this one-hand-up, one-hand-down posture was not encountered in the 124 burials excavated at Piedras Negras (Coe 1959; Escobedo and Houston 1997, 1998, 1999, 2001, 2005), yet has many parallels in the depiction of dance in Classic Maya art (see images in Looper 2009 or the Kerr Maya Vase Database, particularly the Maize God on K8540). As for the flexed leg of the young man in Burial 4, the tight articulation of the bones of his feet indicate he was likely wearing footwear when he was interred. One of his hands rested on his pelvis while the other was at his side. Considering the placement of his left hand, one wonders whether he was holding a perishable staff or some other object typically used in Maya dance.

As discussed previously, sociopolitical ties in the Yaxchilan kingdom were reified through ritual dance involving the king and his courtiers. Unfortunately, the diversity of dance rituals portrayed in the iconography of Yaxchilan does little to facilitate interpretation of the El Kinel burials. Nevertheless, we suspect the Yaxchilan lords' preoccupation with dance informed the mortuary rites at El Kinel. But, why dancing in the grave?

The answer again lies in Maya myths of maize, life, and death and especially beliefs pertaining to the quintessential dancer of Maya lore: the Maize God. As Mary Miller (1992, p. 159) suggests, "in nature, maize plants sway to and fro, their crisp, green leaves moving like limbs of the human body; the Maize God, too, is in motion, often seeming to dance and sway." The Maize God's role as a principal dancer can be traced at least as far back as the Late Preclassic as shown in the murals of San Bartolo. As Karl Taube (2009, p. 49) suggests, "dancing maize gods closely related to courtly life, and reflected the beauty, health and abundant wealth of the ruler. However, in dance, the maize god could also symbolize the resurrection of the deceased ruler as corn growing from the earth." We suggest that the myth of a dancing, resurrecting Maize God had currency beyond the courts and was embodied in the burials at El Kinel. It is possible that the young age of the dead in Burials 2 and 4 prompted their association with the youthful Maize God whose myth celebrates the triumph of life over death.

8.6 Conclusions

We posit that the burials of El Kinel embody pan-Maya beliefs pertaining to life and death yet were translated through local ideology. Among the most salient mortuary rites performed at El Kinel was the orientation of burials to 120°, the interment of some individuals with maize grinding implements, the burial of others with perforated inverted ceramic dishes, the removal of skeletal elements, and the positioning of limbs to replicate the idealized posture of dancers. Rather than simply revealing novel manifestations of Maya worldview, however, the data from El Kinel provide fundamental insight into the role of ritual practice in the construction of community and kingdom in the Late Classic period Yaxchilan polity.

Many of the mortuary rites detailed in this chapter were practiced by the residents of the Late Classic period inhabitants of the South Sector and the later inhabitants of the Terminal Classic period North Sector. The temporal division between these two time periods roughly corresponds to the collapse of the royal court at Yaxchilan. Among other things, the demise of kingship in the Middle Usumacinta River basin resulted in an opening up of trade, presumably as old limits on travel dissolved (Golden et al. 2012). However, with the collapse of the courts came polity fragmentation, including the demise of the landscape system of fortification employed by the lords of Yaxchilan to protect the kingdom (Scherer and Golden 2009). The resulting uncertainty may have prompted the abandonment of the South Sector, even as occupation continued and flourished in the North Sector of El Kinel.

The continuity in ritual practice across the two sectors, as evidenced in the mortuary deposits, suggests that the inhabitants of El Kinel continued to identify with the Yaxchilan polity even after the demise of its court, as further underscored by the placement of Monument 1 within the North Sector. Bear in mind, however, that Monument 1 was manufactured in the years prior to the court's collapse and predates much of the documented occupation of the North Sector. We suggest the monument was reset in the North Sector (perhaps from the South Sector, or elsewhere in the polity) as a memorial to a then-defunct court to which the inhabitants of El Kinel still identified as an important source of meaning and identity.

Aspects of the mortuary ritual, especially the concern with the 120° sacred ritual axis, further reveal that throughout its occupation, the inhabitants of El Kinel pursued shared ritual practice with the lords of Yaxchilan. One of the novel contributions of McAnany's landmark book *Living with the Ancestors* was the exploration of how the mortuary record might be used to explore the relationship between royal kingship and nonelite kinship among the Classic Maya. What we see in the mortuary record at El Kinel is the adoption of ritual ideology and practice that originated with the court at Yaxchilan and was unique to that kingdom. In this case, shared ritual practice was a mechanism through which kingdom was "imagined" (Anderson 1991).

One of the most significant assertions that we have made over the course of this chapter is that the mortuary ritual at El Kinel embodied elements of the myth of the Maize God and solar symbolism. To date, the massive body of literature on the Classic Maya emphasizes that ritual practice surrounding this deity was the

purview, if not monopoly, of the royal courts. There is little doubt that the Maya kings embodied aspects of the Maize God and invoked imagery of the sun, in both life and death. However, if our interpretations our correct, Maya nonelites also drew from this ideological well for inspiration in their own ritual practices; commoners, too, could emerge from the turtle carapace of the world's surface to rise as young maize.

It is entirely possible that Maya dynasts actively cultivated these shared practices as they pursued social coherency across their kingdoms. Nevertheless, we do not mean to suggest that shared ritual practice operated as a perfect mechanism for society building à la Émile Durkheim (2001) or Alfred R. Radcliffe-Brown (1945). Rather, we concur with Catherine Bell (1992, p. 216) and see mortuary rites and other forms of ritual practice as domains of negotiation that could operate in a diverse, and sometimes contradictory, fashion. Just as ritual practice can be employed to consolidate society's beliefs around dominant power structures (i.e., Maya royal courts), it may be employed to direct the faith of society away from such axes of power. For McAnany (1995), royal ancestor veneration was a cooption of earlier nonelite forms of ritual practice—a grassroots system remade for the interests of the elite. On the other side of that coin, we see mortuary rites at El Kinel as evidence of a willing adoption of royal ritual practice among nonelites. At the height of the court's power, shared ritual practice reinforced a coherent image of the Yaxchilan kingdom as a unified community. What is so compelling about the case of El Kinel is that this shared ritual practice remained meaningful, even as the court itself withered away.

Acknowledgments We thank the community of La Técnica for permitting us to carry out our research at El Kinel. We would like to acknowledge the contributions of our research team, particularly our codirector, Rosaura Vásquez, and those who participated in the 2006 and 2007 field seasons: Selket Callejas, Betsy Marzahn-Ramos, Juan Carlos Meléndez, Mauro Montejo, Fabiola Quiroa, and Claudia Valenzuela. Our work depended on the invaluable assistance of our local guides and excavation collaborators from the community of Santa Rita, especially Julián Aju Hitos, Pánfilo Regino Hernández, and Ambrosio Hernández Ixcayau. Our work at El Kinel was conducted with support from the Foundation for the Advancement of Mesoamerican Studies, Inc. (# 05027), the NSF Senior Research Grant Program (BCS-0715463), the H. John Heinz III Charitable Trust Grants for Latin American Archeology, and the Norman Fund and the Jane's Fund for Faculty Travel of the Latin American Studies Program at Brandeis. We thank the Defensores de la Naturaleza for their support and assistance, and IDAEH and CONAP for permission to carry out our research in and around the Parque Nacional Sierra del Lacandón. Marc Zender and Gabriel D. Wrobel provided valuable comments on an earlier draft of this paper. All errors and omissions are ours.

References

Anaya Hernandez, A. (2001). *Site interaction and political geography in the Upper Usumacinta region during the Late Classic: A GIS approach.* International Series 994. Oxford: British Archaeological Reports.

Anderson, B. (1991). *Imagined communities: Reflections on the origin and spread of nationalism*. London: Verso.

Ashmore, W. (1991). Site-planning principles and concepts of directionality among the ancient Maya. *Latin American Antiquity, 2*(3), 199–226.

Ashmore, W., & Sabloff, J. A. (2002). Spatial orders in Maya civic plans. *Latin American Antiquity, 13*(2), 201–215.

Barnhart, E. L. (2002). Residential burials and ancestor worship: A reexamination of Classic Maya settlement patterns. In V. Tiesler Blos, R. Cobos, & M. Greene Robertson (Eds.), *La organización social entre los Mayas prehispánicos, coloniales y modernos* (pp. 141–158). Mexico City: Instituto Nacional de Antropología e Historia, Mexico.

Bell, C. (1992). *Ritual theory, ritual practice*. Oxford: Oxford University Press.

Bell, E. E., Sharer, R. J., Traxler, L. P., Sedat, D. W., Carrelli, C. W., & Grant, L. A. (2004). Tombs and burials in the Early Classic acropolis at Copan. In E. E. Bell, M. A. Canuto, & R. J. Sharer (Eds.), *Understanding Early Classic Copan* (pp. 131–158). Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Bricker, V. R. (1983). Directional glyphs in Maya inscriptions and codices. *American Antiquity, 48*(2), 347–353.

Buikstra, J. E., Price, T. D., Wright, L. E., & Burton, J. H. (2004). Tombs from Copan's acropolis: A life history approach. In E. E. Bell, M. A. Canuto, & R. J. Sharer (Eds.), *Understanding Early Classic Copan* (pp. 191–212). Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Buikstra, J. E., & Ubelaker, D. H. (1994). *Standards for data collection from human skeletal remains*. Arkansas Archeological Survey Research Series No. 44. Fayetteville: Arkansas Archeological Survey.

Carlsen, R. S., & Prechtel, M. (1997). The flowering of the dead. In R. S. Carlsen (Ed.), *The war for the heart and soul of a Highland Maya town* (pp. 47–67). Austin: University of Texas Press.

Chase, D. Z., & Chase, A. F. (2011). Ghosts amid the ruins. In J. L. Fitzsimmons & I. Shimada (Eds.), *Living with the dead: Mortuary ritual in Mesoamerica* (pp. 78–101). Tucson: The University of Arizona Press.

Christenson, A. J. (2007). *Popol Vuh: The sacred book of the Maya. The great classic of Central American spirituality, translated from the original Maya text*. Norman: University of Oklahoma Press.

Christenson, A. J. (2010). Maize was their flesh: Ritual feasting in the Maya Highlands. In J. E. Stall & M. Carrasco (Eds.), *Pre-Columbian foodways: Interdisciplinary approaches to food, culture, and markets in ancient Mesoamerica* (pp. 577–600). New York: Springer.

Coe, W. R. (1959). *Piedras Negras archaeology: Artifacts, caches, and burials*. Museum Monographs 18. Philadelphia: University Museum, University of Pennsylvania.

Cucina, A., & Tiesler, V. (2003). Dental caries and antemortem tooth loss in the Northern Peten area, Mexico: A biocultural perspective on social status differences among the Classic Maya. *American Journal of Physical Anthropology, 122,* 1–10.

Durkheim, É. (2001). The elementary forms of religious life (trans: C. Cosman). Oxford: Oxford University Press.

Eberl, M. (2005). *Muerte, entierro y ascensión. Ritos funerarios entre los antiguos Mayas*. Libros Científicos. Tratados 21. Mérida: Universidad Autónoma de Yucatán.

Escobedo, H. L. (2001). Anexo I: Notas sobre el monumento de la cooperativa tecnica agropecuaria, La Libertad, Peten. In P. M. Morales (Ed.), *Prospección arqueológica del sitio El Kinel, La Libertad, Petén: Temporada 2001* (pp. 14–15). Guatemala City: Informe Final Entregado al Instituto de Antropología e Historia.

Escobedo, H. L., & Houston, S. D. (Eds.). (1997). *Proyecto arqueológico Piedras Negras: Informe preliminar no. 1, tercera temporada*, *1997*. Guatemala City: Informe Entregado al Instituto de Antropología e Historia de Guatemala.

Escobedo, H. L., & Houston, S. D. (Eds.). (1998). *Proyecto arqueológico Piedras Negras: Informe preliminar No. 2, tercera temporada*, *1998*. Guatemala City: Informe Entregado al Instituto de Antropología e Historia de Guatemala.

Escobedo, H. L., & Houston, S. D. (Eds.). (1999). *Proyecto arqueológico Piedras Negras: Informe preliminar No. 3, tercera temporada*, *1999*. Guatemala City: Informe Entregado al Instituto de Antropología e Historia de Guatemala.

Escobedo, H. L., & Houston, S. D. (Eds.). (2001). *Proyecto arqueológico Piedras Negras: Informe preliminar No. 4, cuarta temporada*, *2000*. Guatemala City: Informe Entregado al Instituto de Antropología e Historia de Guatemala.

Escobedo, H. L., & Houston, S. D. (Eds.). (2005). *Informe de las intevenciones en la Estructura K-5 de Piedras Negras*. Report Presented to the Dirección General del Patrimonio Cultural y Natural de Guatemala, Guatemala City.

Fitzsimmons, J. L. (1998). Classic Maya mortuary anniversaries at Piedras Negras. *Ancient Mesoamerica, 9,* 271–278.

Fitzsimmons, J. L. (2006). Classic Maya tomb re-entry. In P. R. C. Colas, G. Le Fort, & B. Liljefors Persson (Eds.), *Jaws of the underworld: Life, death, and rebirth among the ancient Maya* (pp. 35–42). Acta Mesoamericana, 16. Markt Schwaben: Verlag.

Fitzsimmons, J. L. (2009). *Death and the Classic Maya kings*. Austin: University of Texas Press.

Fitzsimmons, J. L. (2011). Perspectives on death and transformation in ancient Maya society. In J. L. Fitzsimmons & I. Shimada (Eds.), *Living with the dead: Mortuary ritual in Mesoamerica* (pp. 51–77). Tucson: The University of Arizona Press.

García Moll, R. (2003). *La arquitectura de Yaxchilan*. Mexico City: Instituto Nacional de Antropologia e Historia.

García Moll, R. (2004a). Shield Jaguar and Structure 23 at Yaxchilan. In M. E. Miller & S. Martin (Eds.), *Courtly art of the ancient Maya* (pp. 268–270). San Francisco: Fine Arts Museums of San Francisco.

García Moll, R. (2004b). Yaxchilan: Evolucion interna. In A. Benavides, L. Manzanilla, & L. Mirambell (Eds.), *Homenaje a Jaime Litvak* (pp. 287–316). Mexico City: Instituto Nacional de Antropologia e Historia.

García Moll, R., & Cosío, D. J. (1986). *Yaxchilán: Antología de su descubrimiento y estudios*. Colección Científica, Serie Arqueología, No. 152. Mexico City: Instituto Nacional de Antropología e Historia.

Gillespie, S. D. (2001). Personhood, agency, and mortuary ritual: A case study from the ancient Maya. *Journal of Anthropological Archaeology, 20,* 73–112.

Gillespie, S. D. (2002). Body and soul among the Maya: Keeping the spirits in place. *Archeological Papers of the American Anthropological Association, 11,* 67–78.

Golden, C. (2003). The politics of warfare in the Usumacinta Basin: La Pasadita and the realm of Bird Jaguar. In M. K. Brown & T. Stanton (Eds.), *Ancient Mesoamerican warfare* (pp. 31–48). Walnut Creek: Alta Mira Press.

Golden, C., & Scherer, A. K. (2006). Border problems: Recent archaeological research along the Usumacinta River. *PARI Journal, 7*(2), 1–16.

Golden, C., & Scherer, A. K. (2013). Territory, trust, growth and collapse in Classic period Maya kingdoms. *Current Anthropology, 54*(4), 397–435.

Golden, C., Scherer, A. K., Muñoz, A. R., & Hruby, Z. (2012). Polities, boundaries, and trade in the Classic period Usumacinta River Basin. *Mexicon, XXXIV*(1), 11–19.

Golden, C., Scherer, A. K., Muñoz, A. R., & Vásquez, R. (2008). Piedras Negras and Yaxchilan: Divergent political trajectories in adjacent Maya polities. *Latin American Antiquity, 19*(2), 249–274.

Golden, C., Scherer, A. K., & Vásquez, R. (Eds.). (2006). *Proyecto Regional Arqueológico Sierra Lacandon: Informe preliminar number 4*. Report Presented to the Instituto de Antropología e Historia de Guatemala (IDAEH), Guatemala City. http://usumacinta-archaeology.blogspot.com/p/publications.html.

Golden, C. W., Scherer, A. K., & Muñoz, A. R. (2005). Exploring the Piedras Negras-Yaxchilán border zone: Archaeological investigations in the Sierra del Lacandón, 2004. *Mexicon, XXVII*(1), 11–16.

Golden, C. W., Scherer, A. K., Vásquez, R., Arroyave, A. L., Meléndez, J. C., Pérez, G., Quiroa, F., & Marzahn-Ramos, B. (2007). La frontera actual, la frontera antigua: Resultados de la

temporada de campo 2006 en El Parque Nacional Sierra del Lacandón. In J. P. Laporte, B. Arroyo, & H. E. Mejía (Eds.), *XVX Simposio de Investigaciones Arqueológicos en Guatemala*, *2006* (pp. 279–292). Guatemala City: Museo Nacional de Arqueología y Etnología.

Gossen, G. H. (1974). *Chamulas in the world of the sun: Time and space in Maya oral tradition*. Prospect Height: Waveland Press.

Grube, N. (1992). Classic Maya dance: Evidence from hieroglyphs and iconography. *Ancient Mesoamerica, 3,* 201–218.

Guernsey, J., & Reilly, F. K. (Eds.). (2006). *Sacred bundles: Ritual acts of wrapping and binding in Mesoamerica*. Barnardsville: Boundary End Resarch Center.

Headrick, A. (2004). The quadripartite motif and the centralization of power. In P. A. McAnany (Ed.), *K'axob: Ritual, work, and family in an ancient Maya village* (pp. 367–378). Monumenta Archaeologica 22. Los Angeles: The Cotsen Instititute of Archaeology (University of California).

Helmke, C. (2010). The transferral and inheritance of ritual priveleges: A Classic Maya case from Yaxchilan, Mexico. *Wayeb Notes, 35,* 1–14.

Houk, B. A., Robichaux, H. R., & Valdez, F. (2010). An early royal Maya tomb from Chan Chich, Belize. *Ancient Mesoamerica, 21*(2), 229–248.

Houston, S. D. (1993). *Hieroglyphs and history at Dos Pilas: Dynastic politics of the Classic Maya*. Austin: University of Texas Press.

Houston, S. D., Escobedo, H. L., Golden, C. W., Scherer, A. K., Vásquez, R., Arroyave, A. L., Quiroa, F., & Meléndez, J. C. (2006). La Técnia and El Kinel: Mounds and monuments upriver from Yaxchilan. *Mexicon, XXVIII,* 87–93.

Houston, S. D., & Scherer, A. K. (2010). La ofrenda máxima: El sacrificio humano en la parte central del área Maya. In L. López Luján & G. Olivier (Eds.), *Nuevas perspectivas sobre el sacrificio humano entre los Mexicas* (pp. 167–191). Mexico City: Instituto Nacional de Antropología e Historia.

Houston, S. D., Stuart, D., & Taube, K. A. (1989). Folk classification of Classic Maya pottery. *American Anthropologist, 91*(3), 720–726.

Looper, M. (2009). *To be like gods: Dance in ancient Maya civilization*. Austin: University of Texas Press.

Lucero, L. J. (2010). Materialized cosmology among ancient Maya commoners. *Journal of Social Archaeology, 10*(1), 138–167.

Maler, T. (1911). *Explorations in the Department of Petén, Guatemala, Tikal: Report of explorations for the museum*. Memoirs of the Peabody Museum of American Archaeology and Ethnology, Harvard University. (Vol. 5, No. 1). Cambridge: Peabody Museum, Harvard University.

Martin, S. (2006). Cacao in ancient Maya religion: First fruit from the maize tree and other tales from the underworld. In C. McNeil (Ed.), *Chocolate in Mesoamerica: A cultural history of cacao* (pp. 154–183). Gainesville: University Press of Florida.

Martin, S., & Grube, N. (2008). *Chronicle of the Maya kings and queens*. (2nd edn.) New York: Thames & Hudson.

Mathews, P. (1988). *The sculpture of Yaxchilan*. Ph.D. dissertation. New Haven: Yale University.

McAnany, P. A. (1995). *Living with the ancestors: Kinship and kingship in ancient Maya society*. Austin: University of Texas Press.

McAnany, P. A. (1998). Ancestors and the Classic Maya built environment. In S. D. Houston (Ed.), *Function and meaning in Classic Maya architecture* (pp. 271–298). Washington, D.C.: Dumbarton Oaks Research Library and Collection.

McAnany, P. A., Storey, R., & Lockard, A. K. (1999). Mortuary ritual and family politics at Formative and Early Classic K'axob, Belize. *Ancient Mesoamerica, 10,* 129–146.

Miller, M. E. (1992). The image of people and nature in Classic Maya art and architecture. In R. F. Townsend (Ed.), *The ancient Americas: Art from sacred landscapes* (pp. 158–169). Chicago: The Art Institute of Chicago.

Miller, V. E. (1981). *Pose and gesture in Classic Maya monumental sculpture*. Ph.D. dissertation. Austin: University of Texas.

Morales, P. (2000a). *Registro de Estela 1, de El Kinel, La Libertad, Petén*. Guatemala City: Informe presentado al Instituto de Antropología e Historia.

Morales, P. (2000b). Sitios arqueológicos de reciente descubrimiento en los municipios de San Andrés y La Libertad, Peten. In J. P. Laporte & H. L. Escobedo (Eds.), *XIV Simposio de Investigaciones Arqueológicas en Guatemala* (pp. 482–495). Guatemala City: Museo Nacional de Arqueología y Etnología.

Morales, P. (2001). *Prospección arqueológica del sitio El Kinel, La Libertad, Petén: Temporada 2001*. Guatemala City: Informe Entregado al Instituto de Antropología e Historia.

Morales, P., & Ramos, C. E. (2002). Prospección arqueológica en El Kinel, La Libertad, Petén. In J. P. Laporte, H. L. Escobedo, & B. Arroyo (Eds.), *XV Simposio de Investigaciones Arqueológicas en Guatemala*, *2001* (pp. 154–165). Guatemala City: Museo Nacional de Arqueología y Etnología.

Núñez Enríquez, L. (2012). Las sepulturas. In R. Liendo Stuardo (Ed.), *Proyecto Arqueológico Chinikihá: Informe, cuarta temporada*, 2011 (pp. 178–224). Report Submitted to the Instituto Nacional de Antropología e Historia, Mexico, D.F.

Quenon, M., & Le Fort, G. (1997). Rebirth and resurrection in maize god iconography. In B. Kerr & J. Kerr (Eds.), *The Maya vase book: A corpus of rollout photographs of Maya vases*. (Vol. 5., pp. 884–902). New York: Kerr Associates.

Radcliffe-Brown, A. R. (1945). Religion and society. *Journal of the Royal Anthropological Institute of Great Britain and Ireland, 75,* 33–43.

Redfield, R., & Villa Rojas, A. (1962). *Chan Kom: A Maya village. Carnegie Institution of Washington Publication 448*. Chicago: The University of Chicago Press.

Ruz Lhuillier, A. (1991). *Costumbres funerarias de los antiguos Mayas*. Mexico City: Universidad Nacional Autónoma de México.

Safronov, A. (2005). Yaxchilan wars in the reign of ‘Itsamnaaj B’alam IV (771—ca. 800). 1385. In P. Eeckhout & G. Le Fort (Eds.), *Wars and conflicts in Prehispanic Mesoamerica and Andes* (pp. 50–57). (BAR International Series no. 1385) Oxford: British Archaeological Reports.

Saul, F. P. (1972). *The human skeletal remains of Altar de Sacrificios: An osteobiographic analysis. Papers of the Peabody Museum of Archaeology and Ethnology*, (Vol. 63, No. 2). Cambridge: Harvard University.

Scherer, A. K. (2006). Bioarqueología de El Kinel, La Técnica, y Zancudero. In C. W. Golden, A. K. Scherer, & R. Vásquez (Eds.), *Proyecto Arqueológico Sierra del Lacandón, Informe Preliminar No. 4, Cuarta Temporada 2006* (pp. 83–94). Report presented to the Instituto de Antropología e Historia de Guatemala (IDAEH), Guatemala City. http://usumacinta-archaeology.blogspot.com/p/publications.html.

Scherer, A. K. (2007). Bioarqueología de El Kinel, temporada de campo 2007. In A. K. Scherer, C. Golden, & R. Vásquez (Eds.), *Proyecto Regional Arqueológico Sierra del Lacandón: Informe Preliminar No. 5* (pp. 186–201). Report presented to the Instituto de Antropología e Historia de Guatemala (IDAEH), Guatemala City. http://usumacinta-archaeology.blogspot.com/p/publications.html.

Scherer, A. K. (2012). The Classic Maya sarcophagus: Rebirth and renewal at Palenque and Tonina. *RES: Journal of Anthropology and Aesthetics, 61/62,* 242–261.

Scherer, A. K., & Golden, C. (2009). Tecolote, Guatemala: Archaeological evidence for a fortified Late Classic Maya political border. *Journal of Field Archaeology, 34*(3), 285–304.

Scherer, A. K., & Golden, C. (2012). *Revisiting Maler’s Usumacinta: Recent archaeological investigation in Chiapas, Mexico*. San Francisco: The Pre-Columbian Art Research Institute.

Scherer, A. K., & Golden, C. (2014). War in the West: History, landscape, and Classic Maya conflict. In A. K. Scherer & J. W. Verano (Eds.), *Battlegrounds and battered bodies: War in Pre-Columbian America*. Washington, D.C.: Dumbarton Oaks Research Library and Collection, pp. 57–92.

Scherer, A. K., & Golden, C. (2013). Water in the West: Chronology and collapse of the Classic Maya river kingdoms. In G. Iannone (Ed.), *The great Maya droughts in cultural context* (pp. 224–248). Boulder: University of Colorado Press.

Scherer, A. K., Golden, C., & Vásquez, R. (Eds.). (2007). *Proyecto Regional Arqueológico Sierra Lacandon: Informe preliminar number 5*. Report presented to the Instituto de Antropología e Historia de Guatemala (IDAEH), Guatemala City. http://usumacinta-archaeology.blogspot.com/p/publications.html.

Sosa, J. R. (1985). *The Maya sky, the Maya world: A symbolic analysis of Yucatec Maya cosmology*. Ph.D. dissertation. Albany: State University of New York.

Stone, A., & Zender, M. (2011). *Reading Maya art: A hieroglyphic guide to ancient Maya painting and sculpture*. New York: Thames & Hudson.

Storey, R. (1997). Individual frailty, children of privilege, and stress in Late Classic Copán. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 116-126). Washington, D.C.: Smithsonian Institution Press.

Storey, R. (1999). Late Classic nutrition and skeletal indicators at Copán, Honduras. In C. D. White (Ed.), *Reconstructing ancient Maya diet* (pp. 169–183). Salt Lake City: University of Utah Press.

Tate, C. E. (1992). *Yaxchilán: The design of a Maya ceremonial city*. Austin: University of Texas Press.

Taube, K. A. (1985). The Classic Maya maize god: A reappraisal. In V. M. Fields (Ed.), *Fifth Palenque round table, 1983* (pp. 171–181). San Francisco: The Pre-Columbian Art Research Institute.

Taube, K. A. (1998). The jade hearth: Centrality, rulership, and the Classic Maya temple. In S. Houston (Ed.), *Function and meaning in Classic Maya architecture* (pp. 427–478). Washington, D.C.: Dumbarton Oaks Research Library and Collection.

Taube, K. A. (2003). Ancient and contemporary Maya concepts about field and forest. In A. Gómez-Pompa, M. F. Allen, S. L. Fedick, & J. J. Jiménez-Osornio (Eds.), *The Lowland Maya area: Three millenia at the human-wildland interface* (pp. 461–494). New York: Food Products Press.

Taube, K. A. (2004). Flower mountain: Concepts of life, beauty, and paradise among the Classic Maya. *RES: Anthropology and Aesthetics, 45*(Spring), 69–98.

Taube, K. A. (2005). The symbolism of jade in Classic Maya religion. *Ancient Mesoamerica, 16,* 23–50.

Taube, K. A. (2009). The Maya maize god and the mythic origins of dance. In G. L. F. Le Fort, R. Gardiol, S. Matteo, & C. Helmke (Eds.), *The Maya and their sacred narratives: Text and context in Maya mythologies* (pp. 41–52). Acta Mesoamericana, Vol. 20. Markt Schwaben: Verlag.

Taube, K. A. (2010). Gateways to Another World: The symbolism of flowers in Mesoamerica and the American Southwest. In K. Hays-Gilpin & P. Schaafsma (Eds.), *The land brightened with flowers: The Hopi Iconography Project* (pp. 73–120). Flagstaff: Museum of Northern Arizona Bulletin.

Taube, K. A. (2012). Creation and cosmology: Gods and mythic origins in ancient Mesoamerica. In D. Nichols & C. Pool (Eds.), *The Oxford handbook of Mesoamerican archaeology* (pp. 741-751). Oxford: Oxford University Press.

Tokovinine, A. (2005). The dynastic struggle and the biography of a *Sajal*: "I was with that king". In P. Eeckhout & G. Le Fort (Eds.), *Wars and Conflicts in Prehispanic Mesoamerica and the Andes* (pp. 37–49). BAR International Series, no. 1385. Oxford: John and Erica Hedges Ltd.

Tovalín Ahumada, A., & Ortiz Villarreal, V. M. (1999). Ofrendas de Bonampak en contextos funerarios. In J. P. Laporte & H. Escobedo (Eds.), *XII Simposio de Investigaciones Arqueológicas en Guatemala*, *1998* (pp. 583–599). Guatemala City: Museo Nacional de Arqueología y Entología.

Tovalín Ahumada, A., & Ortiz Villarreal, V. M. (2006). Bonampak más allá de sus murales. La gran plaza. *Lakamha'*, Año 5/Segunda Época*, 19,* 3–6.

Vásquez, R., Scherer, A. K., & Golden, C. (Eds.). (2005). *Proyecto Regional Arqueológico Sierra Lacandon: Informe preliminar number 3*. Report presented to the Instituto de Antropología e Historia de Guatemala (IDAEH), Guatemala City. http://www.sierralacandon.org/resources-pubs.html.

Vásquez, R., Scherer, A. K., Golden, C., Houston, S. D., Quiroa, F., Meléndez, J. C., & Arroyave, A. L. (2006). En el reino de Pájaro Jaguar: Reconocimiento arqueológico en el área sur de la Sierra del Lacandón, Petén. In J. P. Laporte, B. Arroyo, & H. Mejía (Eds.), XIX Annual Simposio de Investigaciones Arqueológicas en Guatemala, 2005 (pp. 795–804). Guatemala City: Museo Nacional de Arqueología y Etnología.

Vogt, E. Z. (1969). *Zinacantan: A Maya community in the Highlands of Chiapas*. Cambridge: The Belnap Press of Harvard University.

Vogt, E. Z. (1992). *Tortillas for the gods: A symbolic analysis of Zinacanteco rituals*. Norman: University of Oklahoma Press.

Weiss-Krejci, E. (2009). El papel político de los muertos entre los antiguos Mayas de Tikal. *Los Investigadores de la Cultura Maya 17, 1,* 129–142.

Weiss-Krejci, E. (2011). The role of dead bodies in Late Classic Maya politics: Cross-cultural reflections on the meaning of Tikal Altar 5. In J. L. Fitzsimmons & I. Shimada (Eds.), *Living with the dead: Mortuary ritual in Mesoamerica* (pp. 17–52). Tucson: The University of Arizona Press.

White, C. D. (1997). Ancient diet at Lamanai and Pacbitun: Implications for the ecological model of collapse. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 171–180). Washington, D.C.: Smithsonian Institution Press.

White, C. D., Pendergast, D. M., Longstaffe, F. J., & Law, K. R. (2001). Social complexity and food systems at Altun Ha, Belize: The isotopic evidence. *Latin American Antiquity, 12*(4), 371–394.

Whittington, S. L. (1992). Enamel hypoplasia in the low status Maya population of prehispanic Copan, Honduras. In A. H. Goodman & L. L. Capasso (Eds.), *Recent contributions to the study of enamel developmental defects* (pp. 185–206). Journal of Paleopathology Monographic Publications No. 2. Chieti. Italy: Associazone Antropologica Abruzze.

Whittington, S. L. (1999). Caries and antermortem tooth loss at Copán: Implications for commoner diet. In C. D. White (Ed.), *Reconstructing ancient Maya diet* (pp. 151–167). Salt Lake City: University of Utah Press.

Whittington, S. L., & Reed, D. M. (1997). Commoner diet at Copán: Insights from stable isotopes and porotic hyperostosis. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 157–170). Washington, D.C.: Smithsonian Institution Press.

Wright, L. E. (1997a). Ecology or society? Paleodiet and the collapse of the Pasión Maya Lowlands. In S. L. Whittington & D. M. Reed (Eds.), *Bones of the Maya: Studies of ancient skeletons* (pp. 181–195). Washington, D.C.: Smithsonian Institution Press.

Wright, L. E. (1997b). Intertooth patterns of hypoplasia expression: Implications for childhood health in the Classic Maya Collapse. *American Journal of Physical Anthropology, 102,* 233–247.

Wright, L. E. (2004). Osteological investigations of ancient Maya lives. In C. W. Golden & G. Borgstede (Eds.), *Continuities and changes in Maya archaeology* (pp. 201–216). New York: Routledge.

Wright, L. E., & White, C. D. (1996). Human biology in the Classic Maya collapse: Evidence from paleopathology and paleodiet. *Journal of World Prehistory, 10,* 147–198.

Źrałka, J., Koszkul, W., Martin, S., & Hermes, B. (2011). In the path of the maize god: A royal tomb at Nakum, Petén, Guatemala. *Antiquity, 85*(329), 890–908.

Chapter 9
Mortuary Pathways and Ritual Meanings Related to Maya Human Bone Deposits in Subterranean Contexts

Andrea Cucina and Vera Tiesler

Abstract The ancient Maya regarded dry caves, crevices, rockshelters, and cenotes as sacred spaces and accesses to the earthen womb of the cosmos, thresholds through which the living communicated with natural powers. To test different hypotheses for context-specific or diverse mortuary use of Maya caves, cenotes, crevices, and rockshelters, we describe sex and age profiles, note the presence and types of cranial modifications, compare patterns of posthumous body manipulation, and reconstruct mortuary pathways in 35 human bone assemblages from the Maya realm, spanning the Preclassic to Colonial/Modern times, the latter represented by the Lacandon Maya in the forest of Chiapas. Combining anthropological, taphonomic, and contextual data sets, we test the hypothesis that different ritual practices and associated mortuary behaviors may be recognized by profiling burial populations from caves, crevices, rockshelters, and cenotes, and both wet and dry cave deposits. The documented scope of mortuary practices involving "hidden places" indicates that every single context went through its own history of use and reuse, regardless of the specific type of context. These results suggest the need for a reevaluation of the generalized roles of such sites as human depositories and for the application of more precise techniques in the recovery and subsequent analyses of human deposits directly related to access to the underworld.

9.1 Introduction

Subterranean passages (deep caves, crevices, rockshelters, sinkholes, etc.) have always occupied a central role in Maya thought and cosmology as places to access the cosmic *mountain* (Bassie-Sweet 1996).[1] Therefore, the exploration and

[1] We employ the word "cave" in this study to designate subterranean passages in general.

A. Cucina (✉) · V. Tiesler
Facultad de Ciencias Antropológicas, Universidad Autónoma de Yucatán,
Km. 1 Carretera Mérida-Tizimín, Cholul, 97305 Mérida, Yucatan, Mexico
e-mail: cucina@uady.mx

V. Tiesler
e-mail: vtiesler@uady.mx

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_9,

interpretation of human remains from these natural geological cavities provide a substantial contribution to the general understanding of Maya mythology and its manifestations in the ancient and modern mortuary ritual landscape (Bassie-Sweet 1996; Bonor 1989; Brady and Prufer 2005; Prufer and Brady 2005; Stone 1995). Given the unified role of these sacred spaces in Mesoamerican worldview, as represented by the Hero Twins defeating the Death Lords in the Xibalba of the Popol Vuh myth (Christensen 2007),[2] it is easy to understand how death, materialized in the form of lifeless bodies, decaying body parts, or skeletonized bones, figured prominently in ancient Maya rituals performed in such hidden geological contexts. These rituals might have been associated with private or public functions in the community and could have been motivated by ancestor veneration, sacrifice, or other behaviors involving human offerings. However, we cannot rule out that they also may have been misinterpreted as something more spiritually laden than they actually were, and in some cases may, instead, simply represent "normal" funerary contexts.

In this chapter, we seek to encompass the scope of mortuary behavior in Maya cave contexts with some of their behavioral underpinnings, calling particular attention to the different and often differentiated taphonomic and osteological patterns in human cave assemblages. As mentioned above, the term "cave" is defined here categorically as a natural underground space. We distinguish dry from submerged subterranean contexts. The latter identify mostly cenotes, i.e., karstic sinkholes that lace the peninsular plains of Yucatan. Distributed all over the Maya area, dry caves form naturally by the weathering of rock and often extend deep underground. These deep caves are distinguished from shallow cave-like openings at the base of a bluff or cliff, such as rockshelters and crevices (i.e., a fracture or fissure in the rock). In archaeology, caves and rockshelters (probably including crevices among the latter) tend to be crisply dichotomized as functionally different types of sites. Nonetheless, such categorical distinction must be used with caution since it "can obfuscate our understanding of the Maya appropriation of underground use" (Rissolo 2005, p. 354), given the fact that the Maya point of view might be different from the westernized one.

Our review of the literature and our own work on human cave assemblages is anchored in two conflicting ideas regarding the nature of "subterranean" human deposits. The first model argues for diverse uses of each type of geological context. It rests upon the observed variability in mortuary pathways encountered even in geologically analogous cavernous contexts (i.e., sites that are morphologically similar to one another). In contrast stands a second model that builds on Thompson's (1992) and Ruz's (1991) idea that the Maya considered caves and cenotes to have distinct ideological meanings and therefore expressed distinct ritual uses. This hypothesis proposes that different mortuary rituals are associated with each specific geological form (i.e., deep dry caves, cenotes, crevices, and rockshelters). Due to the lack of

[2] According to López Austin (1989, p. 23), we understand *worldview* as the articulated set of ideological systems and elements (preferences, concepts, attitudes and beliefs) that are interrelated in a relatively congruent manner, through which an individual or social group attempts to understand the world.

detailed taphonomic information from most of these sites, we will primarily focus our analysis on the sex and age profiles and cranial modifications from each site, as well as aspects of posthumous body treatments inferred from the distribution of anthropogenic marks on bone.

9.2 Potential and Limitations of the Study of Human Bone Deposits in Maya Caves

Despite the prominent role of human remains in Mesoamerican ideology and religious ceremonies, our knowledge of the specific forms of their ritual disposal and of postdepositional treatments remains fragmentary (Scott and Brady 2005). Similarly, as mentioned above, we still have a rather sketchy understanding of the exact functions or meanings of such deposits within various chronological and cultural contexts, a conclusion already drawn by Ricketson (1925), and voiced again and again by more recent scholarship (see Scott and Brady 2005, pp. 263–266; Tiesler 2005, pp. 342–344 for a brief review of the literature; Also, see Wrobel et al., Chap. 4, this volume).

There are several reasons for the shortcomings of this and other lines of research on ancient human cave assemblages, which we wish to address in the following paragraphs. In a nutshell, "background noise" is imposed by the mostly incomplete nature of the mortuary record (as standing for the ancient funerary rite) in caves and the notoriously bad preservation of organic remains (Tiesler 2005). This situation is often aggravated in cave contexts by scavenging and looting of accessible materials. Direct cultural associations are limited or impossible in most cave assemblages from remote areas, as they are devoid of any residential functions.

Other limitations in studying ancient Maya mortuary behavior in caves have to do with pre-Hispanic mortuary behavior in ancient Mesoamerica. Here, native cosmology and religious thought denote an intimate relationship between life and death. The continuity between the realm of death and that of the living is expressed in the common use of residential living spaces as depositional areas for the deceased (Fitzsimmons and Shimada 2011; López Austin 1989; Malvido et al. 1997; Manzanilla and Serrano 2003). Combined with the lack of any collectively regulated disposal areas exclusively destined for the burial of the dead (Goldstein 1981; Saxe 1970), this fluid notion of life and death presents Mesoamerican archaeology with an enormous range of disposal forms and spaces in both ancestrally and sacrificially motivated behavior involving human deposition.

It is often difficult to distinguish the mortuary behavior from other kinds of activity in Mesoamerican archaeology. The ancient Maya mortuary record denotes a fluid transition between life and death, which is most noticeable within the confines of its pre-Hispanic communities and urban centers (Fitzsimmons 2009; Welsh 1988). Noticeably, ancient Maya settlements did not hold separate cemeteries, conceived here as formal disposal areas exclusively used for burial of the dead (Goldstein 1981). Instead, human assemblages are found interspersed, at least spatially, with all sorts

of other activity areas inside and outside of settlements. This inclusive notion is also expressed in many human assemblages from Maya rockshelters, crevices, and surface and underwater caves, whose material record manifests an often large scope of rituals and quotidian uses apart from serving as natural "ready-made" depositories for the dead (see, e.g., Bonor 1989; Carot 1989; Wrobel 2008; Wrobel et al. 2009).

Posthumous body treatments in ancient Maya cave deposits and mortuary depositions in general were just as diverse as the locations where they were interred. Here, primary placements of individual corpses demonstrate an array of different body arrangements (supine, flexed, seated, etc.) oriented in all directions. Pigmentation or wrapping procedures were practiced in some areas (Fitzsimmons 2009; Pereira and Michelet 2004; Tiesler et al. 2012; also, see Duncan, Chap. 10, this volume). Other treatments, like cremation, postdepositional burning, extraction (reduction) or addition of corpses, and reuse and recycling (of the body, the skeleton, or its segments), have all been clearly identified as ancestral behaviors in the material record (Fitzsimmons 2009; Tiesler and Cucina 2007; Weiss-Krejci 2011). Single bones of ancestors as relicts were often destined to be venerated in temples and altars or to accompany later primary interments of family members (McAnany 1995; Weiss-Krejci 2011). Less reverentially motivated ancient disturbances could result from intentional desecration and looting, from disposal of the bodies during postsacrificial or termination rituals, or unintentionally from architectural rearrangements that disturbed long forgotten graves (Chase and Chase 1998, 2011; Fitzsimmons 2009; McAnany 1995; Sharer and Traxler 2003; Tiesler 2007; Tiesler et al. 2010; Weiss-Krejci 2011; Welsh 1988). In practice, the breadth of Maya mortuary conduct and the apparent lack of collectively followed norms have rendered patterning efforts more difficult here than in most other archaeologically studied cultural settings. This lack of predictability also holds true for human assemblages recovered from Maya cave contexts, which has rendered futile archaeological research suitably designed to untangle cave-related Maya mortuary behavior. The great majority of cave burials appear more as by-products of field endeavors directed to other research questions. This situation also implies that those research units that may be significant for reconstructing mortuary conduct (complete excavations) have been left largely unattended.

As in other archaeological contexts, academic traditions and disciplinary divisions also affect the approaches and interpretations of archaeological cave research (see, e.g., Bassie-Sweet 1996; Brady and Prufer 2005; Prufer and Brady 2005; Stone 1995). In Maya scholarship, the vast majority of research directed toward human cave deposits falls into the domain of archaeology, and specifically speleology, mortuary archaeology, zooarchaeology, and bioarchaeology, carried out independently from one another. It is unsurprising, therefore, that the vast corpus of available burial information, with an impressive number of recorded human cave vestiges, has not been able to identify regional mortuary practices for territories and sites that once shared a cultural landscape. The aggregate funerary taxonomies have at least worked (and surprisingly well) in inferring Maya political complexity, social hierarchy, and gender expressions (Krejci and Culbert 1995; Welsh 1988;

Wright 2006; see also Scott and Brady 2005 for burial taxonomies in cave contexts). But here we are interested in reconstructing and understanding mortuary behavior per se. The interdisciplinary divide between conventional archaeology and physical anthropology in part explains the scarcity of suitable research designs to untangle ancient mortuary behaviors related to caves.

It should be stressed at this point that there are also other problems of a more technical nature that hamper the study of skeletal assemblages from dry and waterlogged cavernous contexts (see Tiesler 2005). Preservation is one issue. Degradation by calcification, crystallization, or mechanical erosion alters those very vestiges sitting on the ground of dry humid caves. Exposure to the elements (like sun, wind, rain, and temperature change) is prone to accelerate the deterioration process of the surface remains of rockshelters and crevices. Severe commingling resulting from protracted, post-postdepositional histories and shifts in substrate will place human bone pieces indiscriminately together with faunal remains, obscuring the memory of place together with any ancient meanings originally ascribed to their deposit and disturbance. Also, more recent disturbances by looting have come to hamper scientific efforts to reconstruct the mortuary pathways of human cave assemblages. Frans Blom's (1954) travel report alerted us to the heavy looting by locals that, by the mid-twentieth century, had substantially diminished archaeological cave deposits in the Chiapanecan Highlands.

Conventional archaeological recording and recovery of human remains from dry and submerged cave contexts do not prove helpful either. Many of the early explorations still focused on extracting the "best" pieces (Blom 1954; Thompson 1992) and most reports lack even sketches of skeletal disposal and layering. We also recall that cenote research, all the way up to its heyday in the 1960s, was conducted using huge extraction pumps to lower the water level, an effort that was assisted by dumping barrels of chloride into the muddy water to increase ground visibility (Folan 1968; Piña Chan 1970). Because this approach was unsuccessful, the pump system was used subsequently for artifact extraction. Although the delicate archaeological material decidedly suffered from this radical excavation method, pumping up the artifacts in fact meant an improvement to the excavation implements that Thompson and his crew had employed 60 years earlier (Thompson 1992). Evidently, until recently, systematic underwater artifact recording was not an issue to be considered.

Only recently has the archaeological community shown interest in incorporating detailed protocols into cave excavations and in adopting new, more cautious skeletal recovery strategies. Hopefully, these will soon set new standards for more refined taphonomic and bioarchaeological reconstructions (González González et al. 2008; Rojas 2010; Rojas et al. 2008; Wrobel et al. 2012). Apart from conventional burial attributes (primary–secondary, disturbed–undisturbed, minimum and probable number of individuals, position and orientation of individual burials, presence and type of offerings), these criteria typically include data related to cave types (dry, humid, submerged), settlement proximity, specific location of deposits within the cave (light zone vs. dark zone; terminal chamber vs. passage area vs. ledge), and deposition (surface vs. interred; Owen 2005).

Regarding bioarchaeology, cave research increasingly benefits from detailed skeletal studies that have been able to grant new insights into the variability of mortuary populations, death circumstances, and sequenced posthumous body treatments (Beck and Sievert 2005; Duday 2009; Tiesler 2005; see also Wrobel et al. Chap. 4, this volume). Along with the above, human taphonomy is ideally suited to untangle the complex mortuary pathways that once produced the contexts under study. The main concern for the analysis of commingled remains in secondary burials generally rests on the need to estimate the minimum number of individuals (MNI) or the minimum number of elements (MNE), with all the intrinsic problems of over- and underestimation that the different approaches generate (Herrmann and Devlin 2008). In the field of zooarchaeology, taphonomic approaches have benefited from the fundamental contribution of works like Lyman's manual "Vertebrate Taphonomy" (Lyman 1994), which encompasses all the potential factors that affect animal skeletons, or parts of them, in the natural process of formation of the context. However, human taphonomy has to deal with both natural and cultural interventions and distinguishes a secondary burial from a mere secondary deposit (Duday 2009). Despite the literature of funerary archaeology, which very often refers in a general and unspecific manner to secondary burials, a thorough analysis is necessary to distinguish whether the human remains had been laid down to rest in the very same place and eventually moved and spread around by anthropogenic or natural causes (water flowing, animals), or if they were intentionally removed from their original place of interment to be redeposited in a different place (Duday 2009). Similarly, mortuary taphonomy aims to reconstruct deposition processes in primary contexts, allowing distinctions to be drawn between intentional vs. nonintentional deposition (accidental), and careful vs. careless depositions, all of which have tremendous potentials for the understanding of the way contexts formed (Duday 2009).

As we will see later in the chapter, the differential presence of some skeletal segments and the relative absence of others allowed us to infer that the bones from the sacred shrines of Mensabak had been moved from their primary location elsewhere and redeposited. Unfortunately, however, we feel that the systematic taphonomic investigation of the mummified or skeletonized remains in Maya subterranean contexts, both from primary and secondary deposits, by itself represents a line of study that still awaits formalization and full exploration.

9.3 Cave Categories and their Meanings

Some 40 years ago, Alberto Ruz's (1965, 1991) pioneering survey of ancient Maya burial traditions dedicated a section each to sinkhole cenotes and (dry) subterranean spaces, the latter including deep caves and rockshelters. Interestingly, Ruz (1965, p. 86, 157–158) still conceived of both spaces as natural mortuary architecture and classified them as types of graves, along with simple burials, funerary chambers and mounds, crypts, and cysts. Although his approach had its methodological limitations, it anticipated more recent conceptions of tombs as constructed cave

environments. Recent scholarship has argued, for example, that the carved subterranean mausoleums of Río Azul or Calakmul's lavish shaft tomb from Structure II recreate subterranean cavities (Adams 1999; Carrasco et al. 1998). Likewise, the frequent placement of broken speleothems together with the dead, like those documented for some of Copan's and Mayapan's central burials (Ruz 1991; Welsh 1988), establish potent cave associations. Particularly evocative is the cave symbolism in Pakal's multiple retainer burial recovered by Ruz's (1955) team during the 1950s. At least five individuals of different ages had been fitted tightly inside a stuccoed box that sealed the monolithic door of the mausoleum's inner chamber (Cucina and Tiesler 2006). Accompanied by broken speleothems, the victims' remains were encrusted with a thick layer of calcium carbonate, indicating they had been laid down—whether purposely or not, we do not know—in an area of active water filtration. Together with the speleothems, the location of this chamber at the extreme end of the long dark passage inside the Temple of the Inscriptions strongly calls to mind cave motifs.

Regarding the breadth of cultural uses of natural deposits, Ruz (1991) emphasized the diversity of funerary functions of deep caves and rockshelters, and linked human sinkhole deposits with sacrifices made to the Rain God. Frans Blom's (1954) travel report informs us about several cave deposits of cremation urns and ossuaries in the Chiapanecan Highlands. Other authors have made a case that the use of caves as burial receptacles was of an unusual and sporadic nature (Butler 1934; Ricketson 1925). And still others, like Welsh (1988, p. 3), or more recently Scott and Brady (2005), have argued that cave burials played a diverse and in some cases distinctive role from most burials placed within civic-ceremonial or residential architecture and therefore should be considered separately. In addition, either implicitly or explicitly, scholars have acknowledged several difficulties that are inherent in quantifying and interpreting mortuary cave use, which is mainly unrelated to settlements and mostly void of chronological and other contextual information. These problems have prompted many scholars to exclude cave burials from systematic mortuary investigations altogether (see, e.g., Welsh 1988; Wright 2006).

9.4 Our Review of Human Cave Assemblages

Our study is founded on our own skeletal research, conducted on a set of cave, cenote, crevice, and rockshelter collections from all over the Maya realm, to which we have added data from published research on other Maya "subterranean" assemblages (Fig. 9.1 and Table 9.1). Table 9.1 divides contexts by caves, cenotes, crevices, and rockshelters, as defined in the introduction of this chapter. In the case of Mensabak, Chiapas, we have combined rockshelters and crevices in a single category, because in both cases, these natural features denote not deep, dark subterranean passages but shallow overhangs on rock faces and presented the very same kind of organization of bones. On the contrary, the "grietas" of Aguateca have been designated as crevices, while Cave Branch, Actun Uayazba Kab, and Ek Xux are

Fig. 9.1 Map of the sites reported in this study

rockshelters. It is important to underline in this context that crisp, mutually excluding categorizations can be difficult to make, because these geological structures/formations can often be connected. In fact, cenotes, which are defined as submerged sinkholes that can be totally underground or be visible from the surface when the roof of the karstic formation collapsed, might have been dry caves in times when the water level was lower than at present. This does not seem to be the case, for

Table 9.1 List of the samples and context analyzed

Site name	Type	MNI (skull only)	Males	Females	Perinatal	Infants	Juveniles	Adults	Anthropogenic marks	Cranial modification	Type of cranial modification	Chronology	References	Analyzed by
Camino Infinito, Chiapas, Mexico	Cave	4			1	2	1						Domenici (n.d.)	Tiesler & Cucina
Cueva del Lazo, Chiapas, Mexico	Cave	9			1	8				4 (N=6)	4 oblique	CLA	Domenici (2006, 2009)	Tiesler & Cucina
Lago Lacandón, Chiapas, Mexico	Cave	6	3	3				6		6 (N=6)	6 erect	POST	Blom (1954)	Tiesler & Cucina
Cueva del Rayo, Chiapas, Mexico	Cave	4	4					4		4 (N=4)	3 oblique; 1 erect	CLA	Domenici (n.d.)	Tiesler & Cucina
Cueva Julian Grajales, Chiapas, Mexico	Cave	5	3	1		1		4		3 (N=4)	3 oblique	CLA?	Blom (1954)	Tiesler & Cucina
Cueva Moxviquil, Chiapas, Mexico	Cave	3	1	2				3		3 (N=3)	3 erect		Blom (1954)	Tiesler & Cucina
Aktún Cacao, Yucatan, Mexico	Cave	3			1	1		1	Fire exposure, slicing marks	1 (N=1)	1 oblique	CLA	Castillo Chávez (1996)	Tiesler

Table 9.1 (continued)

Site name	Type	MNI (skull only)	Males	Females	Perinatal	Infants	Juveniles	Adults	Anthropogenic marks	Cranial modification	Type of cranial modification	Chronology	References	Analyzed by
Xcan, Yucatan, Mexico	Cave	15	4	7		3		12		14 (N=14)	12 oblique; 2 erect	PRE/CLA	Márquez de González et al. (1982)	Tiesler
Ixkun, SE Peten, Guatemala	Cave	3		1		1		2		1 (N=1)	1 oblique	CLA	Reports Atlas (IDAEH)	Tiesler & Cucina
Ak' Ab, SE Peten, Guatemala	Cave	2	1	1			1	1		2 (N=2)	2 oblique	CLA	Reports Atlas (IDAEH)	Tiesler & Cucina
Na Balam, SE Peten, Guatemala	Cave	4						4	Fire exposure			PRE	Reports Atlas (IDAEH)	Tiesler & Cucina
Barton Creek, Belize	Cave	34	6	7		12	2	17				CLA	Owen (2005)	Owen
Tunich Muknal, Belize	Cave	15	2	1		7	2	5		4	4 oblique	CLA	Gibbs (2000)	Gibbs
Copan, Gordon Cave, Honduras	Cave	4	4					4	Fire exposure, slicing marks	2 (N=4)	2 erect	CLA?	Gordon (1898)	Tiesler
Cueva de El Duende, Dos Pilas, Guatemala	Cave	3?				1?		2	Slicing marks			CLA	Minjares (2003)	Minjares
Cueva Río el Duende, Guatemala	Cave	17?	1?	1		1		3	Slicing marks			CLA	Minjares (2003)	Minjares

Table 9.1 (continued)

Site name	Type	MNI (skull only)	Males	Females	Perinatal	Infants	Juveniles	Adults	Anthropogenic marks	Cranial modification	Type of cranial modification	Chronology	References	Analyzed by
Cueva Río Murcielagos, Guatemala	Cave	1							Slicing marks			CLA	Minjares (2003)	Minjares
Cueva de Sangre, Dos Pilas, Guatemala	Cave	5	1?									CLA	Minjares (2003)	Minjares
Cueva de Kaxon Pec, Dos Pilas, Guatemala	Cave	3	1	1				2				CLA	Minjares (2003)	Minjares
Cueva los Quetzales, Dos Pilas, Guatemala	Cave	1	1			1		4	Slicing marks			CLA	Minjares (2003)	Minjares
Dzibilchaltún, Yucatan, Mexico	Cenote	2		1				2		0 ($N=1$)			Andrews and Andrews (1980)	Tiesler
Cenote Sagrado Chichen, Yucatan, Mexico	Cenote	144	50	19		71	13	58	Fire exposure, slicing marks, sharp force trauma	129 ($N=144$)	7 oblique; 121 erect	POST?	Piña Chan (1970); Thompson (1992)	Tiesler & Cucina

Table 9.1 (continued)

Site name	Type	MNI (skull only)	Males	Females	Peri-natal	Infants	Juve-niles	Adults	Anthropo-genic marks	Cranial modification	Type of cranial modifica-tion	Chronol-ogy	References	Analyzed by
San José Mayapan, Yucatan, Mexico	Cenote	20	12	7				20		9 (N=20)	9 erect	POST/ COL	Serafin (2010); Tiesler (2005)	Tiesler
Cenote La Calavera, Quintana Roo, Mexico	Cenote	13	7	5		1		12		8	2 oblique; 6 erect sup		Rojas et al. (2008)	Ortega
San Gervasio, Cozumel, Quintana Roo, Mexico	Cenote	3		1		3				1 (N=1)	1 erect	POST	DAF(INAH)	Tiesler & Cucina
Aguateca, Grieta principal, Guatemala	Crevice	44	12	5		10		35	Slicing marks	5	2 oblique, 1 erect	CLA	Palomo (2007)	Palomo
Aguateca, Grieta Rincón, Guatemala	Crevice	17	12	2		3		14	Slicing marks	3		CLA	Palomo (2007)	Palomo
Caves Branch Rock Shel-ter, Belize	Rock-shelter	32	5	8		9		23				CLA	Glassman and Bonor (2005)	Bonor Vil-larejo
Actun Uay-azba Kab, Belize	Rock-shelter	13	1	3	2	2	1	9				CLA	Gibbs (2000)	Gibbs

Table 9.1 (continued)

Site name	Type	MNI (skull only)	Males	Females	Perinatal	Infants	Juveniles	Adults	Anthropogenic marks	Cranial modification	Type of cranial modification	Chronology	References	Analyzed by
Ek Xux Mayakak, Belize	Rockshelter	13	4	4		5		8			1 erect?	CLA	Saul et al. (2005)	Saul & Saul
Mensabak, Mensabak, Chiapas, Mexico	Rockshelter/crevice	8	7	1				8		8	8 erect	POST/COL/MOD	Tiesler et al. (2010)	Tiesler & Cucina
Zak Tat, Mensabak, Chiapas, Mexico	Rockshelter/crevice	10	5	5				10	Slicing marks, sharp force trauma	9	9 erect	POST/COL/MOD	Tiesler et al. (2010)	Tiesler & Cucina
Chakah Tun, Mensabak, Chiapas, Mexico	Rockshelter/crevice	2		1	1			1		2	2 erect	POST/COL/MOD	Tiesler et al. (2010)	Tiesler & Cucina
Cui Tschon, Mensabak, Chiapas, Mexico	Rockshelter/crevice	1	1					1		1	1 erect	POST/COL/MOD	Tiesler et al. (2010)	Tiesler & Cucina
Dzibana, Mensabak, Chiapas, Mexico	Rockshelter/crevice	1		1				1		1	1 erect	POST/COL/MOD	Tiesler et al. (2010)	Tiesler & Cucina

MNI minimum number of individuals, *CLA* Classic, *POST* Postclassic, *PRE* Preclassic, *COL* Colonial, *MOD* Modern

example, for the famous Sacred Cenote of Chichen Itza, which is apparently not part of a net of tunnels; however, many cenotes are connected to one another in a system that, when dry in past times, might have been analogous to a cave system. Rockshelters can be defined as shallow overhangs on rock faces, natural geological protections that do not tunnel into the rocks. Although sometimes they can be found in association with cave entrances, they can be considered as independent units of analysis (though see caution evoked by Rissolo 2005). Last, crevices can be defined as narrow fractures or fissures in the rock. They are variable in depth and height. Crevices and rockshelters are often associated with each other, as is the case of the geological system at Mensabak, Chiapas. Differently from caves, these small fissures in the rock are too narrow to create enclosed spaces and can be considered as an extension of the shelters.

For each site, we obtained information on the MNI (either calculated directly by the authors or according to the value reported in the specific references) and sex and age distribution. Presence of anthropogenic marks, of cranial modification, and whenever possible of cranial modification types are also reported together with the chronological period that encompasses the sample. The contexts reported come from the karstic peninsular crust (Xcan, Dzibilchaltun, Chichen Itza, Mayapan, Cenote de la Calaveras, Actun Cacao, San Gervasio; Andrews and Andrews 1980; Castillo Chávez 1996; Márquez de González et al. 1982; Piña Chan 1970; Rojas et al. 2008), the endorheic basin of the eastern Guatemalan Peten area (Ixkun, Ak' Ab, and Na Balam of the Atlas de Guatemala Archaeological Project (IDAEH); Laporte 1998, 2008), and the Chiapanec Usumacinta Basin with its adjacent highlands (Camino Infinito and Cueva del Lazo, of the Rio la Venta Project at the fringes of the Maya world; Domenici 2006, 2009). Last, we analyzed Blom's collection (Lago Lacandon, Cueva del Rayo, and Cueva Julian Grajales Cintalapa; Blom 1954), and Mensabak's Lacandon sacred shrines, the latter being our current project as part of the Mensabak Archaeological Project (Palka 2005; Tiesler et al. 2010). The published information included here also covers caves in the areas around Dos Pilas (Minjares 2003) and Aguateca (Palomo 2007) in the western Guatemalan Peten, and several caves and rockshelters in Belize (Gibbs 2000; Glassman and Bonor 2005; Owen 2005; Saul et al. 2005) and Honduras (Gordon 1898; Table 9.1).

With the exception of Mensabak, we were not involved in the field recovery of any of the collections for which we include primary data. All data were collected between 1993 and 2009 at the different governmental and private facilities in Mexico and Guatemala where they are currently curated. The analysis of the samples from Gordon cave site from Copan, Honduras, was conducted at the Peabody Museum of Harvard University. Analysis of the Mensabak collection began in 2010 as part of the Mensabak Archaeological Project directed by Joel Palka (University of Illinois, Chicago). The Mensabak skeletal material, which comes from a series of crevices and rockshelters, was analyzed in situ and has not been removed from its original context.

The analytical techniques employed to determine age and sex were based on standard practices for osteometry and macroscopic observation. Sex was determined based on the dimorphic features of skulls, pelvises, and long bones (Buikstra and Ubelaker 1994). Age at death in the subadult segment of the collections was estimated on the basis of the degree of dental formation and eruption, long bone

length, and ossification of epiphyseal unions (Buikstra and Ubelaker 1994); in the adult group, age was estimated using the degree of bone remodeling of the pubic symphysis and auricular surface of the ileum, dental attrition, and cranial suture closure (Brooks and Suchey 1990; Buikstra and Ubelaker 1994; Lovejoy et al. 1985; Meindl and Lovejoy 1985). The common taxonomy for classifying artificially produced skull shapes, which apparently was followed in all of the included studies, distinguishes tabular oblique shapes, produced by free head splints, from tabular erect forms, produced by cradleboarding. This classification originates in the work by José Imbelloni (Dembo and Imbelloni 1938) and has been adapted to native Mesoamerican forms by Arturo Romano (1965; see also Tiesler 2014).

Most collections were also scrutinized systematically for natural and anthropogenic surface marks. Contextual information for each series was considered by examining burial descriptions and graphic information recorded originally or communicated by the recovery teams. Much to our regret, contextual and, more importantly, taphonomic information was often missing in the majority of cases and the set of information included in the database for this study is rather heterogeneous. However, we believe that the cautiously transcribed data sets do reflect the assemblage characteristics present and recorded in each case.

9.5 Results

This section takes into consideration the distribution and variability of taphonomy, sex and age composition, cranial modification types, and anthropogenic marks among the different subterranean mortuary contexts from the Maya cultural landscape.

9.5.1 Taphonomy

Generally speaking, the variation in preservation of interred bone from cave contexts resembles that of other burials deposited in filled space (i.e., architecture). There is ample evidence of deterioration of skeletal segments due to faunal activity (such as rodents), while unsurprisingly almost no root etching occurs on the surfaces. At one extreme stands the excellent organic preservation found within the caves in the Chiapas Highlands (see Fig. 3.3, this volume), while at the other extreme are the severely damaged skeletal remains from the muddy substrates typical of the semitropical Peten, in which water activity often generated heavy calcite deposits on the bones, hampering their analysis (Fig. 9.2).

In aquatic environments, especially karstic sinkholes, water plays a protective role for bones, since it provides a stable, oxygen-free environment. Despite the good preservation of the material, the commingling of the bones hampered our studies of the samples from three cenotes. This is due to underwater decomposition, which usually results in complete disarticulation and disturbances of skeletons and, in the case of Chichen Itza's Sacred Cenote, by the dredging technique used during

Fig. 9.2 Skull from a humid cave environment completely covered by calcareous concretions. (Nabolom Museum, San Cristóbal de las Casas; photograph by V. Tiesler)

recovery. Naturally, this aspect rendered any attempt to reconstruct individual skeletons unfruitful, so these commingled bone assemblages could be scrutinized only as anatomical parts and not as individuals, for which we chose the skull as the primary source of basic biographic (sex/age) and cultural (cranial modification) information.

Interments in rockshelters vary depending upon the use given to these geological formations. Regular, primary interments' degree of preservation follows the rules dictated by soil acidity, looting, space reuse, and so on (Fig. 9.3). In turn, sacred shrines in rockshelters show the typical weathering defoliation and destruction commonly encountered in human segments exposed to tropical environments (Fig. 9.4), because in shrines bones are left on the surface and not interred. In terms of anthropogenic interference with the depositions, primary burial (i.e., underneath the surface), with what appears to be unintentional disturbance from later intrusive burials, are typical of Classic period rockshelter mortuary ritual from the Belizean sites (see, e.g., Wrobel et al. 2009); in contrast, the majority of the skeletal remains from the Colonial/Modern Mensabak sacred shrines in crevices and rockshelters are represented by secondary surface deposition. The majority of these bones were moved at some point from another area where the bodies were originally interred and left to decompose—likely from primary burial contexts within or near the rockshelters, from the dark zone areas of nearby caves, or from regular interments from somewhere around the lagoon. An exception was found in a test pit carried out in the center of the Sak Tat shrine in which a primary articulated interment of a seated individual had been disturbed, and the skull, femurs, tibias, and left humerus were intentionally removed.

9.5.2 Sex and Age Profiles

Caves, cenotes, and rockshelters display evidence for a puzzlingly wide array of mortuary behaviors. This also holds true when we examine the sex and age profiles of those interred at these sites. Even though the total number of sexed individuals

Fig. 9.3 Primary depositions from Caves Branch Rockshelter, Belize. (Photograph by A. Cucina)

is reduced (Table 9.1), we can recognize a predominance of males in cenotes (males = 67.6 %), the Aguateca crevices (males = 77.4 %), and rockshelters/crevices (males = 61.9 %); a more balanced proportion in caves (males = 54.5 %); and a predominance of females in rockshelters (males = 40 %). A Chi-square analysis highlights a significant difference in the distribution of males and females among the different contexts (Chi-square = 10.971, $p = 0.027$), which is mainly due to the difference between cenotes and rockshelters/crevices and rockshelters. Unfortunately, the human assemblage from sinkholes is mostly made up of the skeletal remains recovered from the Sacred Cenote of Chichen Itza, and thus the statistical dominance of this single site likely biases our cenote sample, making it less representative of cenotes in general. In addition, due to the commingled state of the bony segments, sex was determined on the basis of the morphology of the skull, which is not as accurate as the pelvis.

In terms of age, a prevalence of adult individuals is evident, although infants and juveniles do appear in the majority of the contexts. In the Sacred Cenote of Chichen Itza, adults and subadults are well balanced with a ratio of 51.1 and 48.9 %, respectively. Lower proportions between subadults and adults (with a consequent underrepresentation of subadults) are found in the samples from the caves from the Yucatan Peninsula, Belize, and the Guatemalan Peten (38.3 % of subadults) as

Fig. 9.4 Secondary deposits at the sacred shrine of Mensabak, Chiapas, Mexico. (Photograph by V. Tiesler)

well as in rockshelters (32.2%). Crevices fall shorter of subadults, which constitute 20.9% of the sample. Last, at Mensabak's sacred shrines only one individual is a subadult, representing 4.5% of the sample available. Obviously, these overall frequencies do not provide any detailed information on age ratios in individual assemblages. In fact, we found important differences between caves. Particularly noteworthy in this respect is San José Mayapan, a submerged skeletal sample that was completely made up of adults; also, the use of rockshelters and crevices as sacred shrines at Mensabak is characterized by a consistent lack of subadults, with only one juvenile in clearly disturbed conditions unearthed from a test pit from the shrine of Sak Tat, also suggesting a selective mortuary use of this group of sites. In contrast, the Río la Venta collection from Cueva del Lazo, Chiapas represents a highly selective mortuary deposit, because all individuals were under age 15 (see also Domenici, Chap. 2, this volume).

Although the generally poor state of preservation restricted the number of possibilities for aging adults, we could age subadults using long bone measurements and degree of dental maturation. Grouped by age cohorts, two different trends are apparent that may indicate distinctive cave, cenote, and rockshelter functions. First, perinatal individuals are relatively scarce regardless of the context. This seems to be

consistent with the generalized lack of perinatal remains in human archaeological assemblages in the Maya region, which may stem from poor preservation or from selective mortuary behavior. On the contrary, infants dying within the first 2 years of life (Infant 1 category) prevail in caves, followed by a lower representation of infants from 3 up to about 10 years of age. This profile is somehow mirroring a "normal" distribution of mortality in preantibiotic populations, in which individuals during the first 2 years of life experience the highest rate of mortality (Milner et al. 2000). Conversely, the infant remains recovered from Chichen Itza's Sacred Cenote denote a preferential disposal of young individuals in the 6–12 year range, with a frequency approximating 40 % of all the individuals, with few younger than age five (corresponding to less than 10 % of the whole sample). Such a distribution confirms a biased disposal choice or, much more likely, the selection of certain age groups for ritual discard in this sacred sinkhole.

Similarly, the subadult cohort of Río la Venta cave is evenly distributed across all age categories, and thus does not reflect a normal mortality curve. Instead, these individuals are representative of specific mortuary activities that are clearly culturally biased toward a set of selected age groups. Even though infant and subadult mortality was very high in prehistoric populations, we feel that in general the frequency of infants and juveniles found in caves, cenotes, and other natural underground places compared to adults is clearly distinct from the natural mortality profile, denoting in some cases a cultural pattern involved in the preferential deposition of individuals in this age range. On the contrary, we found no infants on the surface of the Lacandons' sacred shrines, denoting a completely different pattern of postmortem ritual behaviors.

9.5.3 Artificial Head Shapes

Among the ancient Maya, the artificial shaping of infants' heads was a readily visible and permanent body modification that expressed identity, ethnicity, and gender (Tiesler 2010, 2012). The permanent nature of this body practice, its transgenerational quality, and its manifold morphological manifestations on the skull reveal underlying *longue durée* cultural dynamics and broad shifts in techniques and artificial head shapes across the centuries.

The results of the analysis of the collection of dry and waterlogged cave series point to broad chronological shifts in the use of compression implements over time resulting in the preferential use of tabular erect forms and the loss of inclined, oblique head silhouettes between the Classic and the Postclassic/Colonial periods (Fig. 9.5). The combined cranial series from the Sacred Cenote of Chichen Itza, which we think was used principally (although not exclusively) during the site's heyday in the tenth and eleventh centuries, illustrates this shift. Only seven skulls still bear an oblique shape, while the overwhelming majority (94.53 %; $N = 128$) shows an erect form. Such evidence is expected because the cenote dates to the Terminal Classic and later. On the contrary, none of the Postclassic skull series documented here bore the tabular oblique that had been so popular during the first millennium AD (Tiesler 2012). This change is most noticeable in the Chiapanec

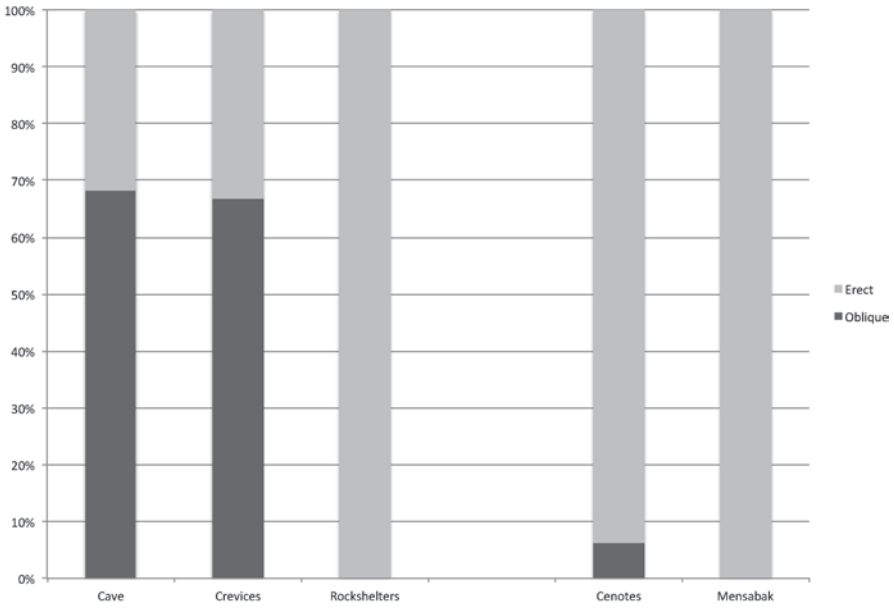

Fig. 9.5 Distribution of erect vs. oblique head shape in the different underground contexts

cave sites, specifically the Mensabak rockshelters and crevices, all of which have the erect form, while within the Classic period samples of the Usumacinta drainage area well over 70% of individuals with modifications display oblique shapes (Tiesler 2012). Given the more recent nature of the remains from the Lacandon cave sanctuaries, at least part of which is dated to after European contact (some C^{14} analyses date them to the seventeeth century), it is surprising that all skulls still appear artificially shaped. However, this distinction likely derives from isolation of Lacandon populations in the forest long after the Spanish occupation and abolition of this body practice in the less remote remainder of the Maya World (Palka 2005).

9.5.4 Anthropogenic Marks

Finally, anthropogenic alterations of a more posthumous nature identify body flaying, dismemberment, removal of soft tissue, or recycling of bones for crafting objects as common practices among Maya groups (Tiesler and Cucina 2007). Signs of perimortem violence in the form of unhealed trauma, traces left by the removal of soft tissue by slicing (Fig. 9.6), and fire exposure of different sorts (whether partial or complete, direct or indirect, incineration or cremation) probably stem mostly from postsacrificial practices, at least before the onset of the Postclassic period (Tiesler 2007). Although postmortem body manipulation is related only indirectly to the manner of death, it nevertheless provides an extraordinarily rich source of

Fig. 9.6 Slicing cut mark on the frontal bone of a damaged cranium from Mensabak's sacred shrine, Chiapas, Mexico. (Photograph by V. Tiesler)

information for the understanding of how both types of demise (i.e., sacrificial vs. natural death) influence corpse processing and deposition.

Regarding dry and submerged cave contexts, our own data and those of our colleagues point to the presence of all the above forms of posthumous body manipulation, even though slicing marks predominate. Furthermore, there seems to be a predominance of male individuals among those presenting bony marks of cultural processing. Inversely, assemblages without signs of processing show an equal representation of both sexes (see also Anda 2007). Looking at the age distribution, among individuals bearing signs of body processing in rockshelters, crevices, caves, and cenotes, adults tend to prevail over subadults, while individuals without those marks seem to be equally divided into adults and subadults.

9.6 Discussion

The data made available in the literature, together with the results obtained from our own investigations of different deposits, clearly indicate that a consistent behavioral model that distinguishes the use of caves from cenotes and from rockshelters is not supported. At least for the part of the Maya area considered by this study, there is a huge amount of variability in the way (and reasons why) these human deposits have formed through time, which is more consistent with a model that considers each context (be it cave, cenote, crevice, or rockshelter) as an independent unit, without evidence for defined cultural norms governing the purposes of use in each case. Contrary to Ruz's (1991) and Thompson's (1992) models, therefore, each context seems to reflect specific (and often, though not always, different) ritual, religious, or alternative cultural behaviors, which do not consistently conform to any standardized procedure and defined scope for the deposition of primary or secondary human remains within contexts that represent the entrance to Xibalba.

This unified semantic connotation is also conveyed by ancient Maya glyphic writings that refer to cave and mountain motifs (Vogt and Stuart 2005, pp. 156–163).

The animate mountain image is one of the most prominent elements of ancient Maya writing and is associated with water, springs, caves, and the sacred origin of things, encompassing both the morphological expressions of cavernous mountain entrances and its uses in the ancient world views, already expressed in the epigraphy of important Classic period centers like Palenque or Dos Pilas. Colonial Yucatecans used the term "*aktun*" both for caves and sinkholes (Barrera 1980). Still today, the northern Lacandon of Mensabak refer with this same word to rockshelters, deep caves, and crevices and adjoin a qualifying adjective to specify its geological morphology (Joel Palka, personal communication 2013).

Our results also show that the scope of observed mortuary patterns is not representative for general population units. There are important differences between the skeletal populations from caves and expected paleodemographic profiles in terms of sex ratio and, more so, in age groups with the noted misrepresentation of expected subadults' proportions in human cave assemblages. Naturally, analogous questions on population representation may be posed on the general underrepresentation of these age groups from settlement areas. In none of these contexts does age distribution reflect a "normal" mortality profile and therefore none are representative of the population's mortality pattern (Paine and Boldsen 2002; Tiesler et al. 2005). Similarly, it can be ruled out that the observed age profile stems from mortal epidemic cycles (Paine and Boldsen 2002), whose age distributions are supposed to be balanced between all the age classes. Usually, anthropological studies also consider a demographic curve heavily unbalanced toward young and mature adults (with a net underrepresentation of subadults and elderly individuals) as a by-product of either selective burial practices and/or bone deterioration that tends to destroy more fragile bones such as those of infants and of the elderly (Hoppa and Waupel 2002; Milner et al. 2000).

Regarding cave contexts, it appears more probable instead that these could serve multiple functions according to their intrinsic morphological characteristics, to regionally defined mortuary behavior, and to aspects of circumstantial nature. For instance, caves could have served both as temporary receptacles for human remains and as final depositional spaces after a sequence of prior mortuary treatments, during which bones may have been moved or removed. Therefore, we suggest considering a shift in the interpretational units from single interments toward mortuary programs and to substitute the conventional focus on separate single individuals/mortuary rituals, still used in burial classifications, for more sophisticated models of mortuary behavior expressed as pathways of sequenced acts (see, e.g., Wrobel et al., Chap. 4, this volume).

It becomes clear that to distinguish modal from nonmodal mortuary behavior and funerary from nonfunerary deposits is still problematical. To establish a pattern that governs the scope of ancient Maya mortuary practices involving caves, as well as to understand the scope of mortuary behavior in caves, needs further research. We have already identified archaeological research designs that generally lack consistent recording of taphonomic variables as a major limiting factor in reconstructing and patterning ancient Maya mortuary behavior in caves (Tiesler 2005). In our own approach or in collaboration with various research projects, we have advocated a multiscalar approach, which targets socially significant units (house platforms, patio

groups, etc.) that are excavated completely (not test pitted) using detailed archaeothanatology (Duday 2009) to reconstruct the *chaîne opératoire* (chain of operations) of each individual deposit and assemblage. Obviously, the formation processes and taphonomic variables are different between contexts. While all three types of subterranean contexts can receive primary as well as secondary funerary depositions, those found in some rockshelters or caves may be the result of very specific processes that imply intentional disturbance with the aim of removing skeletal segments or objects, looting, intentional desecration by rival parties (Brady and Colas 2005), or simple reorganization of the skeletal material to create room for further depositions. In such contexts, it is clear that every single deposit has its own history in which it has undergone a unique process that can encompass one single cause of disturbance or a combination of causes (i.e., removal, reorganization, and looting).

On the contrary, cenotes are less likely to yield articulated remains for analysis (Tiesler 2005); the majority of the skeletal remains originated from secondary disposal or from the gradual decomposition of body parts or of whole bodies, which were either intentionally discarded (therefore whose presence does not respond to ritual funerary purposes) or had accidentally fallen into the sinkhole. All of these situations tend to generate bone assemblages with little or no anatomical connection (Anda 2007) that often have been further disturbed, dispersed, or mixed by the uncontrolled presence of cenote diving, tourism or exploration, or in cases like the Sacred Cenote at Chichen Itza, by destructive archaeological recovery methods. In some rare cases, undisturbed contexts in cenotes may preserve articulated remains in relative anatomical position (Anda 2006). Though rare, such primary contexts may directly reflect actual ritual behaviors performed in cenotes or submerged caves during dry seasons, in which lower water levels allowed the transportation and placement of a dead body that would later be submerged as the water level rose. Unfortunately, in one way or another, in ancient or modern times, most of the assemblages seem to have suffered intentional (i.e., looting) or unintentional (i.e., taphonomic) disturbances that are unrelated to ancient ritual and which have altered their original assemblage resulting in the loss of sensitive data.

Before closing the discussion, we think it is important to highlight the recent case studies of Sak Tat, Mensabak, and other sacred shrines of the Lacandon Maya that we mapped during 2010 and 2011 (Palka 2005; Tiesler et al. 2010). They provided us with interesting pieces of information on the taphonomy, formation processes, and organization of human assemblages from the numerous ritual contexts of rockshelters and crevices. They were all sacred places, as the local Lacandons explained to us, and as the associated material evidence confirmed—the ceramic assemblage appeared to consist almost entirely of censers. The human remains comprised only adult individuals with not all the bony segments equally represented. Only a single test pit has been excavated in one of the rockshelters, which revealed a heavily disturbed primary seated burial, confirming that the surface deposits are ossuaries, of commingled, selected bony segments, rather than primary surface burials. As Duday (2009) explained, the selective presence of specific bony segments, notably skulls and long bones, with a marked underrepresentation of small segments like tarsals, metatarsals, and phalanges, is a clear indication of a secondary ossuary.

Fig. 9.7 Secondary bone assemblage in the sacred shrine of Sak Tat (Mensabak, Chiapas, Mexico). **a** Assemblage as was left by the Lacandons at the end of the 2010 field season. **b** Same assemblage as it was encountered at the beginning of 2011 field season. (Mensabak Archaeological Project; photographs by A. Cucina)

The presence of cranial deformation and the C^{14} analyses suggest that the skeletal remains date to Postclassic and Colonial times; however, it is likely that this redeposition process might have continued until more recent times, since Petryshyn (2005) reported unmodified skulls in his visit to the Holy Lake of Mensabak in 1968.

However, we were eventually overwhelmed by the taphonomic histories evident among the human remains, some of which had gone through different stages of redeposition from primary burial places around the lagoon. In some cases, bones had been moved as a result of vandalizing at the hands of rival Tzeltal communities, while in others they were arranged or stacked simply as a means of maintenance during or between ceremonies. The latter type of activity, in particular, generated interesting bundles with long bones surmounted by skulls that contrasted with other disorganized secondary bone assemblages located only a few meters away that, as we witnessed, resulted from no specific ritual activity. Instead, the arrangement of bones was performed randomly, based on the person's artistic ideas at the moment, and the organization of some of these arrangements had clearly changed when the same assemblage was encountered a year later (Fig. 9.7a, b).

9.7 Conclusions

In conclusion, we have learned through this study that every subterranean passage is a unit that is associated with unique combinations of ecological, settlement, and cultural influences. We cannot assume they have parallel meanings or significance to the groups that used them, simply because morphologically they can be classified as rockshelters, crevices, deep caves, or cenotes. Each is set apart by their particular history of specific uses that are likely to have changed over time. Hopefully, this systematic regional research, although admittedly sketchy, is beneficial in disentangling and clarifying different functions and roles of deep caves, cenotes, and rockshelters, both without and with human remains. As for the latter, we feel that

reconstruction of accumulated mortuary depositional processes must incorporate complete taphonomically informed intensive/extensive excavations and direct dating of relevant individual assemblages to improve the perspectives of reconstructing the *chaîne opératoire* of each depositional sequence. It is only this detailed level of reconstruction of mortuary pathways that sets the stage for a broader discussion of singular vs. unified behavioral components or for inferring long-standing, culturally embedded, conservative trends vs. social change and crises in cave uses. Specifically, social disruption is prone to be expressed in shifts or contingencies in burial practices as expressed in mortuary repertoires in caves.

We acknowledge that ritual is not only ideology or religion, it is also action, and despite the fact that it may not be always ritually driven, actions do leave telling evidence in the archaeological record. In order to avoid conceptual conflation of behavior with beliefs, in this chapter, we have refrained from ascribing ad hoc meanings and symbolic action to specific mortuary practices (see Walker 1995). We have prioritized instead the discussion of mortuary behavior as such as ritual action, which we believe is a convenient anchor for all subsequent endeavors. Whatever the theoretical framework of understanding Maya mortuary programs associated with caves, the data-rich research environment will facilitate and at the same time anchor a culturally sensitive (emic) interpretational frame, aligned with Mesoamerican thought—a situation that is much different from some other past societies, which are less refined (icono-) graphically, documented, or continuous than the Maya.

Acknowledgments Thanks to our colleague Gabriel D. Wrobel for all his help and advice along the road of presenting and publishing this work. The referred information is either published, has appeared in thesis, or was collected by the authors as part of the following collaborative research projects: *Mensabak Archaeological Project* (Joel Palka, University of Illinois at Chicago, and all the Lacandon community members of Mensabak involved), *Proyecto Arqueológico Río la Venta* (Davide Domenici, Eliseo Linares, Thomas Lee, INAH/University of Bologna), *Proyecto Atlas de Guatemala* (Juan Pedro Laporte, IDAEH), *Proyecto Arqueológico San José Mayapán* (Eunice Uc, Carlos Peraza, INAH). Additional human remains, retrieved mostly by earlier archaeological work, are curated and were studied at the following institutions: Peabody Museum, Harvard University, *Museo Nabolom*, San Christóbal de las Casas, Centro INAH, Yucatán, and Dirección de Antropología Física/INAH.

References

Adams, R. E. W. (1999). *Río Azul. An ancient Maya city*. Norman: University of Oklahoma Press.

Anda, G. de (2006). *Análisis osteotafonómico de restos óseos sumergidos en cenotes. Una visión desde el Cenote Sagrado de Chichen Itza*. M.A. thesis. Mérida: Universidad Autónoma de Yucatán.

Anda, G. de (2007). Sacrifice and ritual body mutilation in postclassical Maya society: Taphonomy of the human remains from Chichen Itza's Cenote Sagrado. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 190–208). New York: Springer.

Andrews, E. W., IV, & Andrews, E. W., V (1980). *Excavations at Dzibilchaltun, Yucatan, Mexico*. . New Orleans: Tulane University. (Middle American Research Institute, n. 48).

Barrera, A. (1980). *Diccionario maya-español, español- maya (Cordemex)*. Mexico City: Porrúa.
Bassie-Sweet, K. (1996). *At the edge of the world. Caves and late classic Maya world view*. Norman: University of Oklahoma Press.
Beck, L. A., & Sievert, A. K. (2005). Mortuary pathways leading to the cenote at Chichen Itza. In G. F. M. Rakita, J. E. Buikstra, L. A. Beck, & S. R. Williams (Eds.), *Interacting with the dead. Perspectives on mortuary archaeology for the new millennium* (pp. 290–304). Gainesville: University of Florida.
Blom, F. (1954). Ossuaries, cremation, and secondary burials among the Maya of Chiapas, Mexico. *Journal de la Société des Américanistes, 43,* 123–135.
Bonor, J. L. (1989). *Las cuevas mayas: Simbolismo y ritual*. Madrid: Universidad Complutense de Madrid, Instituto de Cooperación Iberoamericana.
Brady, J. E., & Colas, P. R. (2005). Nikte' Mo' scattered fire in the cave of Kab' Chante': Epigraphic and archaeological evidence for cave desecration in ancient Maya warfare. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 149–166). Boulder: University Press of Colorado.
Brady, J., & Prufer, K. M. (Eds.). (2005). *In the maw of the earth monster: Studies of Mesoamerican ritual cave use*. Austin: University of Texas.
Brooks, S., & Suchey, J. (1990). Skeletal age determination based on the os pubis: A comparison of the Acasádi-Nemeskéri and Suchey-Brooks methods. *Human Evolution, 5,* 227–238.
Buikstra, J. E., & Ubelaker, D. H. (1994). *Standards for data collection from human skeletal remains*. Research Series no. 44. Fayetteville: Arkansas Archaeological Survey.
Butler, M. (1934). A note on Maya cave burials. *American Anthropologist, 36,* 223–225.
Carot, P. (1989). *Arqueología de las cuevas del norte de Alta Verapaz*. Mexico City: Cuadernos de Estudios Guatemaltecos I, CEMCA,.
Carrasco, R., Boucher, S., Álvarez, P., Tiesler, V., García, V., García, R., & Vázquez, J. (1998). A dynastic tomb from Campeche, Mexico: New evidence on Jaguar Paw, a ruler of Calakmul. *Latin American Antiquity, 10*(1), 47–59.
Castillo Chávez, O. del. (1996). *Un acercamiento a los procesos tafonómicos en la gruta Aktun Cacao, Yucatán, México*. B.A. thesis. Mérida: Universidad Autónoma de Yucatán.
Chase, D., & Chase, A. (1998). The archaeological context of caches, burials, and other ritual activities for the Classic period Maya (as reflected at Caracol, Belize). In S. Houston (Ed.), *Function and meaning in Classic Maya architecture* (pp. 299–332). Washington, DC: Dumbarton Oaks.
Chase, D., & Chase, A. (2011). Ghosts amid the ruins: Analyzing relationships between the living and the dead among the ancient Maya at Caracol, Belize. In J. L. Fitzsimmons & I. Shimada (Eds.), *Living with the dead. Mortuary ritual in Mesoamerica* (pp. 78–101). Tucson: University of Arizona Press.
Christensen, A. J. (2007). *Popol Vuh: The sacred book of the Maya*. Norman: University of Oklahoma Press.
Cucina, A., & Tiesler, V. (2006). The companions of Janaab' Pakal and the 'Red Queen' from Palenque, Chiapas. Meanings of human companion sacrifice in Classic Maya society. In V. Tiesler & A. Cucina (Eds.), *K'inich Janaab' Pakal I of Palenque. Life and death of a Maya ruler* (pp. 102–125). Tucson: University of Arizona Press.
Dembo, A., & Imbelloni, J. (1938). *Deformaciones intencionales del cuerpo humano de carácter étnico*. Buenos Aires: Biblioteca Humanior.
Domenici, D. (2006). Investigaciones arqueológicas en el sitio El Higo, Selva El Ocote, Ocozocoautla, Chiapas. In D. Aramoni Calderón, T. L. Whiting, & M. Lisbona Guillén (Eds.), *Presencia Zoque. Una aproximación multidisciplinaria* (pp. 323–344). Mexico City: UNICACH/COCYTECH/UNACH/UNAM.
Domenici, D. (2009). Arqueología de la selva El Ocote, Chiapas. In P. Gorza, D. Domenici, & C. Avitabile (Eds.), *Mundos Zoque y Maya, miradas italianas* (pp. 15–48). Mexico City: Universidad Nacional Autónoma de México.
Duday, H. (2009). *The archaeology of the dead. Lectures in archaeothanatology*. Oxford: Oxbow Books.

Fitzsimmons, J. L. (2009). *Death and the Classic Maya kings*. Austin: University of Texas Press.
Fitzsimmons, J. L., & Shimada, I. (Eds.). (2011). *Living with the dead. Mortuary ritual in Mesoamerica*. Tucson: University of Arizona Press.
Folan, W. J. (1968). *El cenote sagrado de Chichen Itza*. Mexico City: Instituto Nacional de Antropología e Historia.
Gibbs, S. A. (2000). *An interpretation of the significance of human remains from the caves of the Southern Maya Lowlands*. M.A. thesis. Peterborough: Trent University.
Glassman, D. M., & Bonor, J. L. (2005). Mortuary practices of the prehistoric Maya from Caves Branch Rock Shelter, Belize. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 297–322). Boulder: University Press of Colorado.
Goldstein, L. (1981). One-dimensional archaeology and multi-dimensional people: Spatial organization and mortuary analysis. In R. Chapman, I. Kinnes, & K. Randsborg (Eds.), *The archaeology of death* (pp. 35–69). Cambridge: Cambridge University Press.
González González, A. H., Rojas, C., Acevez, E., Avilés, J., Analco, S., Río, O. Del, Luna, P., Velázquez, A., Stinnesbeck, W., Terrazas, A., & Benavente, M. (2008). Evidence of early inhabitants in submerged caves in Yucatan, Mexico. In M. E. Leshikar-Denton & P. Luna Erreguerena (Eds.), *Underwater and maritime archaeology in Latin America and the Caribbean* (pp. 127–142). Walnut Creek: Left Coast Press Inc.
Gordon, G. B. (1898). *Caverns of Copan, Honduras. Report on explorations by the museum, 1896–1897* (Vol. 1, n. 5.). Cambridge: Harvard University. (Memoirs of the Peabody Museum of American Archaeology and Ethnology)
Herrmann, N. H., & Devlin, J. B. (2008). Assessment of commingled human remains using a GIS-based approach. In A. J. Bradley & J. E. Byrd (Eds.), *Recovery, analysis and identification of commingled human remains* (pp. 257–270). Totowa: Humana Press.
Hoppa, R. D., & Waupel, J. W. (Eds.). (2002). *Paleodemography. Age distribution from skeletal samples*. Cambridge: Cambridge University Press.
Krejci, E., & Culbert, P. (1995). Preclassic and Classic burials and caches in the Maya Lowlands. In N. Grube (Ed.), *The emergence of Lowland Maya civilization* (pp. 103–116). Markt Schwaben: Acta Mesamericana, Anton Saurwein.
Laporte, J. P. (1998). La información arqueológica de los entierros del Atlas Arqueológico de Guatemala, parte 2: PSP-172/200. In *Reporte 12, Atlas arqueológico de Guatemala* (pp. 305–312). Guatemala: Ministerio de Cultura y Deportes.
Laporte, J. P. (2008). La información arqueológica de los entierros del Atlas Arqueológico de Guatemala, parte 5: Entierros 250 a 275. In *Reporte 22, Atlas Arqueológico de Guatemala* (pp. 560–627). Guatemala: Dirección General del Patrimonio Cultural y Natural, Ministerio de Cultura y Deportes.
López Austin, A. (1989). *Cuerpo humano e ideología (las concepciones de los antiguos nahuas)*. Mexico City: Universidad Nacional Autónoma de México.
Lovejoy, C. O., Meindl, R. S., Pryzbeck, T. R., & Mensforth, R. P. (1985). Chronological metamorphosis of the auricular surface of the ilium: A new method for the determination of adult skeletal age at death. *American Journal of Physical Anthropology, 68*, 15–28.
Lymann, L. R. (1994). *Vertebrate taphonomy*. Cambridge: Cambridge Manuals in Archaeology, Cambridge University Press.
Malvido, E., Pereira, G., & Tiesler, V. (Eds.). (1997). *El cuerpo human y su tratamiento mortuorio*. Mexico City: Colección Científica, Instituto Nacional de Antropología e Historia.
Manzanilla, L., & Serrano, C. (2003). *Practicas funerarias en la Ciudad de loe Dioses. Los enterramientos humanos de la antigua Teotihuacán*. Mexico City: Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México.
Márquez de González, L., Benavides, A., & Schmidt, P. (1982). *Exploraciones en la Gruta de Xcan, Yucatán*. Merida: Centro Regional del Sureste, Instituto Nacional de Antropología e Historia.
McAnany, P. (1995). *Living with the ancestors: Kinship and kingship in ancient Maya society*. Austin: University of Texas Press.

Meindl, R. S., & Lovejoy, C. O. (1985). Ectocranial suture closure: A revised method for the determination of skeletal age at death on the lateral-anterior sutures. *American Journal of Physical Anthropology, 68*(1), 57–66.

Milner, G. R., Wood, J. W., & Boldsen, J. L. (2000). Paleodemography. In M. A. Katzenberg & S. R. Saunders (Eds.), *Biological anthropology of the human skeleton* (pp. 467–497). New York: Wilev-Liss.

Minjares, A. (2003). *Human skeletal remains of the ancient Maya in the caves of Dos Pilas, Guatemala*. M.A. thesis. Austin: University of Texas.

Owen, V. A. (2005). A question of sacrifice. Classic Maya cave mortuary practices at Barton Creek Cave, Belize. In J. E. Brady & K. M. Prufer (Eds.), *In the maw of the Earth Monster: Studies of Mesoamerican ritual cave use* (pp. 323–340). Austin: Linda Schele Series in Maya and Pre-Columbian Studies, University of Texas.

Paine, R. R., & Boldsen, J. L. (2002). Linking age-at-death distributions and ancient population dynamics: A case study. In R. D. Hoppa & J. W. Vaupel (Eds.), *Paleodemography: Age distribution from skeletal samples* (pp. 169–180). Cambridge: Cambridge University Press.

Palka, J. W. (2005). *Unconquered Lacandon Maya. Ethnohistory and archaeology of indigenous culture change*. Gainesville: University Press of Florida.

Palomo, J. M. (2007). *Muerte, cerro y cueva: La bioarqueologia en las grietas de Aguateca*. B.A. thesis. Guatemala City: Universidad de San Carlos de Guatemala.

Pereira, G., & Michelet, D. (2004). Gobernantes mayas en lechos de muerte: El caso de Balamkú, un patrón funerario del clásico temprano. In R. Cobos (Ed.), *Culto funerario en la sociedad Maya: Memoria de la Cuarta Mesa Redonda de Palenque* (pp. 333–368). Mexico: Instituto Nacional de Antropología e Historia.

Petryshyn, J. T. (2005). A Lacandon religious ritual in the Cave of the God Tsibana at the holy lake of Mensabok in the rainforest of Chiapas. (P.R. Colas, Trans., & Ed.). In J. E. Brady & K. M. Prufer (Eds.), *In the maw of the Earth Monster: Mesoamerican ritual cave use* (pp. 329–341). Austin: Linda Schele Series in Maya and Pre-Columbian Studies, University of Texas Press.

Piña Chan, R. (1970). *Informe preliminar de la reciente exploración del Cenote Sagrado de Chichen Itza*. Mexico: Instituto Nacional de Antropología e Historia, no. 24.

Prufer, K. M., & Brady, J. E. (Eds.). (2005). *Stone houses and earth lords: Maya religion in the cave context*. Boulder: University of Colorado Press.

Ricketson, O. (1925). Burials in the Maya area. *American Anthropologist, 27*(3), 381–401.

Rissolo, D. (2005). Beneath the Yalahau: Emerging patterns of the ancient Maya ritual cave se from Northern Quintana Roo, Mexico. In J. E. Brady & K. M. Prufer (Eds.), *In the maw of the Earth Monster: Mesoamerican ritual cave use* (pp. 342–372). Austin: Linda Schele Series in Maya and Pre-Columbian Studies, University of Texas Press.

Rojas, C. (2010). Tratamientos mortuorios en los cenotes. *Arqueología Mexicana, 105,* 60–64.

Rojas, C., Gonzales, A. H., Terrazas, A., & Benavente, M. (2008). Mayan mortuary deposits in the cenotes of Yucatan and Quintana Roo, Mexico. In M. E. Leshikar-Denton & P. L. Erreguerena (Eds.), *Underwater and maritime archaeology in Latin America and the Caribbean* (pp. 143–155). Walnut Creek: Left Coast Press. Inc.

Romano, A. (1965). *Estudio morfológico de la deformación craneana en Tamuín, S.L.P., y en la Isla del Idolo, Veracruz*. Mexico: Serie de Investigaciones 10, Instituto Nacional de Antropología e Historia.

Ruz, A. (1955). Exploraciones en Palenque: 1952. *Anales del Instituto Nacional de Antropologia e Historia, 6*(1), 79–110.

Ruz, A. (1965). Tombs and funerary practices of the Maya Lowlands. In R. Wauchope (Ed.), *Handbook of middle American Indians* (pp. 441–461). Austin: University of Texas.

Ruz, A. (1991). *Costumbres funerarias de los antiguas Mayas*. Mexico City: Instituto de Investigaciones Filológicas, Centro de Estudios Mayas, Universidad Nacional Autónoma de México.

Saul, J. M., Prufer, K. M., & Saul, F. S. (2005). Nearer to the gods. Rock shelter burials from the Ek Xux Valley, Belize. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and eath lords: Maya religion in the cave context* (pp. 297–323). Boulder: University Press of Colorado.

Saxe, A. A. (1970). *Social dimensions of mortuary practices*. Ph.D. dissertation. Ann Arbor: University of Michigan.

Scott, A. M., & Brady, J. E. (2005). Human remains in Lowland Maya caves. In K. M. Prufer & J. E. Brady (Eds.), *In the maw of the Earth Monster: Studies of Mesoamerican ritual cave use* (pp. 263–284). Austin: Linda Schele Series in Maya and Pre-Columbian Studies, University of Texas Press.

Serafin, S. (2010). *Bioarchaeological investigation of violence at Mayapan*. Ph.D. dissertation. New Orleans: Tulane University.

Sharer, R., & Traxler, L. P. (2003). Las tumbas reales más tempranas de Copán: Muerte y renacimiento en un reino Maya Clásico. In A. Ciudad, M. H. Ruz Sosa, & M. J. Ponce de León (Eds.), *Antropología de la eternidad: La muerte en la cultura Maya* (pp. 161–174). Madrid: Sociedad Española de Estudios Mayas/Centro de Estudios Mayas, UNAM.

Stone, A. J. (1995). *Images from the underworld. Naj Tunich and the tradition of Maya cave painting*. Austin: University of Texas Press.

Thompson, E. H. (1992). The sacred well of the Itzaes. In C. Coggins (Ed.), *Artifacts from the centoe of sacrifice, Chichen Itza, Yucatan* (pp. 1–8). Harvard: Peabody Museum of Archaeology and Ethnology.

Tiesler, V. (2005). What can the bones really tell us? The study of human skeletal remains from cenotes. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 341–363). Boulder: University Press of Colorado.

Tiesler, V. (2007). Funerary or nonfunerary? New references in identifying ancient Maya sacrificial and postsacrificial behaviors from human assemblages. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 14–45). New York: Springer.

Tiesler, V. (2010). "Olmec" head shapes among the Preclassic Period Maya and cultural meanings. *Latin American Antiquity, 21*(3), 290–311.

Tiesler, V. (2012). *Transformarse en Maya: El modelado cefalico entre los Mayas Prehispanicos y Coloniales*. Mexico: Universidad Autónoma de Yucatán/Universidad Nacional Autónoma de México.

Tiesler, V. (2014). The bioarchaeology of artificial cranial modifications. New approaches to head shaping and its meanings in Pre-Columbian Mesoamerica and beyond. New York: Springer.

Tiesler, V., & Cucina, A. (Eds.). (2007). *New perspectives on human sacrifice and ritual body treatments in ancient Maya society*. New York: Springer.

Tiesler, V., Cucina, A., Sosa, T. S., Falla, M., & Meindl, R. (2005). Comercio, dinamicas bioscoiales y estructura poblacional del asentamiento constar de Xcambo, Yucatan. *Los Investigadores de la cultura Maya, 13,* 365–372.

Tiesler, V., Cucina, A., Suzuki, S., & Chi Keb, J. R. (2010). *Reporte de las actividades de sondeo y prospección de restos humanos, Mensabak, Chiapas, Temporada 2010*. (Unpublished report on file). Universidad Autónoma de Yucatán, Mérida.

Tiesler, V., Quintana, P., Aguilar, D., Arias, I. O., Cauich, J. V., Folan, W., & Dominguez, M. (2012). What's on the bone, reconstructing the posthumous body treatments of the ancient Maya aristocracy of Calakmul, Campeche, Mexico. In C. Lozada & B. O. Donnabhain (Eds.), *The dead tell tales: Jane E. Buikstra and narratives of the past* (pp. 85–94). Los Angeles: Cotsen Institute of Archaeology, University of California.

Vogt, E. Z., & Stuart, D. (2005). Some notes on ritual caves among the ancient and modern Maya. In K. M. Prufer & J. E. Brady (Eds.), *In the maw of the Earth Monster: Studies of Mesoamerican ritual cave use* (pp. 155–185). Austin: Linda Schele Series in Maya and Pre-Columbian Studies, University of Texas Press.

Walker, W. H. (1995). Ceremonial trash? In J. M. Skibo, W. H. Walker, & A. E. Nielsen (Eds.), *Expanding archaeology* (pp. 67–79). Salt Lake City: University of Utah.

Weiss-Krejci, E. (2011). The role of dead bodies in the Late Classic Maya politics: Cross-cultural reflections on the meaning of Tikal Altar 5. In J. L. Fitzsimmons & I. Shimada (Eds.), *Living with the dead: Mortuary ritual in Mesoamerica* (pp. 17–52). Tucson: The University of Arizona Press.

Welsh, W. B. (1988). *An analysis of Classic Lowland Maya burials*. London: British Archaeological Reports International Series 409.

Wright, L. (2006). *Diet, health, and status among the Pasion Maya*. Nashville: Vanderbilt Institute of Mesoamerica, Archaeological Series 2, Vanderbilt University.

Wrobel, G. D. (2008). *Temporal changes in the mortuary ritual use of the Caves Brach Rockshelter, Belize*. www.famsi.org: Foundation for the Advancement of Mesoamerican Studies Inc. Report.

Wrobel, G. D., Jordan, J. M., & Hardy, J. (2009). Social and political transformations in the Caves Branch River Valley: Evidence from natural and constructed ritual environments. *Research Reports in Belizean Archaeology, 6,* 199–207.

Wrobel, G. D., Andres, C. R., Morton, S. G., Shelton, R., Michael, A., & Helmke, C. (2012). Ritual landscapes of the Caves Branch River Valley. *Research Reports in Belizean Archaeology, 9,* 233–244.

Chapter 10
Mortuary Sealing Among the Maya

William N. Duncan

Abstract In the Maya region, covering architecture and human remains in white marl has traditionally been interpreted as an act of defacement that accompanied some termination rituals. Recently, researchers have shown that such covering was a form of ritualized wrapping or sealing and could occur in the absence of other signs of desecration, as a part reverential termination. Here, I build on this work to argue that such sealing is not necessarily part of termination rites at all and could occur independently in mortuary contexts. I also suggest that such sealing is a distinct subset of other types of mortuary wrapping. Decoupling sealing from termination and exploring its relationship to other forms of wrapping helps refine our understanding of mortuary and ritual categories in the Maya area.

10.1 Introduction

The Mesoamerican religious worldview was and is defined by a belief in both linear and cyclical time, the idea that the cosmos is animated by cycles of birth, death, and rebirth (Gossen 1986, pp. 5–8). Dedication and termination rituals in Mesoamerica were two mechanisms of punctuating and exercising control over these cycles (Mock 1998a). Although there is increasing agreement in our ability to recognize and distinguish between Maya dedication and termination rituals (Pagliaro et al. 2003, p. 76), identifying their subcategories as well as other related ritual distinctions in the material record remains a challenge, particularly in mortuary contexts (Becker 1992, p. 186; Chase and Chase 1998, p. 302; Coe 1959; Duncan 2005a; Stanton and Magnoni 2008; Tiesler 2007; Weiss-Krejci 2003). Some authors (Ambrosino et al. 2003; Brown and Garber 2003; Pagliaro et al. 2003) have proposed distinguishing reverential and desecratory termination. Both were frequently characterized by burning and destruction, but reverential termination occurred due to the Mesoamerican need to end one cycle of life for another to begin (Pagliaro et al. 2003). Desecratory termination was defined by an attempt to destroy enemy communities' animating essences and power (Pagliaro et al. 2003, p. 77).

W. N. Duncan (✉)
Department of Sociology and Anthropology, East Tennessee State University, Johnson City, TN 37614, USA
e-mail: duncanwn@etsu.edu

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2_10,

Elisabeth Wagner (2006) has shown one of the signs of termination, covering buildings (and other media) in white marl, actually could occur in the absence of other signs of defacement. She argued that enclosing buildings and caches in white marl in both desecratory and reverential termination sealed the buildings and effectively made sacred bundles of them. She focuses on architecture but also gives examples from mortuary contexts. In this chapter, I build on her work to make two points. The first is that encasing bodies in white marl and similar material should not be considered a marker of termination per se, but as a separate ritual process, sealing, that could occur in conjunction with desecratory or reverential termination rituals, or alone. Second, I review variability in mortuary wrapping to suggest that sealing in white marl was distinct from other forms of wrapping in mortuary contexts, though they may have been related. Decoupling sealing from termination and exploring its relationship to other forms of wrapping helps refine our understanding of mortuary and ritual categories in the Maya area.

10.2 Cyclical Time, Dedication, and Termination

Gary Gossen (1986, pp. 5–8) noted in 1986 that cyclical time was a sacred component of the Mesoamerican worldview, and recent work (Clark and Colman 2008; Gillespie 2010; Mock 1998a; Stanton and Magnoni 2008; Saturno et al. 2012; Vail and Hernández 2011) has affirmed that in fact the Maya were in fact "obsessed with time" (Rice 2004, p. xvi, 2007). The origin of Mesoamericans' concern with cyclical time likely reflects agricultural cycles (specifically the time for maize to grow), solar and lunar correlates, Venus cycles, and human gestation (Rice 2007, pp. 35–38). One consequence of cyclical time was that death was not a final end but was followed by rebirth in some form (Becker 1992, p. 190; Carlsen and Prechtel 1991; Carrasco and Hull 2002; Eberl 2005, p. 48; Fitzsimmons 2006, 2011; Gillespie 2002, p. 67; Taube 2004; Vogt 1998).

The Maya used rituals to exercise some control over cycles of birth and death, and in doing so framed and ordered their physical, sociopolitical, and cosmological landscape (Matthews and Garber 2004). In Mesoamerica, houses, ceramic vessels, figurines, and other media contained souls or animating essences (Mock 1998a). These various media were ensouled upon construction and could be ritually terminated (Becker 1992; Mock 1998b), effectively punctuating cycles of birth and death. Brian Stross (1998) described an ethnographic example in which Tzeltal Maya speakers in Tenejapa, Mexico killed a chicken and buried it below the center beam of a house. The death of the chicken facilitated the rebirth of its soul, thereby animating the building and completing its construction. Human bodies and burials were potent media for the Maya and they were used in both termination and dedication rituals (within communities and kingdoms, as well as by enemies) to manipulate actively memory and forgetting (Navarro Farr et al. 2008; Stanton and Magnoni 2008, p. 5). Burials connected the living and the dead and were used to

negotiate claims of legitimacy regarding descent, power, and territory[1] (Gillespie 2002; Hansen et al. 2008, p. 41, 52; Houston and McAnany 2003; Stanton and Magnoni 2008, p. 5).

Investigators generally agree that dedicatory and termination deposits may be distinguished from one another (Pagliaro et al. 2003). Ethnographically, dedicatory contexts are characterized by processes of purification, defining the space and time surrounding the ritual, and the naming, assignment of guardianship, animation, clothing, and feeding of the dedicated object (Stross 1998). The burial of complete (or at least not intentionally destroyed) objects under or in a structure is a common sign of ensoulment in the material record. Termination deposits are generally characterized by significant burning, destruction of items such as ceramics and architecture, enveloping white marl, significant deposition of elite artifacts, and disturbance of burials (Garber 1983; Pagliaro et al. 2003, pp. 76–80; Stanton and Magnoni 2008). Recently, investigators (Becker 1992, p. 186; Chase and Chase 1998, p. 302; Child and Golden 2008; Rice 2004, p. xvii; Stanton and Magnoni 2008) have argued that termination and dedication are insufficiently nuanced labels that likely contained subcategories. Termination has received more attention than dedication in recent research (Ambrosino et al. 2003; Brown and Garber 2003, 2008; Pagliaro et al. 2003, p. 76; Stanton and Magnoni 2008; but see Chase and Chase 1998) and it is clear that it can minimally be divided into desecratory and reverential types. Reverential termination, like the sacrificed chicken in the Tenejapa example, reflected a need for one life cycle to end before another could begin (Pagliaro et al. 2003, p. 77). Desecratory termination marked a similar concern but occurred in the context of destroying the animating "supernatural power of an object, person, place or portal to the other world" that was associated with enemy kingdoms, communities, or factions (Pagliaro et al. 2003, p. 77). These termination rituals occurred in the context of host of political and historical processes, including settlement abandonment, conquest, continuity, reuse, or reoccupation (Stanton and Magnoni 2008, pp. 13–17) and reflected different levels of scale and planning (Canuto and Andrews 2008, p. 260; Matthews and Garber 2004). Thus, identifying subtypes of termination materially remains a challenge, one of which is amplified because none of the aforementioned criteria are present in all termination rituals.

10.3 Sealing, Wrapping, and Sacred Bundles

Layers of white marl are frequently cited as evidence of termination (Ambrosino et al. 2003, p. 113; Freidel and Schele 1989, p. 239; possibly Iannone 2005, p. 34; McGee 1998, p. 41; Pagliaro et al. 2003, pp. 76–77; Sullivan et al. 2008, ppp. 96–97; see Wagner 2006 for an excellent review). The best known architectural examples

[1] There is no universally agreed-upon definition as to how to discern the recently deceased from more remote ancestors, but the relationship between the living and the deceased (recently, remotely, and perhaps fictively) was a fertile locus for social and political negotiation.

of this were found at the sites of Cerros in Belize (Str. 5C–1st and 2nd; Freidel and Schele 1989, p. 237; Freidel et al. 1998, p. 135; Wagner 2006, pp. 57–58) and Yaxuna in the Yucatan peninsula (Str. 5E–52 of Group 5E–50; Freidel et al. 1998, p. 140; Wagner 2006, pp. 57–58). Both sites had evidence of white marl enveloping architecture after they were destroyed or defaced. However, recently Wagner (2006) noted that the Maya buried some buildings within white marl intact, with no other signs of defacement. Other authors have made similar comments (e.g., Rice 2009, p. 411), but Wagner (2006) argues that enclosure in white marl without other signs of desecration was a form of the ritualized sealing found throughout Mesoamerica, and that sealing buildings in white marl effectively made sacred bundles out of the buildings.

Wrapping, binding, and sealing were and are important ritual processes throughout Mesoamerica (Christenson 2006; Houston et al. 2006, pp. 83–85; Klein 1982; Megged 2010, pp. 136–139). These processes have deep roots in the region (Reilly 2006) and various media, including human remains (Headrick 1999; Houston et al. 2006, p. 83; Pohl 1994), ceramic vessels (Reilly 2006, p. 2), stelae and carved monuments (Rice 2004, p. 81; Reilly 2006, pp. 4–9), buildings (see above), jade and chocolate (Stuart 2006), and a variety of other organic items were bound (Olivier 2006; Stenzel 1968). Iconographic symbolism for bundling includes objects being tied with knotted bands (Reilly 2006), twisted cords (Miller 1982), and symbols reflecting weaving (Figs. 10.1 and 10.2; Christenson 2006; Looper 2006; Reents–Budet 2006). Werner Stenzel (1968) was among the first to discuss the importance of sacred bundles in Mesoamerica, and researchers (Benson 1976; Klein 1982; Guernsey and Reilly 2006; Pohl 1994) have built on his work since to characterize bundles and binding in general. Objects were wrapped in part to protect and shroud them from profane viewing, but binding also created and commemorated sacred objects (Guernsey and Reilly 2006).

Wrapping and binding spoke to the tenuousness of cosmic order in Mesoamerica. Time and space had to be framed and ordered, and binding was a ritualized way of doing so (Matthews and Garber 2004). Tzutujil Maya speakers view the woven fabric in looms as a symbol reflecting the cosmos (Looper 2006, p. 80). Cecelia Klein (1982) argues that the heavens were perceived as a well-organized weaving, while the underworld was viewed as a tangled mess of disorganized threads. Arthur Miller (1982, p. 94) follows this line of thought with his interpretation that the twisted threads in the murals at the site of Tulum were umbilical cords connecting heaven and earth. Because the cords had been severed in the past, they needed to be retied to reorder the universe. The association of the mat icon (a woven symbol) with rulership reflected the responsibility of kings to bear the burden of framing and completing temporal cycles. Units of time were explicitly bound. When stelae were erected at the beginning of *k'atuns*, they were unwrapped (Stuart 1996, p. 154). Klein (1982, p. 25) shows that when Maya *k'atuns* were completed (filled), they were tied up (Fig. 10.3; see also Houston et al. 2006, pp. 83–85; Stuart 1996, p. 154). *K'atun* endings were marked by *k'altuun* (stone binding) rituals, which marked the resealing of the stelae's potent essences (Houston et al. 2006, p. 81). A carved peccary skull from Copán exhibits a wrapped stela (Reents-Budet 2006,

Fig. 10.1 Sacred bundle of jade, from Yaxchilan Stela 1. (Redrawn by Meara Bridges from Guernsey and Reilly 2006: Fig. 2)

p. 118; Fig. 10.3) and carved altars and sculptures at the site were bundles that likely held sacred objects related to temporally based rituals (Newsome 2003).

Bundles had energy as a "secret and invisible content" (Stenzel 1968, p. 351) and were thought of as being containers of gods' animating essences (Megged 2010, p. 136). They were oracular, consulted before making decisions (Byland and Pohl 1994, pp. 206–208; Klein 1982, p. 10; Olivier 2006), and were carried before armies in battle among the Mixtec (Pohl 1994). Kings and corporate groups created and maintained bundles in an effort to establish and bolster claims of authority (Reents-Budet 2006, p. 115). Thus, bundles frequently featured prominently in founding myths and accession rites (Boone 2000a, b, p. 58, 145, 152; Megged 2010, p. 96). The best known example of this was the founding of Tenochtitlan by the Mexica.

Fig. 10.2 Detail of ruler's belt from Quiriguá Zoomorph P. (North face; redrawn by Meara Bridges from Looper 2006: Fig. 7)

Huitzilopochtli guided the nomadic Mexica on their migrations ending at Tenochtitlan and they carried his sacred bundle with them (Fig. 10.4; Megged 2010). The founding of the city likely followed the same process seen elsewhere in central Mexico, such as making offerings to deities, building a temple, drilling fire into a new temple to dedicate and name it, and placing the sacred bundles and fire drilling equipment in the temple (Boone 2000a, pp. 551–565; Tedlock 1996, p. 50 describes the role of bundles in the *Popol Vuh* as well). The bundle was still kept in the Templo Mayor of Tenochtitlan in 1539, and it remained sufficiently important at the time of conquest that the Spaniards considered finding it to be an important goal of their inquisition (Stenzel 1968, p. 349). Stenzel (1968) reports that everyone was afraid to open the Huitzilopochtli bundle and the four men tasked with the opening of the bundle had inherited the positions from their fathers.

Sacred bundles were important symbols for demonstrating legitimacy of authority. Thus, kings opened bundles to demonstrate links to prior rulers on important dates (Megged 2010, p. 96) and at coronation ceremonies (Olivier 2006). Dorie Reents-Budet (2006, p. 115) demonstrates that bundles featured prominently in accession rites at the Maya sites of Yaxchilan and Dos Pilas in Mexico and Guatemala, respectively. Elizabeth Benson (1976) similarly has noted that iconography at the Maya sites of Palenque, Yaxchilan, and Bonampak show individuals in lineages handing wrapped and unwrapped signs of rulership to one another (Fig. 10.1; also

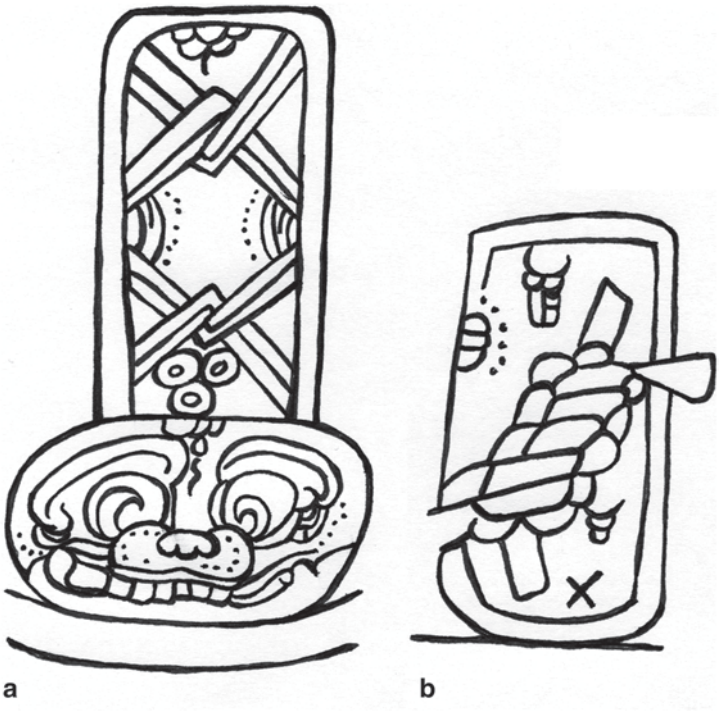

Fig. 10.3 **a** Wrapped stela from incised peccary skull from Copán. **b** Wrapped stela from the Madrid Codex. (Redrawn by Meara Bridges from Reents–Budet 2006: Fig. 6)

see McAnany 1995, pp. 61–62). John Pohl (1994, p. 82) has shown that taking and burning enemy bundles was also an explicit strategy for undermining enemies' claims to authority among the Mixtec (see also Byland and Pohl 1994; and Guernsey and Reilly 2006 for review).

Sacred bundles were associated with whiteness. The word for white in various Maya languages is *sak*, but it can also mean "bright" or "resplendent" (Hofling and Tesucun 1997, pp. 551–554; see Wagner 2006 for review). In particular, whiteness seems to have been associated with rebirth and the way of the soul after death (Eberl 2005, p. 124). Death is sometimes referred to as finishing the "white flower breath" (Fitzsimmons 2009, p. 11). After death, the soul continued on a *sakbe,* or white road, and epigraphically the cessation of a breath was frequently associated with the death verb *och b'ih*, which means "enters the road" (Taube 2004). Kerry Hull (2006, pp. 45–50) argued that there was also an explicit pre-Columbian connection between animating essences, *sakbeob* (white roads), and umbilical cords after death. This is consistent with Elisabeth Wagner's (2006, pp. 63–64) observation that the phrase *sak hunal* may refer to the white leaves of the inner husk covering young corn cobs, vernix caseosa (the white film covering newborns), or the white cloth used to make sacred bundles. Ancestor bundles were normally white in the Aztec

Fig. 10.4 Huitzilopochtli's sacred bundle from the Codex Boturini. (Redrawn by Meara Bridges from Olivier 2006: Fig. 2)

codices and paper ornaments found with Aztec mortuary bundles are typically white (Megged 2010, p. 102, 112). The Aztec used white cords to bind wooden images and sacred branches that were used by kin in mourning rites after death (Megged 2010, pp. 109, 124). The association of whiteness with rebirth was extended to associations with passage of time and the cosmos. The 260-day sacred calendar may have been called *saak ja'ab'*, meaning "white" or "magnificent" year (Rice 2004, p. 59). Ralph Roys (1967, p. 91) noted that layers in bundled objects in the Chilam Balam of Chumayel were compared to "a white mantle and to an enormous tortilla with thirteen layers of beans inside." Finally, white was associated with accession and dynastic power. In Classic Maya accession rituals, the Jester God headband was translated as "white bark paper" or "white eternal" and symbolized the king accept-

ing the mantle of office (Stuart 1996). The council house, or *popol nah* in Yucatec Maya, was also known as the white plumeria house (*sak nikte'il nah*; Thompson 1970, pp. 202–203) and the council house at Copán (Str. 10L–22A) had white flowers, mats, and snakes on it (Looper 2006, p. 93).

10.4 Uncoupling Sealing from Termination

Wagner's demonstration that sealing architecture, burials, and caches in white marl could occur in the absence of any other signs of defacement was an important step in reconciling the relationship between the two processes. Here, I review the various combinations and permutations of the two processes and build on her work to argue that we can further uncouple them with regard to mortuary contexts because termination and sealing in white marl can occur in the absence of the other.

10.4.1 Desecratory Termination with Sealing

The two most commonly cited architectural examples of termination with sealing in white marl are found at the sites of Yaxuna, Mexico (Freidel et al. 1998, p. 140; Wagner et al. 2006, p. 58) and Cerros, Belize (Freidel 1986; Freidel and Schele 1989, p. 237). The examples from Cerros and Yaxuna are considered desecratory acts of termination performed in the context of military defeat (Schele and Freidel 1990, p. 127) and the end of an elite dynasty (Freidel et al. 1998), respectively. Desecratory termination with sealing in mortuary contexts was found at the site of Zacpetén, in northern Guatemala.

Operation (op.) 1000 is a large depression on the northwest corner of the Zacpetén's principal ceremonial group (group A). The depression contained a large mass grave, containing at least 37 individuals that included males, females, and juveniles (Duncan and Schwarz 2014, in press). The stratigraphy of the grave showed that layers of white limestone (Layers 8, 5, and 3) enclosed the remains (Layer 6; Fig. 10.5; Duncan and Schwarz 2014, in press). The layers above this were architectural collapse or erosion. Layer 7 reflected in situ burning. The mass grave layer was created during the fifteenth century (Duncan and Schwarz 2014, in press), however, three features on the periphery of op. 1000 indicate that the depression had been used repeatedly for ritual activity since the Middle Preclassic (1000–300 B.C.). There was no principal personage or grave goods found in the mass grave layer.

Osteological analysis of the remains showed that the grave was a secondary deposit. Although there were at least 37 individuals present, as indicated by the temporal and femur bones, smaller skeletal elements were underrepresented. The minimum numbers of individuals for the tarsals (19), metatarsals (18), distal pedal phalanges (9), carpals (9), metacarpals (9), and distal manual phalanges (7) were lower than larger elements. This is consistent with the low levels of articulation in

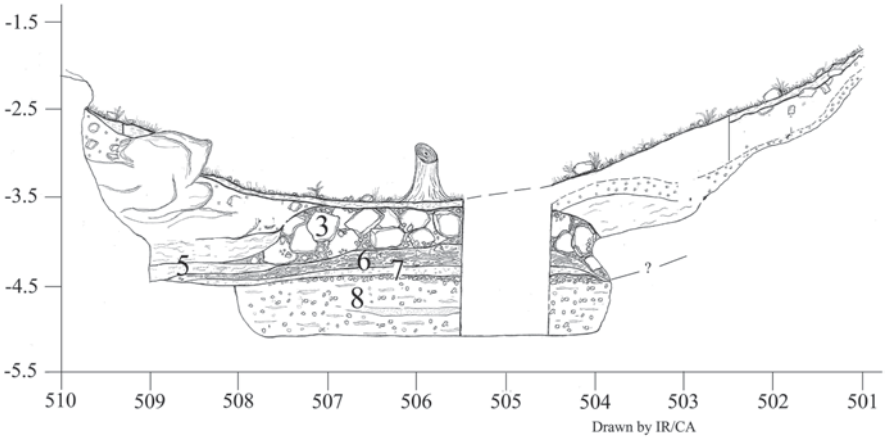

Fig. 10.5 East-facing profile at line 106 from op. 1000, Zacpetén. (Modified from Duncan 2005b)

the assemblage, although there were some articulated remains. Additionally, right forearm bones and maxillary molars were significantly underrepresented in the assemblage. Spatial analyses demonstrated that the right forearm bones had a different distribution than other long bones, implying that they were intentionally omitted from the grave. Many of the long bones exhibited cut marks on the middle of their shafts as well as on the ends, indicating that the remains were likely defleshed (as opposed to simply dismembered; Duncan and Schwarz 2014, in press).

The mass grave dated to the time that a new social group, the Kowoj, emerged as a political force in the Petén lakes region in the Late Postclassic (Duncan and Schwarz, in press). The Kowoj were locked in an ongoing struggle for political dominance in the region with another social group, the Itzá. The Kowoj created mass graves at another site in the Petén lakes region (Topoxté) and at the site in the Yucatan peninsula from which they migrated (Mayapán; Duncan and Schwarz, in press). Thus, the grave appears to have been created when the Kowoj took over the site of Zacpetén (Duncan and Schwarz, in press).

There are four likely scenarios to account for the creation of the grave: creation of a family ossuary; sacrifice; burial of war dead; and the reburial of enemy remains after they had been exhumed and violated. The grave in op. 1000 is not a family ossuary. Ossuaries are defined as final repositories for the remains that typically have been previously processed and reflect funerary treatment (see Duncan and Schwarz, in press for a discussion of the difference of ossuaries, multiple burials, and mass graves). The cut marks, lack of grave goods, absence of a principal person, and missing right forearm bones indicated that the grave was nonfunerary in nature and was designed to violate the deceased. In Maya, mural victors and individuals of high status were depicted as right handed; vanquished enemies and sacrificial victims were left handed (Duncan and Schwarz, in press). Additionally, unlike the Zapotal ossuary from Veracruz, Mexico (Tiesler et al. 2013), the remains in op. 1000 were interred in a single episode.

The mass grave may reflect sacrifice or war dead; however, there are very low levels of articulation in the grave. There were infants in the grave, falsifying the idea that soldiers were buried there. However, it is possible that the deceased were killed in a raid. The identification of sacrifice in the Maya area is an ongoing challenge, but is particularly difficult to do in secondary contexts. The low levels of articulation here (vis a vis demonstrated sacrificial contexts; e.g., Duncan 2011) indicate that if the grave were the product of sacrifice or the burial of war dead, then the remains were processed considerably before interment and they were not simply buried after the individuals were killed.

A final scenario is the reburial of enemy ancestors. When the Kowoj took over the site of Zacpetén, they would have needed to dislodge the previous occupants' claims to legitimate ownership of the site. Exhuming enemy ancestors and reburying them in op. 1000 would have created a symbol of the Kowoj victory from enemy remains. This possibility is most consistent with the low levels of articulation in the grave; however, neither sacrifice nor burial of war dead are exclusive with this scenario.

Although we cannot know for certain which of these three scenarios led to the creation of the grave (all three could have contributed), the white layers of limestone reflect the fact that the grave layer was ritually sealed. Additionally, the feature was abandoned after the mass grave was created, even though group A was used through the time of contact with Spaniards. This implies that there was a taboo associated with the feature because the remains maintained their potency (cf. Sullivan et al. 2008, p. 99). Wrapping the remains by enveloping them in white limestone (layers 8, 3 and 5) would have served a dual purpose—it would have commemorated their enemies' defeat as well as sealed off the potentially harmful remains as the Kowoj established their control of Zacpetén.

10.4.2 Sealing in Reverential Termination

Wagner (2006) notes that the Maya buried some buildings within white marl intact, with no signs of defacement. The best-known architectural example of this is the Rosalila structure (Str. 10L–16–3rd) at Copán, in Honduras (Wagner 2006). Other examples have been reported at Nixtun–Ch'ich' (Str. B5 in Mound ZZ1; Rice 2009, p. 411) and Ek' Balam (the structure housing the tomb of U Kit Kan Lek; Wagner 2006, p. 60). The Maya wrapped and covered bodies in various media including red or white cloth, cinnabar, sedge, and animal skins. I discuss variability in wrapping below and its relationship to sealing, but here I focus on examples that reflect sealing in a white plaster. At Lamanai in Belize, a Preclassic tomb in Str. N9–56 (Pendergast 1981) was plastered in a similar fashion to the Rosalila structure. The corpse was painted with red pigment, covered in clay, and then surrounded by grave goods. A wooden frame was then erected round the body and textiles that were treated with a white lime plaster were placed on the frame. Textiles with a red dye were then placed on top of it. The entire tomb was built on top of a floor of a previous construction prior to beginning a new construction (Pendergast 1981, p. 39).

Tomb 4 in Structure 2 at Calakmul is another example of this practice. This tomb housed Yuknoom Yich'aak K'ahk'(Jaguar Paw Smoke), a seventh-century AD ruler (Carrasco et al. 1999, p. 53). The body lay in an extended supine position with his hands folded on his chest and stomach. The corpse had been placed on a wooden litter and was wrapped in a textile that had been treated with a white substance that Carrasco and colleagues suggested was latex (Carrasco et al. 1999, p. 53). The ruler was then sealed in resin (Carrasco et al. 1999, p. 53). Substructure 2-B was built on top of Tomb 4. Tomb 1 of Structure XV at Calakmul may reflect a similar process (Carrasco et al. 1999, p. 53).

10.4.3 Termination Without Sealing

The aforementioned examples make clear that wrapping can occur with desecratory and reverential termination in various media. However, wrapping is clearly not a constituent element of termination because either could occur in the absence of the other. One well-known example involving both architecture and human remains is the skull pit at the site of Colha in Belize. The skulls of 30 individuals (20 adults of both sexes and 10 juveniles) were placed in a pit west of a stairway of op. 2011, an elite residence during the Late to Terminal Classic period (AD 800–850; Massey 1989; Mock 1998b). The heads were flayed and the structure was burned after the deposition of the remains. The skull deposit was likely created as the site was overthrown either from internal coup or from outside forces, and was followed by a hiatus at the site (Massey 1989; Mock 1998b). Such desecratory termination would have "dismantled the losing community's ties to its ancestral power and deactivated the soul force, or *ch'ulel*, that animated its sacred space" (Brown and Garber 2003, p. 93).

Other examples of termination occurring without wrapping in Mesoamerica include skull racks (e.g., Wilkinson 1997) and human trophies that were worn (Moser 1973; Spence et al. 2004). Most examples are interpreted as sacrificial victims' body parts (Miller 2007). Houston et al. (2006, pp. 203–207) noted that this likely reflects the appropriation and incorporation of fallen enemies' animating essences. However, some examples of human femora being taken, such as the frieze at Lambityeco, Oaxaca, are interpreted as using ancestors' remains to establish legitimacy of power (Feinman et al. 2010).

10.4.4 Sealing in the Absence of Termination in Mortuary Contexts

Sealing in the absence of termination occurred during tomb reentry. Such reentry, of course, occurred after initial burial rites. One can reasonably argue that any and all rituals associated with dead bodies were part of one continuous mortuary process that did not reflect clear distinctions between the preliminal, liminal, and

postliminal periods (Eberl 2005, p. 111; Fitzsimmons 1998, 2006, p. 38; Wagner 2006, p. 67). However, even if defining these boundaries remains a point of ongoing research, Weiss-Krejci (2011) has highlighted the distinction between funerary and postfunerary rituals. From this perspective, tomb reentry was separate from initial mortuary treatments following the death of the individual ritually speaking. Tombs could be reentered to take grave goods, desecrate burials, to bury more people (recently deceased or relics of past relatives), and to commune with the deceased rulers (Chase and Chase 1996; Fitzsimmons 2006; McAnany 1995; Weiss-Krejci 2003, 2004). Reentry of kings's tombs seems to have consisted of removal of the capstones, modifying the tomb contents (either the remains themselves or grave goods, or by burning incense), and the subsequent resealing of the tomb or possible reburial of the remains elsewhere (Fitzsimmons 2006). Fitzsimmons (2006) has noted that the sealing process of tombs frequently involved fire but in some cases the placement of white marl was part of the process as well. Tomb 23 in Str. 6F–3 at the site of Yaxuna is an example of a burial sealed without other signs of termination. The tomb was created for an Early Classic ruler and the floor was covered in white marl (Wagner 2006, p. 62). The tomb was reentered during the dedication of a later construction episode (Str. 6F–3/4) and was sealed with more white marl and a jade offering (Wagner 2006, p. 62). The dedication of the new building and resealing of the tomb would have helped maintain the power of the tomb, and bolster the legitimacy of the line between the two rulers. Burials 1 and 10 from the site of Piedras Negras in Guatemala may have reflected similar processes. Both burials were reentered in antiquity and then intentionally covered with white lime (Coe 1959, pp. 121–127). Burial 1 seems to have been disturbed in situ during the reentry, but Coe (1959) suggested that the remains from Burial 10 were removed for reinterment elsewhere.

10.4.5 Defining the Relationship Between Sealing and Termination in Mortuary Contexts

Termination, in the Mesoamerican worldview, necessarily leads to a rebirth in some form. Sealing in mortuary contexts frequently accompanied termination because it reflected an effort to frame and order this rebirth in time and space. The relationship between the two, and whether or not they cooccurred, reflected political context and history. In the case of desecratory termination accompanied by sealing, such as at Zacpetén, there was an attempt to seal in potentially malevolent essences so the inhabitants of the site would not be harmed (Duncan and Schwarz in review a; Wagner 2006). Additionally, the public bundling of enemy remains created an enduring symbol of their defeat as a new social group, the Kowoj, overtook the site. Desecratory termination without any sign of wrapping, such as that seen at Colha, though was not characterized by any immediate subsequent occupation. The fact that those who took over or destroyed a site were not going to live at the site suggests that they did not have to shield themselves from the remains' potent malevolence. Sealing in the context of reverential termination was a way of curating or embalming essences so they could be incorporated into new life cycles (Wagner 2006, p. 61). This occurred in the context of reverential mortuary practices such as

at Calakmul when political continuity was being accentuated to legitimize claims to power. Finally, sealing that occurred in circumstances removed from the individual's death was associated with accessing tombs and caches like sacred bundles. These were likely used to demonstrate continuity to past rulers (either directly or to temporally remote rulers; Fitzsimmons 2006). All of these contexts are consistent with finding sacred bundles frequently associated with founding and accession rites (see above). It is worth noting that these rituals can frequently occur in a palimpsest within the same context due to remarkably complex circumstances surrounding occupation such as abandonment, continuity, reoccupation, take over, and insurrection (Navarro Farr et al. 2008). As a result, detailed contextual analyses will continue to be the key for distinguishing them.

10.5 Distinguishing Wrapping and Sealing

Heretofore in this chapter, I have described sealing as the covering of bodies in white material expressly for the purpose of containing souls or animating essences. However, the Maya wrapped bodies and parts in a host of ways, thus it is worth discussing whether or not we might distinguish sealing, at least as a subset, from other forms of wrapping. Bishop Diego de Landa described wrapping corpses in shrouds as a normal part of burial in Colonial Yucatan (Tozzer 1941). Cloth shrouds do not always (or even necessarily frequently) preserve in the lowland Maya area, but in extended burials the presence of folded arms over the chest is interpreted as evidence of wrapping in the absence of cloth (Reese-Taylor et al. 2006, p. 43). Direct evidence of shrouds exists, however, and burial 195 from Tikal is a well-known example, in which the extended body was wrapped in multiple layers and tied with a cord. Remnants of wrapping indicated that they were red (Coe 1990, pp. 565–567). The red coloring is important because a number of burials from the Maya region exhibit similar treatment. Weiss-Krejci (2006a) reported pigment on 60 individuals from a survey of 3,700 individuals from 63 sites. The application of red pigment could occur along with other covering practices, as seen at Rio Azul Tomb 19, in which the body was covered with cinnabar and allspice leaves, and wrapped in burlap cloth (Adams 1999, p. 219). Similar red painting accompanying possible wrapping was reported at Kaminaljuyu Tomb 2, Structure E-III-3 (Shook and Kidder 1952, p. 64) and at Calakmul in Tomb 1, Structure III (Folan 1995, p. 321) and the aforementioned Tomb 4 in Structure II.

Other materials have also been used to cover or wrap bodies in the Maya region such as bark and animal skins. At Copán, a burial in the Chorcha pyramid within Temple 26 had been wrapped in a sedge matt (Fash 1991). Similarly, Fowler (1984, p. 609) reported 24 individuals from Chalchuapa wrapped in bark cloth mats. At Altun Ha, the body in Structure B-4/7 was placed on a wooden litter, and covered in felid skins (of multiple species) and red cloth that appears to have been dyed (Pendergast 1969, pp. 21–27). Similarly, the aforementioned Tomb 4 found in Calakmul Structure II was wrapped in textiles and jaguar skins (Carrasco et al. 1999).

Finally, I should note that some have distinguished wrapping from bundling, defining the latter on the basis of flexed posture (Reese-Taylor et al. 2006). Various burials at Zaculeu (Woodbury and Trik 1953, p. 80) and in northern Belize (Reese-Taylor et al. 2006) may have been bundled or just flexed, seated burials. However, some burials contain explicit evidence of bundling, such as burial A75 at the site of Uaxactun that contained a child in a flexed position and remnants of rope (Reese–Taylor et al. 2006, pp. 48–49).

These examples demonstrate that the Maya wrapped bodies in multiple ways. I suggest that it is useful to identify sealing as a distinct subset of mortuary wrapping. Sealing explicitly reflected a desire to enclose animating essences hermetically and there is no clear indication that this was true for other forms of mortuary wrapping, which likely reflected elevated status, general cosmological concerns, and regional trends. Covering remains in jaguar skins and placement in tombs, for example, reflected elite status (Saunders 1994). Red was explicitly associated with east in the Maya area (Matthews and Garber 2004) and thus likely reflected widespread cosmological beliefs about rebirth (Ruz 1968) as well as elevated status in many cases. Weiss-Krejci (2006a) found the use of red pigment in a host of contexts (on articulated and disarticulated remains and applied during the initial preparation of the corpse or in tomb reentry). This variety may suggest that the use of red pigment reflected local tradition though in some cases. The Kowoj social group at the site of Mayapán and Zacpetén were associated with the colors red and black on ceramics, for example (Cecil 2001). This is likely true for the relationship of body position and wrapping as well. Bodies were clearly flexed in ancestor bundles elsewhere in Mesoamerica (Pohl 1994), and in some cases, it is associated with elevated status (McAnany 1995). However, reviews of Maya mortuary practices have found site and regional variation with regard to trends in body position without obvious pan-Maya trends (Ruz 1968; Weiss-Krejci 2006b; Welsh 1988).

Even though sealing may be differentiated from wrapping in mortuary contexts, it probably was not an absolute distinction. There may be forms of sealing other than wrapping in white marl. Fitzsimmons (2006) noted that many tombs were sealed after reentry with burning rituals and do not show any record of being sealed in white layers. Similarly, the practice of mortuary sealing may reflect factors other than a concern for containing animating essences. Status and local and regional trends, particularly within certain Classic Period kingdoms, may well have influenced sealing practices. For example, it may have been explicitly important for Calakmul but seems not to have been a practice at Palenque (Tiesler 2006, p. 34). Finally, there were several practices that enclosed bodies and seemed to have reflected concern for containing animating essences as a part of framing and ordering space, but are not exactly the same (materially) as formal sealing. This may be true for some of the aforementioned forms of wrapping. Since much of Maya lowland geology is characterized by white limestone, virtually any interred body could be reasonably argued to be ritually enclosed in a white material. Similarly, dedicatory burials, in which human remains were placed between architecture layers to ensoul and animate new construction, sealed in animating essences when they were reborn (Becker 1992, p. 188; Duncan 2011). Placing bodies (in whole or part) in urns or lip

to lip vessel caches (e.g., Uaxactun; Smith 1950, pp. 89–90) likely reflected an attempt to contain souls and essences. Caves were clearly used to seal off harmful essences because they were entrances to the underworld (Eberl 2005, p. 72). Hofling (1991, pp. 188–192) documents a contemporary Itzá tale from El Petén, Guatemala in which a sorcerer uses thread to seal a monster in a cave. Hanks (1990) noted that shamans take evil spirits from Yucatec Maya houses and place them in a chultun (a cistern). Examples of isolated bones sealed in caves have been interpreted as either deceased warriors or sacrificial victims (Cueva de Sangre, Dos Pilas; Scott and Brady 2005, p. 274). However, at Copán, Maudslay (1889–1902, p. 32) reported over 50 ceramic vessels containing human remains packed in lime in a chamber. Wagner (2006) suggested that the chamber served as a symbolic cave and may have been an ossuary. Thus, caves were associated with sealing harmful essences but the variability in cave burials makes characterizing them as a whole challenging. Although these caveats suggest that the distinction between sealing and wrapping is not absolute, they in no way undermine the idea that formal sealing is a specific type of wrapping that reflected a particular concern with framing and ordering cycles of birth, death, and rebirth.

10.6 Conclusion

Recent work on termination in the Maya area has discerned subcategories of this type of ritual. This work has shown that one of the material signatures of termination, encasing media in white marl, was actually a form of ritualized sealing that was tantamount to making sacred bundles. Here, I have built on this work to suggest that termination and ritualized sealing were actually separate processes and that their relationships in mortuary contexts likely reflected larger political events. I have also explored variability in mortuary wrapping to suggest that sealing in white marl was a distinct subset of wrapping. Future research will continue to shed light on the relationship of ritual wrapping with these and other practices, but decoupling sealing from termination, and distinguishing it from wrapping, should continue to further refine our understanding of all three processes.

Acknowledgments I would like to thank Dr. Gabriel D. Wrobel for inviting my participation in this volume. Dr. Estella Weiss-Krejci provided a thoughtful review and cogent criticisms that improved this chapter. All of the members of Proyecto Maya Colonial, in particular Dr. Leslie Cecil and the faculty and students of CUDEP in Guatemala, notably Lics. Romulo Sánchez Polo, Rolando Torres, Ivo Romero, and Mara Reyes made valuable contributions to this project. This project could not have been possible without cooperation from members of IDAEH in Guatemala, in particular Lics. Boris Aguilar and Sheila Flores. Dr. George Stuart kindly gave permission to reproduce several of images I used in this chapter. Carmen Arendt and Felix Duncan provided unflagging support, for which I am most grateful. Funding was provided in part by NSF doctoral dissertation improvement grant BCS 0125311. Any remaining errors are solely mine.

References

Adams, R. E. W. (1999). *Río Azul: An ancient Maya city*. Norman: University of Oklahoma Press.

Ambrosino, J. N., Arden, T., & Stanton, T. W. (2003). The history of warfare at Yaxuná. In M. K. Brown & T. W. Stanton (Eds.), *Ancient Mesoamerican warfare* (pp. 109–124). Walnut Creek: Altamira Press.

Becker, M. J. (1992). Burials as caches; caches as burials: A new interpretation of meanings of ritual deposits among the Classic period Lowland Maya. In E. Danien & R. Sharer (Eds.), *New theories on the ancient Maya* (pp. 185–196). Philadelphia: University of Pennsylvania.

Benson, E. P. (1976). Ritual cloth and Palenque kings. In M. G. Robertson (Ed.), *The art, iconography, and dynastic history of Palenque, Part III* (pp. 45–58). Proceedings of the Segunda Mesa Redonda de Palenque. Pebble Beach: Pre-Columbian Art Research Institute, Robert Louis Stevenson School.

Boone, E. H. (2000a). Bringing polity to place: Aztec and Mixtec foundation rituals. In C. Vega (Ed.), *Códices y documentos sobre México: Tercer simposio internacional* (pp. 547–573). Mexico: Instituto Nacional de Antropología e Historia.

Boone, E. H. (2000b). *Stories in red and black: Pictorial histories of the Aztecs and Mixtecs*. Austin: University of Texas Press.

Brown, M. K., & Garber, J. F. (2003). Evidence of conflict during the Middle Formative in the Maya Lowlands: A view from Blackman Eddy, Belize. In M. K. Brown & T. W. Stanton (Eds.), *Ancient Mesoamerican warfare* (pp. 91–108). Walnut Creek: Altamira Press.

Brown, M. K., & Garber, J. F. (2008). Establishing and reusing sacred place: A diachronic perspective from Blackman Eddy, Belize. In T. W. Stanton & A. Magnoni (Eds.), *Ruins of the past* (pp. 147–170). Boulder: University Press of Colorado.

Byland, B. E., & Pohl, J. M. D. (1994). *In the realm of 8 Deer: The archaeology of the Mixtec codices*. Norman: University of Oklahoma Press.

Canuto, M. A., & Andrews, A. P. (2008). Memories, meanings, and historical awareness: Post-abandonment behaviors among the Lowland Maya. In T. W. Stanton & A. Magnoni (Eds.), *Ruins of the past* (pp. 257–274). Boulder: University Press of Colorado.

Carlsen, R. S., & Prechtel, M. (1991). The flowering of the dead: An interpretation of Highland Maya culture. *Man, 26*(1), 23–42.

Carrasco, M. D., & Hull, K. (2002). The cosmogonic symbolism of the corbeled vault in Maya architecture. *Mexicon, XXIV*(2), 26–32.

Carrasco Vargas, V., Boucher, B., Alvarez González, P., Tiesler Blos, V., García Vierna, V., García Moreno, R., & Vázquez Negrete, J. (1999). A dynastic tomb from Campeche, Mexico: New evidence on Jaguar Paw, a ruler of Calakmul. *Latin American Antiquity, 10*(1), 47–58.

Cecil, L. (2001). *Technological styles of Late Postclassic slipped pottery from the Central Petén Lakes region, El Petén, Guatemala*. Ph.D. dissertation, Carbondale, Southern Illinois University.

Chase, D. Z., & Chase, A. F. (1996). Maya multiples: Individuals, entries, and tombs in structure A34 of Caracol, Belize. *Latin American Antiquity, 7*(1), 61–79.

Chase, D. Z., & Chase, A. F. (1998). The architectural context of caches, burials, and other ritual activities for the Classic period Maya (as Reflected at Caracol, Belize). In S. D. Houston (Ed.), *Function and meaning in Classic Maya architecture* (pp. 299–332). Washington, D.C.: Dumbarton Oaks Research Library and Collection.

Child, M. B., & Golden, G. W. (2008). The transformation of abandoned architecture at Piedras Negras. In T. W. Stanton & A. Magnoni (Eds.), *Ruins of the past* (pp. 65–90). Boulder: University Press of Colorado.

Christenson, A. J. (2006). Sacred bundle cults in Highland Guatemala. In J. Guernsey & F. K. Reilly III (Eds.), *Sacred bundles: Ritual acts of wrapping and binding in Mesoamerica* (pp. 226–246). Ancient America Special Publication Number 1. Barnardsville: Boundary End Archaeology Research Center.

Clark, J. E., & Colman, A. (2008). Time reckoning and memorials in Mesoamerica. *Cambridge Archaeological Journal, 18*(1), 93–99.

Coe, W. R. (1959). *Piedras Negras archaeology: Artifacts, caches, and burials*. Philadelphia: University of Pennsylvania.

Coe, W. R. (1990). *Excavations in the great plaza, north terrace and north acropolis of Tikal*. Philadelphia: University Museum, University of Pennsylvania.

Duncan, W. N. (2005a). Understanding veneration and violation in the archaeological record. In G. F. M. Rakita, J. E. Buikstra, L. A. Beck, & S. R. Williams (Eds.), *Interacting with the dead: Perspectives on mortuary archaeology for the new millenium* (pp. 207–227). Gainesville: University Press of Florida

Duncan, W. N. (2005b) *The bioarchaeology of ritual violence in Postclassic El Petén, Guatemala (AD 950–1524)*. Ph.D. dissertation, Carbondale, Southern Illinois University.

Duncan, W. N. (2011). Bioarchaeological analysis of sacrificial victims from a Postclassic Maya temple from Ixlú, El Petén, Guatemala. *Latin American Antiquity, 22*(4), 549–572.

Duncan, W. N., & Schwarz, K. R. (in press). A Postclassic Maya mass grave from Zacpetén, Guatemala. *Journal of Field Archaeology*.

Duncan, W. N., & Schwarz, K. R. (2014). Partible, permeable, and relational bodies in a Maya mass grave. In A. Osterholtz, K. Baustian, & D. Martin (Eds.), *Commingled and disarticulated human remains: Working towards improved theory, method and data* (pp. 149–172). New York: Springer.

Eberl, M. (2005). *Muerte, entierro y ascensción: ritos funerarios entre los antiguos mayas*. Mérida: Ediciones de la Universidad Autónoma de Yucatán.

Fash, W. (1991). *Scribes, warriors and kings: The city of Copán and the ancient Maya*. New York: Thames & Hudson.

Feinman, G. M., Nicholas, L. M., & Baker, L. C. (2010). The missing femur at the Milta Fortress and its implications. *Antiquity, 84*(326), 1089–1101.

Fitzsimmons, J. L. (1998). Classic Maya mortuary anniversaries at Piedras Negras, Guatemala. *Ancient Mesoamerica, 9*(2), 271–278.

Fitzsimmons, J. L. (2006). Classic Maya tomb re-entry. In P. R. Colas, G. LeFort, & B. L. Persson (Eds.), *Jaws of the underworld: Life, death, and rebirth among the ancient Maya* (pp. 35–42). Acta Mesoamericana, Vol. 16. Markt Schwaben: Verlag Anton Saurwein.

Fitzsimmons, J. L. (2009). *Death and the classic Maya kings*. Austin: University of Texas Press.

Fitzsimmons, J. L. (2011). Perspectives on death and transformation in ancient Maya society: Human remains as a means to an end. In J. L. Fitzsimmons & I. Shimada (Eds.), *Living with the dead: Mortuary ritual in Mesoamerica* (pp. 53–77). Tucson: University of Arizona.

Folan, W. J., Marcus, J., Pincemin, S., del Rosario Domínguez Carrasco, M., Fletcher, L., & Morales Lopez, A. (1995). Calakmul: New data from an ancient Maya capital in Campeche, Mexico. *Latin American Antiquity, 6*(4), 310–334.

Fowler, W. R. (1984). Late Preclassic mortuary patterns and evidence for human sacrifice at Chalchuapa, El Salvador. *American Antiquity, 49*(3), 603–618.

Freidel, D. A. (1986). The monumental architecture. In D. A. Freidel & R. A. Robertson (Eds.), *Archaeology at Cerros, Belize, Central America, Volume I: An interim report* (pp. 1–22). Dallas: Southern Methodist University Press.

Freidel, D. A., & Schele, L. (1989). Dead kings and living temples: Dedication and termination rituals among the ancient Maya. In W. Hanks & D. S. Rice (Eds.), *Word and image in Maya culture: Explorations in language, writing, and representation* (pp. 233–243). Salt Lake City: University of Utah Press.

Freidel, D. A., Suhler, C. K., & Cobos Palma, R. (1998). Termination ritual deposits at Yaxuna: Detecting the historical in the archaeological contexts. In S. B. Mock (Ed.), *The sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record of Mesoamerica* (pp. 135–146). Albuquerque: University of New Mexico Press.

Garber, J. F. (1983). Patterns of jade consumption and disposal at Cerros, Northern Belize. *American Antiquity, 48*(4), 800–807.

Gillespie, S. D. (2002). Body and soul among the Maya: Keeping the spirits in place. In H. Silverman & D. B. Small (Eds.), *The space and place of death* (pp. 67–78). Archaeological Papers, Vol. 11. Arlington: American Anthropological Association.

Gillespie, S. D. (2010). Maya memory work. *Ancient Mesoamerica, 21*(2), 401–414.

Gossen, G. H. (1986). Mesoamerican ideas as a foundation for regional synthesis. In G. H. Gossen (Ed.), *Symbol and meaning beyond the closed community: Essays in Mesoamerican ideas* (pp. 1–8). Albany: Institute for Mesoamerican Studies, State University of New York.

Guernsey, J., & Kent Reilly III, F. (2006). Introduction. In J. Guernsey & F. Kent Reilly III (Eds.), *Sacred bundles: Ritual acts of wrapping and binding in Mesoamerica* (pp. v-xvi). Barnardsville: Boundary End Archaeology Research Center.

Hanks, W. F. (1990). *Referential practice: Language and lived space among the Maya*. Chicago: The University of Chicago Press.

Hansen, R. D., Howell, W. K., & Guenter, S. P. (2008). Forgotten structures, haunted houses, and occupied hearts: Ancient perspectives and contemporary interpretations of abandoned sites and buildings in the Mirador Basin, Guatemala. In T. W. Stanton & A. Magnoni (Eds.), *Ruins of the past* (pp. 25–64). Boulder: University Press of Colorado.

Headrick, A. (1999). The street of the dead … It really was: Mortuary bundles at Teotihuacan. *Ancient Mesoamerica, 10*(1), 69–85.

Hofling, A. C. (1991) *Itzá Maya texts with a grammatical overview*. Salt Lake City: University of Utah Press.

Hofling, A. C., & Fernando Tesucún, F. (1997). *The Itzaj Maya—Spanish—English Dictionary*. Salt Lake City: University of Utah Press.

Houston, S. D., & McAnany, P. A. (2003). Bodies and blood: Critiquing social construction in Maya archaeology. *Journal of Anthropological Archaeology, 22*(1), 26–41.

Houston, S., Stuart, D., & Taube, K. (2006). *The memory of bones: Body, being, and experience among the Classic Maya*. Austin: University of Texas Press.

Hull, K. (2006). Journey from the ancient Maya tomb: Ropes, roads, and the point of departure. G. LeFort & B. L. Persson (Eds.), *Jaws of the underworld: Life, death, and rebirth among the ancient Maya* (pp. 43–52). Acta Mesoamericana, Vol. 16. Markt Schwaben: Verlag Anton Saurwein.

Iannone, G. (2005). The rise and fall of an ancient Maya petty royal court. *Latin American Antiquity, 16*(1), 26–44.

Klein, C. (1982). Woven heaven, tangled Earth: A weaver's paradigm of the Mesoamerican cosmos. Ethnoastronomy and archaeoastronomy in the American tropics. *Annals of the New York Academy of Sciences, 385,* 1–35.

Looper, M. G. (2006). Fabric structures in classic Maya art and ritual. In J. Guernsey & F. Kent Reilly III (Eds.), *Sacred bundles: Ritual acts of wrapping and binding in Mesoamerica* (pp. 80–104). Barnardsville: Boundary End Archaeology Research Center.

Massey, V. K. (1989). *The human skeletal remains from a terminal classic skull pit at Colha, Belize. Papers of the Colha Project* (Vol. 3). College Station: The University of Texas and Texas A & M University.

Matthews, J. P., & Garber, J. F. (2004). Models of cosmic order: Physical expression of sacred space among the ancient Maya. *Ancient Mesoamerica, 15*(1), 49–59.

Maudslay, A. P. (1889–1902). *Biologia Centrali Americana: zoology, botany and archaeology* (Vol. 1). London: R. H. Porter.

McAnany, P. A. (1995). *Living with the ancestors: Kinship and kingship in ancient Maya society*. Austin: University of Texas Press.

McGee, R. J. (1998). The Lacandon incense burner renewal ceremony: Termination and dedication ritual among the contemporary Maya. In S. B. Mock (Ed.), *The sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record of Mesoamerica* (pp. 41–46). Albuquerque: University of New Mexico Press.

Megged, A. (2010). *Social memory in ancient and Colonial Mesoamerica*. New York: Cambridge.

Miller, A. G. (1982). *On the edge of the sea: Mural painting at Tancah–Tulum, Quintana Roo, Mexico*. Washington, D. C.: Dumbarton Oaks.

Miller, V. (2007). Skeletons, skulls, and bones in the art of Chichen Itzá. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifices and ritual body treatments in ancient Maya society* (pp. 165–189). New York: Springer.

Mock, S. B. (1998a) Prelude. In S. B. Mock (Ed.), *The sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record of Mesoamerica* (pp. 3–20). Albuquerque: University of New Mexico Press.

Mock, S. B. (1998b). The defaced and the forgotten: Decapitation and flaying/mutilation as a termination event at Colha, Belize. In S. B. Mock (Ed.), *The sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record of Mesoamerica* (pp. 113–124). Albuquerque: University of New Mexico Press.

Moser, C. L. (1973). *Human decapitation in ancient Mesoamerica. Studies in Pre–Columbian art and archaeology*, no.11. Washington D. C.: Dumbarton Oaks.

Navarro Farr, C., Freidel, D. A., & Arroyave Prera, A. L. (2008). Manipulating memory in the wake of dynastic decline at El Perú-Waka': Termination deposits at abandoned structure M13–1. In T. W. Stanton & A. Magnoni (Eds.), *Ruins of the past* (pp. 113–146). Boulder: University Press of Colorado.

Newsome, E. A. (2003). *The "bundle" altars of Copán: A new perspective on their meaning and archaeological contexts. Ancient America 4*. Washington, DC: Center for Ancient American Studies.

Olivier, G. (2006). The sacred bundles and the coronation of the Aztec king in Mexico- Tenochtitlan. In J. Guernsey & F. Kent Reilly III (Eds.), *Sacred bundles: Ritual acts of wrapping and binding in Mesoamerica* (pp. 199–225). Barnardsville: Boundary End Archaeology Research Center.

Pagliaro, J. B., Garber, J. F., & Stanton, T. W. (2003). Evaluating the archaeological signatures of Maya ritual and conflict. In M. K. Brown & T. W. Stanton (Eds.), *Ancient Mesoamerican warfare* (pp. 75–90). Walnut Creek: Altamira Press.

Pendergast, D. M. (1969). *Altun Ha, British Honduras (Belize). The sun god's tomb*. Occasional paper 19. Ontario: Royal Ontario Museum Art and Archaeology.

Pendergast, D. M. (1981). Lamanai, Belize: Summary of excavation results, 1974–1980. *Journal of Field Archaeology, 8*(1), 29–53.

Pohl, J. M. D. (1994). *The politics of symbolism in the Mixtec codices*. Nashville: Vanderbilt University Publications in Anthropology.

Reents–Budet, D. (2006). Power material in ancient Mesoamerica: The roles of cloth among the Classic Maya. In J. Guernsey & F. Kent Reilly III (Eds.), *Sacred bundles: Ritual acts of wrapping and binding in Mesoamerica* (pp. 105–126). Barnardsville: Boundary End Archaeology Research Center.

Reese-Taylor, K., Zender, M., & Geller, P. L. (2006). Fit to be tied: funerary practices among the Prehispanic Maya. In J. Guernsey & F. Kent Reilly III (Eds.), *Sacred bundles: Ritual acts of wrapping and binding in Mesoamerica* (pp. 40–58). Barnardsville: Boundary End Archaeology Research Center.

Reilly III, F. K. (2006). Middle formative origins of the Mesoamerican ritual act of bundling. In J. Guernsey & F. Kent Reilly III (Eds.), *Sacred bundles: Ritual acts of wrapping and binding in Mesoamerica* (pp. 1–21). Barnardsville: Boundary End Archaeology Research Center.

Rice, P. M. (2004). *Maya political science: Time, astronomy, and the cosmos*. Austin: University of Texas Press.

Rice, P. M. (2007). *Maya calendar origins: Monuments, mythistory, and the materialization of time*. Austin: University of Texas Press.

Rice, P. M. (2009). Mound ZZ1, Nixtun-Ch'ich', Petén, Guatemala: Rescue operations at a long-lived structure in the Maya Lowlands. *Journal of Field Archaeology, 34*(4), 403–422.

Roys, R. L. (1967). *The Book of Chilam Balam of Chumayel* (2nd ed.). Norman: University Oklahoma Press.

Ruz Lhuillier, A. (1968). *Costumbres funerarias de los antiguos Mayas*. Mexico: Universidad Nacional Autónoma de México.

Saturno, W. A., Stuart, D., Aveni, A. F., & Rossi, F. (2012). Ancient Maya astronomical tables from Xultan, Guatemala. *Science, 336*(6082), 714–717.

Saunders, N. J. (1994). Predators of culture: Jaguar symbolism and Mesoamerican elites. *World Archaeology, 26*(1), 104–117.

Schele, L., & Freidel, D. A. (1990). *A forest of kings: The untold story of the ancient Maya*. New York: William Morrow.

Scott, A. M., & Brady, J. E. (2005). Human remains in Lowland Maya caves: Problems of interpretation. In K. M. Prufer & J. E. Brady (Eds.), *Stone houses and earth lords: Maya religion in the cave context* (pp. 263–284). Boulder: University Press of Colorado.

Shook, E. M., & Kidder, A. V. (1952). *Mound E-III-3, Kaminlajuyu, Guatemala*. Publication 596. Washington, DC: Carnegie Institution of Washington.

Smith, A. L. (1950). *Uaxactun, Guatemala: Excavations of 1931–1937*. Publication 588. Washington, DC: Carnegie Institution of Washington.

Spence, M., White, C., Longstaffe, F. J., & Law, K. R. (2004). Victims of the victims: Human trophies worn by sacrificed soldiers from the feathered serpent pyramid, Teotihuacan. *Ancient Mesoamerica, 15*(1), 1–15.

Stanton, T. W., & Magnoni, A. (2008). Place of remembrance: The use and perception of abandoned structures in the Maya Lowlands. In T. W. Stanton & A. Magnoni (Eds.), *Ruins of the past* (pp. 1–24). Boulder: University Press of Colorado.

Stenzel, W. (1968). *The sacred bundles in Mesoamerican religion*. Thirty-eighth International Congress of Americanists, Stuttgart–München, 1968, 2, 347–352.

Stross, B. (1998) Seven ingredients in Mesoamerican ensoulment: Dedication and termination in Tenejapa. In S. B. Mock (Ed.), *The sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record of Mesoamerica* (pp. 31–40). Albuquerque: University of New Mexico Press.

Stuart, D. (1996). Kings of stone: A consideration of stelae in ancient Maya ritual and representation. *Res: Anthropology and Aesthetics, 29–30,* 148–171.

Stuart, D. (2006). Jade and chocolate: Bundles of wealth in classic Maya economics and ritual. In J. Guernsey, & F. Kent Reilly III (Eds.), *Sacred bundles: Ritual acts of wrapping and binding in Mesoamerica* (pp. 127–144). Barnardsville: Boundary End Archaeology Research Center.

Sullivan, L. A., Hageman, J. B., Houk, B. A., Hughbanks, P., & Valdez, F. Jr. (2008). Structure abandonment and landscape transformation: Examples from the Three Rivers region. In T. W. Stanton & A. Magnoni (Eds.), *Ruins of the past* (pp. 91–112). Boulder: University Press of Colorado.

Taube, K. A. (2004). Flower mountain: Concepts of life, beauty, and paradise among the Classic Maya. *Res: Anthropology and Aesthetics, 45,* 69–98.

Tedlock, D. (1996). *Popol Vuh: The definitive edition of the Maya book of the dawn of life and the glories of gods and kings*. New York: Simon and Schuster.

Thompson, J. E. S. (1970). *Maya history and religion*. Norman: University of Oklahoma Press.

Tiesler, V. (2006). Life and death of the ruler: Recent bioarchaeological findings. In V. Tiesler & A. Cucina (Eds.), *Janaab' Pakal of Palenque: Reconstructing the life and death of a Maya ruler* (pp. 21–48). Tucson: The University of Arizona Press.

Tiesler, V. (2007). Funerary or nonfunerary? New references in identifying ancient Maya sacrificial and postsacrificial behaviors from human assemblages. In V. Tiesler & A. Cucina (Eds.), *New perspectives on human sacrifice and ritual body treatments in ancient Maya society* (pp. 14–44). New York: Springer.

Tiesler, V., & Romano-Pacheco, A., Gómez-Valdés, J., & Daneels, A. (2013). Posthumous body manipulation in the Classic Period Mixtequilla: Reevaluating the human remains of ossuary I from El Zapotal, Veracruz. *Latin American Antiquity, 24*(1), 47–71.

Tozzer, A. (1941). *Landa's relación de las cosas de Yucatan*. *A translation edited with notes*. Cambridge: The Peabody Museum of American Archaeology and Ethnology, Harvard University.

Vail, G., & Hernández, C. (2011). The construction of memory: The use of Classic period divinatory texts in the Late Postclassic Maya codices. *Ancient Mesoamerica, 22*(2), 449–462.

Vogt, E. Z. (1998). Zinacanteco dedication and termination rituals. In S. B. Mock (Ed.), *The Sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record of Mesoamerica* (pp. 21–30). Albuquerque: University of New Mexico Press.

Wagner, E. (2006). White Earth bundles—the symbolic sealing and burial of buildings among the ancient Maya. In P. R. Colas, G. LeFort, & B. L. Persson (Eds.), *Jaws of the underworld: Life, death, and rebirth among the ancient Maya* (pp. 55–70). Acta Mesoamericana, Vol. 16. Markt Schwaben: Verlag Anton Saurwein.

Weiss-Krejci, E. (2003). Victims of human sacrifice in multiple tombs of the ancient Maya: A critical review. In A. Ciudad Ruiz, M. H. Ruz Sosa, & M. J. Iglesias Ponce de León (Eds.), *Antropologia de la eternidad: La muerte en la cultura Maya* (pp. 355–381). Madrid: Centro de Estudios Mayas, Sociedad Espanola de Estudios Mayas.

Weiss-Krejci, E. (2004). Mortuary representations of the Noble House: A cross-cultural comparison between collective tombs of the ancient Maya and Dynastic Europe. *Journal of Social Archaeology, 4*(3), 368–404.

Weiss-Krejci, E. (2006a). The Maya corpse: Body processing from Preclassic to Postclassic Times in the Maya Highlands and Lowlands. In P. R. Colas, G. LeFort, & B. L. Persson (Eds.), *Jaws of the underworld: Life, death, and rebirth among the ancient Maya* (pp. 71–80). Acta Mesoamericana, Vol. 16. Markt Schwaben: Verlag Anton Saurwein.

Weiss-Krejci, E. (2006b). Identifying ethnic affiliation in the Maya mortuary record. In F. Sachse (Ed.), *Maya ethnicity: The construction of ethnic identity from the Preclassic to modern times* (pp. 47–60). Acta Mesoamericana, Vol. 19. Markt Schwaben: Verlag Anton Saurwein.

Weiss-Krejci, E. (2011). The formation of mortuary deposits: Implications for understanding mortuary behavior of past populations. In S. C. Agarwal & B. A. Glencross (Eds.), *Social bioarchaeology* (pp. 68–106). Malden: Wiley-Blackwell Ltd.

Welsh, W. B. M. (1988). *An analysis of Classic Lowland Maya burials.* International Series 409. Oxford: British Archaeological Reports.

Wilkinson, R. G. (1997). Appendix B. Human skeletal remains from La Coyotera. In C. S. Spencer & E. M. Redmond (Eds.), *Archaeology of the Cañada de Cuicatlán, Oaxaca* (pp. 614–619). New York: American Museum of Natural History.

Woodbury, R. B., & Trik, A. S. (1953). *The ruins of Zaculeu, Guatemala*. Richmond: The United Fruit Company.

Index

G. D. Wrobel (ed.), *The Bioarchaeology of Space and Place,*
DOI 10.1007/978-1-4939-0479-2, © Springer Science+Business Media New York 2014

D