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**PRECLASSIC MAYA SHELL ORNAMENT
PRODUCTION IN THE BELIZE VALLEY, BELIZE**

BY

BOBBI M. HOHMANN

B.A., Anthropology, Southwest Texas State University, 1992

M.A., Anthropology, University of New Mexico, 1994

DISSERTATION

Submitted in Partial Fulfillment of the
Requirements for the Degree of

**Doctor of Philosophy
Anthropology**

The University of New Mexico
Albuquerque, New Mexico

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ABSTRACT

Ethnographic and ethnohistoric data confirm that shell objects have served many functions in stateless societies around the world, including their use as utilitarian implements, currency or medium of exchange, and personal adornment. Shell items are argued to have served many of these same functions in prehistoric Maya society. While shell artifacts have been recovered from prehistoric sites throughout the Maya Lowlands, very little is known about the industry that produced these items, particularly during the Preclassic (1500 B.C. – A.D. 250) period. Our knowledge of the Preclassic shell ornament industry has increased significantly with recent finds from Pacbitun, located in the Belize Valley of west-central Belize. In this dissertation the Preclassic shell artifacts from Pacbitun and other Belize Valley sites (i.e., Barton Ramie, Blackman Eddy, Cahal

Pech, Dos Chombitos Cik'in, and Zubin) are evaluated to provide information on the production, distribution, and consumption of shell ornaments during this period. The results of these analyses are used to address the social, economic, and political importance of shell to the Maya during this early period of cultural development.

The distribution of shell working materials indicates that the residents of two Belize Valley sites were involved in shell ornament production during the Preclassic period: Pacbitun and Cahal Pech. Production activities appear to have been dispersed at both the site and regional levels, such that no single group had control over this important industry. The association of shell working materials with Preclassic domestic architecture indicates that at least some of the production activities were undertaken at the household level. Contextual analysis has revealed that shell was of ritual or symbolic significance to the Belize Valley Maya by the beginning of the Middle Preclassic period, as evidenced by the frequent inclusion of shell items in burial and cache deposits. It is suggested here that during the Middle Preclassic, politically motivated individuals began importing this ritually significant material and producing shell ornaments to be used in competitive displays and exchanges designed to build power and prestige at the intra- and inter-community levels.

TABLE OF CONTENTS

LIST OF FIGURES	XV
LIST OF TABLES	XVII
CHAPTER 1 INTRODUCTION AND OVERVIEW.....	1
CHAPTER 2 WEALTH ITEMS AND SPECIALIZED CRAFT	
PRODUCTION	11
Wealth and Subsistence Items	11
Wealth Items in Ethnographic Studies.....	14
Wealth Items in Prehistoric Cultures	17
Wealth Items and the Development of Complexity.....	21
Wealth Items in the Maya Lowlands	29
Summary	33
CHAPTER 3 CRAFT SPECIALIZATION AND THE ORGANIZATION OF	
SHELL ORNAMENT PRODUCTION	35
Craft Specialization.....	35
Organization of Production.....	36
Archaeological Indicators of Production	38
Direct Evidence of Production.....	38
Indirect Evidence of Production	43
Studies in Shell Ornament Production.....	45
Summary	55

CHAPTER 4 THE BELIZE VALLEY: NATURAL AND CULTURAL

SETTINGS.....	56
Natural Setting	56
Geographic Location.....	56
Geology	60
Hydrography	60
Climate.....	61
Vegetation and Fauna	62
Cultural Historical Background	63
Chronology	63
History of Archaeological Research	66
Belize Valley Preclassic.....	68
Settlement	68
Architecture.....	69
Subsistence and Diet.....	73
Trade and External Relations.....	75
Preclassic Sites in the Belize Valley	79
Pacbitun.....	79
Barton Ramie	81
Blackman Eddy	82
Cahal Pech	83
Dos Chombitos Cik'in	84
Zubin.....	86

Summary	87
CHAPTER 5 ANALYTIC METHODS	89
Shell Analysis in the Maya Lowlands	89
Pacbitun Preclassic Shell Assemblage.....	92
Taxonomic Classification	94
Typological Classification	104
Beads.....	105
Tinklers	107
Adornos.....	108
Pendants	108
Blanks	108
Miscellaneous Worked Shell	109
Detritus.....	109
Technological Analysis.....	109
Contextual Analysis.....	110
Summary	114
CHAPTER 6 PACBITUN PRECLASSIC SHELL ASSEMBLAGE.....	115
Resource Utilization.....	115
Shell Ornaments.....	120
Shell Ornament Production.....	131
Production Tools.....	131
Production Techniques.....	137
Production Process.....	142

Summary	146
CHAPTER 7 CONSUMPTION OF SHELL ORNAMENTS.....	148
Shell Usage in Maya Society	148
Ethnohistoric Data	148
Iconographic and Archaeological Data.....	150
Consumption of Shell Ornaments at Pacbitun	160
Consumption of Shell Ornaments at Belize Valley Sites	162
Comparative Data from Other Preclassic Lowland Sites	164
Summary	170
CHAPTER 8 ORGANIZATION OF SHELL ORNAMENT PRODUCTION IN	
THE BELIZE VALLEY.....	171
Archaeological Indicators of Shell Working	171
Shell Working at Cahal Pech	174
Concentration of Shell Working at Cahal Pech	179
Shell Working at Pacbitun	181
Concentration and Scale of Shell Ornament Production at Pacbitun	191
Concentration of Shell Working at the Regional Level.....	194
Product Standardization	195
Summary	202
CHAPTER 9 CONCLUSIONS AND DIRECTIONS FOR FUTURE	
RESEARCH	204
Preclassic Shell Industry	204
Shell Ornament Production.....	206

Function of Preclassic Shell Ornaments	210
Shell and the Preclassic Political Economy	212
Directions for Future Research	215
Summary	219
REFERENCES	220

LIST OF FIGURES

Figure 4.1. Map of the Maya Area Showing Select Archaeological Sites and Regional Divisions.	58
Figure 4.2. Map of the Belize Valley Showing Archaeological Sites.	59
Figure 4.3. Ceramic Sequences for Select Sites in the Belize Valley and Department of Peten, Guatemala.	65
Figure 6.1. Representative Sample of Middle Preclassic Shell Ornaments from Pacbitun.	121
Figure 6.2. Representative Sample of Middle Preclassic Irregular Beads from Pacbitun.	122
Figure 6.3. Sample of Middle Preclassic Shell Artifacts from Pacbitun.	123
Figure 6.4. Sample of Middle Preclassic Shell Artifacts from Pacbitun.	123
Figure 6.5. Sample of Middle Preclassic Shell Artifacts from Pacbitun.	124
Figure 6.6. Percentage of Middle Preclassic Shell Ornament Types from Pacbitun.	126
Figure 6.7. Middle Preclassic Burin Spall and Microdrills from Pacbitun.	134
Figure 6.8. Middle Preclassic Chert Burin Spalls from Pacbitun.	135
Figure 6.9. Middle Preclassic Chert Microdrills from Pacbitun.	135
Figure 6.10. Bow Drill and Pump Drill.	142
Figure 6.11. Middle Preclassic Shell Detritus from Pacbitun.	144
Figure 7.1. Codex Representations of God N.	152

Figure 7.2. Representation of Shell Tinklers in Lintel Carving from Tikal.	153
Figure 7.3. Bloodletting Rituals Depicted in the Madrid Codex.	158
Figure 8.1. Isometric Plan of Cahal Pech Central Precinct and Peripheral Settlements.....	175
Figure 8.2. Isometric Plan of Pacbitun Central Precinct.....	182
Figure 8.3. Plan View of Plaza B Excavations and Middle Preclassic Architecture at Pacbitun.....	186
Figure 8.4. Diameter for Early Middle Preclassic Disk Beads at Pacbitun.	199
Figure 8.5. Diameter for Late Middle Preclassic Disk Beads at Pacbitun.....	199

LIST OF TABLES

Table 5.1. Identified Taxa in Middle Preclassic Deposits at Pacbitun.	98
Table 6.1. Frequency of Identified Taxa for Worked Shell Artifacts at Pacbitun.....	116
Table 6.2. Frequency of Early and Late Middle Preclassic Worked Shell Types at Pacbitun.	125
Table 6.3. Pacbitun Early Middle Preclassic Modified Shell Artifacts by Zoological Taxa.	127
Table 6.4. Pacbitun Late Middle Preclassic Modified Shell Artifacts by Zoological Taxa.	128
Table 6.5. Frequency of Middle and Late Preclassic Shell Types at Select Belize Valley Sites.....	130
Table 6.6. Frequency of Early and Late Middle Preclassic Gastropod Shell Parts from Pacbitun.....	139
Table 7.1. Pacbitun Middle Preclassic Shell Ornaments by Archaeological Context.....	161
Table 7.2. Contextual Data for Modified Preclassic Shell Ornaments from Belize Valley Sites.....	163
Table 7.3. Worked Shell Artifacts from Preclassic Contexts at Select Lowland Maya Sites.....	166

Table 8.1. Distribution of Middle and Late Preclassic Shell Working	
Material at Cahal Pech.	177
Table 8.2. Distribution of Middle Preclassic Shell Working Materials	
at Pacbitun.....	188
Table 8.3. Summary Statistics for Middle Preclassic Disk Bead Diameter.....	200

CHAPTER 1

INTRODUCTION AND OVERVIEW

Archaeological research in the Maya Lowlands has revealed a lengthy sequence of occupation extending from the Archaic (6000-2000 B.C.) to the Colonial (A.D. 1540) period. Lowland Maya civilization reached its pinnacle of cultural development during the Classic (A.D. 250-900) period, a time that is marked by the presence of a clearly defined social hierarchy, leadership by a dynastic ruler, large civic-ceremonial centers, monumental architecture, intensive agricultural systems, and elaborate systems of hieroglyphic writing and calendrics. Since the late nineteenth century when archaeological research first began in the Maya Lowlands, scholars have focused most of their attention on the major developments in Classic Maya society. While archaeological data and hieroglyphic texts have provided considerable information about the social and political roles played by the Maya elite during this period of peak fluorescence, we currently know very little about the timing and nature of the development of sociopolitical complexity in the Maya Lowlands.

Over the last thirty years many archaeologists have begun to direct their attention towards the elucidation of Preclassic or Formative (1500 B.C. – A.D. 250) period Maya society. Despite the recent interest in early Maya development, our knowledge of the Preclassic period remains limited. Preclassic occupation levels are often deeply buried beneath subsequent architectural features, making these deposits difficult to access without large-scale excavations that would potentially destroy major Classic period

constructions. Intensive archaeological research in the southern Maya Lowlands has revealed that many of the traditional cultural hallmarks of Classic Maya civilization had their origins in the Preclassic period. The presence of a settlement hierarchy (Fedick 1989; Hammond 1992; Sharer 1992), monumental public architecture (Robertson and Freidel 1986; Garber et al. 1998; Hansen 1989; Matheny 1986), differential mortuary treatment (Hammond 1999; Isaza Aizpurua and McAnany 1999; Robin 1989; Robin and Hammond 1991; Song 1995), craft specialization (Shafer and Hester 1983), exotic or non-local materials and artifacts (Awe 1992; Awe and Healy 1994; Garber 1989; Healy and Awe 2001; Hirth 1992; Hohmann and Powis 1996, 1999), and differential access to foodstuffs (Lentz 1991; Pohl 1985; Powis et al. 1999; White 2000; White et al. 1996) suggest that the Maya made the transition from an egalitarian to a ranked and/or stratified society by the end of the Middle Preclassic (900-300 B.C.) period.

Archaeological research has shown that residents of the Maya Lowlands had access to artifacts manufactured from non-local raw materials by the early facet of the Middle Preclassic (900-300 B.C.) period. While staple or food items were likely exchanged at the local and regional levels, only durable goods would have been transported great distances. Physicochemical analyses such as X-Ray Fluorescence (XRF) and Instrumental Neutron Activation Analysis (INAA) have played a crucial role in the reconstruction of prehistoric exchange relationships, allowing scholars to trace the movement of certain resources from their point of origin to the location of their final deposition. Obsidian, marine shell, and jade are the most common non-local materials that have been identified in archaeological deposits at sites throughout the Maya Lowlands. The nearest obsidian sources are found in the volcanic highlands of

Guatemala; jade was most likely derived from the Motagua River valley in southeast Guatemala; and marine shell was procured from the Caribbean Sea or Gulf of Mexico. Given their sources, obsidian and jade can clearly be defined as exotic materials at any lowland Maya site from which they are recovered. Marine shell, on the other hand, is only considered an exotic material when it is found at inland sites. While there is little direct evidence for the production of jade artifacts at lowland sites, the presence of production by-products and complete and incomplete marine shell and obsidian artifacts indicates that at least some of these items were being produced locally from imported materials. The evidence for local production does not, however, preclude the possibility that finished products were also being imported into lowland sites.

The non-local nature of these materials combined with their restricted distribution within receiver sites has led many Mayanists to argue that artifacts produced from these materials were prestige items that were circulated between the elite members of Maya society. Prestige items are typically defined as items of little to no utilitarian value that are used by individuals as symbols of status and authority or as generalized wealth that is used in social, economic, and political exchanges at the intra- and inter-community levels (Brumfiel and Earle 1987; Earle 1982; Hirth 1992; Peregrine 1991). These items are frequently referred to in the archaeological literature as elite, status, luxury, or wealth items. A wide variety of prestige goods have been reported in the ethnographic and ethnohistoric literature from around the world, including such items as shell ornaments, feathered headdresses, animal fur and skins, precious metals, and various types of textiles. While prestige goods are often easily recognized in modern tribal societies, the identification of prestige goods in archaeological contexts is a more difficult task.

Factors such as the type of raw material (local versus non-local), relative scarcity, technological sophistication, and/or labor investment are frequently used in the identification of prestige goods in archaeological contexts.

Polychrome pottery, marine shell ornaments, chipped stone eccentrics, and jade celts and ornaments are commonly identified as prestige goods in the Maya Lowlands. Based on a variety of archaeological, epigraphic, and iconographic evidence, archaeologists commonly argue that members of the Maya elite were involved in the production and/or distribution of prestige goods during the Classic period (Lecount 1999, 2000; Reents-Budet 1998). Archaeological and ethnographic research has indicated that there is a direct relationship between the emergence of powerful elites and craft specialization (Clark and Parry 1990; Earle 1994; Peregrine 1991, 1993). It has been suggested that political actors began to control or manage the production and distribution of prestige items in an attempt to maintain and increase their political authority within the community and abroad. In egalitarian and ranked societies this control often translates to the production of prestige items by attached or sponsored specialists who manufacture items for a specific elite patron.

In the Maya Lowlands there is a growing body of evidence that indicates that craft specialists were retained by members of the Maya elite class during the Late Classic (A.D. 600-900) period. The identification of craft workshops in elite compounds provides evidence in support of this hypothesis. At the site of Copan in Honduras (Fash 1991; Hendon 1989; Webster 1992:144), researchers have identified a shell working area in a non-royal elite residential establishment and at Buena Vista del Cayo in Belize (Ball 1993) a specialized painted ceramics workshop has been identified in an elite residential

compound. Epigraphic and iconographic data have also supported the hypothesis that some of these specialists or artists were members of the ruling elite (Coe 1977; Fash 1991; Reents-Budet 1994; Reents-Budet 1998). To date no comparable findings have been reported from Preclassic contexts in the Maya Lowlands. While the Preclassic Maya were obviously engaged in the production of a variety of goods, there is no clear evidence that these production activities were controlled by a particular segment of the population.

As noted above, marine shell was an important raw material used in the production of prestige goods throughout Mesoamerica. Ethnographic and ethnohistoric data confirm that shell objects have served many functions in non-state societies around the world, including their use as utilitarian implements, currency or medium of exchange, symbols of status, and generalized wealth. Shell items are argued to have served many of these same functions in Mesoamerican societies, including the Maya groups that inhabited the lowland regions of Mexico, Belize, Guatemala, and Honduras. At the time of Conquest, shell beads served as a form of currency in market exchanges (Roys 1943:52-54; Tozzer 1941:95-96, 231) and as costume decoration or body adornment for priests and other high status individuals (Tozzer 1941:95-96, 148). Shell ornaments have also been found in prehistoric deposits ranging from the Middle Preclassic (900-600 B.C.) to the Postclassic (A.D. 900-1540) period. Their presence in a number of different contexts suggests that shell items may have served multiple functions in Maya society; however, their predominance in offerings indicates that these items were highly valued and imbued with ritual significance. This is further supported by the use of shell in Classic period iconographic and epigraphic representations found on mural paintings

(Miller 1982; Miller 1986; Morris et al. 1931), underworld scenes painted on polychrome vessels (Coe 1978; Kerr 1992; Reents-Budet 1994; Robicsek and Hales 1981), codex representations (Schellhas 1904; Spinden 1957), and cave paintings (Stone 1995; Stuart 1981).

While a significant number of marine shell ornaments have been recovered from archaeological deposits at sites throughout the Maya Lowlands, very little is known about the industry which produced these items, particularly during the Preclassic or Formative (900 B.C. – A.D. 250) period. Our knowledge of the Preclassic shell ornament industry has increased significantly with recent finds from the site of Pacbitun, a medium-sized Maya site located in the foothills of the Maya Mountains of western Belize, on the southern rim of the Belize Valley. The focus of this study is the Preclassic shell ornament industry from Pacbitun. Recent archaeological excavations at the site have revealed architectural remains and associated evidence of shell ornament production dating to the Middle Preclassic (900-300 B.C.) period (Hohmann and Powis 1996, 1999; Hohmann et al. 1999). The evidence from Pacbitun indicates that early inhabitants of the site were involved in the acquisition of marine shell and the production of shell ornaments by the early facet of the Middle Preclassic period (900-600 B.C.). In this study I will evaluate the production, distribution, and consumption of Preclassic shell ornaments at Pacbitun, and compare this information with that from other Preclassic sites in the Belize Valley. Information derived from these analyses will be used to address the social, political, and economic significance of shell ornaments during the Preclassic period in this important region of the Maya Lowlands.

The concept of prestige items and the relationship between the production of these high-value goods and the development of sociopolitical complexity is discussed in Chapter Two. The chapter begins with a discussion of subsistence and prestige goods and then proceeds to a presentation of anthropological models that emphasize the use of prestige goods in the development of political economies. The chapter concludes with a discussion of prestige goods in the Maya Lowlands.

Chapter Three deals with the organization of craft production as it relates to the identification of craft specialization in the archaeological record. This section begins with a brief summary of the archaeological literature on production studies, focusing particular attention on the multidimensional approach used by Costin (1991). This is followed by a presentation of the variables (i.e., concentration, context, intensity, scale) used to describe production activities and the types of direct and indirect evidence archaeologists use to reconstruct the organization of production. In the final section of this chapter background information on shell ornament production is presented, including case studies from various regions of North and South America.

The natural setting and cultural historical background of the Belize Valley are presented in Chapter Four. This information will provide a broader context for the discussion of the findings from Pacbitun and other sites in the Belize Valley. In the first section of this chapter the regional geology, hydrography, climate, vegetation, and fauna are discussed. This is followed by a brief overview of the cultural history for the Belize Valley, including information on the established chronological sequence of occupation, previous archaeological research, and characteristics of the Preclassic period. Settlement, subsistence, trade and external relations, and architecture will be addressed. Finally, a

brief site summary is presented for each of the Belize Valley Preclassic sites from which shell data are drawn; information on location, site layout, and history of Preclassic investigations is included.

The analytic methods used to evaluate the Preclassic shell industry are presented in Chapter Five. To begin, I provide a brief historical sketch of the major developments in the analysis of shell artifacts in the Maya Lowlands. Data collection strategies and chronological placement of the Preclassic shell artifacts are then presented. This is followed by a discussion of the methods used to evaluate the shell artifacts from Pacbitun and other Belize Valley sites. Finally, a discussion of the taxonomic, technological, typological, and contextual analyses undertaken on the Preclassic shell artifacts will be discussed.

In Chapter Six data on the Pacbitun Preclassic shell industry are presented. This chapter is divided into three sections based on the taxonomic, typological, and technological analyses conducted on the artifacts. Results of these analyses are used to discuss the types of artifacts produced during the Preclassic period, resource procurement and utilization, and production tools, techniques, and processes. While the focus of this study is the Middle Preclassic assemblage from Pacbitun, comparative data from other Belize Valley sites are presented at the end of each section. Combined these data provide significant new information on the production of shell ornaments during the Preclassic period.

In Chapter Seven ethnohistoric, iconographic, and archaeological data are presented in order to provide information about the diverse roles played by shell artifacts in prehistoric and historic Maya society. This is followed by a discussion of the results of

the contextual analysis conducted at Pacbitun and other Belize Valley sites. In the final section of this chapter comparative contextual data from Preclassic sites in northern Belize are presented. Unlike the Belize Valley, significant quantities of shell ornaments have been recovered from primary use-related contexts at multiple Maya sites in northern Belize (e.g., Cerros, Colha, Cuello, K'axob).

Aspects of the organization of shell ornament production at Pacbitun and other Belize Valley sites are discussed in Chapters Eight. This chapter begins with a discussion of the methods used to identify shell-working areas at Preclassic sites in the Belize Valley. Distributional data on shell ornaments, shell detritus, and shell working tools are presented. These data are then used to address the concentration and scale of production at the site and regional levels. Comparative data from Preclassic sites in northern Belize are again presented to provide a broader context from which to view the production of these important Preclassic artifacts. While the first half of this chapter deals with direct evidence of shell ornament production in the Belize Valley, the second part of the chapter addresses indirect evidence gathered from finished shell artifacts. In this section of the chapter data derived from the Pacbitun disk beads are used to address the issue of product standardization and specialized production.

Chapter Nine concludes this dissertation with a discussion of the Belize Valley shell ornament data and its possible role in the development of complexity in this important region of the Maya Lowlands. Through major research efforts conducted over the last two decades our knowledge of the Preclassic Maya has increased dramatically. While we know a great deal about architectural practices, subsistence and diet, and the range of artifacts and materials available to the Preclassic Maya, archaeologists still know

very little about the complex sociopolitical relationships that existed between individuals during the Preclassic period and how prestige goods may have been involved in intra- and inter-community exchanges. In this chapter it is suggested that shell ornaments were highly valued items that were used in competitive displays and exchanges designed to build power and prestige at the local and/or regional levels. Directions for future research are presented in the final section of this chapter.

CHAPTER 2

WEALTH ITEMS AND SPECIALIZED CRAFT PRODUCTION

In this chapter I will discuss the concept of wealth items and the relationship between the production of these high-value goods and the development of social, political and economic complexity. In the first section of the chapter a distinction will be made between subsistence and wealth items. Ethnographic and archaeological examples will be provided and identifying characteristics and uses determined. This will be followed by a presentation of archaeological models that emphasize the use of wealth items in the development of political economies, paying close attention to the control exerted over the production, distribution, and consumption of these items. Finally, the relationships between wealth items, specialized craft production, and the development of complexity are evaluated.

WEALTH AND SUBSISTENCE ITEMS

Exchange is a basic component of any economic system; thus, it is not surprising that this subject has taken a central role in anthropological research over the last several decades. Researchers have argued that economic activities are embedded within the social structure of societies; thus, by reconstructing economic relationships one can gain a better understanding of prevailing social relationships. The study of trade and exchange has become central to archaeological research in recent years as evidenced by the abundant collection of literature devoted to the subject (Earle and Ericson 1977; Ericson and Baugh 1992; Hirth 1984; Sabloff and Lamberg-Karlovsky 1975). The emphasis on

reconstructing exchange systems is due in part to the development of various types of physicochemical analyses (e.g., X-Ray Fluorescence, Neutron Activation Analysis, Atomic Absorption Spectrometry) that have allowed researchers to determine the precise origin of source materials such as ceramics, obsidian, chert, jade, and shell. Using these characterization analyses it has become possible to reconstruct various aspects of the production and distribution systems of many traded items. While the movement of material goods is perhaps the most obvious sign of exchange, it is also possible to identify cases where individuals and/or groups shared ideas, beliefs, inventions, and values.

A wide variety of material goods were produced and exchanged in prehistoric and historic times. Two general classes of goods are traditionally distinguished in the anthropological and archaeological literature: subsistence and wealth items (Brumfiel and Earle 1987:4). Subsistence items include goods used to fulfill basic household needs such as food, food processing tools and equipment, storage and service vessels, manufacturing tools, and clothing. While the assemblage of subsistence items will vary from culture to culture, it generally consists of low-value utilitarian items that are widely distributed and manufactured at the local level from locally available materials

Wealth items have been variously referred to in the literature as primitive valuables, prestige goods, elite items, status items, or luxury items (Brumfiel and Earle 1987; Dalton 1977; Ekholm 1977; Hirth 1992). Wealth items typically derive their value from the labor invested in manufacture, technological sophistication, type of raw material, and/or relative scarcity. Earle (1982:66) notes that wealth items traditionally act as stores of value and as means of payment. As a means of payment they may be

exchanged for other goods and services and as a store of value one can convert goods and labor into wealth items that can be maintained without loss of value. A review of the ethnographic and archaeological literature reveals that there is considerable variation in the types of goods that have been utilized as wealth items, including perishable and durable items. Shell ornaments, feathers, animal fur and skins, precious metals, decorated pottery, and various types of textiles have all been identified as wealth items in prehistoric and modern groups. In certain cases socially valued food items have also been recognized as wealth items. While subsistence items are used in a variety of activities designed to maintain the household, wealth items typically function as visible indicators of an individual's status and prestige or as generalized wealth that is used in a variety of exchanges at the intra- and inter-community levels. Personal adornment is perhaps the most common means of displaying an individual's status and prestige; however, one's position can also be demonstrated through household possessions (Smith 1987). For example, the use of highly elaborate serving vessels in competitive feasts serves as a means of visibly displaying the owner's wealth.

At this point it is necessary to point out that many of the wealth items mentioned above have also served as forms of currency, media of exchange, or primitive money (Dalton 1977; Neale 1976). On occasion these items were used for different functions simultaneously, making it difficult to identify a function from archaeological materials. Money traditionally has four related functions: medium of exchange, standard of value, store of value or wealth, and standard of deferred payment (Neale 1976:7). In primitive economies money is considered "limited purpose" because it does not fulfill each of the functions listed above (Dalton 1965; Neale 1976:3). Historic and ethnohistoric research

have revealed that at the time of European contact, a number of shell species were being used as media of exchange in various regions around the globe. Cowrie shells (*Cypraea moneta*, *Cypraea annulus*) were exchanged widely in regions of Africa and Asia (Neale 1976:44-45, 88-89; Safer and Gill 1982); tusk shells (*Dentalium* sp.) were exchanged along the northwest coast of North America (Drucker 1951); and wampum beads (*Mercenaria mercenaria*) were exchanged in certain regions of eastern North America (Ceci 1982; Smith 1983; Yerkes 1983). At the time of conquest the early Spanish conquistadors and missionaries also reported the use of shell beads in market exchanges among the Maya groups of the Yucatan Peninsula (Tozzer 1941; Roys 1943). In many of these same societies shell was also used as a form of personal adornment, identifying the wearer as a person of power and rank.

WEALTH ITEMS IN ETHNOGRAPHIC STUDIES

Ethnographic research has provided abundant data on the social and political uses of wealth items in non-state societies. A review of the ethnographic literature reveals that wealth items are often used as personal adornment, payments in social exchanges (e.g., bridewealth), exchange for subsistence items, and exchange in highly competitive political spheres. Some wealth items are exchangeable and are used for multiple functions while others are restricted to a single function. The Tsembaga Maring of highland New Guinea variously use items such as shell, feathers, marsupial pelts, pigs, and stone axes as (1) bridewealth, marriage, and death payments, (2) reciprocal payments for pigs during ceremonial events, (3) payment for subsistence items, and (4) personal adornment during important ceremonies (Rappaport 1967:103-109, 186, 215-216). In terms of their political structure, the Tsembaga Maring are neither truly egalitarian nor

politically stratified, an intermediate status that Clark and Blake (1994) have termed transegalitarian. While there are no “Big Men” or chiefs among the Tsembaga Maring, there are many ceremonial exchanges of wealth items between villages, a feature that is often associated with stratified societies (Rappaport 1967:28-30). For the Tsembaga Maring these exchanges occur during kaiko ceremonies that are sponsored by individual villages (Rappaport 1967:166-218). During these ceremonies a large number of pigs are slaughtered by the hosting village and males of both villages engage in ceremonial dances. These inter-village ceremonies facilitate the exchange of subsistence and wealth items and marriage partners, but they are not used as a real source of power within these communities.

In the Trobriand Islands axes, shell necklaces and arm bands, boar’s tusks, clay pots, lime spoons, decorative belts, pigs, and yams are used as wealth items (Malinowski 1922). While many of these items are used in social payments and as personal adornment, it is their use in highly competitive political exchanges that has received the most attention from anthropologists. In this ranked society there are clearly defined classes of wealth that circulate in different exchange spheres (Malinowski 1922). Shell necklaces and conus shell arm bands are two types of wealth items that only circulate in a competitive exchange system known as kula exchange. In this system shell necklaces (*soulava*) and conus shell armbands (*mwali*) are exchanged between leaders of different villages in an effort to attract supporters from outside their respective communities. These exchanges often occur between leaders on other islands (e.g., Woodlark and Amphlett) with the added distance increasing the prestige gained through these

exchanges. This support translates to greater prestige and power at the subclan level, the most basic level of political leadership in this system.

While the primary function of the kula exchange is to establish and extend a leader's power and prestige, this system of competitive exchange also serves an economic function. In addition to the ceremonial kula exchanges that take place between competing leaders, a wide variety of low-level exchanges typically occur between members of the leaders' entourage. Mauss (1967:3) has summarized this relationship in his seminal work on gift exchange:

In the systems of the past we do not find simple exchange of goods, wealth and produce through markets established among individuals. For it is groups, and not individuals, which carry on exchanges, make contracts, and are bound by obligations; the persons represented in the contracts are moral persons-clans, tribes, and families; the groups, or the chiefs as intermediaries for the groups, confront and oppose each other. Further, what they exchange is not exclusively goods and wealth, real and personal property, and things of economic value. They exchange rather courtesies, entertainments, ritual, military assistance, women, children, dances, and feasts; and fairs in which the market is but one element and the circulation of wealth but one part of a wide and enduring contract.

Although this quote does not specifically mention the exchange of wealth items between politically motivated individuals, it does address how these exchanges benefit the larger community by opening the door for other social, political, and economic interactions.

In his comparative study of primitive valuables in Melanesia, Earle (1982:80-82) argues that changes occur in the characteristics and functions of wealth items with increasing political differentiation. In this region there is a clear trend towards politicization in the exchange of valuables. In less complex societies, such as the Tsembaga Maring, valuables are highly exchangeable and there is little attempt to control the production and distribution of these items as a basis for political power and prestige.

In more complex societies, like that of the Trobriand Islands, wealth items are central to political competition at a variety of levels and control over their production and distribution is vital to the maintenance of power. Although Malinowski does not specifically address the production of the shell items used in kula exchange, he does mention that Trobriand leaders sponsored specialists to polish stone axes that served as wealth items in other exchanges. If wealth items could be produced and distributed by any member of Trobriand society, then they would not play a significant role in these competitive political exchanges. The relationship between the level of social complexity, wealth items, and the occurrence of specialists is discussed in further detail below.

WEALTH ITEMS IN PREHISTORIC CULTURES

While wealth items are often easily identified in contemporary societies, such as those just mentioned in Melanesia, the task becomes increasingly complicated when attempting to identify these items in prehistoric cultures. In archaeological deposits artifacts are found in a number of depositional contexts, including construction fill, middens, burials, and caches. Unfortunately, these data do not always provide conclusive evidence of the role these items played in the dynamic social setting prior to their deposition. In the absence of observations about the function of wealth items in the dynamic social setting, archaeologists have traditionally relied on the criteria used by ethnographers to identify wealth items: relative scarcity, labor investment, technological sophistication, and type of raw material. In some cases ethnohistoric, epigraphic, and iconographic data are also available, providing additional evidence of the function of particular artifacts.

Using these criteria archaeologists have identified a wide variety of wealth items in prehistoric societies around the globe. While a comprehensive listing of wealth items from individual cultures is beyond the scope of this chapter, there are a number of items that transcend cultural boundaries, including shell ornaments, jade ornaments and figurines, decorated pottery, and socially valued food items. Many of these items are also listed in the ethnographic studies mentioned above.

Shell artifacts are a ubiquitous artifact class found in prehistoric archaeological deposits around the globe. While shell has consistently been used for utilitarian implements and food sources in coastal and island societies, it is most commonly used in the production of ornaments that would have been sewn onto clothing or worn individually or strung together as necklaces, bracelets, anklets, or armbands. Shell items have often been identified as elements of composite artifacts such as headdresses and mosaic masks. A wide variety of shell ornaments have been found in archaeological deposits throughout North and Central America, including those found in the American Bottom (Muller 1987; Prentice 1989; Trubitt 1996, 2000), American Southwest (Howard 1993; McGuire and Howard 1987; Seymour 1988; Seymour and Schiffer 1987), northern Mexico (Bradley 1992, 2000; Novella 1995), and Oaxaca (Feinman 1999; Feinman and Nicholas 1993, 2000; Flannery and Winter 1976; Pires-Ferreira 1976, 1978). The presence of shell ornaments at sites located outside their natural range of occurrence has led many scholars to argue that these items served as wealth items, a theory that is often supported by the differential distribution of shell ornaments between households and their frequent inclusion as burial goods in elite interments.

A variety of decorated pottery forms have also been identified as wealth items in many prehistoric cultures. Pottery that has been classified as wealth items typically show a degree of skill, technological sophistication, and labor investment beyond that of ordinary utilitarian ceramics. These differences may be visible in the vessel form or the decorative techniques used by the potters. Most of the pottery that has been identified as wealth items exhibit sophisticated surface treatments. Painting is one of the many treatments (e.g., burnishing, polishing, carving, incising, impressing, modeling) used by potters making high-value pottery. Prehistoric Mesoamerican cultures have provided archaeologists with abundant examples of elaborately decorated pottery. For example, stuccoed and painted pottery have been identified as wealth items in Central Mexico during the Classic period. Stucco painting occurred most frequently on cylindrical tripod vessels with hollow supports. Social, political, and religious scenes are commonly depicted on these spectacular vessels.

One of the most intriguing wealth items mentioned above is socially valued food items. In recent years great advances have been made in the methods and techniques archaeologist use to interpret their data. These advances have led to greater interest in patterns of food consumption, particularly as they relate to the identification of persons of high status or rank. Isotopic evidence from human bone and the differential distribution of food items have indicated that in many prehistoric cultures, patterns of food consumption varied depending on an individual's status. Costin and Earle (1989:696-698) have reported isotopic evidence indicating that during the pre-Inka Wanka II (A.D. 350-1460) period in central Peru, members of the elite class were consuming more meat than commoners. They also note that agricultural products such as chili peppers, tobacco,

and coca were only found in elite households. Several authors have suggested that foods such as these were procured or grown by politically motivated individuals and served in ceremonial feasts designed to impress potential supporters (Clark and Blake 1994).

Archaeologists have traditionally argued that these and other wealth items served many of the same functions in prehistoric societies as those from which ethnographic observations were made, including their use as personal adornment, social payments, and exchange in competitive political spheres. Like the ethnographic case studies already mentioned, they often act in concert to influence the social, political, and economic systems in the societies in which they are utilized. While archaeologists tend to agree on what artifacts constitute wealth items in certain cultures, the subtleties surrounding their specific use are often difficult to discern. As noted above, wealth items often serve multiple functions in the same society, a point that contributes to the difficulty in identifying the function of wealth items in prehistoric cultures.

Hirth (1992:22) argues that archaeologists have difficulty distinguishing between wealth items that are used as “badges of authority” and those that serve as “generalized wealth.” Badges of authority or status insignia are used by individuals as a way of visibly displaying their rank or office in society. These “badges” often take the form of personal adornment such as necklaces, bracelets, armbands, belts, and headdresses. Symbols such as these were noted in Aztec society at the time of Spanish contact (Anawalt 1980; Brumfiel 1987). Nose, lip, and ear ornaments and certain cloth patterns were protected by sumptuary laws and could only be worn by Aztec lords. We would expect these items to have a highly restricted distribution given the specific nature of their function. In societies where elite power is based on prestige and cannot be backed

up by codified laws or military force, some scholars have argued that these symbols or badges of authority can become objects of power in and of themselves, legitimating the role of the elites within that society (Marcus 1974:83-84; Peregrine 1991:2).

Generalized wealth, on the other hand, is used by members of society in a number of social, political, and economic transactions at the intra- and inter-community levels. While badges of authority should have a highly restricted distribution, items functioning as generalized wealth should have a wide distribution given their use in a variety of exchanges. Based on the widespread evidence of worked shell ornaments and shell bead production, scholars working in the American Bottom have suggested that shell beads functioned as generalized wealth in Mississippian (A.D. 1050-1350) societies in this region (Muller 1987; Prentice 1987; Trubitt 1996, 2000). Although beads dominate the shell assemblage at sites such as Cahokia, other shell ornaments have also been identified at the site, including engraved shell cups, gorgets, and ear ornaments. Unlike shell beads, their limited distribution has led some scholars to argue that these items represent badges of authority that were restricted to a small segment of the population (Brown et al. 1990).

WEALTH ITEMS AND THE DEVELOPMENT OF COMPLEXITY

While the relationship between wealth items and the development of social complexity has been touched on in many of the ethnographic and archaeological examples presented above, the topic has not received a thorough treatment. Ethnographic research among egalitarian and ranked societies has revealed that wealth items are commonly used in exchanges designed to garner support at the intra- and inter-community levels. The attempts to entice supporters are often characterized by ceremonial feasting events and exchanges that are designed to impress potential

supporters – the grander the scale the better. In these societies power is often measured by the number of supporters an individual has rather than how much wealth he controls. Wealth items are also central to a number of political economy models used by archaeologists to describe the evolution of sociopolitical complexity, particularly those referred to as political models (Brumfiel and Earle 1987; D'altroy and Earle 1985; Frankenstein and Rowlands 1978).

Brumfiel and Earle (1987) summarize three models that address the relationship between specialization, exchange, and social complexity – commercial, adaptationist, and political. In commercial models normal economic growth leads to specialized production, ultimately allowing certain individuals to increase their profits and their status in society. Adaptationist models emphasize the organizational role played by political actors in developing subsistence factors, centralized production, and sponsoring long distance exchange. In these cases the populations they administer are the prime beneficiaries of their efforts. In political models actors seek to increase their power and authority by controlling the production and distribution of strategic resources in order to legitimate their status and maintain social inequality. Unlike adaptationist models (Halstead and O'Shea 1989; Rathje 1971, 1972; Wittfogel 1957), political models emphasize the benefits conferred to members of the elite class rather than the populations they administer.

Political models are frequently divided into two broad categories based on the strategies used by political actors to accumulate strategic resources. Production oriented strategies emphasize control over the production of agricultural goods, labor, and/or craft items while exchange oriented strategies focus on the different mechanisms through

which food, raw materials, and/or finished products are exchanged (Brumfiel and Earle 1987:3; Hirth 1996:213-219). While these strategies have been presented as two distinct categories, in reality they are inextricably linked for control over production leads directly to control over distribution. Blanton and colleagues (1996:4-5) have referred to systems with these characteristics as network-based political economies in which politically motivated individuals gain power by maintaining individual-centered exchange relations. Through the use of exclusionary power strategies actors attempt to monopolize the basis for power in society, including both objective and symbolic power. Objective sources of power include wealth and factors of production while symbolic power includes religion and ritual. While most models of political economy focus on objective sources of power, some scholars have argued that symbolic power played an equally important role in the development of social complexity in certain cultures (Demarest and Conrad 1992; Drennan 1976; Freidel and Schele 1988; Helms 1979, 1992, 1993).

Control over the production of wealth items can occur under many different circumstances since there are many stages in the production cycle. Ethnographic and ethnohistoric data have shown that politically motivated individuals often employ craft specialists to produce wealth items for their needs. Specialists who work for patrons have been variously referred to as attached, embedded, sponsored, and tethered specialists (Ames 1995; Brumfiel and Earle 1987; Clark and Parry 1990; Costin 1991; Santley et al. 1989). Although the definitions of these terms do vary somewhat, they all basically refer to individuals who produce goods for a patron rather than an unspecified consumer population. In many of the case studies presented above, scholars have

documented the use of craft specialists to produce wealth items for members of an elite class. The relationship between specialized production and the development of complexity has been a topic of great interest to anthropologists and archaeologists. In their cross-cultural examination of this relationship, Clark and Parry (1990:315-319) have noted an association between attached or patronized specialization and less complex societies, including agrarian, rank, and chiefdom societies. According to their study, hypertrophic or high-value items were also strongly associated with rank or chiefdom societies where establishing and maintaining prestige and power are the most crucial. Based on their findings they argue that patronized craft specialization may have been critical to the emergence of rank societies.

Earle (1987:69-71) presents an excellent example of the many ways Hawaiian chiefs used craft specialists to control the production of feathered cloaks, the most important object of wealth and symbol of power in Hawaiian chiefdoms. He notes that control was manifest at all steps of the system, including the procurement of feathers, fabrication into cloaks, and distribution to allies. Feathers were procured by professional bird hunters who returned their valued commodity directly to the paramount chiefs, feathers were woven into fine nets by skilled craftsmen who were most likely supported by the chiefly household, and cloaks were distributed to other high ranking chiefs in formal presentations at ceremonies between allies.

Political actors may also control the acquisition of raw materials used in the production of wealth items. Physical proximity to a local resource is perhaps the best way to exert control over its use. For example, the stone tool production center of Colha was advantageously situated within a high-quality chert-bearing zone in northern Belize

and residents produced a large number of lithic tools for intra- and inter-regional distribution (Hester and Shafer 1994; Santone 1997; Shafer and Hester 1983). A similar situation has been noted for stone tool producers in the Channel Islands (Arnold 1987, 1990; Arnold and Munns 1994).

When the raw materials of interest are exotic or non-local, alternative strategies must be utilized. In some cases exchange relationships are formed between those with access to strategic raw materials and those who desire these materials. As already mentioned, these relationships are often cemented and maintained through the exchange of wealth items. Ownership of specific technology may also provide actors with a means of controlling strategic raw materials. For example, in Pacific maritime societies like the Chumash of the Channel Islands of California and the Nootkans of British Columbia, access to sophisticated watercraft translated into control over certain coastal resources. Archaeological data from the Channel Islands indicate that the Chumash were involved in the production of shell ornaments for approximately 7,000 years (Arnold and Munns 1994:478). Archaeological data from the mainland indicate that nearly all of the regional supply of shell beads came from these islands (Arnold 1991, 1995). Arnold notes that these goods were controlled by a small number of individuals who owned the only canoes that could make the journey across the channel. According to Drucker (1951:11), the Nootkans used their sophisticated canoes to harvest *Dentalium* shells from shallow beds off the coast of Vancouver Island. A handful of Nootkan chiefs appear to have had exclusive rights to these sources because they possessed the only watercraft that could withstand the journey.

Whenever wealth items are identified in archaeological contexts, archaeologists frequently turn to the prestige goods economy model to explain the function of wealth goods in the society under study. This model was originally developed to explain the evolution of ranked lineages in African societies (Meillassoux 1978; Ekholm 1977). In these societies senior members of the group control the prestige goods needed by junior members for marriage exchanges and a variety of other social payments. By controlling access to these items dyadic relationships are formed between patrons who control access to these social valuables and clients who are reliant upon them for items necessary for social reproduction (e.g., bride-price, debt payment). Patrons accumulate surplus wealth by forcing subordinate individuals to make payments or tribute for access to these social valuables, a process that allows for the differential accumulation of wealth within communities. Many descriptions of prestige goods economies focus on the political advantage gained by controlling access to strategic resources that can only be obtained through external exchange (Ekholm 1977; Frankenstein and Rowlands 1978; Friedman and Rowlands 1977).

Many archaeologists have used the prestige goods economy model to describe the political economy operating in a number of regions prehistorically, including the American Southwest (Bradley 1992, 2000; McGuire 1986; McGuire and Howard 1987), American Bottom (Brown et al. 1990; Pauketat 1993; Trubitt 1996, 2000), and Mesoamerica (Blanton et al. 1981, 1996; Bradley 1992; Stark 1986). With the exception of a few scholars (e.g., Frankenstein and Rowlands 1978; Friedman and Rowlands 1977), a review of the literature reveals that few archaeologists address the archaeological signatures of prestige goods economies in their research. Instead of addressing the larger

methodological issues related to the identification of archaeological correlates, most archaeologists have simply proposed this model when prestige or wealth items are identified. While wealth items were exchanged widely in these and other regions in prehistoric and historic periods, the presence of wealth items cannot be used as the sole criterion for the identification of prestige goods economies.

Other models place less emphasis on the use of wealth items in patron-client relationships and more on their role in exchanges for subsistence items during resource shortfalls. Halstead and O'Shea have presented several studies which address the use of social storage in coping with resource scarcity (Halstead 1981; Halstead and O'Shea 1989; O'Shea 1981). In their model food is exchanged for non-food tokens with the understanding that such tokens can later be re-exchanged for food. Non-food tokens are generally durable wealth items of agreed upon value. While these exchanges do not initially occur for the purpose of gaining power and prestige, Halstead and O'Shea argue that consistent shortfalls can lead to unequal accumulation of wealth among individuals or groups. Halstead (1981) asserts that a managerial elite may be required for this system to function properly, a comment that places this model firmly within the realm of adaptationist models.

Taking elements of the social storage and prestige goods economy models, Flannery (1968) has presented a sort of hybrid between the adaptationist and political models. Based on the identification of Olmec style artifacts in Formative deposits in the Valley of Oaxaca, Flannery argued that that politically motivated individuals were engaged in long distance trade for the purpose of acquiring exotic goods to enhance their status and position in society. In this case the Olmec were importing ilmenite mirrors and

exporting marine shell, mica, and Olmec symbols and ideology (Flannery 1968:105-108). The frequent occurrence of Olmec style motifs (i.e., paw-wing, double-line-break) on local Oaxacan pottery led Flannery to propose that the Formative Oaxacan villagers were using the “esoteric knowledge” provided by the Olmec to reinforce their local status. While he argues that the purpose of these exchanges was to enhance and reinforce previously existing systems of status, he also notes that the function of these exchanges may have been to enhance the security of local populations against resource shortfalls (Flannery 1968:107).

In light of all the evidence which supports the association between wealth items and the development of complexity, Brumfiel and Earle (1987:7) pose an interesting question: Can wealth items generate non-egalitarian relationships in the absence of elite control? They argue that this transformation can occur under the right circumstances and they provide an excellent ethnographic example of this situation. They cite Douglas’ study (Douglas 1963, 1967 in Brumfiel and Earle 1987:7) of raffia cloth production and exchange among the Lele tribe of Zaire. At the time of the study raffia cloth was used in many social exchanges. Unlike the prestige goods economy model, senior Lele males did not have direct control over raffia cloth. In fact, all Lele men engaged in the weaving of raffia cloths. Since it was impossible for junior males to produce enough cloths needed for all of their social obligations they would turn to senior males for contributions, thus patron-client relationships were formed between senior men who possessed stores of raffia cloth and junior members who needed these cloths for social reproduction. The widespread production of wealth items is the main criterion that distinguishes this model from the prestige goods economy model. As noted above, the widespread production of

shell beads at sites in the American Bottom (e.g., Cahokia) has led scholars to argue that shell beads served as generalized wealth in Mississippian society (Brown et al. 1990; Pauketat 1993; Trubitt 1996, 2000). The model presented above may account for this distribution.

WEALTH ITEMS IN THE MAYA LOWLANDS

Maya civilization reached its period of peak fluorescence during the Classic period, a time period marked by the presence of a pronounced social hierarchy. The nature of Classic Maya social organization has long been the source of great debate among scholars. Chase (1992) has recently provided a succinct discussion of the three historical perspectives on Classic Maya social organization. He refers to these models as (1) egalitarian, (2) two-class, and (3) complex. In the first model Maya society is viewed as being egalitarian with a rotating system of officials similar to the modern cargo system in the Maya Highlands (Vogt 1964; Vogt and Cancian 1970; Willey 1956). The traditional two-tiered model divides Maya society into two distinct classes where elites or nobles governed society and commoners served largely as farmers and laborers (Thompson 1931, 1966). This two-class model dominates present-day conceptions of Classic period Maya social structure, although there is increasing support for the complex or multi-tiered model that views Maya society as having been composed of multiple levels (Chase and Chase 1992; Chase 1992). The Chases argue that neither the ethnohistoric nor archaeological record suggest a rigid two-class system. This leaves the third option of a complex model for social organization in the Classic period.

The organization of Maya social structure during the Preclassic period is even more difficult to discern given the lack of intensive archaeological research for this time

period. The presence of occasional wealth items in Preclassic deposits has led some scholars to argue that the Maya had made the transition from an egalitarian to a ranked and/or stratified society by the Late Preclassic period; however, there is some evidence to suggest that this transition may have occurred even earlier. Archaeological evidence from sites like Cuello, Colha, K'axob in northern Belize; Blackman Eddy, Cahal Pech, and Pacbitun in central Belize; and Nakbe and El Mirador in the Department of Peten, Guatemala have contributed much to our understanding of this period.

Regardless of the perspective of Maya social structure, there is evidence that wealth items played an important role in Maya society from the Preclassic to the Postclassic period. Polychrome pottery, marine shell ornaments, and jade ornaments are among the durable items that have been classified as wealth items in the Maya Lowlands. Socially valued food items have also been noted in some contexts. Given the ethnohistoric evidence presented from other Mesoamerican societies, particularly the Aztec, perishable materials (e.g., wood, bone, plant) would have also been used in the production of wealth items. Like the Aztecs, certain textiles or patterns may have been restricted to members of the elite class. While shell and jade jewelry would have been displayed on the body, items like decorated pottery and restricted foodstuffs may have been used in ceremonial feasting events designed to impress potential supporters.

Shell and jade jewelry are perhaps the most common wealth items identified in archaeological deposits throughout the Maya Lowlands. These items have been found in a wide variety of contexts ranging from the Middle Preclassic to the Late Postclassic periods. The majority of the shell artifacts identified in the lowlands was derived from the Caribbean Sea or Gulf of Mexico, although a small percentage have been traced to the

Pacific Ocean. These items are most commonly recovered from burial contexts where they were most often used as jewelry, including necklaces, bracelets, anklets, and arm bands. Although some of these jewelry pieces were manufactured from a single medium, it was not uncommon for shell and jade ornaments to be intermixed on the same piece of jewelry. Freidel and Schele (1988) have noted the importance of jade pendants as symbols of Maya royalty. They have argued that the elaborately carved bib-head pendants represent icons of kingship and power by the Late Preclassic period.

Socially valued food items are also argued to have been wealth items among the lowland Maya. Isotopic and archaeological data from several lowland sites have revealed that access to certain foodstuffs may have been restricted to certain members of society during both the Preclassic and Classic periods. Isotopic analysis of human bone has indicated that marine fish and shellfish (White and Schwarcz 1989) and maize (White et al. 1996) were potentially restricted food items during the Preclassic period. Based on the differential distribution of deer bones, Pohl (1985) has suggested that deer meat was also restricted to members of the elite class during the Classic period. As noted above, these items may have played an integral role in feasting events designed to attract supporters.

Elaborately painted pictorial vessels are among the many items found in Classic period elite burials throughout the Maya lowlands. Although a few of these items have been dated to the Late Preclassic, the majority of these vessels have been recovered from Classic contexts. The restricted distribution, labor investment, and skill required to produce these vessels have made these items one of the most recognizable forms of Maya wealth. Although there is a great deal of variation within this category, this highly

sophisticated pottery generally includes polychrome vessels with pictorial imagery that depict the natural universe, historical scenes, and supernatural beings and events (Kerr 1989, 1990, 1992; Reents-Budet 1994, 1998). These are often accompanied by hieroglyphic texts that act as historical narratives, including personalized names, titles, and dates of important events. In some cases painter's signatures have even been identified (Houston and Taube 1987). While the identification of these items has often led to an assumption that the possessor was of elite status, Lecount (1999, 2001) has recently argued that elites commonly used these vessels as political currency, distributing them widely to their supporters. Depending on their political strategy, these items may have been distributed to members of a number of different classes, not just the Maya elite class.

Archaeological evidence suggests that many wealth items may have been produced by attached specialists working for elite patrons. While ceramic production loci are notoriously difficult to identify archaeologically, researchers working at the Maya site of Buena Vista del Cayo, Belize, have exposed a specialized painted ceramic workshop in an elite residential compound (Ball 1993). Interestingly, epigraphic and iconographic data have indicated that some of these specialists or artists were members of the ruling elite (Coe 1977:345; Reents-Budet 1994, 1998). Workshops for the production of other wealth items have also been identified, including a shell workshop in a non-royal elite residential establishment at the site of Copan in Honduras (Fash 1991; Hendon 1989: 375; Webster 1992:144) and a workshop for slate artifacts attached to an elite residential compound at Pacbitun in Belize (Healy et al. 1995). Although production

activities have been noted at many other Maya sites, there is little direct evidence of attached specialization.

SUMMARY

Shell ornaments, feathers, animal fur and skins, precious metals, decorated pottery, and various types of textiles have all been identified as wealth or prestige items in prehistoric and modern groups. Wealth items are frequently discussed in political economy models in which politically motivated individuals gain power and prestige through their control of the production and distribution of these high value items. Ethnographic studies among contemporary stateless societies have shown that politically motivated individuals often employ specialists to produce wealth items to be used in competitive displays and exchanges designed to garner political support at the intra- and inter-community levels; this differential access to wealth items often leading to institutionalized inequality. The function of wealth items in prehistoric societies is more difficult to discern since these items are no longer functioning in the dynamic cultural setting. Labor investment, technological sophistication, type of raw material, and/or relative scarcity are criteria commonly used by archaeologists to determine an item's value, but these criteria cannot inform directly on an item's function.

Items classified as wealth or prestige items are commonly found in prehistoric deposits in the Maya Lowlands. Wealth items such as jade and shell ornaments and polychrome ceramic vessels are frequently recovered from burial and cache deposits, but iconographic evidence suggests that they also played important roles among the living. For instance, shell ornaments were worn as jewelry and polychrome vessels appear to have been used in ceremonial presentations. During the Classic period there is strong

evidence indicating that members of the elite class were involved in the production of certain wealth items, such as polychrome vessels. As in the political economy models mentioned above, these items may have been used in political maneuvering at the intra- and inter-community levels. The production, distribution, and consumption of shell ornaments and their importance in the Preclassic political economy will be discussed for the remainder of this study.

CHAPTER 3

CRAFT SPECIALIZATION AND THE ORGANIZATION OF SHELL ORNAMENT PRODUCTION

The relationship between high-value items, gift exchange, and specialized production were discussed in Chapter Two. Here the organization of craft production is discussed in more detail, allowing for a more comprehensive look at the approaches used by archaeologists in reconstructing production activities at the site and regional levels. This chapter begins with a brief summary of the archaeological literature on specialized craft production, focusing particular attention on the multidimensional approach used by Cathy Costin (1991) to reconstruct the organization of production. Shell ornament production is discussed in the second half of the chapter, including information on the identification of production locales and efforts to reconstruct the concentration, context, intensity, and scale of production. Studies from the American Southwest, American Bottom, Valley of Oaxaca, Caribbean, and Maya Lowlands are presented.

CRAFT SPECIALIZATION

Craft specialization is a topic that has received much attention over the last half century, particularly in relation to the development of socioeconomic and sociopolitical complexity. In egalitarian societies production activities are often referred to as generalized or non-specialized and are generally designed to replenish the household assemblage. Sahlins (1972) has referred to this form of production as the Domestic Mode of Production. At the opposite end of the continuum lies full-time specialized production. While this term is frequently used in the archaeological literature, there is

little agreement about how it is defined and how to identify specialized production in archaeological contexts. Variables such as the amount of time spent in production, proportion of one's livelihood obtained from the activity, presence of a title or office, and technological skill or expertise are frequently used by archaeologists in their attempts to distinguish specialized from generalized production (Brumfiel and Earle 1987; Clark and Parry 1990; Costin 1991; Rice 1981). Most archaeologists agree that specialization involves the production of items for distribution beyond the production locale, but there is great variation in the level of inclusiveness in these definitions. Clark and Parry (1990:297) define craft specialization as the "production of alienable, durable goods for nondependent consumption". Costin (1991) has noted that this broad definition allows even the most limited production efforts to be categorized as specialized as long as goods are being exchanged beyond the family unit. Costin (1991:4) prefers a more narrow definition which states that specialization is "a differentiated, regularized, permanent, and perhaps institutionalized production system in which producers depend on extra-household exchange relationships at least in part for their livelihood, and consumers depend on them for acquisition of goods they do not produce themselves". Using this definition the role of craft specialists is intensified, including only those individuals who are regularly engaged in the production of items for exchange beyond the household. Craft specialization or specialized production will be defined in this fashion for the remainder of this study.

ORGANIZATION OF PRODUCTION

Despite the difficulty in establishing a standardized definition for craft specialization, archaeologists do agree that there is considerable variation in the way

specialized production is organized. Archaeologists typically address four parameters or variables in their attempts to reconstruct the organization of production: concentration, context, intensity, and scale. Concentration considers the distribution of producers on the landscape. Based on their spatial arrangement, the concentration of production locales is considered dispersed or nucleated. Distribution of resources, mode of transportation, mechanisms for exchange, and control over production are all factors that influence the location of production locales. The second parameter, context, refers to control over the production and distribution of goods. Location of production remains the primary determinant of context. Attached specialists are typically located within or adjacent to elite or governmental structures while independent specialists remain spatially segregated. Intensity, the third parameter, informs on the amount of time involved in production activities with individuals either producing on a full-time or part-time basis. Archaeologists typically rely on the relative density of production debris as an indicator of intensity. Finally, scale refers to the size and constitution of production facilities. While size refers to the areal extent of the production facility, constitution refers to the relationship among producers. At the extremes of this category are small, kin-based production facilities and large, factory level facilities composed of unrelated producers.

Since the 1970s, archaeologists have presented a number of typologies of specialization based on varying degrees of elite or institutional involvement and/or scale and intensity of production (Brumfiel and Earle 1987; Earle 1981; Peacock 1982; Rice 1981; Santley et al. 1989; Van der Leeuw 1977). These typologies have been adopted by many scholars in their efforts to address the organization of production for specific types of artifacts. More recently, Costin (1991:8-18) has presented an eight-part typology

using all four of the parameters just mentioned. While several of these parameters were used in the creation of earlier typologies, only the typology created by Costin includes a comprehensive look at all four parameters. While these typologies have played a critical role in efforts to define the organization of production, it is the independent variables that are of the most interest to the present study.

ARCHAEOLOGICAL INDICATORS OF PRODUCTION

A review of the archaeological literature reveals that archaeologists utilize two kinds of evidence to reconstruct production parameters: direct and indirect. Direct evidence consists of artifacts and features that identify locations where production activities occurred, including manufacturing tools, production debris, and/or special facilities. Each of the four production parameters can be addressed once production loci have been identified. Since production locales are often difficult to identify archaeologically, researchers frequently turn to indirect data to provide information on the organization of production. Indirect evidence is derived directly from finished artifacts. While this type of evidence cannot inform directly on the concentration, context, scale, or intensity of production, it can be used to address the relative degree of specialization in a given production system (Costin 1991:33). Standardization, efficiency, and skill are common measures used by archaeologists to inform on specialization.

Direct Evidence of Production

To reconstruct the organization of craft production archaeologists must first identify areas where production activities occurred. Identifying the location of production loci is particularly useful in reconstructing the concentration, scale, and

context of production. Identification of production debris (i.e., raw materials, tools, incomplete products) in primary use contexts is the most direct way of identifying areas where craft production activities took place. Unfortunately, ethnoarchaeological research (Deal 1985; Hayden and Cannon 1983) has shown that in sedentary communities little refuse is typically left in primary contexts, making it difficult to identify areas where production activities occurred.

Research conducted in Highland Maya communities has shown that living surfaces, including house floors and patio areas, are periodically cleaned to prevent the accumulation of refuse in high use areas (Hayden and Cannon 1983:125-126; Deal 1985:259-260). Some of the larger pieces of refuse are picked up and either deposited in refuse pits or are placed in “provisional discard” areas if there is some potential for future use. Provisional discard areas are generally located along the walls or corners of structures or along the walls just outside the structure. In modern Maya communities house and patio surfaces are also frequently swept to remove smaller materials such as organic and inorganic debris produced during food processing, cooking, and craft production. The refuse gathered during sweeping events is most often deposited in the area immediately surrounding structures where they often accumulate and become embedded in drainage ditches around the perimeter of structures (Deal 1985:260). Where living surfaces are composed of permeable materials such as earth or sand, small fragments often become embedded in floor surfaces during everyday household activities. Some small materials are also occasionally left behind in difficult to reach places like corners and along structure walls (Hayden and Cannon 1983:126; Schiffer 1976:32). Although most refuse does not remain in primary use contexts, the presence of

small fragments of production debris embedded in floor surfaces and in the areas immediately surrounding structures provides us with some evidence of the types of production activities that were undertaken in that area.

Archaeologists are also faced with the problem of distinguishing between production areas and areas of refuse disposal or storage areas. The archaeological literature is filled with reports in which researchers have interpreted dense concentrations of production debris as production locales. Since ethnoarchaeological research has shown that living areas are regularly cleaned to prevent the accumulation of refuse in high traffic areas, it is doubtful that production debris would be left in primary use contexts for any considerable length of time. Archaeological and ethnoarchaeological research has shown that refuse is commonly discarded in (1) middens adjacent to production sites, (2) specialized dumps located at some distance from the production sites, or (3) in convenient natural dumping areas such as rivers, streams, or ravines (Deal 1985; Hayden and Cannon 1983:137, 146; Santley and Kneebone 1993:46). The deposition of refuse in specialized dumps or natural dumping areas provides little direct evidence that can be used to reconstruct the concentration, context, intensity, and scale of production, although the presence of production tools and debris does indicate that community residents were involved in production activities.

The misidentification of production localities is a problem that has been discussed at length in the literature on Mesoamerican archaeology. At the site of Teotihuacan in Central Mexico, extensive excavations revealed dense deposits of obsidian debris distributed throughout the site. These deposits were initially interpreted as obsidian workshops based on the presence of finished artifacts, obsidian debris, and broken and

unfinished obsidian artifacts (Millon 1970:1080-1081; Santley 1984; Spence 1981, 1984, 1986). Based on his original field observations, Spence (1981:771) claimed that there were over four hundred obsidian workshops at Teotihuacan during the Classic period. Other researchers have argued that the role of the obsidian industry at Teotihuacan has been seriously overstated. Central to their argument is the misidentification of workshops at the site. They argue that the large obsidian deposits exposed at the site represent refuse dumps or areas where obsidian was used in the production of other items (Clark 1986; Santley and Pool 1992). Excavations in “downtown” Teotihuacan have provided data in support of this hypothesis. At the Hacienda Metepec complex, an apartment compound previously identified as an obsidian workshop, excavations have revealed that the large quantities of obsidian debris found on the floor surface were deposited after the compound had been abandoned (Santley and Kneebone 1993:58).

Production debris in middens adjacent to production locales can be used to address the organization of production, particularly if used in conjunction with direct evidence of production from primary use related contexts such as floor deposits. Archaeological research has shown that production debris is often deposited in middens adjacent to production facilities. The majority of these data come from studies of chipped stone production. At the site of Tula in Hidalgo, Mexico, researchers identified an Early Postclassic (A.D. 900-1250) obsidian workshop associated with residential structures and peripheral refuse dumps (Healan et al. 1983). Healan and colleagues have argued that individuals who inhabited this site were producing obsidian artifacts in an open area adjacent to their dwellings and that production debris from these activities was deposited in refuse pits just beyond the workshop area. This reconstruction is supported

by the identification of obsidian microdebitage in the floor of the presumed workshop area and the absence of similar material in the residential structures.

A similar scenario has been reported at the site of Colha, an important lithic production center in northern Belize. The high quality chert deposits surrounding Colha were intensively exploited by site occupants from the Middle Preclassic to the Late Classic period. During this time a limited range of utilitarian and ceremonial tools were produced, including oval bifaces, tranchet-bit implements, stemmed macroblades, and large bifacial eccentrics. Excavations at the site have revealed close to one hundred dense concentrations of chert debris and incomplete chert tools, most of which date to the Late Classic period (Hester and Shafer 1992; Shafer and Hester 1983). These distinctive deposits are frequently situated next to residential architecture. Shafer and Hester (1983) have interpreted these dense concentrations as workshop deposits where production debris was disposed of after it was removed from the neighboring production locale. Although the excavators offer no microdebitage data from floor deposits, they do report that microdebitage and chipping dust were present in significant quantities in the workshop deposits (Hester and Shafer 1992:246). Armed with these findings they argue that flint knappers most likely engaged in the production of lithic tools at the very location the deposits were accumulating, a pattern unlike that noted for Tula. Other scholars have questioned these interpretations, instead arguing that the “workshops” represent secondary refuse dumps resulting from the discard of lithic debitage by multiple households (Moholy-Nagy 1990:270-271).

Indirect Evidence of Production

As mentioned above, standardization, efficiency, and skill are common indirect measures used by archaeologists to identify the degree of specialization in a given production system. Like the parameters discussed above, each of these measures exist as degrees along a continuum representing specialized production. Artifact standardization refers to the production of items with little individual variability; efficiency records the amount of labor invested in the production of an item; and skill refers to the level of ability of the producers. To measure the degree of standardization, efficiency, and skill in a production system, technological, typological, and/or stylistic data are recorded for individual artifacts. These measures have been discussed at length in the archaeological and ethnoarchaeological literature, particularly in relation to pottery production, since many modern groups continue to produce pottery in traditional ways (Feinman et al. 1981; Hagstrum 1985; Longacre 1999; Longacre et al. 1988; Rice 1981; Stark 1995).

Artifact standardization has probably received the most attention of the three measures mentioned above. As already mentioned, standardization is a measure of the degree of product variability which ultimately informs on the relative number of production units or producers (Costin 1991:35). Archaeologists have measured a wide variety of attributes to address product standardization, including technological, typological, and stylistic attributes. In each of these cases greater variability is believed to represent generalized production by many units while less variability represents specialized production by few units. Simple and complex statistics are commonly used to assess the degree of standardization within a particular assemblage, including standard deviation, coefficient of variation, and diversity measures.

Efficiency is a relative measure of the time, energy, and raw materials invested in the production of a particular item (Costin 1991:37). Based on modern economic principles it is argued that economizing behavior will determine production by specialists, the assumption being that producers will need to become more efficient since they are producing more goods. Archaeologists have proposed several measures to address efficiency of production, including gesture analysis (Hagstrum 1985) and production step measures (Feinman et al. 1981). Briefly, each of these methods is designed to measure the number of “steps” or actions taken to complete a certain aspect of ceramic production. It is suggested that specialists will try to economize by decreasing the number of steps required in the production process; however, it must be noted that materials produced as high value or prestige items will exhibit more labor rather than less in production, making efficiency alone an inadequate measure of specialization.

The third indirect measure of specialization is skill. Skill informs on the level of ability of individual producers, the assumption being that specialists will have a higher skill level and make fewer mistakes than non-specialists (Arnold 1987, 1999; Costin and Hagstrum 1995; Longacre 1999). Skill is a difficult variable to measure in any context, particularly since different skills are required for different technologies. In his study of modern potters from the Philippines, Longacre (1999) found that older, more experienced potters produced water vessels with less metrical variation than their younger, less experienced counterparts. It is argued that the experienced potters were more skilled and thus able to consistently produce vessels of the same size and shape. In addition to the skill required to form or build pottery, producers must also be skilled in the areas of clay

preparation and firing. Without substantial knowledge of these techniques, there would be a great deal of inconsistency in the vessels produced.

While these measures may not inform the archaeologist directly on the concentration, context, intensity, or scale of production, they do provide additional evidence that can be used to interpret the level of specialization extant in a given production system. To determine whether standardization, efficiency, and skill are appropriate measures of specialization, one must first evaluate the nature of the item under study. While these measures may provide relevant data for some types of goods, they may be inappropriate measures for others. For example, it is doubtful that economizing behavior would be evident in the production of certain prestige goods since these highly visible items are intended to demonstrate an individual's political, social, and economic status. In fact, the more time, energy, and raw materials invested in the production of these items, the greater their significance.

STUDIES IN SHELL ORNAMENT PRODUCTION

A wide variety of shell artifacts were produced prehistorically, including ornamental and utilitarian items. Over the last several decades, knowledge of shell ornament production has increased dramatically. While the archaeological literature on shell ornaments has traditionally centered on typological and taxonomic analyses, more recent studies have endeavored to reconstruct aspects of production, distribution, and consumption of shell artifacts. What follows is a brief review of some of the relevant archaeological studies dealing with shell ornament production.

While finished items are commonly encountered in archaeological contexts, shell-working areas or production locales are rarely identified. As discussed above, the

identification of shell working areas can be hindered by a variety of cultural and natural formation processes that affect archaeological deposits. Fortunately, shell is a durable material that is frequently preserved in archaeological deposits, even under the most extreme circumstances. This tendency towards preservation is due in part to the calcium carbonate component in shells which acts to equalize soil acidity, particularly in poor tropical soils. Shell working areas have traditionally been identified by the presence of quantities of raw materials, artifacts in various stages of the production process, and/or various types of manufacturing technology (e.g., drills, blades, abraders/grinding stones). While the raw materials, artifact type, and tool technology may differ somewhat from region to region, the basic shell working toolkit remains the same in many prehistoric contexts.

Like the cultural and natural processes mentioned above, production techniques and processes may also hinder the identification of shell working areas. Like lithic tool manufacture, the production of items from shell often involves a subtractive process requiring the removal of material from a parent body (Francis 1982, 1987; Suarez Diaz 1989). Initial stages in the reduction process may involve flaking, cutting, or grinding, resulting in the accumulation of production byproducts or detritus. Subsequent stages in the production process frequently involve further modifications such as drilling, cutting, incising, grinding, and/or smoothing. These modifications leave little archaeological residue other than macro- and microscopic dust. While some types of shell required only minimal modification to produce the final product, others involved several stages and a significant amount of labor. In the production of shell ornaments, for instance, many groups created items of adornment simply by perforating the body of small gastropods or

snapping off the tip of tusk shells, leaving the shell's original form nearly intact. Since this type of modification involved only minor alterations with an insignificant amount of production debris, the evidence of production activities would be difficult to recognize archaeologically. In other cases ornaments were manufactured from portions or segments of large gastropods, requiring the removal of small fragments from the parent shell. These smaller fragments were then further modified by drilling, grinding, and/or smoothing. At each stage in this process shell debris would be produced, making the evidence of production activities more visible in the archaeological record.

While the presence of shell debris has led many archaeologists to argue for the presence of shell working activities at individual sites, few have actually identified specific areas where shell working occurred. Researchers working in the American Southwest have been able to identify shell-working locales in Preclassic and Classic period Hohokam communities (Howard 1985, 1993; McGuire and Howard 1987; Seymour 1988). Howard has reported shell-working areas at such sites as the Hind Site (Howard 1993:368-371), Shelltown (Howard 1993:396-405), and Los Hornos (Howard 1985:463). At each of these sites excavators identified areas or "aprons" of dense shell debris and finely ground shell embedded in floor surfaces within several pithouses and other small structures. The shell debris was concentrated around hearths that were centrally located within the structures. These deposits are indicative of the *Glycymeris* bracelet production that was undertaken by residents at these and other sites in the region (McGuire and Howard 1987). Similar deposits were also encountered in the floor assemblages of pithouse structures at the Hohokam site of Snaketown (Seymour 1988:816-819; Seymour and Schiffer 1987:585, 587). Shell debitage, unfinished

ornaments, and objects broken during manufacture were identified in and around a number of Colonial and Sedentary (A.D. 700-1100) period Hohokam house structures. While most of these materials were recovered from interior floor deposits, high concentrations of shell debris were also noted in nearby refuse pits (Seymour 1988:820-821; Seymour and Schiffer 1987:593).

Feinman and colleagues (Feinman 1999; Feinman and Nicholas 1993, 2000; Feinman et al. 1991; Feinman et al. 1993) have recorded a similar scenario at the Ejutla site in the Ejutla Valley, Oaxaca. During their survey of the Ejutla Valley in 1984-1985, Feinman and Nicholas identified a dense concentration of surface shell along the eastern edge of the modern town of Ejutla de Crespo. Excavations (1990-1993) in this area exposed a Classic (A.D. 200-800) period residential structure, dense midden deposits, and multiple ash-filled pits (Feinman and Nicholas 2000:123). More than 24,000 pieces of marine shell and 169 microdrills were recovered from sub-surface deposits at the site (Feinman 1999:88). The shell assemblage consisted of detritus, slightly modified pieces, and complete and incomplete ornaments (Feinman and Nicholas 2000:126). Virtually all of the shell artifacts were identified as Pacific species (i.e., *Spondylus*, *Strombus*, *Pinctada*), the nearest coast lying approximately 100 km away. Most of the shell artifacts were found in midden contexts adjacent to the residential structure, although a number of items were found in floor deposits inside the structure (Feinman and Nicholas 2000:130). In addition to the few macro-artifactual shell remains recovered inside the Classic period structure, significant quantities of micro-artifactual shell debris were identified in interior floor deposits, leading researchers to argue that shell working activities were being undertaken in this structure (Feinmann et al. 1993:38-39; Middleton 1995). The micro-

artifactual data have also indicated that residents of the Classic period structure were involved in a wide variety of craft activities, including pottery production and lapidary work.

Feinman and Nicholas (Feinman 1999; Feinman and Nicholas 2000) have used their findings to address the organization of shell ornament production at the Ejutla site. Based on their findings they have argued for household-scale production of shell ornaments. The high density of production debris and lack of finished products has also led them to suggest that the level of production was greater than that needed by a single household, but they do not specifically address the issue of production intensity (i.e., full-time or part-time). On a broader scale, the findings from Ejutla have led these scholars to propose a re-evaluation of our assumptions about economic specialization at the household scale. While production in residential contexts has traditionally been associated with part-time, low intensity, local production, Feinman (2000) and Nicholas (Feinman and Nicholas 1999) argue that this is an inaccurate portrayal of some household-scale production systems, particularly that of shell ornament production.

Shell working locales have also been identified in the Early and Middle Formative villages of San Jose Mogote and Tierras Largas in the Valley of Oaxaca (Flannery and Winter 1976:36-39; Pires-Ferreira 1976, 1978). Excavations at these sites have revealed that early villages were composed of multiple “household clusters” consisting of associated residential architecture, bell-shaped pits, burials, and middens (Winter 1976). Evidence from house floors and peripheral deposits indicates that many residents were involved in shell working activities during this early time period. At San Jose Mogote shell working debris consisted of chert debitage and tools, shell detritus, and shell

ornaments in various stages of production. These deposits were typically concentrated in the corners of structures, but debris was also encountered in general excavations in the household clusters (Pires-Ferreira 1976: Table 10.8). The presence of shell working debris at virtually every domestic structure in these two settlements and the virtual absence of this same evidence at other sites in the region has led Flannery and Winter (1976:39) to argue that shell working may have been a regional specialization, with virtually all households in particular settlements involved in production activities. While these researchers have referred to Formative shell ornament production as specialized, there is little evidence to support this supposition. Based on the frequency data provided by Pires-Ferreira (1976: Table 10.8), only 142 pieces of worked and unworked shell were recovered from Early Formative deposits at San Jose Mogote.

While the above studies have used shell ornaments and debris to identify where shell working occurred, others have identified more permanent facilities for shell working. Carlson (1993) describes such facilities identified at the Governor's Beach site (GT-2) in the Turks and Caicos Islands of the Greater Antilles. The GT-2 site was inhabited by members of the Taino population between A.D. 1100-1200 and includes several formalized shell workshops (Carlson 1993:46-55). Like those shell-working areas mentioned above, the GT-2 workshops have high concentrations of shell detritus, broken and incomplete shell ornaments, finished ornaments, coral abraders, and chert debitage. In addition to the standard shell working debris, Carlson has also identified "concreted blocks" or polishing stations and upright stone and conch shell anvils used in the production process. In her analysis of the spatial distribution of beads and shell detritus, Carlson (1993:50) found that ornament production activities seem to have been

carried out sequentially, with drilling and blank production in one area and final grinding and polishing in another.

Evidence of prehistoric shell working has also been derived indirectly from shell working tools. In Mississippian (A.D. 1050-1350) component sites in the American Bottom, particularly Cahokia and its peripheral settlements, researchers have commonly used microdrills to indicate that residents of certain households or sites were engaged in the production of shell ornaments. Researchers working in the American Bottom have exposed significant quantities of shell artifacts and chert microdrills (Holley 1995; Morse 1972; Pauketat 1993; Prentice 1983; Yerkes 1983, 1987, 1989); unfortunately, these items are rarely found in direct association with one another. While a number of possible shell workshops have been noted at Cahokia since the 1930s, only one has been excavated – Kunnemann Mound. The Kunneman Mound excavations revealed substantial evidence of shell ornament production, including quantities of chert microliths (i.e., microcrills, microblades, microcores), unfinished shell beads, unworked shell fragments, and sandstone abraders, saws, and chisels (Pauketat 1993).

Although there is some direct evidence of shell bead production in the Cahokia settlement system, researchers have relied primarily on indirect evidence to indicate areas or sites where production activities were undertaken. Microwear analysis conducted by Yerkes (1983) has shown that microdrills from Cahokia were used almost exclusively to drill shell. Despite the overwhelming evidence that these specialized tools were used to work shell, Yerkes (1989:97) states that:

The lack of good association between shell refuse and microdrills at the Cahokia site may indicate that only the final drilling of the shell beads took place where the microdrills were found while the raw shell was cut into bead blanks elsewhere. It is also possible that the concentrations of microlithic artifacts mark the locations where drills were replaced in their hafts, not the activity areas where shell beads were manufactured.

Since the publication of these important findings, researchers in the area have frequently used microdrills as indicators of shell working activity, even in the absence of shell materials. Using this strategy, archaeologists have argued that shell bead production was a widespread activity that occurred throughout Cahokia and other sites in the American Bottom (Trubitt 1996, 2000; Yerkes 1989). Yerkes (1989:102-103) has even suggested that during the Stirling (A.D. 1100-1200) phase of the Mississippian period, shell ornament production was characterized as a regional specialization with nearly all households at certain sites engaged in the activity. This strategy of using microliths as the main indicator of shell bead working has potentially inflated the importance of shell working in the American Bottom.

Through her analysis of shell artifacts at the site of Tikal, Moholy-Nagy (1963, 1978, 1985, 1987, 1994, 1997) has been able to identify a number of interesting patterns in the temporal, spatial, and contextual distribution of shell during the Preclassic and Classic periods. The Tikal shell assemblage consists of 13,520 shell artifacts, including unworked shell (n=4,042), complete and fragmented shell artifacts (n=5,542), shell debitage (n=3,707), and probably debitage (n=229) (Moholy-Nagy 1994:93). Based on the presence of marine shell debitage at the site, Moholy-Nagy (1994:95, 1997:295) argues for the local production of shell ornaments at the site. In her recent article on the organization of Classic period craft production at Tikal, Moholy-Nagy (1997:295) states

that “correctly identified debitage, by definition, is always a sign of craft activity somewhere, no matter where it is found.”

Based on their recovery context, raw material type, and association with specific structure groups, Moholy-Nagy (1994:101-103; 1987:147) divided the modified and unmodified shell artifacts into “higher status” and “lower status” complexes. According to Moholy-Nagy, high status shell debitage (i.e., *Spondylus*) was recovered from burial and cache deposits in high status groups in Tikal’s epicenter or downtown area. Low status debitage (i.e., white marine shell and freshwater mussel), in contrast, was found throughout the site, but these materials were derived primarily from middens and construction fill. Despite her inability to identify areas where shell working occurred, she proposes that during the Classic period high status and low status items were produced by specialists living in small structure groups in various parts of the site. Based on little evidence, Moholy-Nagy (1994: 105; 1997:308) argues that non-elite artifacts were produced by part-time independent specialists, while high status artifacts were produced by full-time attached specialists possibly living in the same groups. Haviland (1985) has also commented on the organization of shell ornament production at Tikal. During his excavations at Groups 4F-1 and 4F2, two small residential groups at Tikal, Haviland (1985:176, Table 123) recovered a small number of worked (n=86) and unworked (n=55) shell artifacts from “undisturbed occupation debris” and construction fill. Like Moholy-Nagy, Haviland (1985:175) argues that members of these two groups were engaged in shell working activities, but the small number of shell specimens suggests that this was only a part-time activity.

Cobos (1994) and Pope (1994) have presented similar findings for the site of Caracol, a large Maya center located on the Vaca Plateau in the foothills of the Maya Mountains. Chert microliths and debitage, worked shell artifacts, and shell debris have been reported in various deposits throughout the site. In most cases these items are not found in direct association with one another; however, the co-occurrence of large numbers of these items has been noted at the Mosquito Group, a small plazuela group approximately 1 km from the site's center (Pope 1994). Cobos (1994:141) and Pope (1994:151) argue that this plazuela group was a shell workshop where marine shell (*Strombus gigas*) was reduced and transformed into finished products.

During excavations at the Mosquito Group, 19 worked shell artifacts and 1,815 pieces of marine shell detritus were recorded (Cobos 1994:147). Complete and broken buttons, rings, and disks were identified in the assemblage. Although a wide variety of chert tools and debitage were found in association with these materials, it is the chert microdrills that provide the most significant information regarding the production of shell artifacts at Caracol. The drills from Caracol were made from modified flakes which were further reduced by trimming the lateral edges and distal tip (Pope 1994:154). A preliminary use-wear analysis has revealed that the majority of these drills exhibited distal polish and rounding from repeated drilling of shell (Pope 1994:154-155).

While Pope and Cobos have identified this group as a shell workshop, they have not identified in situ deposits where shell working occurred. The chert and shell materials recovered from the Mosquito Group were found in an open chamber, a collapsed tomb, and sub-plaza deposits (Pope 1994:151). Pope (1994:152) notes that the shell working refuse may have been deposited during routine maintenance of the

workshop area, but it is also possible that these materials were gathered from refuse dumps and re-deposited as construction fill.

SUMMARY

While studies of trade and exchange dominated the archaeological literature throughout much of the later decades of the twentieth century, many archaeologists have begun to turn their attention towards the organization of production activities. The recognition that elements of production can be reconstructed from archaeological materials has stimulated an interest in the identification of craft specialists, a trait that has often been used to determine the level of complexity in a given society. Concentration, context, scale, and intensity are common variables archaeologists evaluate in their efforts to reconstruct the organization of production systems. Identifying areas where production activities occurred provide the most direct evidence of the organization of production, but indirect evidence obtained from finished artifacts can also provide pertinent information about production activities. To date most production studies have focused on ceramic and lithic materials, but there is a growing body of knowledge on the production of shell ornaments, an artifact class that is found in prehistoric and historic cultures around the globe. The archaeological literature on shell ornaments has traditionally centered on typological and taxonomic analyses. These studies have provided important information about raw material usage and the types of artifacts that were being produced during certain time periods, but they have provided little information about the system responsible for their production. More recent studies, such as the ones mentioned in this chapter, have made considerable progress towards gaining a more complete picture of this important industry.

CHAPTER 4

THE BELIZE VALLEY: NATURAL AND CULTURAL SETTINGS

This chapter provides background information on the natural setting and cultural historical background of the Belize Valley. In the first section of this chapter information on the region's geology, hydrography, climate, vegetation, and fauna are presented. Cultural historical information for the Belize Valley is presented in the second half of the chapter, including discussions of (1) chronology, (2) previous archaeological research, (3) cultural characteristics of the Preclassic period, and (4) Preclassic sites in the region.

NATURAL SETTING

Geographic Location

The Maya Lowlands cover approximately 390,000 square kilometers, encompassing modern-day Belize and Guatemala and parts of Mexico (Campeche, Chiapas, Quintana Roo, Yucatan), and Honduras (Sabloff 1990:14) (Figure 4.1). Mayanists have traditionally divided this vast area into the Northern and Southern Lowlands based on changes in climate, vegetation, and geology. The Northern Lowlands are dominated by scrub forest and low precipitation while dense tropical rainforest and high levels of precipitation characterize the Southern Lowlands. Of specific interest to the present study is the upper Belize River valley, located in the Southern Lowlands of west-central Belize (Figure 4.2). For the remainder of this study the region will be referred to simply as the Belize Valley. This "region" was first defined by Gordon

Willey and colleagues during their ground breaking settlement pattern research in the area during the mid-1950s. In his 1965 publication titled *Prehistoric Maya Settlement in the Belize Valley*, Willey defined the study area as the upper portion of the Belize River lying between the Guatemalan frontier and the community of Cocos Bank (Willey et al. 1965:23). Archaeologists working in the area today continue to use this term; however, the specific boundaries of the region seem to vary depending on the individual researcher. For the present study the Belize Valley will be defined by international and physiographic boundaries. The western boundary of the study area is defined by the Mopan River as it crosses the international border separating Belize and Guatemala. The remaining physiographic boundaries are formed by changes in the natural environment. The Belize Valley is bordered by the Maya Mountains to the south, and upland terrain consisting of escarpments and plains to the north. The community of Cocos Bank lies at the eastern extent of the region, separating the rainforest areas of the upper or western portion of the Belize Valley from the extensive swamps and sandy savanna lands of the lower or eastern portion.

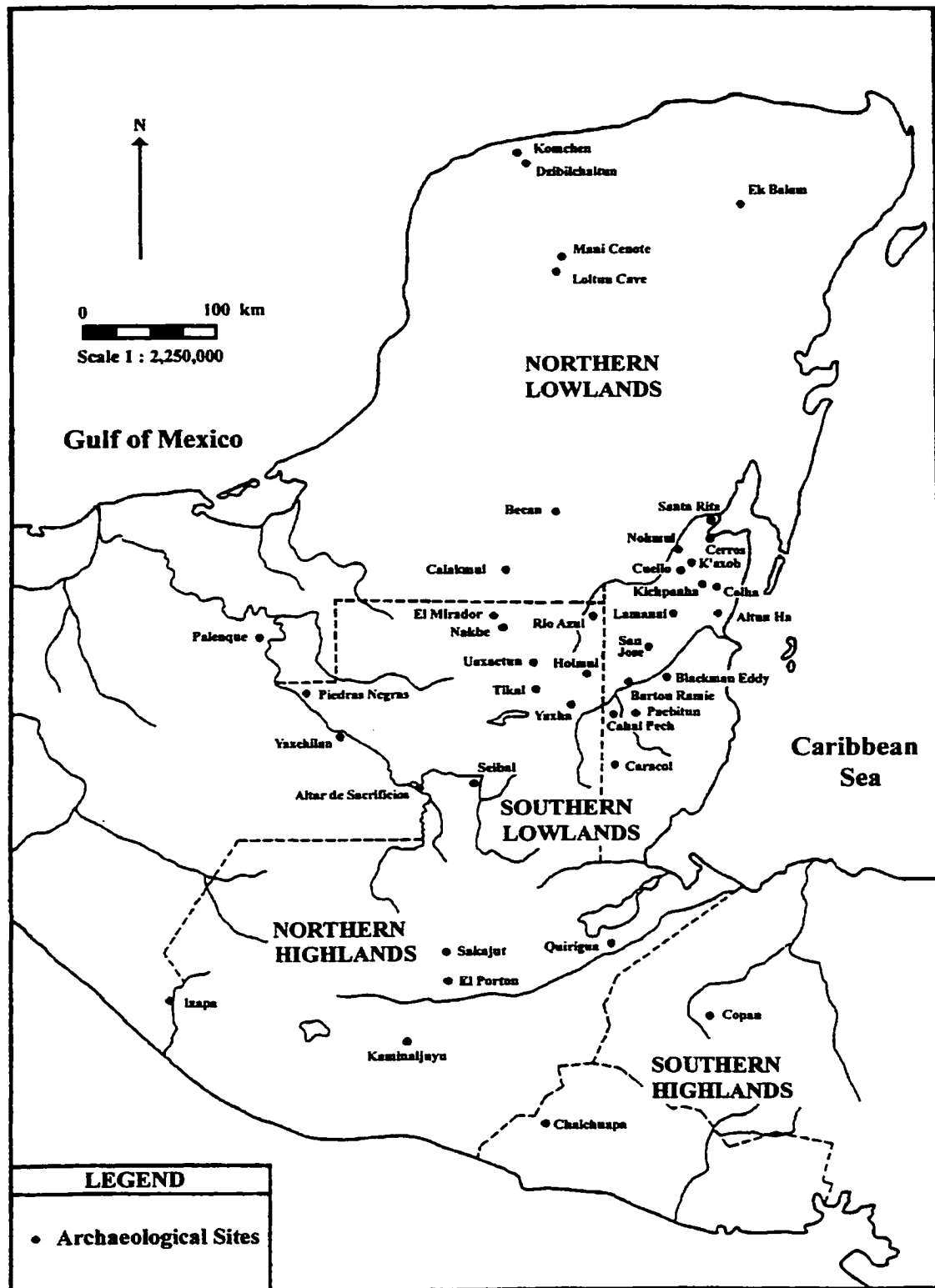


Figure 4.1: Map of the Maya Area Showing Select Archaeological Sites and Regional Divisions (after Awe 1992, Figure 1).

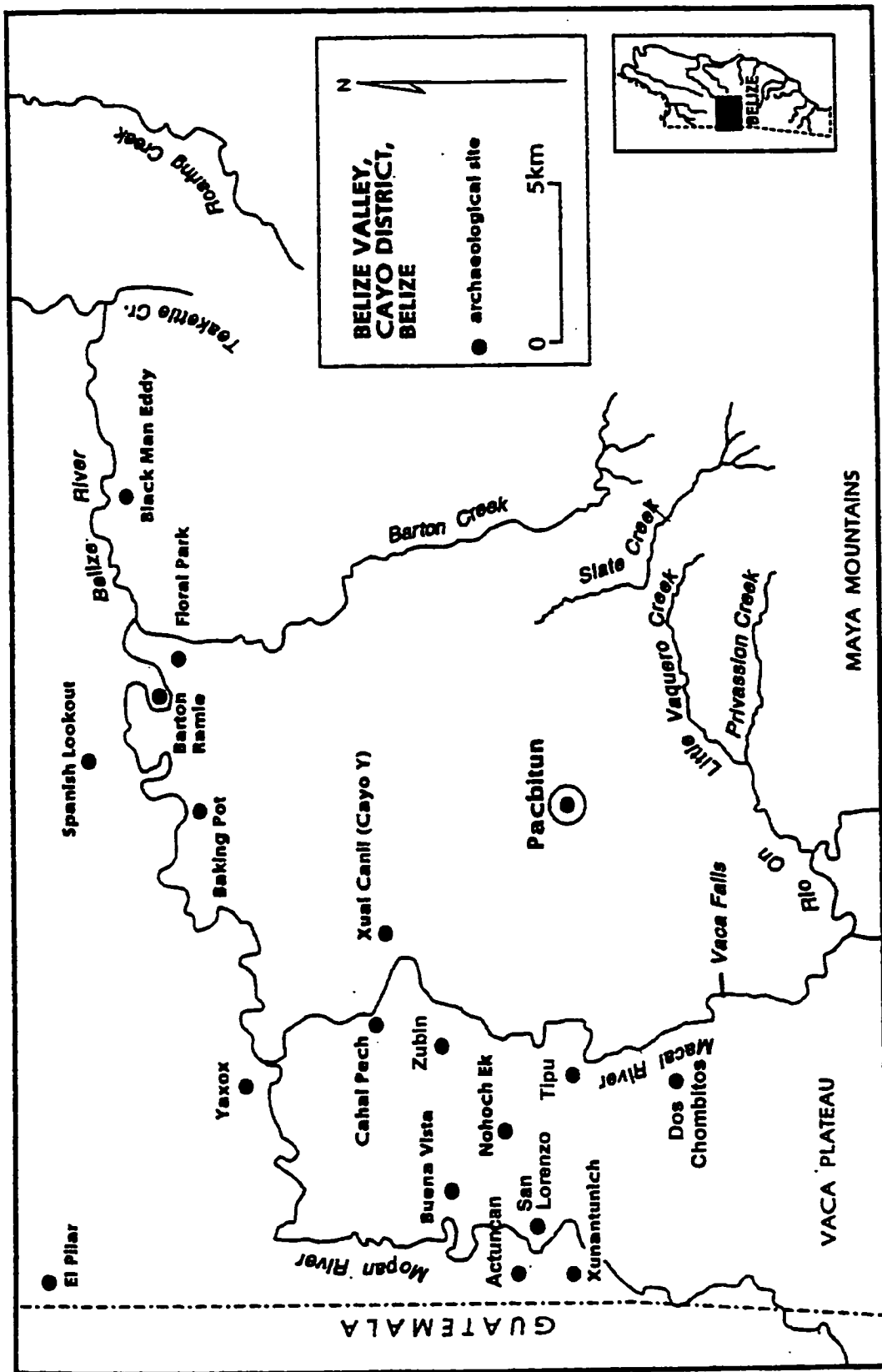


Figure 4.2: Map of the Belize Valley Showing Archaeological Sites.

Geology

Belize forms part of the low-lying, limestone shelf of the Yucatan Peninsula that emerged from the sea during the Pleistocene (West 1964:70-73). The southern portion of the shelf upfaulted at the close of the Paleozoic, forming the Maya Mountains which cover a considerable portion of south-central Belize (Bateson 1972:957). The northern half of the peninsula consists of a low-lying plain with a series of limestone hills punctuating the landscape of the northwest region (West 1964:70). The Belize Valley includes three major geological features: (1) Alluvial Deposits, (2) Limestone Platform, and (3) Pleistocene Coastal deposits (Fedick 1988, 1989, 1995; Ford and Fedick 1992; Jenkin et al. 1976; Wright et al. 1959). Alluvium ranging from Pleistocene to recent age has been deposited throughout the Belize Valley and four river terraces can currently be identified in the region (Fedick 1988:86; Jenkin et al. 1976:51). Flanking the alluvial deposits to both the north and south is the limestone platform, consisting of extensive deposits of limestone dating to the Cretaceous, Eocene, and Miocene (Dixon 1956:27-28; Jenkin et al. 1976:48-49). In various places throughout the valley, Pleistocene coastal deposits have also been identified. These deposits were laid down during the early Pleistocene or late Pliocene when the coastline was between 16 meters and 55 meters above present sea level (Dixon 1956; Jenkin et al. 1976). The resulting landscape is one of great resource diversity.

Hydrography

At the heart of the Belize Valley lies the Belize River, one of the country's most prominent hydrographic features and natural resources (Figure 4.2). The Belize River has two principal tributaries, the Mopan or Western Branch and the Macal or Eastern

Branch. The Macal River drains the central portion of the Maya Mountains while the Mopan originates further to the southwest, draining both the western portion of the Maya Mountains and the eastern, swampy portion of the Department of the Peten, Guatemala. These two rivers join to form the Belize River approximately 2 kilometers north of the modern town of San Ignacio in the Cayo District. Many smaller tributaries also join these major rivers, including Barton Creek, Roaring Creek, Garbutt Creek, and Iguana Creek. From the confluence the Belize River flows in an east-northeasterly direction to the Caribbean Sea, roughly bisecting the country into northern and southern halves. These rivers have swift currents and are subject to seasonal flooding, sometimes rising up to 12 meters above normal levels (Willey et al. 1965:23). While destructive, this periodic flooding deposits naturally fertile soils on the interfluvial bottomlands of the valley, allowing for year-round cultivation in some areas. These three major river systems (Belize, Mopan, and Macal Rivers) would have provided early Maya inhabitants with continued access to aquatic resources and waterborne transportation throughout the year.

Climate

The climate of the Belize Valley can be best classified as tropical to sub-tropical, having distinct wet and dry seasons (Wright et al. 1959; Hartshorn et al. 1984). Although there is temporal variation from year to year, the wet season typically occurs between June and December or January with a drier season extending from February to May. On average this region receives between 50 to 70 inches of rain annually and the average temperature ranges between 24 and 26 degrees Celsius (Birchall and Jenkin 1979). Despite this general pattern there is considerable spatial variation in both temperature and precipitation in the Belize Valley due to changing topography.

Vegetation and Fauna

The climatic, geological, and geographical variations each influence the existing pattern of vegetation in the Belize Valley. Today much of the fertile, alluvial bottomlands have been cleared for agricultural development (i.e., citrus orchards). Although this clearing has altered the natural plant distribution or ecology in the area, paleoethnobotanical studies have shown that the predominant species in the region today are the same as those which dominated in the past (Weisen and Lentz 1999). The limestone hills surrounding the valley are dominated by tropical broadleaf forests that include such species as allspice (*Pimenta dioica*), breadnut or ramon (*Brosimum alicastrum*), cohune palm (*Orbignya cohune*), copal (*Protium copal*), mahogany (*Swietenia macrophylla*), and sapodilla (*Manilkara zapota*). The alluvial terraces support many of these same species (e.g., cohune, mahogany) as well as fig (*Ficus radula*), cedar (*Cedrela mexicana*), and cacao (*Theobroma cacao*).

Like the vegetation on which it thrives, the fauna inhabiting the Belize Valley is both abundant and diverse, including a wide variety of terrestrial and aquatic species (Wright et al. 1959). The limestone hills are home to a wide variety of mammals and birds including agouti (*Agouti paca*), armadillo (*Tatusia novemcinctus*), red brocket deer (*Mazama americana*), white-tailed deer (*Odocoileus truei*), opossum (*Didelphis marsupialis*), peccary (*Dicotyles tajacu*), rabbit (*Sylvilagus* sp.), chachalaca (*Ortalis vetula*), and ocellated turkey (*Agriocharis ocellata*). In the alluvial bottomlands the faunal assemblage includes aquatic species like catfish (*Siluriformes* sp.), molluscs (*Nephronaias* sp., *Pachychilus* sp., *Pomacea* sp.), turtles (*Chelonia* sp.), and crocodiles (*Crocodylus moreletii*). Zooarchaeological research has also shown that most of these

species were utilized by the prehistoric inhabitants of the region (Powis et al. 1999; Stanchly 1995).

CULTURAL HISTORICAL BACKGROUND

Chronology

The principal periods of cultural development in the Belize Valley are the Preclassic (1500 B.C. – A.D. 300), Classic (A.D. 300-900), and Postclassic (A.D. 900-1500) periods. While some regions in Mesoamerica are known to have been occupied during the Paleoindian (ca. 12000-6000 B.C.) and Archaic (ca. 6000-2000 B.C.) periods, there is limited evidence for this early occupation in the Maya Lowlands (Brown 1980; Hester et al. 1993; Jacob 1995; Jones 1994; Kelly 1993; Lohse 1992; MacNeish et al. 1982; Pohl et al. 1996; Vaughan et al. 1985; Velasquez 1980). To date there is no direct evidence to suggest that the Belize Valley was occupied during these early periods, but archaeological investigations have revealed a long chronological sequence extending from the Preclassic to the Postclassic period. Figure 4.3 provides a listing of the major period divisions and several well-established local ceramic sequences in the Belize Valley and adjacent regions of the lowlands. The focus of this study is the Preclassic (ca. 1500 B.C. – A.D. 250), the first time period during which there is firm evidence of permanent settlements throughout the Maya Lowlands. The Preclassic in the Belize Valley has traditionally been subdivided into four eras: Early Preclassic (ca. 1500-1000 B.C.), Middle Preclassic (ca. 900-300 B.C.), Late Preclassic (ca. 300 B.C. – A.D. 0), and Protoclassic (A.D. 0-300). Several of these periods have been further subdivided into two or more facets or phases.

Several local ceramic sequences have been developed for sites in the Belize Valley, allowing for strong temporal control at the site level and providing a means of comparison between sites in the region. The ceramic sequence from Barton Ramie (Gifford 1965:319-384, 1976) is the most established and utilized sequence in the region; however, additional local sequences have also been constructed for the sites of Cahal Pech (Awe 1992:225), Pacbitun (Healy 1990a:257), and Xunantunich (Thompson 1940). Despite the differences in geography, the similarities between the local ceramic assemblages indicate a closely-knit regional sequence.

Time	Major Periods	Uaxactun	Pacbitun	Cahal Pech	Barton Ramie
1400	P O C Late				
1300	S L Middle				
1200	T A				New Town LF
1100	S				EF
1000	I Early				
900	C				
800	TERMINAL	3			
700	C L Late	Tepeu 2	Tzib	Mills	Spanish Lookout
600	A	1	Coc	Gadsden	Tiger Run
500	S	3			
400	I Early	Tzakol 2	Tzul	Ahcabnal	Hermitage
300	C	1			
200				Xakal LF	
100	Proto-Classic		Ku	EF	Floral Park
AD					Mount Hope
100					
200	P R E C L A S S I C Late	Chicanel	Puc		Barton Creek
300					
400		Mamom			
500					
600	Middle		Mai LF	Kanluk LF	Jenny Creek LF
700			EF	EF	EF
800					
900					
1000					
1100					
1200	Early				
1300					
1400					

Figure 4.3: Ceramic Sequences for Select Sites in the Belize Valley and Department of Petén, Guatemala.

History of Archaeological Research

Given its strategic position between the Caribbean Sea and Maya heartland to the west, the Belize Valley has been the subject of early explorations and sporadic archaeological research for close to a century. Early investigations in this region involved limited site mapping and excavations at sites like Actuncan (Gann 1925), Baking Pot (Ricketson 1929), Cahal Pech (Satterthwaite 1951), Nohoch Ek (Coe and Coe 1956), and Xunantunich (Gann 1918, 1925, 1927; MacKie 1961, 1985; Satterthwaite 1951; Thompson 1940). This early research was instrumental in providing preliminary information about the location, size, architecture, and material culture attributed to the Prehispanic populations who inhabited this region. During this early phase of research a local sequence or relative chronology based on ceramic materials was established for the site of Xunantunich (Thompson 1940), providing researchers with a mean chronological basis for comparison between sites in the lowlands. This lengthy chronological sequence extended from the Preclassic through the Classic period, a sequence comparable to those established earlier by Thompson (1939) at San Jose in northern Belize and Smith (1955) at Uaxactun in the Department of Peten, Guatemala. While many of the larger sites had been tested during the early-mid twentieth century, very little effort had been directed towards the smaller sites and mounded features in the region.

Beginning in the 1950s, there was a revolution in American archaeology beginning with Gordon Willey's groundbreaking research in the Viru Valley, Peru (Willey 1953). Between 1954 and 1956 Willey continued this innovative settlement pattern research in the Belize Valley where he and his colleagues conducted an extensive

survey and excavation of sites in the upper Belize River Valley, including Barton Ramie, Floral Park, Warrie Head, Cayo Y, Baking Pot, Xunantunich, and Cahal Pech (Willey et al. 1965). Their major focus was on the housemounds of Barton Ramie where extensive agricultural clearing allowed for easy identification and excavation of prehistoric mounds or features. Using the ceramic collection derived from these excavations and comparative data from Benque Viejo (Thompson 1940), San Jose (Thompson 1939), and Uaxactun (Smith 1955), a local chronological sequence was constructed for Barton Ramie (Gifford 1965:322-390). This sequence consisted of eight ceramic complexes, extending from the early Middle Preclassic (Jenny Creek) to the Late Classic (Spanish Lookout) period (Figure 4.3). The ceramic sequence from Barton Ramie (Gifford 1965, 1976) is the most established and utilized sequence in the valley.

In more recent years a number of independent research projects have been undertaken in the Belize Valley. Each of these projects has had unique research goals and methods. While some of these projects have focused investigations on the central precinct of a single center, others have incorporated extensive settlement studies into their research design. Most of these long-term projects have focused on Classic and Postclassic centers such as Buena Vista and Las Ruinas de Arenal (Ball and Taschek 1991; Taschek and Ball 1999); El Pilar (Ford and Fedick 1992; Ford et al. 1995); Pacbitun (Healy 1990a); Tipu (Graham 1991; Graham and Bennett 1989; Graham et al. 1985); Xual Canil (Iannone 1997); and Xunantunich (Leventhal 1997; Robin 1999; Yaeger 2000). These projects have provided archaeologists with a better picture of the dynamic social, political, and economic landscape during the Classic period.

A number of projects have also begun to focus attention on the Preclassic period in the Belize Valley, the period during which many of the major cultural hallmarks of Maya civilization first developed. While Preclassic deposits have been reported at a number of sites in the valley (e.g., Actuncan, Barton Ramie, Blackman Eddy, Cahal Pech, El Pilar, Nohock Ek, Pacbitun, Xunantunich), only a few scholars have initiated research projects focusing on this early period. These projects include the Belize Valley Archaeological Reconnaissance Project at Cahal Pech (Awe 1992), Belize Valley Archaeology Project at Blackman Eddy (Garber et al. 1998; Brown and Garber 2000; Brown et al. 1999), and Preclassic Maya Archaeological Project at both Pacbitun and Cahal Pech (Healy and Awe 1995, 1996; Healy. ed. 1999). The data derived from these projects/excavations form the basis of the current research project.

BELIZE VALLEY PRECLASSIC

Settlement

Gordon Willey first noted Preclassic settlement in the Belize Valley during his survey of the region between 1954 and 1956 (Willey et al. 1965). Based on his findings at Barton Ramie, Willey argued that Preclassic settlement in the region was restricted to the alluvial bottomlands while the adjacent limestone hills were used for extensive cultivation (Willey et al. 1965:573-576). Based on the findings of independent research projects undertaken throughout the Belize Valley, we now know that Preclassic settlement was not restricted to the alluvium. One of the most comprehensive surveys in the region was undertaken by the Belize River Archaeological Settlement Survey (BRASS) project (Ford and Fedick 1992). Forty-eight residential units were tested during this project, revealing ceramics dating from the Middle Preclassic to the

Postclassic period. Using agricultural land evaluations and intensive archaeological survey data from the survey area, Fedick (1988:207-208; 1989) has noted that Middle Preclassic settlement was widespread with sites located in the alluvium and the limestone platform. While settlement density was highest in the limestone platform, midden densities indicate the highest relative residential stability was in the alluvial bottomlands near the most agriculturally useful soils. The BRASS survey data indicate that there was an increase in settlement during the Late Preclassic with a greater number of settlements found in less desirable or agriculturally useful areas (Fedick 1988:208-209).

Unfortunately, no land-use studies of this scale are available for other areas of the Belize Valley. Although comparable studies are not available, archaeological research throughout the valley has revealed that many valley sites had significant Middle and/or Late Preclassic occupation. Sites like Actuncan (McGovern 1992, 1993), Barton Ramie (Willey et al. 1965), Blackman Eddy (Brown and Garber 2000; Brown et al. 1999; Garber et al. 1998), Cahal Pech (Awe 1992; Cheetham 1995, 1996; Healy and Awe 1995, 1996), Dos Chombitos Cik'in (Robin 1997, 1999), El Pilar (Ford and Fedick 1992; Ford et al. 1995), Nohoch Ek (Coe and Coe 1956), Pacbitun (Healy 1990a; Healy ed. 1999; Hohmann and Powis 1996, 1999; Hohmann et al. 1999), and Zubin (Iannone 1996) have all reported Middle and Late Preclassic artifactual and architectural features. Given the limited testing of Preclassic deposits at some of these sites, it is not possible to reconstruct the Preclassic settlement at the site level.

Architecture

Middle Preclassic domestic and non-domestic architecture has been exposed at a number of sites in the Belize Valley. Excavations at Cahal Pech (Awe 1992; Cheetham

1995, 1996) and Pacbitun (Hohmann and Powis 1996, 1999; Hohmann et al. 1999) have revealed a significant number of Middle Preclassic domestic structures. During this period domestic architecture consists of low, rectangular, earthen platforms surrounded by retaining walls constructed of roughly shaped limestone blocks. The surfaces of these platforms were typically tamped marl or lime plaster. The presence of postholes and wattle-and-daub fragments indicate that some of these platforms supported perishable pole-and-thatch superstructures. At Pacbitun it is clear that these rectangular structures were clustered in groups of two or more surrounding an open plaza area, a pattern that has been well documented during the Classic period throughout the lowlands. While dimensions have not been obtained for most of these structures, recent excavations at Pacbitun have revealed that one structure (Sub-Str B2) measured 9 meters x 6 meters, making this one of the largest Middle Preclassic domestic structures reported in the Maya Lowlands (Hohmann and Powis 1996, 1999).

In contrast to these domestic structures, other types of Middle Preclassic architecture in the Belize Valley appear to have served non-domestic functions. One such architectural type is the circular or apsidal structure. At present six Middle Preclassic circular structures have been identified in the region. Four of these structures have been reported at Cahal Pech (Aimers et al. 2000; Awe 1992; Powis 1996) and El Pilar (Ford et al. 1995) and Xunantunich (Yaeger 1996:143-144) have each reported one round or circular structure. While only small portions of the structures at Xunantunich and El Pilar were exposed, a complete horizontal exposure of three of the Cahal Pech structures (Tolok Group Structures 14 and 15; Zotz Group Structure 2/2nd) has revealed a significant number of burials extending from the Middle Preclassic to the Late Classic

period. The presence of multiple intrusive burials suggests that these structures were ultimately used as burial shrines, even after the Preclassic structures were covered by subsequent building activity. It has been suggested that these structures were used in ritual performances related to their role as burial or ancestral shrines (Aimers et al. 2000:81-83). The presence of Late Classic burials in each of these structures clearly indicates that the location of these structures was of some significance to residents of these groups centuries after they were covered.

Middle Preclassic elevated platforms and small pyramidal structures have also been identified at the sites of Cahal Pech and Blackman Eddy. The size, location, and architectural elaboration of these structures suggest that they were public structures whose function was related to Maya ceremonialism. The most intensive research on these public structures has been undertaken at Blackman Eddy. At Blackman Eddy excavations in Structure B1 of the central precinct have revealed 12 major construction phases beginning during the early Middle Preclassic and continuing through the Late Classic period (Brown and Garber 2000; Brown et al. 1999; Garber et al. 1998). One of the earliest construction phases of Structure B1 (B1-4th) consisted of a large rectangular platform with an inset staircase and an extended basal platform. According to Brown and colleagues (Brown et al. 1999), there is preliminary evidence to suggest that the remains of a highly fragmented armature represent that of a stucco mask. If this interpretation is correct, then it represents one of the earliest documented examples of a stucco mask in the Maya Lowlands. Platform-type structures have also been reported in the central precinct and peripheral areas at Cahal Pech (Awe 1992:208-213; Cheetham et al. 1993:164-178; Cheetham 1996:22).

Architectural activity in the Belize Valley continues at an accelerated pace during the Late Preclassic. Like the preceding period, domestic and non-domestic architecture has been identified at a number of sites in the region. Domestic architecture remains relatively unchanged from the Middle to the Late Preclassic period, but the face of many Belize Valley sites was changed considerably due to the large-scale construction of non-domestic architecture such as pyramidal structures, range structures, elevated platforms, and ballcourts. Actuncan, Blackman Eddy, Cahal Pech, and Pacbitun have all recorded one or more of these types of Late Preclassic architecture. Although it is difficult to know the exact configuration of these Late Preclassic communities, the majority of these structures were situated in what are now the central precincts of these sites. The construction of large non-domestic architecture combined with the large-scale filling and leveling in the plaza areas suggests the formalization of plaza groups at this time.

While there is an increase in the occurrence of domestic architecture, most of the Late Preclassic building efforts seem to have been directed toward the construction of ritual or ceremonial structures. Excavations at Cahal Pech and Pacbitun have revealed that the initial construction of most non-domestic architecture occurred during the Late Preclassic period. Securely-date pyramidal structures have been identified during excavations at Cahal Pech (Awe 1992:76; Cheetham et al. 1993:159) and Zubin (Iannone 1996), and it is likely that the future excavations will reveal additional pyramidal structures dating to this period. Platforms with stucco masks are also more abundant during this period with example being identified at Actuncan (McGovern 1994:112), Blackman Eddy, (Brown and Garber 2000; Brown et al. 1999; Garber et al. 1998), and Cahal Pech (Awe 1992). These architectural features provide some of the best evidence

for the formalization of Preclassic religious and political institutions in the valley. These masks are believed to have communicated information regarding the supernatural and been used to legitimize the authority of the rulers at individual sites (Freidel and Schele 1988). A Late Preclassic ballcourt at Pacbitun provides additional evidence of the ritual or ceremonial nature of architecture during this early period (Healy 1990a:252-253; 1992). While the ballcourt may have been an arena for a sporting event, it is believed that the ballgame had its roots in an ancient religious and ritual system (Schele and Freidel 1991).

Subsistence and Diet

Over the last five years paleobotanical, zooarchaeological, and isotopic analyses have been conducted on certain Preclassic materials recovered from the sites of Cahal Pech and Pacbitun, providing significant new data on subsistence practices in the valley. These preliminary data have indicated that the Middle Preclassic inhabitants of the Belize Valley were agriculturalists whose diet was supplemented by wild plants, terrestrial herbivores, and marine and freshwater fish and shellfish. Comparable data have been reported from multiple Preclassic sites in northern Belize, including Colha (Carr 1985; Shaw 1991), Cuello (Miksicek 1991; Wing and Scudder 1991), and Cerros (Carr 1986; Cliff and Crane 1989).

A number of Middle Preclassic botanical remains have been reported from Cahal Pech (Lawlor et al. 1995; Powis et al. 1999; Wiesen and Lentz 1999). Cultigens such as maize (*Zea mays*), squash (*Cucurbita* sp.), and beans (*Phaseolus* sp.) were identified, as were domestic and wild species such as wild fig (*Ficus* sp.), guava (*Psidium guajava*), pine (*Pinus* sp.), malady (*Aspidosperma* sp.), glassy wood (*Astronium graveolens*), and

aguacatillo (*Nectandra* sp.). Like other lowland inhabitants, the Belize Valley Maya were utilizing a wide number of wild and domestic plants to satisfy their subsistence and everyday needs (e.g., cooking, construction).

Zooarchaeological analyses have revealed that the Belize Valley Maya utilized a wide variety of local terrestrial, freshwater, avian and domestic species as well as a number of marine species derived from the Caribbean Sea, approximately 110 kilometers from the juncture of the Macal, Mopan, and Belize Rivers (Powis et al. 1999; Stanchly 1995). Since most Middle Preclassic settlements were located in close proximity to one or more freshwater sources (e.g., rivers, streams, aguadas, and bajos), it is not surprising that domestic midden deposits contain a large number of freshwater fish, reptiles, and molluscan species. Archaeologically, the most abundant invertebrate species recovered are *Nephronaias* sp., *Pachychilus* sp., and *Pomacea* sp. The presence of substantial quantities of these freshwater species has led researchers to argue that the early inhabitants of the Belize Valley were utilizing these freshwater shell species as dietary supplements (Healy et al. 1992; Powis et al. 1999; Stanchly 1995). A number of vertebrate and invertebrate marine species have also been identified in Middle Preclassic deposits. Bony fish like parrotfish (*Sparisoma* sp.), hogfish (*Lachnolaimus* sp.), grouper (*Epinephalus* sp.), and snapper (Lutjanidae) are commonly identified as are a number of shellfish, including conchs (*Strombus* sp.), tusk shells (*Dentalium* sp.), olive shells (*Oliva* sp.), and marginellas (*Marginella* sp.). Some of these species could have been easily collected in the shallow estuarine environments along the coastline, while others were reef or offshore species found only in the deep or pelagic waters beyond the reef.

Subsistence practices appear to remain relatively constant throughout the Late Preclassic period. As in the earlier period, floral and faunal samples indicate that valley residents were complementing a maize-based diet with a wide variety of wild and domestic plant and animal species. Isotopic analysis of human bone has provided additional information on the Late Preclassic subsistence and diet. White et al. (1996) analyzed the stable carbon and nitrogen isotopes of seven Late Preclassic individuals from the site of Cahal Pech. The isotopic data complement the botanical and faunal reconstructions, indicating that the Late Preclassic inhabitants were agriculturalists who supplemented their diet with a mixture of terrestrial herbivores, marine reef fish, and freshwater fish and shellfish (Powis et al. 1999:374). Similar results have also been reported on Preclassic samples from lowland sites such as Lamanai and Cuello (Tykot et al. 1996; van der Merwe et al. 1994; White and Schwarcz 1989) in northern Belize and Altar de Sacrificios and Seibal (Wright 1994) in Guatemala. Although the sample size is notably small, the isotopic data for the Cahal Pech burials also suggests that there may have been differential access to food resources within the site. Residents of Cas Pek, a small peripheral settlement believed to have been occupied by shell workers, seem to have consumed more maize and reef fishes than other peripheral settlements (White et al. 1996). White and colleagues argue that consumption of these two food sources may have been restricted to certain segments of society during the Preclassic period.

Trade and External Relations

Artifactual materials have provided significant information regarding the crafts and technologies that were available in the Belize Valley during the Middle and Late Preclassic periods. The Preclassic remains from the Belize Valley are numerous and

diverse with a wide variety of material types represented, including ceramic, chert, bone, shell, greenstone, obsidian, granite, and slate. The majority of artifacts collected were manufactured of locally available materials; however, a significant number of artifacts were manufactured from non-local materials derived from neighboring lowland regions or from the Maya Highlands to the south. These materials provide valuable information about external contacts and trade during the Preclassic period. Artifacts manufactured from non-local raw materials are commonly found in Middle and Late Preclassic deposits, although they constitute only a small percentage of the total artifactual assemblage. Obsidian, greenstone, and marine shell are the three most common non-local materials identified in the Preclassic deposits across the Belize Valley. Research has shown that while some of these artifacts were imported as finished products, others were produced locally from imported materials.

Obsidian is not naturally available in the karst limestone topography of the Maya Lowlands. The nearest obsidian sources are found in the volcanic highlands of Guatemala, approximately 400-500 km southwest of the Belize Valley. Physiochemical analysis (e.g., X-ray Fluorescence and Neutron Activation Analysis) of Middle Preclassic samples from Pacbitun and Cahal Pech have indicated that three highland Guatemalan sources were being utilized during the Middle and Late Preclassic periods: El Chayal, Ixtepeque, and San Martin Jilotepeque (Awe et al. 1996; Healy 1990a:259-260; Hohmann and Glascock 1996). Temporal variation in obsidian source utilization is a topic that has been discussed by several researchers working in the Maya Lowlands, but until recently, there has been little to no comparative data from the Belize Valley. From the available data it is clear that during the Middle Preclassic the San Martin Jilotepeque

source was the most dominant source being utilized by residents of the Belize Valley.

During the Late Preclassic no clear pattern emerges, although it does appear that El Chayal obsidian was being utilized more intensively by lowland residents, a pattern that continued into the Early and Late Classic periods.

Typological and technological analyses have also demonstrated that at least some of the Middle Preclassic obsidian artifacts were being produced locally from highland materials (Hohmann and Glascock 1996). The Middle Preclassic obsidian assemblage consists of blades, flakes, angular debris, and polyhedral cores. The presence of irregularly-shaped macroblades, angular debris, and flakes with some cortex indicates that some local reduction of obsidian was taking place. The absence of large decortication flakes and the limited amount of cortex on the dorsal surface of flakes also suggests that obsidian was most likely being imported as macrocores.

Marine shell, the focus of this study, is another non-local material that was being utilized by the early inhabitants of the Belize Valley. Prior to the early 1990s, only a few marine shell artifacts had been identified in Preclassic deposits in the Belize Valley. During excavations at Cahal Pech and Pacbitun in the 1990s, substantial quantities of complete and incomplete shell ornaments and marine shell detritus were recovered from a number of different contexts, including middens, burials, caches, and construction fill. The association of complete and incomplete ornaments, abundant quantities of marine shell detritus, and chert microdrills provides substantial evidence that at least some of the Preclassic Maya were involved in the production of marine shell ornaments by the beginning of the Middle Preclassic period. Since a variety of marine fish species were also being imported to valley sites, it is possible that marine shells were initially being

brought into valley sites as a foodsource. Whether marine shells were being imported principally as a food source and were subsequently utilized for artifact production or if they were imported specifically for artifact manufacture cannot be determined with the present data.

Greenstone or jade artifacts were also commonly found in Middle and Late Preclassic deposits in the Belize Valley. The raw material for these items was most likely derived from the Motagua River valley in southeast Guatemala, a distance of approximately 250 km, although they may have come from as close as the Maya Mountains. Without chemical characterization analysis of the greenstone artifacts, determining the source will be impossible. In the Belize Valley greenstone artifacts have been found primarily in midden contexts (Ferguson et al. 1996; Hohmann and Powis 1996), although a few pieces have been found in burials (Schwake 1996:88) and dedicatory caches (Ferguson et al. 1996:44; Garber et al. 1998:10). Triangulates, beads, and pendants are the most common forms encountered during the Preclassic period in the Belize Valley. While there is clear evidence for the production of obsidian and marine shell artifacts in the region, there is little evidence for the local manufacture of greenstone items. It must be noted, however, that the production of greenstone items typically involved modifications such as drilling, grinding, and smoothing to give objects their final form. These modifications leave little in the way of recognizable waste products other than macro and microscopic dust, making it difficult to identify production areas.

PRECLASSIC SITES IN THE BELIZE VALLEY

Pacbitun

Pacbitun is a medium-sized Maya center located in the foothills of the Maya Mountains of the Cayo District of western Belize, approximately 3 km east of the modern Maya community of San Antonio. The site is located approximately 7.5 kilometers east of the Macal River, but there are several smaller streams or tributaries located within 5-10 km of the site. The central precinct sits atop an elevated limestone plateau running in an east-west fashion. Like the plateau on which it sits, the central precinct is also oriented in an east-west direction and consists of at least 40 Late-Terminal Classic period masonry structures covering an area of about 14.5 hectares (145,000 m²) (Healy 1990a:250). The central precinct consists of three major plazas (A, B, C) linearly aligned with two additional plazas (D and E) located to the north of the main site axis.

The earliest archaeological investigations at Pacbitun were conducted by Paul Healy of Trent University during the summers of 1984, 1986, and 1987 (Healy 1988, 1990a, 1990b, 1992; Healy et al. 1990; Healy 1995). During these three seasons many architectural and other cultural features within the central precinct were mapped and tested and a settlement survey and sampling program were undertaken in the site's periphery (Bill 1987; Campbell-Trithart 1990; Richie 1990; Sunahara 1995). Excavations in the central precinct revealed a long, stratigraphic sequence of occupation extending from the Middle Preclassic (900 B.C.) to the Late-Terminal Classic (A.D. 900) period (Healy 1990a:257). While Middle Preclassic artifactual materials were found in test units throughout the central precinct, no associated Middle Preclassic architectural features were identified. Late Preclassic architecture was identified in virtually all tested

structures in the central precinct; however, the exact configuration and dimensions of most of these features have not been determined. Despite the widespread testing program carried out in the site's periphery, only two mounds revealed securely-dated Preclassic deposits (Campbell-Trithart 1990; Sunahara 1995:76-79).

As part of the Trent University Preclassic Maya Archaeological Project, directed by Paul Healy and Jaime Awe, the author conducted excavations at Pacbitun during the summers of 1995, 1996, and 1997 (Hohmann and Powis 1996,1999; Hohmann et al. 1999). The majority of the these excavations focused on Plaza B, an area where easily accessible Middle Preclassic deposits had been noted during earlier excavations (Healy 1990a:256). Additional excavations were also conducted in Plazas C and D, two smaller plazas that had not been previously investigated. The sub-plaza deposits in these three plazas ranged from the Middle Preclassic (Mai phase) to the Late Classic period (Tzib phase) (Hohmann and Powis 1996, 1999). With the aid of ceramic cross-dating and multiple radiocarbon dates (Healy 1999; Hohmann and Powis 1996:103, 107), the Middle Preclassic period was further subdivided into early (900-600 B.C.) and late (600-300 B.C.) facets.

Excavations in the plaza areas at Pacbitun revealed significant Middle Preclassic (900-300 B.C.) architectural and artifactual materials. Portions of 22 basal platforms were identified in sub-plaza deposits in Plaza B (Sub-SA B4, B7, B9, B12; Sub-Strs B1-B3, B5-B6, B8, B10-B11, B13, B14), Plaza C (Sub-Strs C1-4), and Plaza D (Sub-SA D1-4). The architectural development at the site will be discussed in more detail in Chapter 8. These Middle Formative structures were dated by ceramic cross-dating and multiple radiocarbon dates (Healy 1999: 69-82; Hohmann and Powis 1996:103, 107, 1999;

Hohmann et al. 1999). In addition to the architectural features, significant quantities of marine shell detritus, shell ornaments, and chert microdrills were found in association with these structures, providing evidence that shell ornament production was undertaken at the site during this period

Barton Ramie

Barton Ramie is situated on the north bank of the Belize River approximately 12 kilometers east of the modern town of San Ignacio. Gordon R. Willey and colleagues were the first to conduct archaeological excavations at the site between 1954 and 1956 (Willey et al. 1965). In relation to other valley sites, Barton Ramie is somewhat unusual in that (1) there is no well-defined central precinct and (2) site boundaries were defined by the limits of field clearing rather than diminishing settlement. While the site is known to cover an area of approximately 2 square kilometers (Willey et al. 1965:31), its actual extent may be much greater.

Between 1954 and 1956 large-scale mapping and intensive excavations were conducted at Barton Ramie. A total of 262 mounded features were identified in the 2 square kilometer area defined by the project. Sixty-five of these mounds were randomly selected for testing. Excavations revealed that the final stage of occupation in all tested mounds dated to the Late Classic period, although a number of mounds revealed a lengthy sequence of occupation beginning during the Middle Preclassic period (Willey et al. 1965:278-279). Preclassic deposits were typically deeply buried, often occurring between two and four meters below the surface of most mounds. During the excavations at Barton Ramie portions of many Middle and Late Preclassic period sub-structural

platforms and associated artifactual materials were exposed (3 Jenny Creek; 15 Barton Creek; 24 Mount Hope; and 50 Floral Park) (Willey et al. 1965: 562).

Blackman Eddy

Blackman Eddy is located approximately 19 kilometers east of San Ignacio, just south of the Western Highway. The site is situated on a ridge overlooking the Belize River and the first alluvial terrace to the north. The site core covers an area of roughly 1.5 hectares and consists of 21 Late Classic pyramidal and range structures surrounding two linearly aligned plazas (Plazas A and B). Excavations at the site (1990-2000) were conducted by the Belize Valley Archaeology Project directed by James F. Garber of Southwest Texas State University.

During the eleven seasons of excavation at Blackman Eddy, all structures and plaza deposits in the central precinct were tested to provide evidence of construction history and chronological development of the site. While a handful of mounded features outside the central precinct have been tested, there has been no established program of settlement survey and excavation in the area surrounding the site. Excavations in the central precinct revealed a lengthy sequence of occupation extending from the early Middle Preclassic to the Late Classic period (Garber et al. 1998). While the initial construction and subsequent modification of the architectural features in Plaza A occurred during the Classic period, there is substantial evidence of Preclassic construction in Plaza B. During unauthorized bulldozing activity, the dominant pyramidal structure in this plaza (Structure B1) was bulldozed along its central axis, leaving behind only the eastern half of the structure. The ongoing excavations at Blackman Eddy have focused on the complete horizontal exposure of Structure B1 and it

surrounding plaza area. To date five major construction phases and various modifications have been identified, the earliest dating to the early Middle Preclassic period (Brown et al. 1999:42). The Middle and Late Preclassic architectural phases consist of large basal platforms supporting raised platforms with inset stairs and stucco masks in some cases (Structure B1-4th and B1-2nd-a, b) (Brown and Garber 1999; Brown et al. 1998; Garber et al. 1998:12, 17). The size and architectural elaboration of these structures combined with the presence of numerous ritual deposits have led researchers to argue that its function was non-domestic.

Cahal Pech

Cahal Pech is a medium-sized center located just off the western highway on the southern outskirts of San Ignacio. The site is located on a hilltop near the confluence of the Mopan and Macal Rivers, the two major tributaries of the Belize River. The central precinct covers an area just over 1 hectare and consists of thirty-five Late Classic pyramidal and range structures arranged around seven plazas (Awe 1992:60).

Although there are references to the site in the writings of many early researchers in the valley (Satterthwaite 1951:22; Thompson 1939:278-282; Willey et al. 1965:577-579), intensive archaeological excavations at Cahal Pech were not initiated until 1988. In 1988 the Belize Valley Archaeological Reconnaissance Project began investigations at Cahal Pech under the directorship of Jaime Awe. Over six seasons (1988-1993) intensive excavations were carried out in the central precinct and a settlement survey and testing project were undertaken in the site's periphery (Awe 1992). These excavations revealed a lengthy chronological sequence extending from the Middle Preclassic through the Late Classic period. A local ceramic sequence consisting of four ceramic complexes was

constructed for the site during these early excavations (Awe 1992:225-248). Two additional field seasons (1994-1995) were undertaken by the Belize Valley Preclassic Maya Archaeological Project, co-directed by Paul F. Healy and Jaime Awe of Trent University (Healy and Awe 1995, 1996). These excavations focused only on those areas of the site that had previously produced Preclassic deposits (i.e., Plaza B, Tolok, Cas Pek).

During the eight seasons of excavation at Cahal Pech, securely-dated Middle and Late Preclassic architectural and artifactual deposits were identified in the central precinct (Plazas A, B, and C) and in three peripheral settlements (Cas Pek, Tolok, Zotz) situated at varying distances from the site core. These will be discussed in more detail in Chapter 8. Many of these deposits were deeply buried beneath Classic period construction levels; however others were more accessible at approximately 1 meter below the modern ground surface. Middle and Late Preclassic domestic and ceremonial architecture were exposed during these investigations, as was a diverse assemblage of Preclassic artifactual remains. Perhaps of the most importance to the present study is the evidence of Preclassic shell ornament production at Cas Pek, one of the site's peripheral settlements.

Dos Chombitos Cik'in

Dos Chombitos Cik'in lies in the southeastern periphery of Xunantunich, the large civic center located approximately 1 kilometer west of Mopan River near the Guatemalan border. The site of Xunantunich or Benque Viejo has been the subject of intermittent, small-scale archaeological research since the early part of this century (Gann 1925; Mackie 1961, 1985; Satterthwaite 1951; Thompson 1940). In 1991 a long-term project

of archaeological investigation was initiated at the site, combining mapping and excavation in the civic center and a settlement program in the periphery. This project was jointly directed by Richard Leventhal of the University of California at Los Angeles and Wendy Ashmore of the University of Pennsylvania. In the civic center excavations were conducted in all major architectural features and plaza areas, revealing that Xunantunich flourished during the Late-Terminal Classic period, a time when most other centers in the region were in the process of collapsing. Although Preclassic ceramics were commonly encountered during excavations in the central precinct, these materials were typically found in construction fill or other mixed contexts, revealing little about the early occupation of the site.

To investigate the distribution of occupation across the landscape, five 400-meter wide transects were established in the periphery of Xunantunich (Ashmore 1995). Test excavations conducted in the periphery of Xunantunich also revealed evidence of Preclassic occupation. Of the many sites identified during the Xunantunich Settlement Survey, San Lorenzo (Yaeger 1996:143-144) and Dos Chombitos Cik'in (Robin 1997:165-169, 1999) are the only ones where securely-dated Preclassic deposits were identified. Of these two settlements, Dos Chombitos Cik'in is the only one to have produced Preclassic shell materials. Excavations at Dos Chombitos Cik'in were conducted by Cynthia Robin of the University of Pennsylvania and form the basis of her doctoral dissertation. The site consists of two Late Classic household-level sites located approximately 8.5 kilometers southeast of Xunantunich. Each household-level site consists of two structures situated around an open plaza area. In 1996 small-scale excavations and post-hole tests were undertaken at this group (Robin 1997:152). During

systematic post-hole tests in the vacant terrain surrounding the westernmost group (T/A1-152), a Middle Preclassic primary domestic midden was encountered. To date no Preclassic architectural features have been associated with this deposit. Based on associated ceramics the midden has been securely dated to the transition period between the early (900-650 B.C.) and late (650-300 B.C.) Middle Preclassic periods. It was from this midden that shell ornaments were recovered.

Zubin

Zubin is a minor center located 2 kilometers south of the site core of Cahal Pech. Excavations at the site (1992-1995) were directed by Gyles Iannone and form the basis of his doctoral dissertation (1996) at University College London. This project was conducted under the auspices of the Belize Valley Archaeological Reconnaissance Project directed by Jaime Awe. Zubin's central precinct covers an area of approximately 250 square meters and consists of two highly restricted plazas bordered by Late Classic pyramidal and range-type structures. A small number of solitary mounds and mound groups have also been identified in the area immediately periphery of the site. Excavations in the central precinct have revealed that the site was occupied from the Middle Preclassic to the Late Classic period, an occupation history mirroring that of its nearest neighbor – Cahal Pech. Iannone (1997:15) argues that Zubin was initially settled by members of the Cahal Pech corporate group who wanted to expand their land holdings to the south of their core zone. Middle and Late Preclassic artifactual remains were encountered in the earliest levels exposed in nearly all of the excavated structures in the central precinct. While there is no evidence of any Preclassic residential or domestic structures, two Preclassic pyramidal structures were identified - Structures C9 and A1.

Middle and Late Preclassic burials and ritual offerings were found in association with these structures, but little Preclassic domestic refuse was identified.

SUMMARY

Archaeological evidence indicates that the Belize Valley was occupied by Maya-speaking peoples by the close of the Early Preclassic period. The Belize River and its major tributaries would have provided early Maya inhabitants with continued access to aquatic resources, waterborne transportation, and agriculturally fertile soils. Although evidence for terminal Early Preclassic occupation is relatively sparse, recent archaeological research has revealed significant new information about the Middle and Late Preclassic period of occupation in this important region. Research has been conducted in the region since the beginning of the twentieth century, but scholars have only recently become interested in the early periods of cultural development. While Preclassic ceramics were considered useful for establishing site chronologies, few archaeologists attempted to excavate these deeply buried deposits until the 1960s when Gordon Willey exposed Middle and Late Preclassic residential structures at the site of Barton Ramie. Although Preclassic settlement was not Willey's research focus, his work served as an impetus for further Preclassic studies in the area. Recent excavations at sites like Blackman Eddy, Cahal Pech, and Pacbitun have continued the tradition of large scale horizontal exposure of Preclassic deposits in the region. Each of these sites has produced significant information regarding architecture, settlement, subsistence and diet, trade and exchange, and ritual behavior. Evidence of monumental public architecture, differential mortuary treatment, exotic or non-local materials and artifacts, and differential access to certain foodstuffs suggest that the Belize Valley Maya made the transition from an

egalitarian to a ranked and/or stratified society by the end of the Middle Preclassic period.

CHAPTER 5

ANALYTIC METHODS

In this chapter I will provide a brief historical background for shell studies in the Maya Lowlands and discuss the methods used to evaluate the shell artifacts from Pacbitun and other Belize Valley sites. In the first section of the chapter, historical developments in the analysis of shell artifacts in the Maya Lowlands will be presented, providing a broader context from which to view the current sample. This will be followed by information on the data collection strategies and chronological placement of the artifacts under study. Finally, a discussion of the taxonomic, technological, typological, and contextual analyses undertaken on the Preclassic shell artifacts will be discussed.

SHELL ANALYSIS IN THE MAYA LOWLANDS

Shell artifacts are commonly found in archaeological deposits throughout the Maya Lowlands. Archaeologists working in the lowlands quickly became interested in the modified or worked shell artifacts that were recovered from coastal and inland sites throughout the region, including Altar de Sacrificios (Willey 1972), Barton Ramie (Willey et al. 1965), Piedras Negras (Coe 1959), San Jose (Thompson 1939), Seibal (Willey 1978), and Uaxactun (Kidder 1947; Ricketson and Ricketson 1937). These early researchers prepared typological and taxonomic classifications of the excavated materials to provide information on the types of shell artifacts that were being manufactured and the raw materials that were used in their production; however, none of these early studies

incorporated the fragmented freshwater and marine shell specimens frequently encountered during their excavations. Unworked specimens were generally only discussed when they were found in special contexts such as burial or cache deposits. On the whole, this material was deemed irrelevant and re-deposited with the back dirt. While the typological classification systems may vary somewhat between these early studies, most researchers identified similar types of worked shell artifacts, including adornos, beads, pendants, and tinklers. Taxonomic identifications revealed that virtually all of the worked specimens were marine species obtained from the Caribbean Sea or Gulf of Mexico; however, a small percentage of the modified shell artifacts was identified as Pacific or freshwater species. The taxonomic identifications and distributional data played a significant role in determining possible trade routes and political affiliations throughout the region.

At the same time early researchers were analyzing archaeological materials, malacologists began compiling data on the distribution of modern molluscs in the waters surrounding the Yucatan Peninsula (i.e., Gulf of Mexico and Caribbean Sea). Malacological studies of marine invertebrates have continued from the late nineteenth century to the present (Baker 1891; Eckdale 1974; Rehder 1981; Rehder and Abbot 1951; Vokes and Vokes 1983; Weisbord 1926), providing detailed data on spatial distribution, habit preference, and morphological characteristics of contemporary species. Similar studies of freshwater and terrestrial species have also flourished (Basch 1959; Bequaert and Clench 1933; Covich 1978, 1980; Goodrich and Schalie 1937; Pilsbry 1891). Each of these studies has provided archaeologists with detailed information that can be used in

their reconstructions of prehistoric subsistence, exchange, craft production, and mortuary practices.

In 1969, E. Wyllys Andrews IV set the stage for the study of Prehispanic malacology with his study entitled *The Archaeological Use and Distribution of Mollusca in the Maya Lowlands*. In this report Andrews provided comprehensive data on the ecological distribution, taxonomic identification, and archaeological occurrence of marine, freshwater, and terrestrial species throughout the Maya Lowlands. The report summarized approximately 15,000 archaeological specimens from 18 lowland sites using malacological data on geographic distribution and taxonomic identification gathered by Andrews from stations along the coast of the Yucatan Peninsula and supplemented by data from other researchers. Unlike many earlier studies, Andrews provided in depth discussions of the many uses of shell materials in Maya society, particularly as trade items, food sources, ornaments, and votive offerings. He also discussed the utilization of shells as motifs to illustrate a number of themes in murals, vessels, and sculpture. Although Andrews did not address the typological classification of the archaeological specimens he catalogued, his study ushered in a new era of research on prehistoric utilization of shells in the Maya region.

Researchers working in the Maya Lowlands have continued to analyze shell materials recovered from archaeological contexts. More recent studies have focused on taxonomic and typological classifications (Buttles 1992; Cobos 1994; Dreiss 1994; Garber 1981; Isaza Aizpurua 1997; Isaza Aizpurua and McAnany 1999; Moholy-Nagy 1963, 1987, 1994; Taschek 1994), but like Andrews' study they have also addressed larger questions of cultural behavior, such as the role of shell in Maya social, political,

and economic activities. Despite this advancement, few of these studies have provided any substantial information on the unmodified specimens encountered during excavations, leaving a significant gap in the data regarding the shell ornament production system. While the unmodified molluscan materials are occasionally analyzed and reported in faunal reports from individual sites (Feldman 1994; Hamilton 1987; Stanchly 1995), there have been few attempts to integrate these two assemblages and address the issue of shell ornament production activities.

PACBITUN PRECLASSIC SHELL ASSEMBLAGE

The focus of this study is the Preclassic shell assemblage from Pacbitun, a site which has provided archaeologists with considerable new data on the Preclassic period in the Belize Valley. Over the last several decades, researchers in the Belize Valley have recovered a wide variety of shell artifacts from archaeological deposits throughout the region. The majority of these have dated to the Classic period; however, recent excavations at Pacbitun have produced a large number of Preclassic shell artifacts. The Pacbitun shell assemblage (n=4,724) represents the largest Preclassic collection in the Belize Valley, consisting of 3,261 (69 percent) worked shell specimens and 1,463 (31 percent) pieces of marine shell detritus. These artifacts were recovered from Plazas B, C, and D of the central precinct during excavations conducted by the author between 1995 and 1997 (Hohmann and Powis 1996, 1999; Hohmann et al. 1999). The artifacts were analyzed by the author in a field laboratory in San Ignacio, Belize during the summers of 1996 and 1997. Ceramic cross-dating and radiometric techniques were used to date the stratigraphic levels from which each of these items was derived (Healy 1999; Healy and Awe 1995). The Preclassic shell artifacts from Pacbitun date entirely to the Middle

Preclassic period (900-300 B.C.). The assemblage can be further subdivided into two temporal categories: early Middle Preclassic (900-650 B.C.) (n=1,235) and late Middle Preclassic (650-300 B.C.) (n=3,505).

Preclassic shell artifacts (n=2,200) have also been reported at five other sites in the Belize Valley: Barton Ramie (Willey et al. 1965), Blackman Eddy (Garber et al. 1997, 1998, 1999), Cahal Pech (Awe 1992; Cheetham 1995, 1996; Lee 1996; Lee and Awe 1995; Powis 1996; Sunahara and Awe 1994), Dos Chombitos Cik'in (Robin 1999), and Zubin (Ferguson 1995; Iannone 1996; Schwake 1996). The shell artifacts in this sample span the Middle (900-300 B.C.) and Late Preclassic (300 B.C. – A.D. 250) periods. Due to the limited sampling of Preclassic deposits and/or revisions in chronology since many of these artifacts were first excavated, narrow temporal divisions could not be applied in all cases. Typological, taxonomic, and contextual data on these artifacts were gathered from published and unpublished reports made available by independent researchers. These data will be presented for comparative purposes in the following chapters.

The Pacbitun shell assemblage consists of complete and broken shell ornaments, ornaments in various stages of the production process, and marine shell detritus. This diverse assemblage provides significant new data on the earliest evidence of shell ornament production in this region, including species utilization, procurement practices, artifacts produced, production techniques, and organization of production activities. All specimens showing signs of cultural modification (i.e., cutting, grinding, smoothing, drilling) were analyzed in the present study, including those manufactured from freshwater and marine species. As mentioned in Chapter Four, large quantities of whole

and fragmented freshwater shell species were recovered from Preclassic contexts. Given the difficulties in determining whether these unmodified freshwater specimens represented ornament production byproducts or refuse from food consumption, only the marine shell detritus was analyzed in the present study. It is important to note that isotopic analysis has shown that marine fish and shellfish were also being consumed by the Preclassic inhabitants of the Belize Valley (Powis et al. 1999; White et al. 1996). The fact that residents of the Belize Valley were consuming marine fish and shellfish leads to some of the same problems regarding the recognition of marine shell detritus produced as a result of food consumption or artifact manufacture. The non-local nature of marine shell and the large number of marine shell ornaments identified in the Preclassic shell assemblage suggests that while the meat from these mollusks may have been consumed, their shells were also being used in the production of ornaments.

TAXONOMIC CLASSIFICATION

Like the various forms of chemical characterization analysis (e.g., XRF, INAA), taxonomic identification of shell artifacts provides archaeologists with specific information regarding the origin of shell materials. Archaeologists commonly use this data to identify temporal and spatial patterns in species utilization, procurement patterns, and possible routes and mechanisms of exchange. Each of the specimens in the Preclassic sample was identified with the aid of a reference collection and published reference manuals, including *The Archaeological Use and Distribution of Mollusca in the Maya Lowlands* (Andrews 1969), *The Audubon Society Field Guide to North American Seashells* (Rehder 1981), *A Field Guide to Shells of the Atlantic and Gulf Coasts and the West Indies* (Morris 1973), and *American Seashells* (Abbott 1974). The analysis of this

material was also facilitated by the input of zooarchaeologist Norbert Stanchly of the Institute of Archaeology, University of London.

All of the shell artifacts at Pacbitun belong to the phylum Mollusca. This phylum includes many invertebrate animals; some of these have external shells while others do not (e.g., nudibranches, squids, octopuses). While many of the animals that inhabit these shells were undoubtedly important to the prehistoric peoples that collected them, in the present study it is only their durable shells that are of significance. In zooarchaeological analysis, researchers traditionally attempt to identify specimens to the lowest zoological taxa possible (i.e., Class, Order, Family, Genus, or Species). This approach was taken in the present study; however, fragmentation and extensive modification often made identifications at the species level impossible. While a few items could be identified at this level, most could only be placed into the larger, more inclusive taxa. A few specimens were so heavily fragmented that they could only be identified as belonging to the phylum Mollusca.

Malacologists and zooarchaeologists evaluate many attributes in their attempts to classify zoological specimens. Shells exhibit a number of recognizable, diagnostic features that can aid in their identification, including attributes related to morphology, surface characteristics, and dimensions. These play a crucial role in the classification process for both modern and archaeological specimens. While field guides and shell catalogs typically provide detailed information on particular species, it must be noted that the range of variation within some species varies so greatly that individual specimens may appear unrelated to the untrained observer.

Morphology, size, and color are attributes that can vary greatly within a species. Like any animal, mollusk shells grow throughout their lifetime. Although the growth process is different for each class of mollusks, the same general patterns apply. Soon after fertilization the shell gland develops. When the young emerge from the egg capsule, they already possess a tiny larval shell, which they may or may not keep as they mature. The shell continues to grow at a regular rate until the mollusk reaches maturity; after which the rate of growth continues at a diminished rate (Rehder 1981:21-22). As mollusks grow, shelly material is continually secreted from glands inside the animal inhabiting the shell, causing changes in shell morphology and/or surface characteristics. Given this continued growth, it is not unusual for young or immature shells to look different from their mature counterparts. These changes often hinder the classification process, particularly when the specimens are incomplete or fragmented.

Coloration and sculpting are also important attributes used in the identification of mollusks, but these attributes may also change throughout the life of a mollusk. While some species are so distinctive or constant in their coloration and sculpture that they are instantly recognizable, others display a range of variation. For instance, in some species surface characteristics such as color and sculpting may differ depending on such characteristics as water temperature and diet. Rosenberg (1992:20) notes that particular cowrie species incorporate in their shells pigments from the soft coral on which they live and feed. Specimens inhabit yellow coral have yellow shells, but if they transfer to purple coral, they will start making purple shells.

The identification process is typically more complicated when archaeological specimens are being classified. While color may play a significant role in the

identification of modern species, its role is significantly diminished when dealing with archaeological collections. Modified and unmodified shell artifacts are often recovered from archaeological deposits, but diagnostic features are not always observable. Exposure and/or deposition in acidic soils often result in the leaching of color from the surface of the shells. The nacreous exterior and sculpting are also frequently ground away during the intensive process of manufacturing certain types of shell ornaments (e.g., disk beads), making it especially difficult to classify individual specimens.

Preservation of the Pacbitun shell artifacts was considered good to excellent. Due to their calcium carbonate composition, shell remains tend to preserve more readily than bone in the highly acidic soil conditions of the tropics. While acidic soils often hinder the identification of zoological remains, this taxonomic agent actually aided the identification of shell specimens evaluated in this study. A number of raw materials were utilized in the production of shell items at Pacbitun. Table 5.1 provides a list of taxa identified in the Preclassic assemblage and the biotic community from which it was derived. These can be divided into three classes: (1) Gastropoda, (2) Pelecypoda, and (3) Scaphopoda. Generally speaking, gastropod (univalve) shells consist of an elongated tube that increases in size as it winds in a spiral around a central axis; pelecypod (bivalve) shells have two circular-oval valves joined together by a hinge-like feature; and scaphopod (tusk) shells are tubular and slightly curved with openings at both ends.

Table 5.1: Identified Taxa in Middle
Preclassic Deposits at Pacbitun

Shell Taxa	Habitat
Gastropoda	
<i>Pomacea flagellata</i>	Freshwater
<i>Pachychilus indiorum</i>	Freshwater
<i>Pachychilus glaphyrus</i>	Freshwater
<i>Prunum</i> sp.	Marine
<i>Melongena</i> sp.	Marine
<i>Oliva</i> sp.	Marine
<i>Strombus</i> sp.	Marine
<i>Strombus gigas</i>	Marine
<i>Strombus pugilis</i>	Marine
Unid. marine gastropod	Marine
Pelecypoda	
<i>Nephronaias ortmani</i>	Freshwater
Ostreidae	
<i>Spondylus</i> sp.	Marine
Unid. marine pelecypod	Marine
Scaphopoda	
<i>Dentalium</i> sp.	Marine
Unidentified	
Unid. riverine	Freshwater
Unidentified	Freshwater/Marine

Descriptive data for the identified molluscan taxa will be discussed in the following section, including information on shell morphology, surface characteristics, and habitat preference. In those cases where species identifications were not possible, generalized information for Caribbean or Atlantic taxa will be provided. To date, ten molluscan genera have been identified in the Preclassic assemblage at the site. As Table

5.1 indicates, the sample includes both freshwater and marine species. Complete and fragmented terrestrial mollusks (*Euglandina* sp. and *Orthalicus* sp.) were also numerous in archaeological deposits at Pacbitun; however, these are intrusive elements that would not have been utilized by the Preclassic inhabitants of the site.

Three of the genera identified in the Preclassic assemblage are freshwater varieties, including two gastropods (*Pachychilus* sp., *Pomacea* sp.) and one pelecypod (*Nephronaias* sp.). Varieties of these three genera have been identified in their natural habitats and in archaeological contexts throughout the Maya Lowlands (Healy et al. 1990; Moholy-Nagy 1978). In those cases where distinctions could not be made between these genera, artifacts were classified as unidentified freshwater specimens.

Members of the *Pachychilus* genus are referred to as *jute* or *tutu* by the modern Maya inhabiting the Belize Valley. Two *Pachychilus* species have been identified in archaeological deposits at Pacbitun: *Pachychilus glaphyrus* and *Pachychilus indiorum*. Each of these species has a conical, tightly coiled shell, but the exterior surface of *Pachychilus glaphyrus* is sculptured while the exterior surface of *Pachychilus indiorum* specimens is smooth. Members of this genus have been identified in swift and brackish water at depths ranging from 16 to 40 centimeters below the surface, but they seem to prefer shallow, swift moving waters (Healy et al. 1990:174).

Pomacea is the only other freshwater gastropod genus known to have been utilized by the prehistoric inhabitants of the Belize Valley. Members of this genus are commonly referred to as apple snails. They have globular, lustrous shells that are thin-walled but durable. Habitat studies in northern Belize and the Peten region of Guatemala

have shown that these species prefer slow-moving freshwater sources including water holes, swamps, lakes, streams, and rivers (Emery 1990; Moholy-Nagy 1978).

Nephronaias, a freshwater pelecypod, was also identified in the Preclassic sample. Members of this genus have an elongated, oval shell with an interior surface coated with nacre or mother-of-pearl that ranges from silvery white through pink and dark purple. *Nephronaias* species prefer environments similar to those occupied by *Pachychilus*.

The majority of the Pacbitun assemblage consists of marine taxa, a fact that is particularly interesting since the nearest coastline (i.e., Caribbean Sea) is located more than 110 kilometers east of the confluence of the Macal, Mopan, and Belize Rivers. Six marine genera and one family have been identified in the Pacbitun assemblage, including four gastropods (*Melongena* sp., *Oliva* sp., *Prunum* sp., *Strombus* sp.), two pelecypods (Ostreidae, *Spondylus* sp.), and one scaphopod (*Dentalium* sp.). Members of each of these genera can be found in the Pacific and Atlantic Oceans, including waters of the Caribbean and Gulf of Mexico. Unlike the freshwater specimens, few of the marine shell artifacts could be classified below the level of genus. For those artifacts that could not be classified below the level of class, unidentified marine gastropod and marine pelecypod categories were established.

All *Dentalium* specimens are commonly known as tusk shells. They have a unique, tubular shell that is slightly curved. The shell is open at both ends and the apex of the shell tapers slightly, giving the shell a tusk-like or conical appearance. They are small specimens ranging between 1.6-6.4 cm in height. *Dentalium* shells are typically found partially buried in sand or mud at depths ranging from 3 to 3200 meters (10-10,500

feet) (Rehder 1981:656-657). In the Caribbean their depths range from 3 to 152 meters (10-500 feet), but they are most often found in waters more than 30 meters (100 feet) deep (Rehder 1981:655). As mentioned in Chapter Two, the Nootkans of the Northwest Coast used to dive for tusk shells off the coast of Vancouver Island (Drucker 1951). The Maya may have been diving for these specimens or they may have been able to recover shells from the coastline where they were washed ashore. Given the small number of these specimens at lowland sites it seems that their collection may have been opportunistic.

Marine pelecypod taxa were also identified, including one family (Ostreidae) and one genus (*Spondylus*). The Ostreidae or oyster family is found worldwide and consists of many genera and species. Exterior surfaces of oyster shells generally have ribs or folds with scalloped or angular edges, giving them a rough appearance. They often have irregular shapes given their growth patterns. A great range in habitat preference is also exhibited by members of this family. Some taxa prefer shallow waters while others prefer deep waters; some prefer open waters to isolated estuaries and bays. Given the similarities in morphology and surface characteristics between the Atlantic/Caribbean species, a lower level of identification was not possible in the present analysis.

Spondylus shells are readily identifiable due to the distinctive long, thin spines that extend from the exterior surface of their left valve. It is these spines that give rise to this genera's common name, the Spiny Oyster. In addition to their spectacular spines, *Spondylus* shells are also brilliantly colored with variations of white, yellow, orange, red, and purple on different species. They are typically found on rocks and coral reefs ranging in depth from 0.3 to 46 meters (1-150 feet) (Rehder 1981:713). Although a species level identification was not possible on the Pacbitun specimens, it is important to

note that a variety of species belonging to the *Spondylus* genera can be found in both Pacific and Atlantic waters. *Spondylus princeps* is the most common species in the Pacific and *Spondylus americanus* in the Atlantic. While *Spondylus princeps* artifacts have been identified in archaeological deposits in the Maya Lowlands, it was impossible to make species level identifications on the Pacbitun artifacts.

Four marine gastropod genera were identified in the Pacbitun assemblage: *Melongena*, *Oliva*, *Prunum*, *Strombus*. Although these genera belong to the same taxonomic class, a great range in size, morphology, and surface characteristics are represented. As Table 5.1 indicates, species level identifications were only possible with certain members of the *Strombus* genus. Members of the Strombidae or conch family, *Strombus* are found in warmer waters of the Pacific and Atlantic. The two species that have been identified in the Pacbitun assemblage, *Strombus gigas* and *Strombus pugilis*, are both found in the western Atlantic, their ranges extending from southeastern Florida to the West Indies and northeastern portions of South America. *Strombus gigas* is commonly referred to as the Pink or Queen Conch. This species is large (17.8-30.5 cm) with a high spire, prominent knobs, pointed spines, and widely flaring outer lip. Their exteriors are usually yellow-buff in color with pink interiors. This species is generally found in relatively shallow water ranging from 1.5-5 meters (5-15 feet) deep. *Strombus pugilis*, or the West Indian Fighting Conch, is a small species (7.6-12.8 cm) with a high spire, pointed spines, and flaring lip. They are normally yellowish-brown with deep orange interiors. This species prefers habits similar to those occupied by *S. gigas*.

The genus *Melongena* is a member of the crown conch family, Melongenidae. This family contains several genera which are found in tropical and temperate waters.

Melongena species prefer the mud or muddy sand in shallow watered lagoons or bays, often near mangroves. Members of this genus range in size from small to large, but specific figures cannot be presented without a species designation. They are thick-shelled specimens with exterior surfaces having characteristic knobs or spines and colored bands. One of the most common Caribbean species, *Melongena melongena*, has a range that extends throughout the West Indies to southern Mexico and Surinam in South America.

The genus *Oliva* represents one of the small to medium sized gastropods identified at Pacbitun. This genus belongs to the Olividae or olive shell family, a large family whose members are found in all tropical waters. Members of this genus typically range from 0.6-12.7 cm in height and have an elongated body, small conical spire, and a distinct pattern of grooves or bands at their base. Many species have elaborate markings on their exterior surface, but without a species designation it is impossible to discuss all of the observed variations.

The smallest marine gastropods at Pacbitun belong to the genus *Prunum*. This is a member of the Marginellidae family, a large family with species found in tropical and temperate seas. In the western Atlantic their range extends from Florida to the West Indies. While a few species can be found in deep waters, most prefer the grassy areas in shallow waters 1.5 to 9 meters deep. Although no species level identifications could be made, some generalizations can be made regarding their size and shell morphology. *Prunum* shells are small, ranging between 10 and 13 mm in height. They are ovately triangular with short, low spires, thickened outer lips, and visible ridges or grooves along their inner lips.

TYPOLOGICAL CLASSIFICATION

Typological classification systems have consistently been employed by researchers studying shell artifacts in the Maya region (Buttles 1992; Cobos 1994; Coe 1959; Dreiss 1994; Garber 1981; Isaza Aizpurua 1997; Kidder 1947; Moholy-Nagy 1963, 1994; Ricketson and Ricketson 1937; Taschek 1994; Willey 1972, 1978; Willey et al. 1965). In these studies descriptive artifact classes are based primarily on formal attributes or artifact morphology. Given this long-standing tradition it was believed that a similar analysis would facilitate comparisons with previously analyzed and published materials from the Belize Valley and other lowland Maya sites. In the present study a typology based on artifact morphology was created to provide information on the range of artifacts produced as well as the steps involved in the production process. While the types utilized in the present study closely follow those presented by Tachek (1994) for the worked shell at Dzibilchaltun, they do conform to the broad categories used by most researchers in the lowlands. The Preclassic shell materials from all Belize Valley sites were placed in this typology. Two general categories of artifacts can be recognized: (1) shell detritus and (2) worked shell. Shell detritus consists of fragmented shell with no signs of further cultural modification while the worked shell artifacts exhibit significant modifications in the form of cutting, drilling, grinding and/or smoothing.

The Pacbitun Preclassic shell assemblage has been divided into seven types or classes. All of the worked shell artifacts at the site have been categorized as personal ornaments, although it is possible that some of the larger, more durable pieces of detritus may have served as utilitarian implements such as burins, gravers, scrapers, etc. The majority of the types used in this study are well-defined artifact classes that have been

found in deposits dating from the Preclassic to Postclassic periods throughout the lowlands. As mentioned above, typological data from other Belize Valley sites was also available for comparative purposes. Although most of the artifact types identified at Pacbitun occur throughout the Belize Valley, a review of the available literature reveals a few additional artifact types not identified at Pacbitun. These will be addressed in more detail in Chapter Six.

Beads

This general term is often applied to relatively small artifacts that exhibit a perforation for stringing and suspension. In the Belize Valley and throughout the lowlands there is a great deal of variability in the size, shape, and species utilization in the production of shell beads. To accommodate this variability, this general category has been further subdivided into seven sub-types: disk, barrel, irregular, square/rectangular, tubular, whole shell scaphopods, and perforated gastropods.

Barrel Beads are characterized by a length that is greater than the diameter and lateral edges that are constricted at the ends. All specimens have a longitudinal, biconical perforation. These items were manufactured from the thicker portions (i.e., columella) of marine gastropods. These beads are generally shorter with a larger diameter than tubular beads.

Disoidal beads are the most common artifact type in the Belize Valley. These beads are circular to oval in shape with a central conical or biconical perforation. The lateral edges or margins of these specimens exhibit grinding and smoothing, resulting in perpendicular to slightly rounded edges. Both freshwater (*Pachychilus* sp., *Nephronaias*

ortmanni) and marine species (*Strombus* sp., *Spondylus* sp.) were used in the production of these beads.

Irregular beads are characterized by irregular outlines and lateral edges that show little to no modification. Although there is a great deal of variation in size and shape within this sub-type, all of these specimens have been perforated either conically or biconically by drilling or punching. Irregular beads are manufactured predominantly from marine gastropods (e.g., *Strombus* sp.), although freshwater gastropods species were used occasionally (e.g., *Pachychilus glaphyrus*, *Pachychilus ortmanni*). Virtually every part of the marine gastropods was utilized for bead manufacture, including the spire, spines, columella, body whorl, and lip fragments. When freshwater gastropod species were used in the production of irregular beads, only the whorls and lip fragments were utilized.

Square/Rectangular beads have a greater length and width than thickness with a central conical or biconical perforation. Lateral edges of these specimens are smoothed and slightly rounded as are the corners. These specimens are relatively flat with parallel faces, although occasionally a convex cross-section is encountered. These beads were most often manufactured from the thin body and lip portions of marine gastropods, although a small percentage was also made from freshwater species.

Tubular or Cylindrical Beads are elongated with a greater length than diameter and a longitudinal, biconical perforation. Transverse cross sections are generally circular or subcircular although a few have roughly parallel sides. Only the thicker portions (i.e., columella) of marine gastropods were used in the manufacture of these beads. Given the

significant modifications of these specimens, genus and species designations could not be made.

Whole Scaphopod Beads are represented by complete and fragmented tusk shells. Some of these specimens have a smooth exterior surface while others display longitudinal ribbing. As with the tubular beads mentioned above, whole scaphopod beads have a length that is greater than the diameter, but their form is not the result of cultural modification.

Perforated Gastropod Beads are small marine species whose original form has been wholly preserved despite minor modifications such as perforating or cutting. This category includes marine gastropods such as *Prunum* sp. and *Olivella* sp. These species are generally perforated by punching through the body whorl or the outer lip, resulting in an irregularly shaped hole from which the beads were strung with the longest dimension in a vertical position. Occasionally the spires of these small gastropods were removed so that they could be strung together horizontally rather than vertically.

Tinklers

Tinklers consist of small-medium marine gastropods, generally *Oliva* species, that have been perforated at their posterior ends (i.e., aperture) for vertical suspension. Perforations are generally produced by drilling or by cutting longitudinal slits until an opening is created. While single perforations are most common, occasionally paired perforations have been identified. The spire portion of the shell is often removed by cutting along the sutures and the edges subsequently smoothed.

Adornos

Adornos are specimens that have been worked into various shapes but have not been perforated. The adornos in the Belize Valley assemblage are typically circular in outline with ground and smoothed faces and lateral edges. Given the absence of perforations for suspension, it is argued that these items may have been sewn onto clothing as a form of decoration or been used as inlay or mosaic elements, toys, gaming pieces, etc. These items were commonly manufactured from marine gastropod species, including *Strombus* and *Spondylus*. In most cases species designations were impossible to determine given the extensive nature of the cultural modifications.

Pendants

Pendants are relatively large items of various shapes that have been perforated for suspension. Freshwater pelecypods (*Nephronaias ortmanni*) and marine gastropods are the most commonly used species in the Belize Valley. The pendants made from freshwater bivalves or clams consist of either a single valve or both valves, each of which are perforated near the hinge. Given the thinness of these specimens, perforations are often produced by punching through the shell near the hinge, although most show evidence of a conical drilling motion. Pendants made from marine gastropods generally have geometric forms and have been drilled biconically. In most cases these items have a central, biconical perforation.

Blanks

Blanks are specimens that have been roughly shaped into a specific form but have not undergone the finishing stages of the production process. The most common blanks identified in the Preclassic assemblage were preforms for disk or square/rectangular

beads. Some of these specimens are not perforated while others are partially perforated. Blanks differ from irregular beads in that the lateral edges of blanks show some signs of flaking or grinding. Like many of the worked shell artifacts, most of these specimens were classified as unidentified marine gastropods.

Miscellaneous Worked Shell

Miscellaneous shell artifacts are those specimens that cannot be readily separated into one of the artifact categories listed above due to fragmentation.

Detritus

Detritus is defined as fragmented shell that has not been intentionally shaped or worked. As mentioned above, only marine shell detritus was classified in this study. Over 90 percent of the unworked specimens analyzed were gastropod fragments, although a small number of marine pelecypod or bivalve fragments were also identified. Evidence suggests that a percussion technique was used to remove small fragments from the gastropod species, resulting in a wide variety of sizes and shapes. In a few select cases there is evidence that fragments were removed by cutting or sawing.

TECHNOLOGICAL ANALYSIS

The third phase of this study involved a detailed technological analysis of the Preclassic shell materials from Pacbitun, including both modified and unmodified artifacts. This phase of the analysis was designed to provide information on the stages in the production sequence, production techniques, production failures, and product standardization. For the worked shell assemblage both nominal and metric data were recorded. The nominal data categories recorded were condition, shell part, drilling technique, perforation type, and alteration. Metric data were also recorded on all

complete artifacts, including weight, thickness, length, width, diameter, and perforation diameter. SPI six inch, electronic vernier calipers were used to calculate linear measurements in 0.1 mm increments and weights were calculated to 0.01 grams using an Ohaus electronic balance. Given the incomplete nature of some of the artifacts in the modified shell assemblage, it was not always possible to obtain metric data for each of these attributes.

Marine shell detritus was also analyzed to provide additional information regarding the production of shell ornaments at Pacbitun. Unlike the modified artifacts, only one attribute was recorded on individual artifacts: shell part. A consideration of the kinds of detritus present in an assemblage can provide evidence not only of the species being utilized, but also of the original form entering the site and the stages involved in the production process. As mentioned in the discussion of the taxonomic analysis above, it was often not possible to determine the genera and/or species of individual specimens due to the highly fragmented nature of the detritus; however, it was often possible to identify the part of the shell from which each specimen was derived.

CONTEXTUAL ANALYSIS

A host of behavioral and transformational processes affect artifacts from the time they are manufactured or first used until the time they enter the archaeological record. In order to determine the original human behavior responsible for an artifact's deposition, it is necessary to evaluate the context in which an item occurs, including the matrix, provenience, and association with other items. An evaluation of these types of data is essential if correct interpretations are to be made and behavior reconstructed. The Preclassic shell artifacts from Pacbitun were recovered from a number of different

contexts, including burial, cache, construction fill, structural fill, and floor deposits.

While these terms are commonly encountered in the archaeological literature, they are rarely defined by Maya scholars. The lack of a standardized nomenclature for archaeological terms has often made the comparison of archaeological data difficult in the Maya Lowlands.

Primary and secondary context are two terms that are firmly entrenched in the archaeological literature. Using definitions presented by Ashmore and Sharer (1996:96-99), artifacts are considered to be in primary context if their provenience and matrix have not changed or been altered since they were first deposited. Artifacts in secondary context, on the other hand, have had their original provenience, matrix, and association with other objects and features altered by transformational processes. Ashmore and Sharer (1996) have divided each of these terms into two more restrictive categories based on the cultural and/or natural processes affecting the artifact upon its deposition. Use-related primary context refers to artifacts that were deposited in the place where they were acquired, made or used (i.e., burials, production loci), while transposed primary context refers to the deposition of artifacts that were moved from the place where they were acquired, manufactured, or used (e.g., middens). The term use-related secondary context is used to describe artifacts whose original location has been altered through ancient or modern human activity, while natural secondary context refers to disturbances caused by natural phenomenon such as erosion, tree roots, animals, etc. Using the definitions presented above, the shell artifacts recovered from Pacbitun can be described as coming from both primary and secondary contexts, including construction fill, structural fill, burials, caches, floor deposits, perimeter deposits, and middens.

Middens or refuse deposits are commonly found in archaeological contexts around the globe. Most midden deposits contain a wide variety of materials that can be considered refuse of everyday household activities such as food processing and tool production. Other middens contain more specialized artifactual materials such as the waste or byproducts from intensive production activities. While the artifacts identified in midden deposits are generally considered to be in secondary contexts, the midden itself may be in a primary use-related context if cultural or natural processes have not affected its location since it was first established.

Construction and structural fill are two terms used to describe materials that are deposited during construction activities. Structural fill refers to materials such as soil, stone, artifacts, and ecofacts that are deposited as fill for structures or other architectural features (i.e., stairs, benches, and outsets). Since these materials serve as the core or heart of many architectural features, they are spatially restricted or enclosed by the walls that form that feature. Construction fill also refers to materials that are intentionally deposited in an effort to fill in or build up an area, but these deposits are not spatially bound by the walls of identified architecture. The frequent use of refuse or midden deposits as construction and structural fill is suggested by the presence of large amounts of artifactual materials in these contexts. While a midden can be considered in transposed primary contexts, its use as fill relegates it to use-related secondary contexts.

Burial and cache deposits represent use-related primary contexts in which artifacts were intentionally placed in special ritual deposits. A burial is defined as a primary interment of one or more individuals in a prepared grave (Becker 1992:187). In the Maya Lowlands there is considerable diversity in the type of repository in which individuals are

placed upon their death, some of which require more labor investment than others. Tomb, crypt, cist, and simple graves are the most common grave types identified in the lowlands (Welsh 1988). Human skeletal remains are also frequently reported in non-grave contexts such as middens and cache deposits. In these cases only a portion of the skeleton is recovered.

In the archaeological literature the term cache is typically used to describe a collection of objects that were stored for future use. This term has multiple meanings to Mesoamerican archaeologists. While caches of stored items have been noted in the archaeological literature from this vast area, the term is most frequently used to describe objects that were deliberately deposited as offerings. Based on their depositional contexts, cache deposits have often been described as being associated with dedicatory or termination rituals (Coe 1959:77; Garber 1989). Dedicatory caches refer to offerings that were intentionally placed with monuments and/or architectural features during their erection or construction, while termination caches refer to offerings that were intentionally deposited at the time of abandonment or destruction of architectural features.

Occasionally artifacts are found in floor deposits. In this study these deposits are divided into those found inside structures and those found outside of structures. The term floor deposit refers to artifacts and ecofacts found embedded in the living surfaces located inside structures. In the Maya Lowlands the surfaces of living areas and activity areas generally consisted of tamped earth, marl, or plaster. While the hardened, more permanent plaster surfaces hindered the accumulation of embedded material this was not the case with tamped surfaces. Although tamped surfaces were hardened through use,

their surfaces were not impermeable to the small debris produced during activities such as tool production and food preparation. Similar deposits noted around the outside of structures are referred to as perimeter deposits.

SUMMARY

Shell artifacts are a ubiquitous artifact class found in Preclassic, Classic, and Postclassic archaeological deposits throughout the Maya Lowlands. Although these artifacts have been of interest to archaeologists since the early days of scientific investigation in the area, most early shell studies have been limited to typological and taxonomic classifications. While these studies have provided significant information on the raw materials that were used in the production of shell ornaments and the types of items that were produced, it has only been in the last two decades that archaeologists have endeavored to move beyond these limited analytical techniques and address larger questions of cultural behavior, such as the role of shell in Maya social, political, and economic systems. To provide a complete picture of the Preclassic shell industry in the Belize Valley, taxonomic, typological, technological, and contextual analyses were conducted. These analyses are designed to provide information on raw material procurement and usage, types of items produced, production techniques, and consumption of shell ornaments.

CHAPTER 6

PACBITUN PRECLASSIC SHELL ASSEMBLAGE

Results of the taxonomic, typological, and technological analyses conducted on the Pacbitun shell artifacts will be presented in this chapter. Combined these data provide significant new information on the production of shell ornaments during the Preclassic period, including resource utilization, products manufactured, production techniques, and production processes. Data from other Belize Valley Preclassic sites will also be presented for comparison.

RESOURCE UTILIZATION

A total of 4,724 shell artifacts were evaluated in this study, including 3,261 modified and 1,463 unmodified artifacts. Taxonomic analysis revealed that the early inhabitants at Pacbitun were utilizing a wide variety of freshwater and marine shell during the Middle Preclassic period. As mentioned in Chapter Four, three freshwater and seven marine genera have been identified in the site assemblage. Frequency data for the modified shell are presented in Table 6.1. These data indicate that the assemblage was dominated by specimens belonging to the class Gastropoda. The modified assemblage consists of 3,261 artifacts, but the degree of modification and fragmentation made identification difficult in some cases, even at the taxonomic level of class. Of the 3,261 artifacts, only nine could not be classified at this level. Of the 3,252 artifacts whose taxonomic class could be determined, 3,173 (97.6 percent) were identified as gastropods. The remaining 79 artifacts were classified as pelecypods (n=19) or scaphopods (n=60).

Table 6.1: Frequency of Identified Taxa for Worked Shell Artifacts at Pacbitun.

	Early Middle Preclassic		Late Middle Preclassic	
	n	%	n	%
<i>Dentalium</i> sp.	4	0.59	15	0.58
<i>Nephronaias ortmani</i>	6	0.89	49	1.9
<i>Pomacea flagellata</i>	0	0	1	0.04
<i>Pachychilus indiorum</i>	9	1.33	33	1.28
<i>Pachychilus glaphyrus</i>	15	2.22	56	2.17
<i>Prunum</i> sp.	6	0.89	28	1.08
<i>Melongena</i> sp.	0	0	2	0.08
<i>Oliva</i> sp.	1	0.15	7	0.27
<i>Spondylus</i> sp.	0	0	2	0.08
<i>Strombus</i> sp.	141	20.86	341	13.19
<i>Strombus gigas</i>	0	0	1	0.04
<i>Strombus pugilis</i>	19	2.81	42	1.62
Unid. marine gastropod	474	70.12	1997	77.25
Unid. marine pelecypod	0	0	3	0.12
Unid. riverine	0	0	1	0.04
Unidentified	1	0.15	7	0.27
Total	676	100	2585	100

Despite the inland location of Pacbitun, approximately 110 kilometers from the ocean, data from Table 6.1 reveal that the Preclassic inhabitants preferred marine shell for the production of shell ornaments. When the early and late Middle Preclassic samples are combined, marine taxa account for 94.8 percent (n=3,083) of the assemblage while freshwater taxa (i.e., *Nephronaias*, *Pachychilus*, *Pomacea*) represent only 5.2 percent (n=170). Eight specimens could not be classified according to habitat (i.e., freshwater or marine). The preference for marine shell is particularly interesting considering that each of the freshwater species could have been obtained locally. A study by Healy and colleagues (1992) found that some of the modern Maya living in the village of San

Antonio, 3 kilometers west of Pacbitun, regularly collect *Pachychilus* for consumption purposes. These specimens are available and accessible in five primary streams located within eight kilometers of Pacbitun: Yal Tutu, Sayab, Barton Creek, Xomble, and Privacion Creek. While there is an increase in the frequency of freshwater taxa between the early and late Middle Preclassic periods, this shift does not correspond to a significant increase in percentage.

Given the extensive modification and lack of characteristic features typically used in the identification process, it was often impossible to make genus and/or species level identifications on the marine shell artifacts. As Table 6.1 illustrates, unidentified marine gastropods comprise the largest taxonomic group for each time period, representing 70.12 percent (n=474) of the early Middle Preclassic and 77.25 percent (n=1997) of the late Middle Preclassic assemblages. This category is particularly bothersome because most analysts working with lowland collections have typically classified similar items as conch shell, despite the lack of identifying attributes. Unidentified *Strombus* is the second most common group during each time period, but frequencies are considerably less than that of unidentified marine gastropods. These specimens account for only 20.86 percent (n=141) and 13.19 percent (n=341) of the early and late Middle Preclassic samples respectively. It must also be noted that low frequencies of *Strombus gigas* and *Strombus pugilis* were also identified in each sample. Only specimens with clear diagnostic features were classified at this level. Although a number of additional taxa were distinguished in the modified assemblage, each of these account for less than 3 percent of the sample totals.

A significant amount of marine shell detritus (n=1,463) was also identified in Middle Preclassic deposits at Pacbitun, providing strong evidence for the local production

of shell artifacts. The unmodified assemblage consists of fragmented marine shell in various shapes and sizes. Gastropod specimens dominate this assemblage, accounting for 99.7 percent (n=1,458) of the total sample. All of these remains were classified as *Strombus*. Although the majority of the assemblage consisted of highly fragmented pieces, relative dimensions and diagnostic characteristics allowed for species level identification on a small percentage of the assemblage, resulting in the classification of 60 *Strombus pugilis* specimens. The remaining four artifacts were classified as pelecypods. One specimen was identified as belonging to the oyster family (i.e., *Ostreidae*) and the other three were classified as unidentified pelecypods.

The Pacbitun shell assemblage is one of great diversity. Specimens of all sizes and habitat preferences were used in the production of shell ornaments. While the majority of the Middle Preclassic artifacts were classified as unidentified gastropods, metric data suggest that they were derived primarily from small to medium sized specimens, perhaps *Strombus pugilis* given the abundance of this taxon in the unmodified assemblage. Other small specimens were also encountered, including *Dentalium*, *Oliva*, and *Prunum*. There is also considerable variation in the habitat preferences of these mollusks. Some of the identified species have a preference for shallow waters while others typically reside in the deeper waters surrounding the coral reef or pelagic waters beyond. Some varieties also prefer to inhabit mud or sand while others attach themselves to rocks or other hard surfaces. Given the range of habitat preferences preferred by the identified taxa, the Maya must have been using a variety of techniques to procure marine shell from the waters of the Caribbean.

Although a large percentage of the Pacbitun assemblage could not be identified below the level of genus, it is likely that all of the marine shell represent Caribbean species. The coast of Belize lies approximately 110 kilometers from the juncture of the Mopan and Macal Rivers at the western edge of the Belize Valley. The Belize River and its major tributaries would have provided early inhabitants of the region with access to waterborne transportation throughout the year. Research at Moho Caye, located at the mouth of the Belize River, indicates there was active waterborne trade up and down the Belize coast and to the interior (Healy and McKillop 1980; McKillop 1980). This major artery would have undoubtedly been used to transport goods between the coast and inland sites, although it is unclear whether shell was being traded to inland sites or if shell was being procured directly by inland residents. Regardless of the mechanism of procurement, collectors would have had access to a wide range of marine species that inhabited the Caribbean or the shallow bays and lagoons along the coastline.

Taxonomic data from other Belize Valley Preclassic sites reveal that similar shell varieties were being utilized throughout the region. Researchers working at Barton Ramie, Blackman Eddy, Cahal Pech, Dos Chombitos Cik'in, and Zubin have each reported freshwater and marine shell specimens in Preclassic archaeological deposits. Unfortunately, taxonomic data from several of the sites were not presented in a fashion that allowed for quantification of individual taxa; thus, only a summary discussion will be presented here. Like Pacbitun, fragmented freshwater shells were frequently encountered in Preclassic deposits at each of these sites, providing additional support for the theory that these mollusks were being used as protein supplements during this early period of occupation. In addition to the unmodified freshwater shells, a small number of

ornaments were made from *Nephronaias*, the pearly freshwater pelecypod. Modified and unmodified marine shell artifacts were also identified, including many of the same genera reported at Pacbitun (e.g., *Oliva*, *Ostrea*, *Prunum*, *Spondylus*, *Strombus*). As is so often the case, most of the artifacts were classified as belonging to the genus *Strombus* despite explicit identification of characteristic or diagnostic features.

SHELL ORNAMENTS

A wide variety of shell artifacts were identified in the Pacbitun assemblage, including eleven classes of modified artifacts; these are illustrated in Figures 6.1, 6.2, 6.3, 6.4, and 6.5. All of the artifacts in this broad category represent items of adornment that would have been attached to various pieces of clothing or worn as jewelry (e.g., necklaces, bracelets, anklets, ear plugs). To date there is no evidence that shell was being used in the production of utilitarian tools at Pacbitun. Given durability and sharp edges of fractured shell, it is possible that some of the unmodified fragments were used as expedient tools in everyday tasks such as cutting, scraping, or hammering. In the coastal areas of the Northern Lowlands, shell was frequently used for these purposes given the absence of suitable stone materials (Eaton 1974, 1978).



Figure 6.1: Representative Sample of Middle Preclassic Shell Ornaments from Pacbitun. (a-b) tinklers, (c-f) irregular beads, (g-h) bead blanks, and (i-j) disk beads.

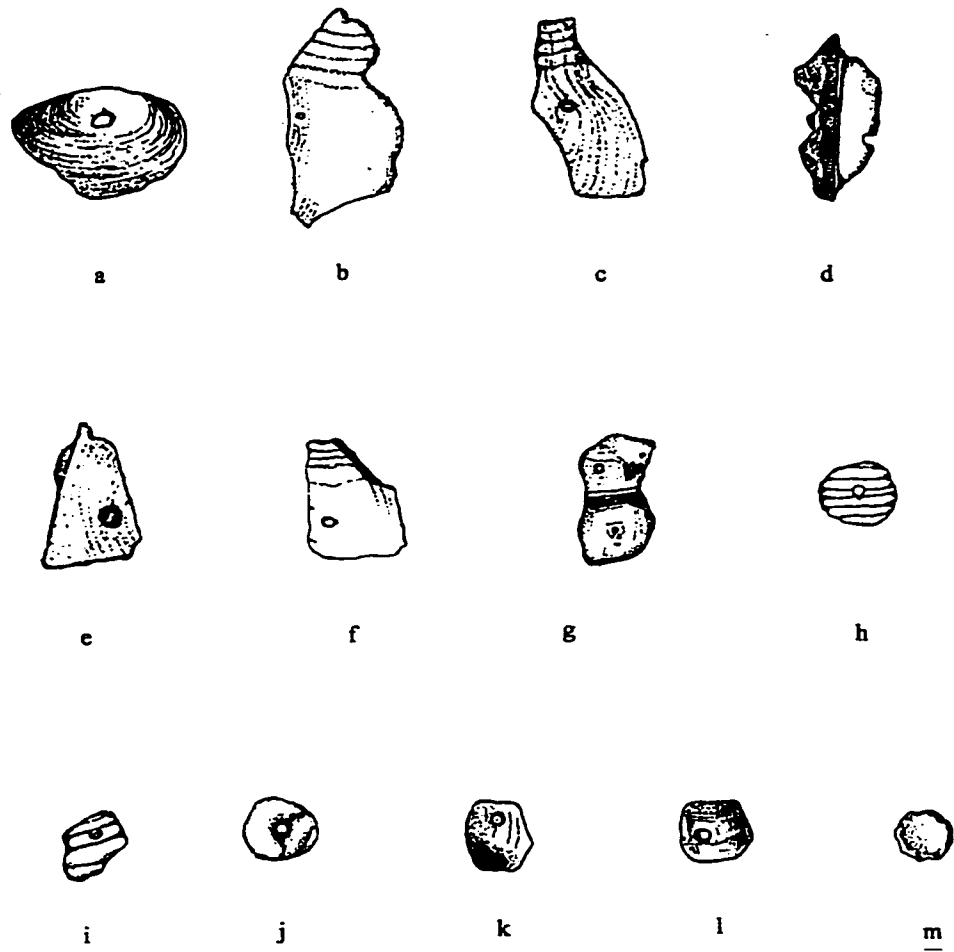


Figure 6.2: Representative Sample of Middle Preclassic Irregular beads from Pacbitun.

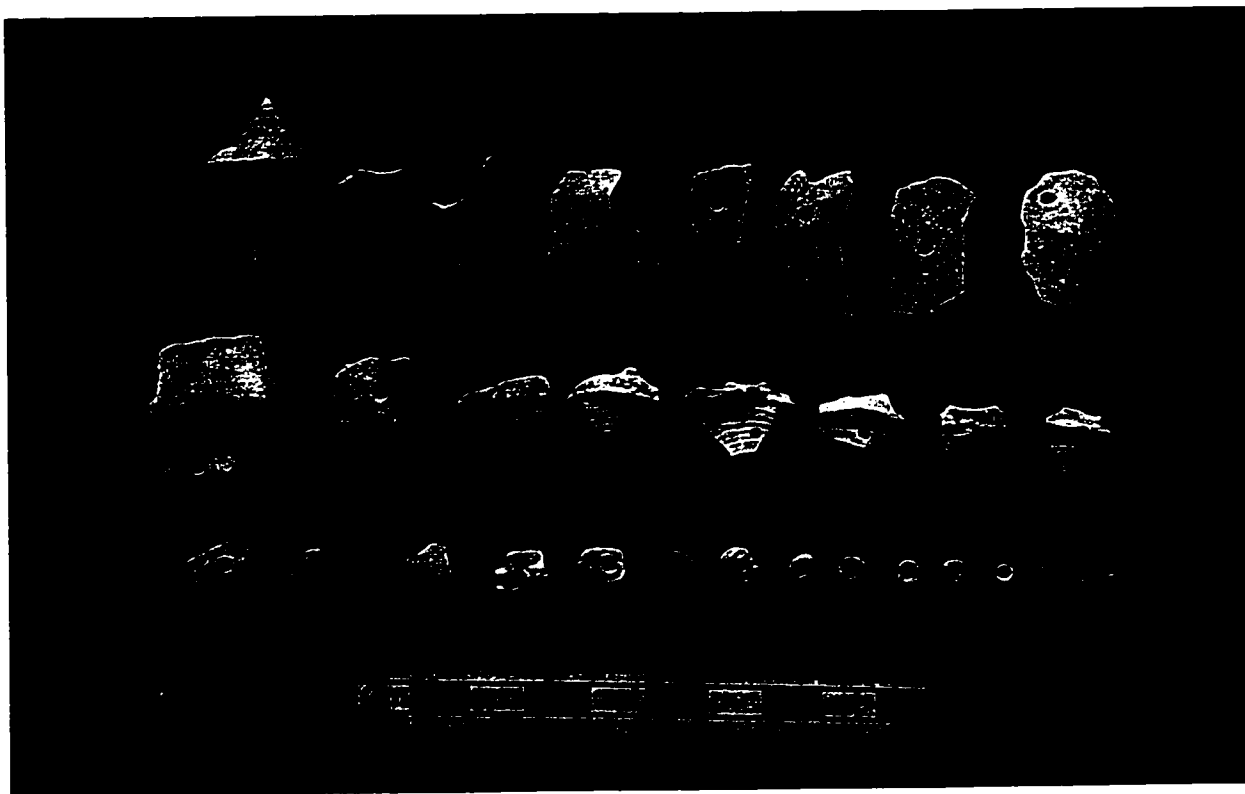


Figure 6.3: Sample of Middle Preclassic Shell Artifacts from Pacbitun.

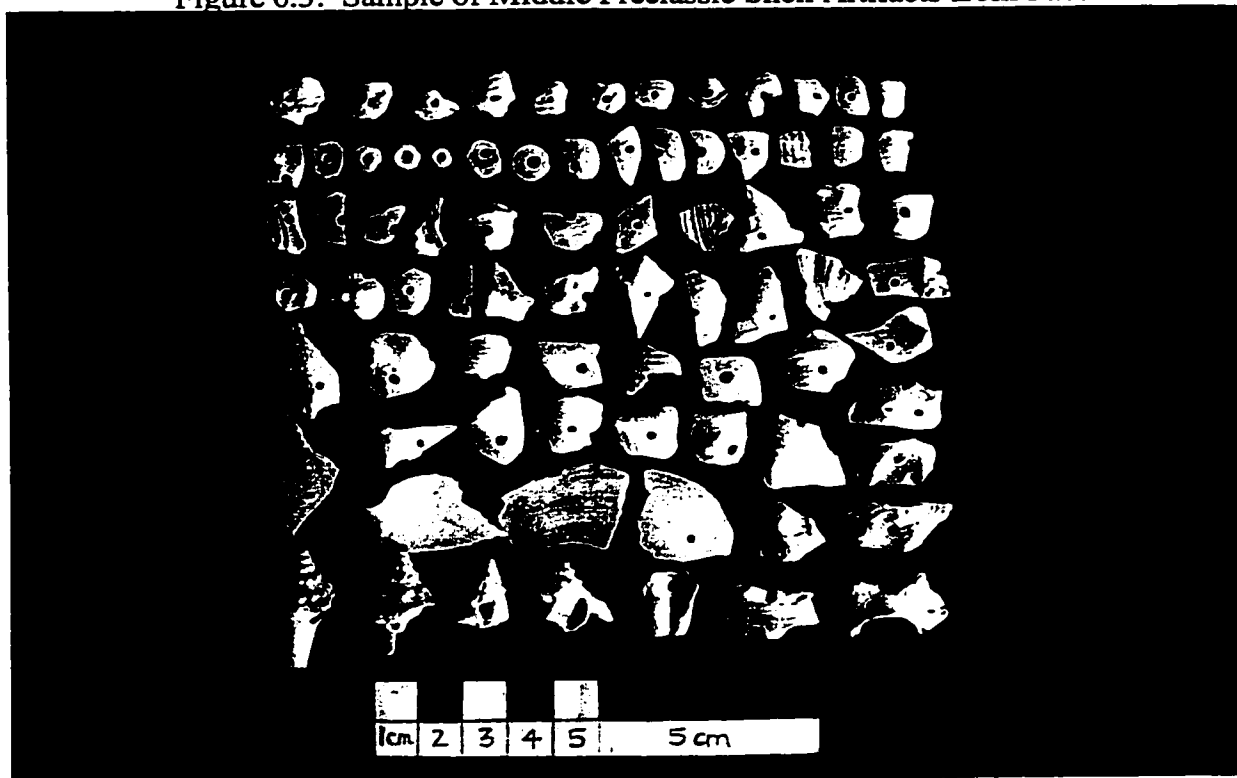


Figure 6.4: Sample of Middle Preclassic Shell Artifacts from Pacbitun.

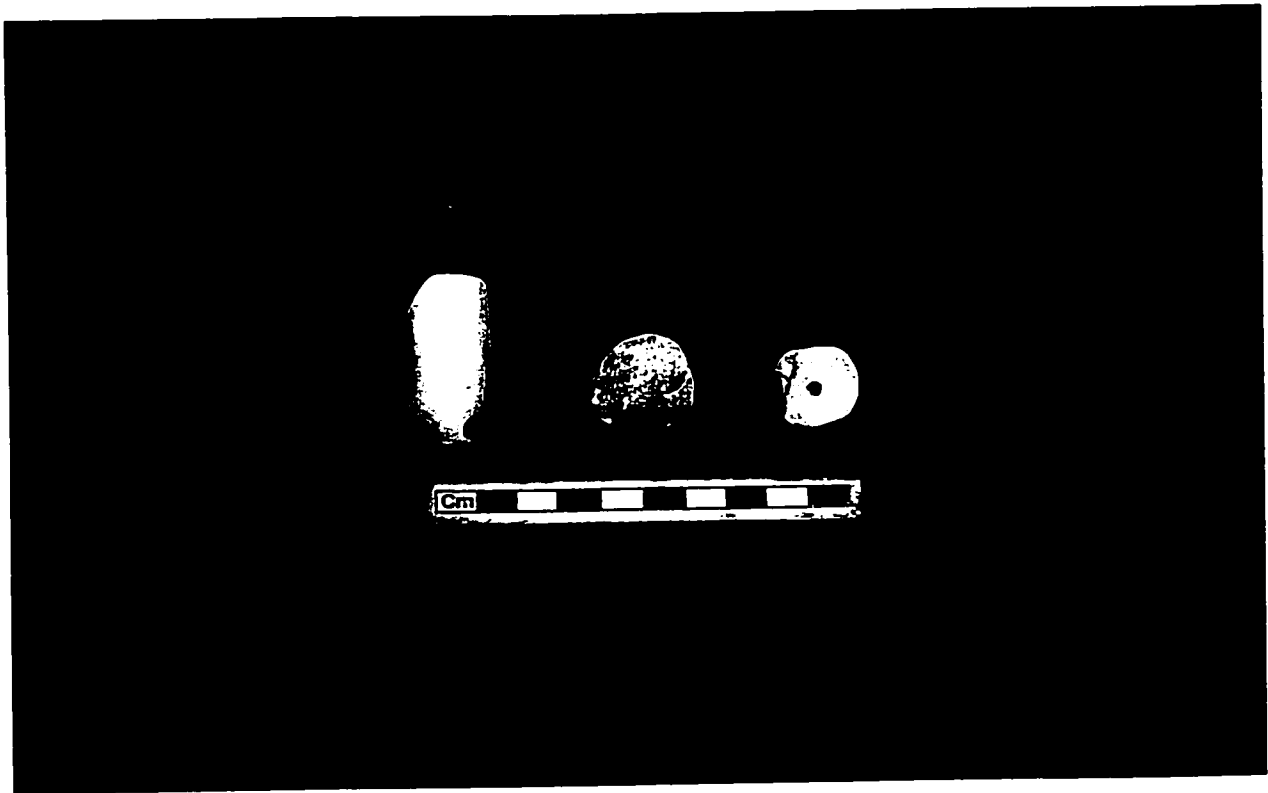


Figure 6.5: Sample of Middle Preclassic Shell Artifacts from Pacbitun.

The Pacbitun modified assemblage is diverse, including artifacts of many different sizes, shapes, and materials. Table 6.2 presents the frequency of artifact types encountered during the early and late Middle Preclassic. Disk and irregular beads are the most abundant artifact types identified throughout the Middle Preclassic period. While irregular beads dominate the early Middle Preclassic sample at 68.34 percent, their numbers decline significantly in the late Middle Preclassic, constituting only 25.65 percent of the sample. At the same time irregular beads are on the decline, the frequency of disk beads is rising, increasing from 20.41 percent in the early Middle Preclassic to 53.42 percent in the late Middle Preclassic. These corresponding shifts are clearly

illustrated in the histogram presented in Figure 6.6. The remaining artifact types occur with less frequency, the majority of them representing less than one percent of each of the samples.

Table 6.2: Frequency of Early and Late Middle Preclassic Worked Shell Types at Pacbitun.

Type	Early Middle Preclassic		Late Middle Preclassic	
	n	%	n	%
Adorno	0	0	1	0.04
Beads				
Barrel	6	0.89	35	1.35
Disk	138	20.41	1381	53.42
Irregular	462	68.34	663	25.65
Square/Rectangular	16	2.37	259	10.02
Perforated Gastropod	6	0.89	33	1.28
Tubular	0	0	3	0.12
Whole Scaphopod	4	0.59	7	0.27
Blank	3	0.44	8	0.31
Pendant	2	0.3	4	0.15
Tinkler	2	0.3	3	0.12
Misc.	1	0.15	5	0.19
Unidentified	36	5.33	183	7.08
Total	676	100	2585	100

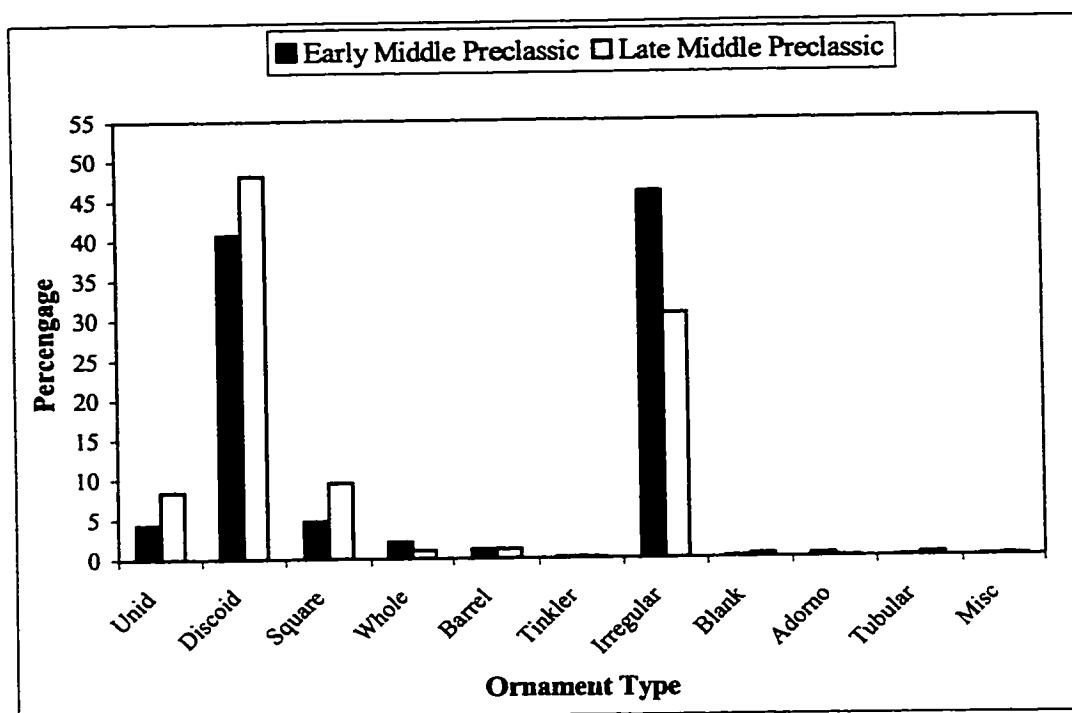


Figure 6.6: Percentage of Middle Preclassic Shell Ornament Types from Pacbitun.

As mentioned in the first section of this chapter, a variety of different raw materials were used in the production of shell ornaments at Pacbitun. Tables 6.3 and 6.4 show the artifact types divided by zoological taxa and chronological period. These tables reveal that a variety of raw materials were used in the production of certain ornaments while others were restricted to only one or two material types. Excluding the artifacts whose types could not be identified due to breakage, irregular beads exhibit the greatest diversity with regard to raw material type. Multiple freshwater and marine species were used in the production of irregular beads. The same is true for several other types, particularly disk and square beads. In addition, disk and irregular beads have the greatest frequencies of artifacts classified as unidentified marine gastropods.

Table 6.3: Pacbitun Early Middle Preclassic Modified Shell Artifacts by Zoological Taxa.

TAXON	Barrel						Perforated						Whole						Blank						Misc						Unidentified					
	n	%	n	%	n	%	Disc	n	%	Irregular	n	%	Square	n	%	Gastropod	n	%	Scaphopod	n	%	Tinkler	n	%	Pendant	n	%	n	%	n	%	n	%	n	%	
Unidentified shell	1		1	0.7																																
Unidentified Riverine																																				
<i>Pachychilus indiorum</i>					9	1.9																														
<i>Pachychilus glaphyrus</i>					13	2.8							2	12.5																						
<i>Nephronaias ortmanni</i>			1	0.7	1	0.2																														
<i>Pomacea flagellata</i>																																				
Unid. Marine Gastropod	6	100	132	95.7	288	62.3	10	62.5																												
<i>Strombus</i> sp.			3	2.2	133	28.8	4	25.0																												
<i>Strombus gigas</i>																																				
<i>Strombus pugilis</i>			1	0.7	18	3.9										6	100																			
<i>Prunum</i> sp.																		4	100																	
<i>Dentalium</i> sp.																																				
<i>Oliva</i> sp.																																				
<i>Melongena</i> sp.																																				
<i>Spondylus</i> sp.																																				
Unid Marine Pelecypod																																				
Total	6	100	138	100	462	100	16	100	6	100	4	100	4	100	2	100	2	100	2	100	2	100	2	100	2	100	3	100	1	100	1	100	36	100		

Table 6.4: Pacbitun Late Middle Preclassic Modified Shell Artifacts by Zoological Taxa.

[illegible]

Comparative data from other Belize Valley Preclassic sites reveal similar patterns to those observed at Pacbitun. A combined total of 277 modified and 1,937 unmodified shell artifacts were reported from five sites in the Belize Valley, including Barton Ramie, Blackman Eddy, Cahal Pech, Dos Chombitos Cik'in, and Zubin. As Table 6.5 indicates, many of the ornament types identified at Pacbitun are represented at sites throughout the Belize Valley. While the definitions for each of these classes may vary slightly from those used at Pacbitun, for the most part the defining characteristics are the same. It must be noted that an additional artifact class has been noted at Zubin. Rectangulates, as they have been termed, are rectangular-shaped items with ground lateral edges and a slightly curved profile (Ferguson 1995:156). Since these items were not perforated, they may have been sewn onto clothing items or served as decorative inlays on composite pieces like mosaic masks. Like Pacbitun, disk beads are the most common artifact type encountered at each of these sites, representing 85.1 percent (n=235) of the total modified assemblage. In contrast to Pacbitun, irregular beads are uncommon, accounting for only 5.8 percent (n=16) of the total modified assemblage from these sites. The remaining artifact types occur in much smaller frequencies, just as they do at Pacbitun.

Table 6.5: Frequency of Middle and Late Preclassic Shell Types at Select Belize Valley Sites

Site	Discoïd		Adono/ Pendant		Irregular		Tinkler		Rectangulate		Unid.		Deritus		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Barton Ramie	41	93.2	4	9.1											44	100
Blackman Eddy	4	28.6	2	14.3			1	7.1					7	50.0	14	100
Cahal Pech																
Cas Pek	25	1.3	3	0.2	10	0.5	3	0.2			2	0.1	1812	97.7	1855	100
Plaza B	66	90.4			6	8.2	1	1.4							73	100
Plaza C	52	100													52	100
Tolok	10	7.8											118	92.2	128	100
Dos Chombitos Cik'in	26	100													26	100
Zubín	11	52.4	1	4.8			4	19.0	4	19.0	1	4.8			21	100
Total	235		10		16		9		4		3		1937		2213	100

SHELL ORNAMENT PRODUCTION

Shell ornament production can be characterized as a subtractive technology where items are produced by removing varying amounts of material from a shell. As replication studies have shown, shell is a notoriously difficult material to work, especially with stone tools technologies (Dales and Kenoyer 1977; Francis 1982, 1987; Lewenstein 1987; Pope 1994). The presence of complete shell ornaments, ornaments in various stages of the production process, marine detritus, and production tools suggest that the inhabitants of Pacbitun were involved in shell working activities by the beginning of the Middle Preclassic period. While shell ornaments have been identified in archaeological deposits at lowland sites dating from the Middle Preclassic through the Postclassic period, little is known about the industry that produced these items. The shell working materials from Pacbitun can be used to address various production related issues, including the identification of shell working tools, techniques, and production processes.

Production Tools

Ethnographic, ethnohistoric, and archaeological evidence have revealed that a wide variety of tools were used to manufacture shell ornaments in Prehispanic Mesoamerica. Given its durability or hardness, stone has typically been the most common raw material used in the modification of shell. Observations made on shell artifacts have indicated that a variety of organic materials were also used in the shell working process. String or fiber appears to have been used to cut shell while materials such as reed, bamboo, and bone were used as hollow tubular drills (Orchard 1975). Many of these tools were also used in lapidary work undertaken on stone materials such as jade, agate, jet, alabaster, and obsidian. Different tools and techniques

would be utilized depending on the type of item being produced. At Pacbitun, a large number of chipped stone tools were found in direct association with the marine and freshwater shell artifacts, suggesting that they may have been used as tools in the shell working process. Although a complete lithic analysis has not been completed at this time, some general observations can be made regarding certain technological and typological aspects of this industry.

The chipped stone assemblage at Pacbitun consists of chert and obsidian artifacts. The Pacbitun Maya had at their disposal a variety of expedient and more standardized tool forms. Flake and blade technologies are both apparent in the obsidian and chert assemblages. Although the largest percentage of the chipped stone artifacts was manufactured from locally available chert, a small number ($n=31$) of obsidian artifacts were also recovered. As mentioned in Chapter Four, the nearest sources for obsidian are in the volcanic highlands of Guatemala, approximately 400-500 km away. The obsidian assemblage includes complete and incomplete prismatic blades, flakes, and polyhedral cores. None of these artifacts shows any significant signs of use wear, suggesting that they had not been used to modify shell materials.

The chert assemblage is larger and more diverse than the obsidian sample. This assemblage contains formal and expedient tools and significant quantities of debitage. The expedient tool industry is characterized by flakes and blades with minimal use wear and/or retouch. In addition to these expedient tools, a number of more standardized tool forms were also identified, including small bifaces, awls, burin spalls, and microdrills. Burin spalls ($n=125$) and microdrills ($n=92$) dominate the formal tool assemblage at Pacbitun. The assemblage shows clear evidence of burin spall technology. Burin spalls

are triangular in cross section and are relatively thick in relation to their length (Figures 6.7 and 6.8). One hundred and twenty five complete and incomplete burin spalls were identified in the Middle Preclassic assemblage. Complete burins spalls have their proximal and distal ends intact and range in length from 23.0 to 77.5 mm.

Microdrills resemble burin spalls in form, however they are distinguished from the former by macroscopic evidence of wear on the proximal and/or distal ends (Figures 6.7 and 6.9). The tip(s) of these specimens exhibit alternate, opposite retouch resulting from rotary motion, indicating that these tools were definitely used for drilling. There is solid evidence that burin spalls were being manufactured and rechipped or modified into microdrills. Ninety-two microdrills were identified in the Pacbitun assemblage, including bi-tipped and uni-tipped drills. Uni-tipped drills ranged between 18.2 and 54.0 mm in length while bi-tipped drills ranged from 16.8 to 39.6 mm. Most of the microdrills have extensive retouch on one or more laterals edges. This retouch suggests that they were chipped to fit a haft, creating a composite drill tool that could have been used on a wide variety of materials (e.g., bone, wood, stone). The triangular cross-section would have given the drill bit maximum strength as well as three strong edges within the haft to keep the tool from shifting when in use.

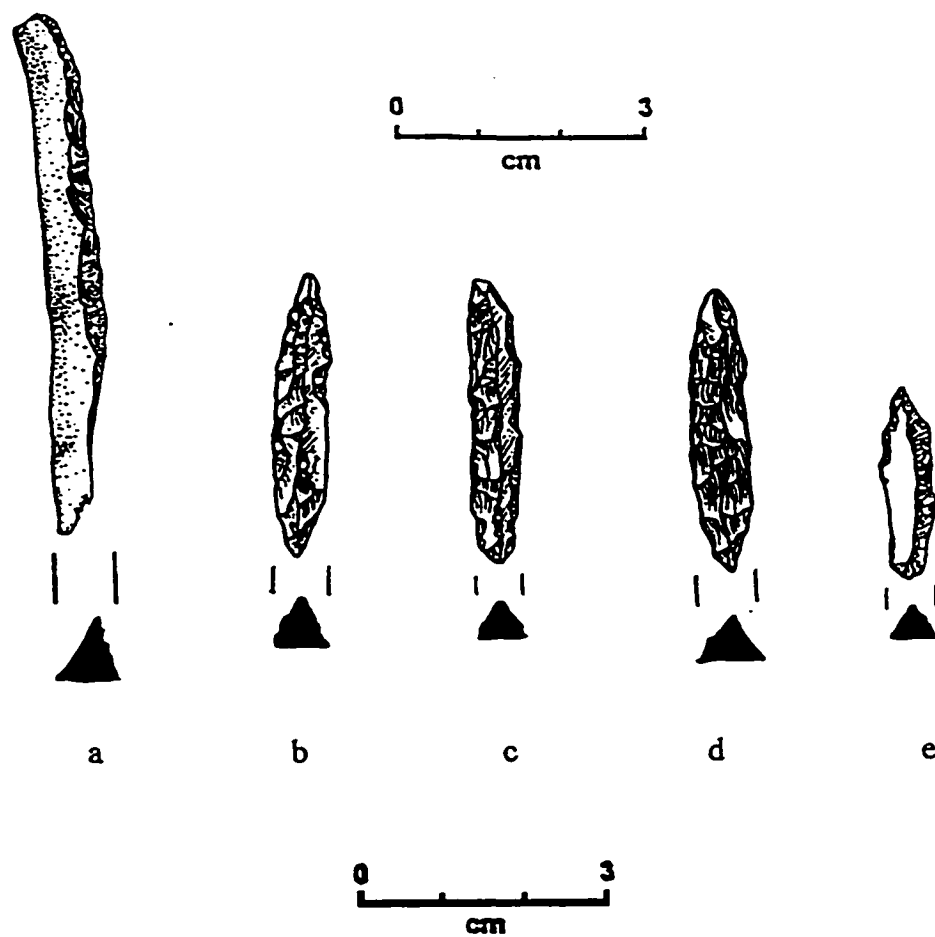


Figure 6.7: Middle Preclassic Burin Spall (a) and Microdrills (b-e) from Pacbitun.

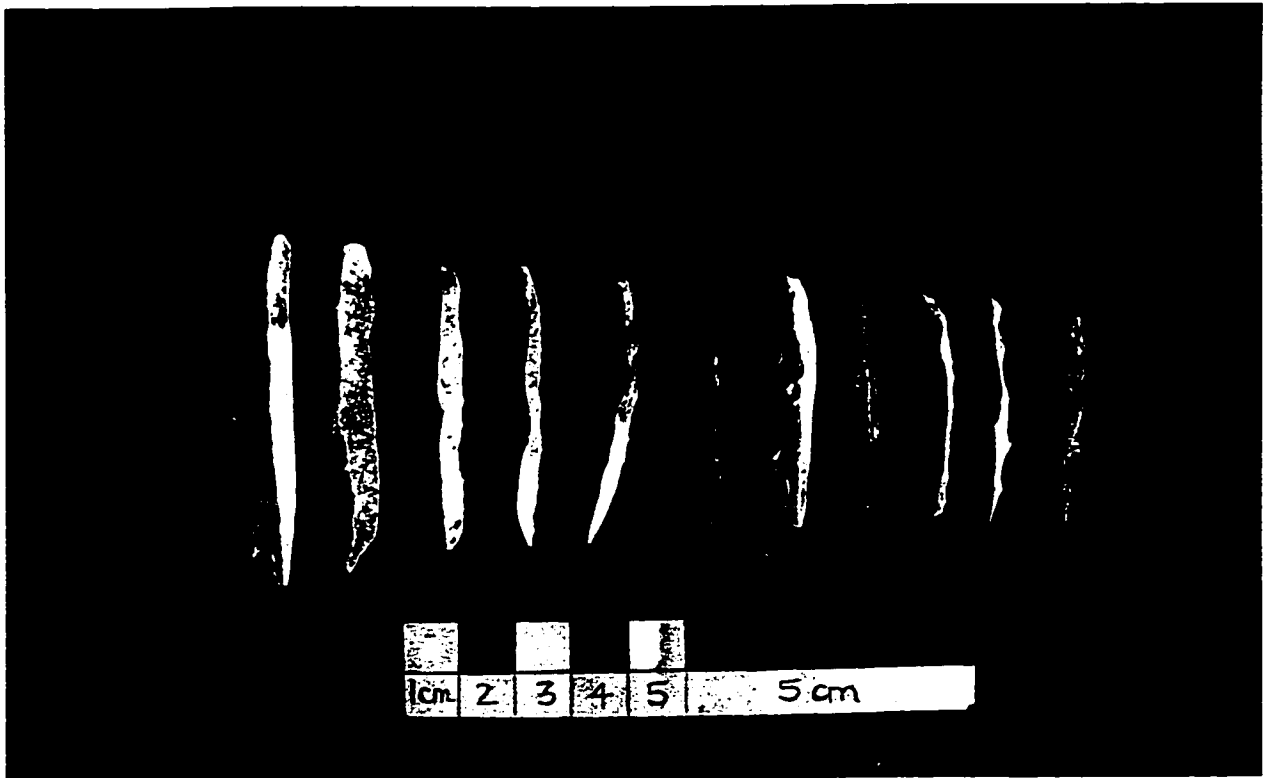


Figure 6.8: Middle Preclassic Chert Burin Spalls from Pacbitun.

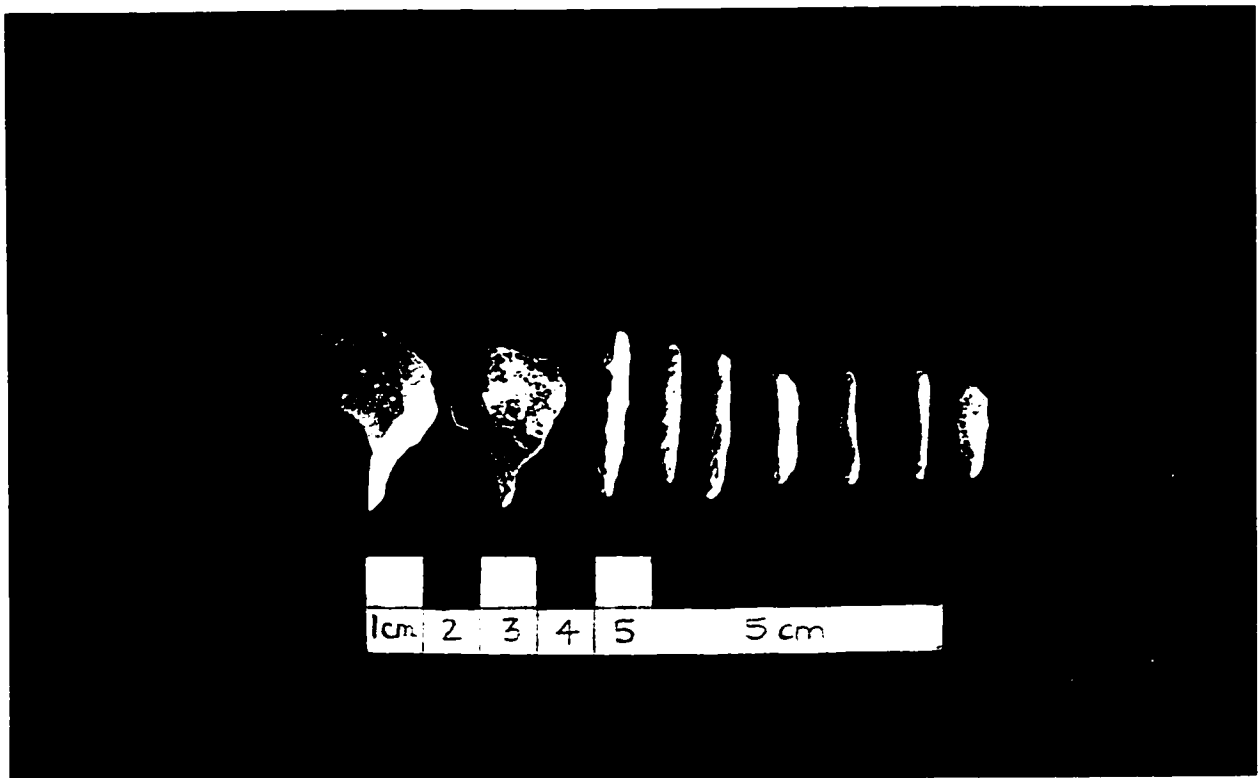


Figure 6.9: Middle Preclassic Chert Microdrills from Pacbitun.

Similar lithic tools have also been found in association with Preclassic period shell working debris at Cahal Pech, located approximately 10 km northwest of Pacbitun. While a small number of drills and/or burin spalls have been identified in Preclassic deposits throughout the site, their numbers are greatest at Cas Pek, a small peripheral settlement located approximately 150-200 meters west of the site core. Archaeological field reports indicate that 516 burin spalls and/or drills were found in association with modified and unmodified shell artifacts at this peripheral settlement during excavations conducted during the summers of 1993, 1994, and 1995 (Iannone and Lee 1996; Lee 1996; Lee and Awe 1995; Sunahara and Awe 1994). Preliminary observations by the author indicate that these artifacts are consistent with those identified at Pacbitun.

Drills and shell working debris have also been identified in Classic period deposits at Caracol, a large Maya center located south of Pacbitun on the Vaca Plateau. Unlike the burin spall technology that was used to produce drills at Pacbitun and Cahal Pech, Pope (1994) reports that most of the Caracol drills were made by trimming the lateral edges and distal end of flakes. Microscopic examination has identified use wear in the form of rounding and smoothing at the tip of these drills (Pope 1994:154). While the use wear analysis and association with shell debris seem to support the idea that these tools were used to drill shell, they may have served as multifunction tools for the working of other materials (e.g., bone, wood, greenstone, teeth).

Preclassic burin spall drills have also been reported for the site of Colha in northern Belize (Shafer and Hester 1983; Potter 1991). While a number of burin spalls have been noted at the site, Potter (1991:24) reports that at least some of these tools were retouched on both ends to form small pointed bits suitable for drilling. Based on his

analysis of the Middle Preclassic lithics at Colha, Potter argues that burin spalls were being removed from blades whose platforms had been prepared through the removal of a transverse flake running perpendicular to the long axis of the blade. This reduction technique, transverse concave truncation, was only found on burinated blades at Colha. These items may have been produced at the small peripheral settlement known as Labpek, an area with considerable evidence of burin and blade manufacture (Potter 1991:24-25).

Production Techniques

Through experimental studies, ethnographic observations, and analysis of archaeological materials, researchers have identified many of the techniques that were used in the manufacture of shell ornaments from around the world. Of all the published materials on shell artifacts in Mesoamerica, the most exhaustive treatment of worked shell comes from Suarez-Diaz (1989). In her book she discusses production techniques used to make a wide variety of shell artifacts from western Mexico. While this study is somewhat limited in its geographic scope, the information that it provides on ornament production is unparalleled.

Analysis of the modified shell artifacts and debris indicates that a variety of different techniques were used to modify shell at Pacbitun, including cutting, flaking, abrading, incising, drilling, and puncturing. Although all of these techniques have been identified in the Middle Preclassic assemblage, some of these techniques are more prevalent than others. The techniques used in the production of shell ornaments vary depending on the type of ornament being manufactured and the raw material utilized, but the observed correlation between certain types and techniques suggests a degree of

routinized production. The high degree of modification made it difficult to identify all of the techniques that would have been used in the manufacture of particular shell ornaments, especially those used during the primary reduction phase. Often only the techniques used in the final stages of the production process could be identified, making it difficult to determine the sequence or steps in the manufacturing process.

Flaking appears to have been one of the first techniques used in the production of certain ornament types. Analysis of the marine detritus reveals that small to medium-sized *Strombus* specimens were being reduced at the site using percussion technology. The resulting products were shell fragments of various sizes and shapes. These irregularly shaped fragments account for 31 percent (n=1,479) of the Pacbitun assemblage. The presence of columella, spire, spine, lip, and body fragments indicates that whole shells were being imported into the site and reduced locally (Table 6.6). A number of bead blanks also show signs of flaking around the lateral edges, suggesting that this technique was used to achieve a rough form before the ornaments were finely shaped and smoothed.

Table 6.6: Frequency of Early and Late Middle Preclassic Gastropod Shell Parts from Pacbitun

Shell Part	Early Middle Preclassic		Late Middle Preclassic	
	n	%	n	%
Body	68	16.1	261	25.1
Columella	36	8.5	131	12.6
Complete	0	0	1	0.001
Lip	193	45.6	378	36.3
Spire	46	10.9	121	11.6
Spine	80	18.9	148	14.2
Total	423	100	1040	100

Few of the Pacbitun artifacts exhibit evidence of cutting, a production technique commonly identified in other regions of Mesoamerica. Cutting or sawing can be used as a finishing technique or a primary reduction technique to remove fragments or pieces from a parent material. Direct evidence of cutting or sawing was only reported on two of the modified artifacts from Pacbitun; each of these were classified as tinklers. One of these artifacts was perforated by cutting across the surface with a string until a small hole appeared. String cutting typically leaves a distinct “V-shaped” depression in the surface of the specimen. This spire of this same artifact was removed during production, but it is impossible to determine if was removed by cutting or abrading since there are no remnant cut marks visible on the surface. The second artifact was a tinkler that had been cut to represent an anthropomorphic figure with two eyes and a mouth. Incising is a related technique that was only identified on one modified artifact at Pacbitun.

One of the most prevalent techniques used to modify shell is abrasion. A large percentage of the modified shell artifacts show signs of being abraded against a hard

surface. Of the 3,261 modified artifacts, 80 percent (n=2,609) show signs of abrasion on one or more surfaces. This is most evident on disk, barrel, square, and tubular beads where all of the surfaces were abraded to both shape and smooth the items. Given the hardness of shell, abrasion tools would have most likely been made of stone. Artifacts may have been abraded or ground individually or in groups strung together on a stick or durable fiber. This latter process results in more uniform artifacts. Francis (1987:31) refers to this process of simultaneous grinding as the “heishi technique”. This technique is still used for bead making by the inhabitants of the Santo Domingo Pueblo in New Mexico. To date no abrasion tools have been identified at Pacbitun. In the Ejutla site in Oaxaca, Feinman and Nicholas (1995:23) have identified river cobbles that bear linear marks from abrasion wear. In the American Bottom, researchers working with shell collections have argued that the uniformity of disc beads was created either by grinding them on turning sandstones slabs or stringing them together and passing them through grooved sandstone abraders (Trubitt 1996:76). Grooved abraders have been noted in archaeological deposits from this region, including the site of Cahokia (Pauketat 1993:93-95).

Drilling and puncturing are two of the most common techniques use to perforate shell. Ninety-eight percent (n=3,189) of the modified shell artifacts from Pacbitun were perforating using one of the above-mentioned techniques. Small, irregular shaped holes with ragged margins were identified on artifacts made from thin-walled freshwater (*Nephronaias* sp., *Pomacea* sp.) and marine (*Prunum* sp.) species. The irregular nature of these perforations suggests that they were made by puncturing or gouging the shell with sharp instrument, most likely a chert microdrill. While this is a quick technique that

produces holes that may be used for suspension, the ragged edges can continue to break as they wear against the string. Only forty-five punctured artifacts were observed in the modified shell assemblage.

Drilled artifacts occurred with much greater frequency ($n=3,130$) at Pacbitun. With the exception of those artifacts exhibiting puncture holes, virtually all of the ornament types identified at the site show signs of drilling. Conical and biconical perforations have been identified on modified shell artifacts in the assemblage, including complete and partial perforations. These holes were undoubtedly made by the chert microdrills found in abundance at the site. Biconical perforations account for 61.4 percent ($n=1,959$) of the perforated sample, while conical perforations account for only 36.7 percent ($n=1,171$). Partial perforations were also noted on a small number ($n=30$) of irregular beads and blanks. In fourteen of these cases, a single partial or incomplete perforation was identified. No attempts were made to re-drill these specimens. In the remaining sixteen cases, partial perforations were found on artifacts that had already been drilled successfully. These partials appear to represent earlier unsuccessful drill attempts.

As mentioned above, a variety of drills could have been used to perforate the shell artifacts. Although no hafts have been identified at Pacbitun or other lowland sites, evidence from the chert microdrills suggests that they were most likely hafted to wooden shafts. Once the microdrill or bit had been set in the haft, drilling could commence by quickly rotating the shaft in alternating directions. Ethnographic and ethnohistoric data indicate that hand drills, pump drills, and bow drills were commonly used tools for bead making in the Americas (Francis 1982, 1987; Kenoyer 1992; Orchard 1975). Figure 6.10 presents illustrations of bow and pump drills. With a hand drill, rotary motion is

accomplished through the simple act of rubbing the shaft between the palms. Pump and bow drills are more complicated tools that use string to revolve the shaft. A pump drill uses a crossbar and twisting string to produce a rotary motion while a bow drill uses a bow device and a sawing motion. Both of these are effective and efficient implements that would have improved the drilling process.

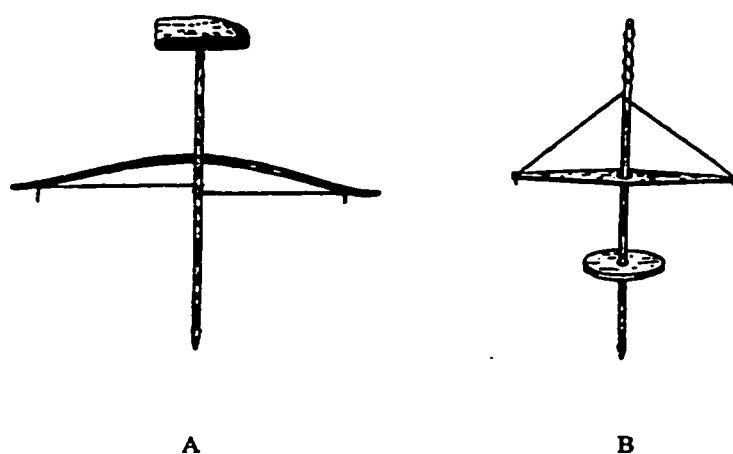


Figure 6.10: Bow Drill (a) and Pump Drill (b) (after Orchard 1975, Figures 44 and 45). Illustration courtesy of National Museum of American Indian.

Production Process

Production techniques used on the Pacbitun artifacts were introduced in the preceding section. In many cases the marks produced by these techniques can be used to determine the steps in the production process. While some types of shell required only minor modification to produce the final form (e.g., tinklers, perforated gastropods, whole scaphopods), others required multiple techniques and steps to complete the production process (e.g., disk, barrel, and square beads). In the following section I will use

observations made on complete and incomplete shell artifacts and shell detritus to infer stages in the production process for irregular and disk beads, the two most common ornament types identified at Pacbitun.

One of the most interesting ornament types identified at Pacbitun is the irregular bead. As mentioned in Chapter Five and Six, irregular beads come in many shapes and sizes and they are manufactured predominantly from species belonging to the genus *Strombus*. Technological analysis indicates that virtually every part of these marine gastropods were being utilized in the production of irregular beads, including the spire, spines, columella, body, and lip (Figure 6.11). The presence of similar materials in the unmodified shell assemblage suggests that resident craftsmen were producing these artifacts (see Table 6.6). *Strombus* specimens were apparently being brought into the site whole and reduced using a percussion strategy. Reduction experiments conducted by the author revealed that direct percussion with a hammerstone resulted in fragments of similar size and shape to those identified in the Pacbitun collections.

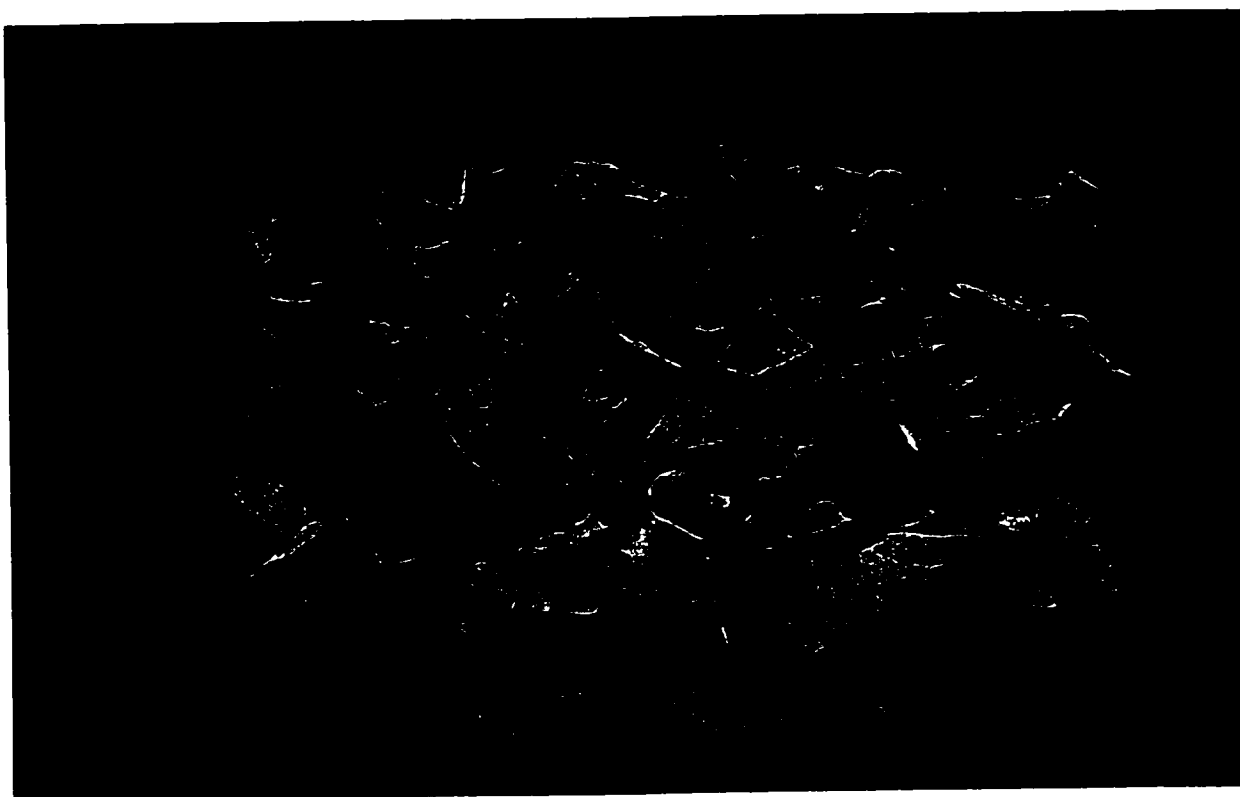


Figure 6.11: Middle Preclassic Shell Detritus from Pacbitun.

After the shells were reduced, the next step in the production process was to perforate the item. All of the irregular beads were perforated conically or biconically using one of the techniques mentioned above (i.e., drilling, puncturing). While the majority of these artifacts had complete drill or puncture holes, partially drilled artifacts were present. As mentioned above, some artifacts had a central partial perforation while others had a complete perforation and a partial somewhere else on the item. Puncture holes occur on only 1.1 percent ($n=12$) of the irregular artifacts while drill holes are found on 98.4 percent ($n=1,119$). Of the drilled items, 64.8 percent ($n=729$) were drilled conically and 32.7 percent ($n=368$) biconically. This appears to have been the final stage in the production process for some irregular beads, but others show signs of abrasion

along the lateral edges. Since over half of the irregular beads are drilled but show no sign of edge abrasion, it is assumed that abrading or grinding was the final stage in the process. Because of their irregular shape, some scholars have suggested that these perforated ornaments represent unfinished artifacts. The inclusion of irregular beads as jewelry in burial contexts indicates that this may be an inaccurate assumption (Robin and Hammond 1991; Robin 1989).

The production process for disk beads is less understood, primarily due to the fact that extensive abrading has obscured all diagnostic features the shell once had. Despite these problems, analysis of complete and incomplete artifacts has provided some information regarding the steps in the production process. Disk beads are circular to oval in shape with a central conical or biconical perforation. The lateral edges of each of these specimens have been abraded and smoothed. Freshwater and marine shell specimens were used in the production of these items, suggesting that the production process may have been different depending on the species being worked. Given the thickness of disk beads, the majority of these specimens appear to have been made from the body of small to medium-sized gastropods.

The early stages in the production process are difficult to determine given the degree of modification on these artifacts. The initial stage in the production of disk beads may have been equal to that of irregular beads, with a gastropod specimen being reduced into smaller fragments by percussion technology. While the similarities between marine detritus and irregular beads have been noted, it is possible that the fragmented shell was also used to make disk beads. The bead blanks and broken beads indicate that disk beads may have been roughly shaped before they were drilled. Bead blanks are typically

circular in shape with rough edges and no perforations, although the presence of partial perforations on a small percentage of these artifacts suggests that they may have been drilled before they were finely shaped and smoothed. As mentioned in the technique section above, these roughly shaped beads may have been strung together and abraded using the “heishi technique”. Careful analysis of the broken disk beads reveals additional evidence about the production process. The lateral edges of all the broken disk beads were finely shaped and smoothed; however, they were all broken along their perforations. These items may have broken while in use or they may represent production failures. Feinman and Nicholas (1995:23) have argued that the small disc beads at Ejuta were finely shaped and smoothed before they were drilled, indicating that beads were not strung together during the finishing process. Given the pattern of breakage, the Pacbitun beads may have also been shaped and smoothed before they were drilled. A conclusive answer to this question cannot be determined without further analysis, but additional information about the production of disk beads will be presented in Chapter Eight when the issue of product standardization is discussed.

SUMMARY

Analysis of the Pacbitun materials has revealed substantial new information regarding the production of shell artifacts during the Preclassic period, including data on resource utilization, products manufactured, and production techniques and processes. While it is unclear whether the Pacbitun craftsmen produced all of the shell ornaments deposited at the site, the presence of complete shell ornaments, ornaments in various stages of the production process, marine detritus, and shell working tools indicates that at least some of the ornaments were manufactured by skilled local craftsmen. Disk and

irregular beads are the most common ornament types identified in the Middle Preclassic assemblage at Pacbitun. While there is clear evidence for the local production of irregular beads, evidence for the production of disk beads is less clear. Despite this ambiguity, it must be noted that disk beads are commonly found in Middle Preclassic deposits at sites throughout the southern Maya Lowlands, including Colha (Buttles 1992; Dreiss 1994), Cuello (Hammond 1991), and K'axob (Isaza Aizpurua 1997; Isaza Aizpurua and McAnany 1999) in northern Belize and Nakbe and Tikal (Moholy-Nagy 1987, 1994) in Guatemala. Like Pacbitun, each of these assemblages is dominated by disk beads, perhaps suggesting an early pan-lowland tradition of ornament production. Since these and other southern lowland sites participated in the Mamom ceramic sphere, it is not surprising that other forms of material culture would also be shared. Although shell ornaments have been identified in Preclassic deposits at sites throughout the lowlands, to date no other sites have produced significant evidence of shell working.

As an inland site, it is significant to note that the most common ornament types identified at Pacbitun, disk and irregular beads, were typically manufactured from marine shell. Similar findings have been reported for Preclassic sites in the Belize Valley and other lowland regions. Given the non-local nature of marine shell, artifacts made from this material may have been deemed more precious or valuable by potential consumers.

CHAPTER 7

CONSUMPTION OF SHELL ORNAMENTS

While the primary focus of this study is the organization of shell ornament production in the Belize Valley, the production system cannot be fully understood without an evaluation of the corresponding patterns of consumption. In this chapter I will present a brief history of the uses of shell in the Maya Lowlands. Ethnohistoric, iconographic, and archaeological data will be presented to provide information about the diverse roles played by shell artifacts in prehistoric and historic Maya society. This will be followed by a discussion of the contextual data for the Preclassic shell ornaments from Pacbitun and other Belize Valley sites. Comparative data from Preclassic sites in the Maya Lowlands will also be presented.

SHELL USAGE IN MAYA SOCIETY

Ethnohistoric Data

Ethnohistoric accounts reveal that at the time of Conquest shell items were used for a number of different purposes by the Mayan peoples that inhabited the lowland regions of the Yucatan Peninsula. The majority of our information about the early post-Conquest era comes from Friar Diego de Landa, a Franciscan missionary who arrived in Yucatan in 1549. After many years of religious proselytizing and abuse of the local Maya peoples, Landa was forced to return to Spain in 1563. Despite his horrific treatment of the local peoples, Landa can be credited with recording many details of Maya culture through native informants like Gaspar Antonio Chi and Nachi Cocom.

During his stay in Spain (1563-1573), Landa wrote *Relacion de las Cosas de Yucatan* (1566), a chronicle of Maya life reporting on their homes, clothing, farming practices, religious ceremonies, calendrics, and hieroglyphic writing. In his manuscript on Maya culture Landa noted that shell items were commonly used as a form of currency in market exchanges and as costume decoration or body adornment for priests and other high status individuals (Tozzer 1941: 95-96, 148, 231). Specifically, Landa states that the Maya "...had others [beads] made of certain red shells for money, and as jewels to adorn their persons; and they carried it in purses of net, which they had, and at their markets they traded in everything which there was in that country" (Tozzer 1941:95-96). Landa also notes that that "Cacao, jade, red stones and beads, and copper bells were frequently used to pay fines or debts" (Tozzer 1941:80). While this quote mentions red stones and beads, Landa may have been referring to *Spondylus* shell, whose exterior surface is characterized by a distinctive, brilliant red/orange color. Gaspar Antonio Chi makes a similar observation, commenting that, "The money which they used was little bells (of copper)... and they were valued according to their quantity or size... (also certain) red (shells) which they bring from outside these provinces, (of which they make strings like) the beads of a rosary" (Tozzer 1941:231).

Landa also discusses the use of shell items in a number of rituals or ceremonies performed by the converted Maya, including baptisms and feasts. During baptism rituals, Landa states, " ... in case of the little boys, they used always to put on their heads a little white bead, stuck to the hair on the top of the head. And the little girls wore a thin cord about their loins, very low, and to this was fastened a small shell which hung over the sexual parts" (Tozzer 1941:102). These items were removed from the children during

their baptism ritual. Mortuary data from Prehispanic periods reveal that similar shell items are often found in the head and pelvic region in child burials (Powis 1996:Appendix B-8; Robin 1989:105). Landa goes on to mention that "...bells and plumage and *mantas* and scallop-shells (*veneras*) and large snail (shells?)" were offered to the stone, clay, and wood idols made by the Maya (Tozzer 1941:111). The use of shell as offeratory items has also been seen in archaeological contexts spanning the length of the cultural sequence in the lowlands. While there is no clear iconographic or archaeological evidence that shell was used as a form of currency prior to the arrival of the Europeans, there is substantial evidence that shell items were being used for personal ornamentation and in various rituals.

Iconographic and Archaeological Data

Archaeological data have also provided valuable information regarding the many uses of shell in pre-Columbian Maya society. Shell artifacts have been identified in deposits extending from the Middle Preclassic to the Postclassic period in the Maya Lowlands. Throughout this lengthy period, abundant quantities of shell artifacts and representations of shell have been found in archaeological contexts, reinforcing the belief that shells were of great political, economic, and social importance to the Maya prior to European contact. Studies in Maya iconography and cosmology have provided evidence that shell was also of great symbolic significance to the lowland Maya. Given its link to the sea, shell has always had a primary association with water. The importance of this connection is no more evident than in the *Popul Vuh*, the highland Quiche Maya creation myth. According to the *Popul Vuh*, in the beginning the world consisted of nothing but an empty sky and sea below. The gods of the sea and sky joined together to create the

earth and its many life forms, all of which emerged from the primordial sea (Tedlock 1985:72-75). To the ancient Maya the earth was the back of a large reptile (i.e., turtle, crocodile) that swam in the primordial sea (Freidel et al. 1993; Thompson 1950:278). Iconographers have argued that shell and other water-related items symbolize the primordial sea out of which all life began. In these cases shell is believed to represent birth and life, but there is also a link between shells and the watery underworld or *Xibalba*, a place where the death gods reside. The underworld deity God N is frequently associated with shells in underworld scenes painted on polychrome vessels and in the Paris and Madrid codices (Figure 7.1). He is frequently depicted emerging from a large conch shell or wearing a conch shell on his back (Coe 1978:70-73; Kerr 1992: 386; Schellhas 1904:37; Spinden 1957:84). Schele and Freidel (1990:414) note that God N is also thought to represent a Pauhtun, one of the beings who held up the four corners of the world in Maya cosmology. Pauhtuns are often depicted wearing a cut shell pendant or emerging from a conch shell.

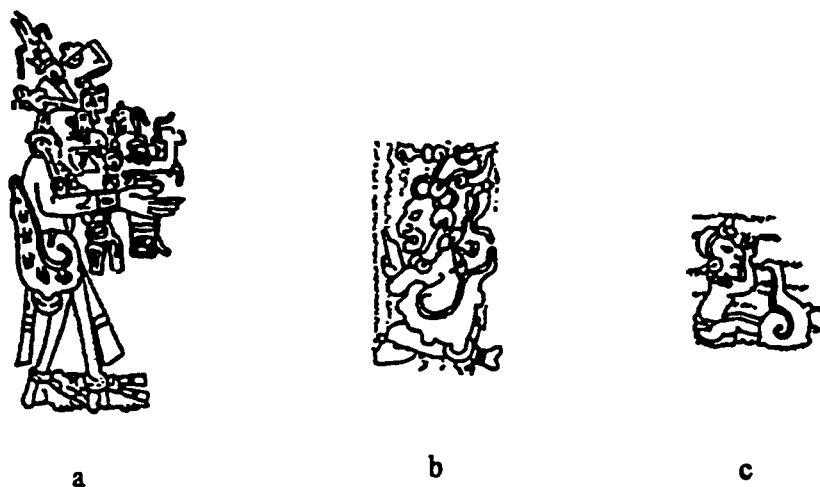


Figure 7.1: Codex Representations of God N. (a) Paris Codex after Sharer 1994, Figure 11.10. Illustration courtesy of Stanford University Press. (b, c) Dresden Codex after Spinden 1957, Figure 108.

Studies of Maya art and iconography have also revealed many of the earthly uses for shell. In representations on carved monuments, painted vessels, and mural paintings, Classic period rulers and other elite personages are frequently depicted wearing shell jewelry (i.e., necklaces, bracelets, ear flares, anklets, and armbands) and/or elaborate costumes adorned with shell items. For instance, Maya rulers often wore shell tinklers suspended from belts or loincloths that were part of their royal regalia (Figure 7.2) (Baudez 1994, Figures 7-9, 11-13, 26, 39, 49-55; Jones and Satterthwaite 1982, Figures 29, 33, 72; Spinden 1957:84). These appear to have been small to medium-sized gastropods that were perforated and attached to the hem of these decorative elements. In some cases tinklers were suspended beneath a “pop” or “mat” sign, one of the main symbols of kingship in Maya hieroglyphic writing (Schele and Freidel 1990:139).

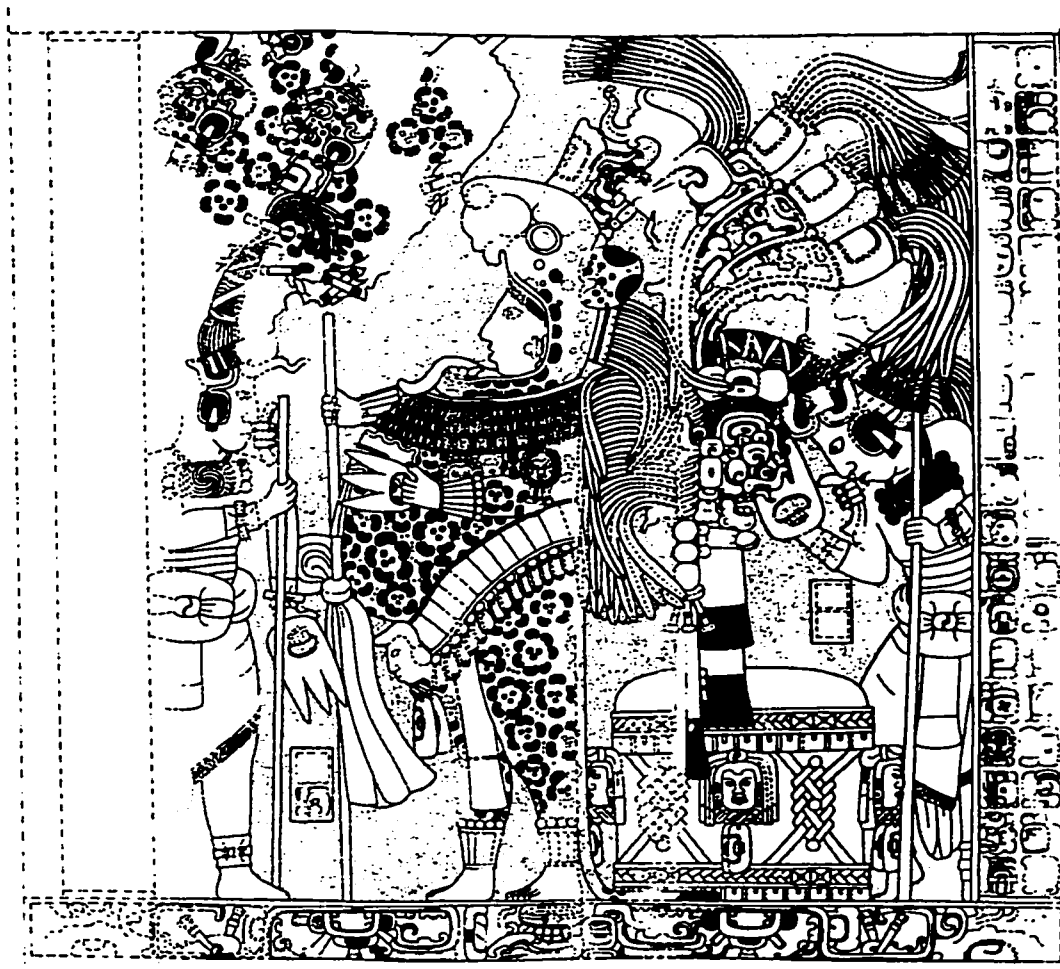


Figure 7.2: Representation of Shell Tinklers in Lintel Carving from Tikal (after Jones and Satterthwaite 1982, Figure 72). Illustration courtesy of University of Pennsylvania Museum.

While the type of material used to create these pieces cannot be identified in stone carvings (e.g., monuments, architectural features), images on polychrome vessels and mural paintings do provide some evidence regarding raw material usage. In these two media members of the elite class are often shown wearing white jewelry items such as bracelets, necklaces, and ear plugs. Based on the presence of jade or greenstone beads in many Classic period elite burials, most scholars have argued that members of the elite class wore jade jewelry as part of their costuming. Given the predominance of white

colored jewelry in painted images, it seems that shell ornaments may have played just as significant a role as their jade counterparts. It must be noted that green paint has been identified on mural paintings and ceramic vessels in the Maya Lowlands, indicating that jade ornaments could have been painted green if desired. Reents-Budet (1994:214) has commented on the lack of green paint on painted vessels in the lowlands. She indicates that a gray color is often found in areas that would most likely have been painted green, such as jade jewelry and quetzal bird feathers. She argues that a fugitive organic pigment may have been used to create a green color but that the pigment would have changed to gray tones when subjected to heat. If this was the case, then the white colored jewelry probably is truly white and depicts shell items rather than jade.

Shell artifacts similar to those represented on carved monuments, painted vessels, and mural paintings have also been recovered from archaeological deposits extending from the Middle Preclassic to the Postclassic period, a time span of approximately two thousand years. The most commonly encountered shell artifacts are items of personal adornment that would have either been sewn onto clothing or worn as jewelry. Beads, pendants, adornos, rings, and earplugs are among the many types of ornaments that have been identified at lowland sites. While worked shell artifacts have been found in a wide variety of depositional contexts (e.g., midden, construction fill, burial, cache), they are most often recovered from ritual deposits such as burials and caches, providing an excellent opportunity to reconstruct ancient ritual behavior and belief systems. Analysis of burial data reveal that some shell artifacts (e.g., pendants) were commonly worn as singular items while others (e.g., beads) were regularly grouped together to form necklaces, bracelets, and armbands (Robin 1989; Welsh 1988). While solitary shell

artifacts have been found with many interments, many more include multiple artifacts typically clustered in the wrist and neck regions. While the presence of shell artifacts in burial deposits provides significant information regarding burial treatment and religious ideology, it cannot provide conclusive evidence of the role shell artifacts played in the dynamic social setting prior to their final deposition. Shell items may have served as symbols of status that were worn only by elites and protected by sumptuary laws or used as generalized wealth consumed in various quantities by virtually all members of a community.

Modified shell artifacts are also commonly found in cache deposits, providing additional support of the ritual significance of shell in prehistoric Maya society. A variety of shell artifacts have been found in association with dedicatory and termination rituals, including both modified and unmodified shell. While some of these caches have been found to contain only shell materials, others consist of a group of artifacts manufactured from several material types (e.g., bone, clay, obsidian, chert, greenstone). Although the ritual nature of these deposits is not in question, the symbolism behind their composition and placement is open to interpretation. Most scholars would agree that these caches played a critical role in the rituals and/or ceremonies performed by the Maya to communicate with the forces that governed their lives. For instance, since bloodletting was a common ritual performed to placate the rulers of the cosmos, bloodletting paraphernalia (e.g., shells, stingray spines, obsidian lancets) were common items deposited in cache deposits (Coe 1959:77-119).

Shell items are also commonly represented as musical instruments and receptacles in scenes on stone sculptures, murals, painted vessels, and codices. Scenes showing

individuals blowing on conch shell trumpets have been reported on mural paintings such as those at Bomampak (Miller 1986). On painted vessels deities are often seen carrying conch shells or using them as trumpets to herald events (Coe 1978:30-32, 40-42; Robicek and Hales 1981:44-45). Similar shell specimens have been found in archaeological contexts. Large gastropods such as conch can easily be modified to create a trumpet-like instrument by removing the apex of the spire to form a mouthpiece and perforating the body for finger holes. Conch trumpets have been noted in archaeological deposits at Cerros (Garber 1989:70), Chichen Itza (Proskouriakoff 1962:422), Dzibilchaltun (Taschek 1994:60-61), Mayapan (Proskouriakoff 1962:384), Tikal (Moholy-Nagy 1994:190), and Uaxactun (Ricketson and Ricketson 1937:201-202). Some of these artifacts were painted while the surface of others was incised with human and/or animal figures and hieroglyphic texts. On painted vessels (Coe 1977; Reents-Budet 1994:36-55, 316) and stone sculpture (Fash 1991:118-121; Schele and Miller 1986:151) halved conch shells are also depicted as paint containers for Maya scribes. Painted vessels frequently show artists engaged in painting codices while in the presence of rulers or other elite personages. On many of these vessels the painters appear to be supernatural deities, presumably depicting mythological scenes and characters portrayed in the *Popul Vuh*.

Shell receptacles have also been found in archaeological contexts. In her discussion of Maya potters Reents-Budet (1994:42-43) has reported two modified shell receptacles that are believed to have served as ink containers. The first container consists of a conch shell that has been halved longitudinally, creating several segments or compartments where paint could be stored. Red paint is still visible on the shell's interior and the hieroglyphic text incised on the shell's exterior indicates that the item was used in

a ritual event performed by a person of elite status. The second shell container resembles a painter's palette with an elongated body terminating in a hand with inwardly curved fingers. While this object clearly resembles a painter's palette, no paint residues have been identified on the surface. Two stone representations of halved conch shells have been identified at Structure 9N-82 at Copan, Honduras, a structure possibly occupied by elite artists (Fash 1991:118-121). One of these ink containers rests in the left hand of a figure on the façade of Structure 9N-82, while the second is found in the left hand of a smaller, three dimensional stone sculpture found in construction fill from the same structure.

Shells may have also served as receptacles for blood during bloodletting rituals performed by the Maya. At the Maya site of Chac Balam, located on Ambergris Caye off the coast of Belize, researchers have reported burials with associated bloodletting paraphernalia, including obsidian blades placed inside conch shells (Guderjan and Garber 1989:133-135). Similar "bloodletting toolkits" are represented in at least two images from the Madrid Codex (Figure 7.3). These images show a man and woman perforating their earlobes while standing over what appears to be a pelecypod or bivalve shell.

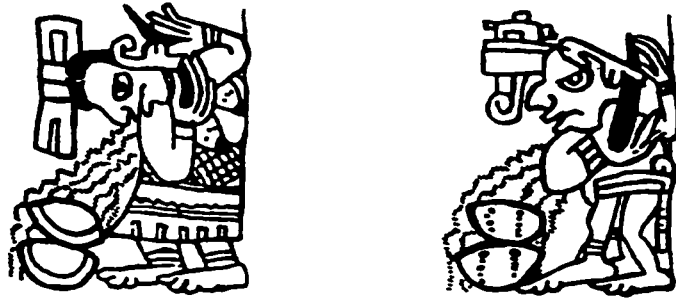


Figure 7.3: Bloodletting Rituals Depicted in the Madrid Codex (after Sharer 1994, Figure 11.12). Illustration courtesy of Stanford University Press.

In addition to the variety of artifacts made from shell, there are also representations of shell in different media, including ceramic and stone. A number of ceramic effigy vessels emphasizing shells as receptacles have been reported from sites in the Maya Lowlands (Coe and Kerr 1982:69; Moholy-Nagy 1963:78; Willey 1972:99-100). Like the conch shell paint containers mentioned above, Reents-Budet (1994:43) has discussed a ceramic paint container sculpted in the form of a halved conch shell that was recovered from the tomb of a Tikal ruler. Perhaps one of the most spectacular pieces imitating shell is an unprovenienced, Early Classic effigy vessel from the Peten, Guatemala. This vessel depicts God N emerging from a large gastropod shell, a scene that has been noted as occurring frequently on polychrome vessels with mythological themes (Coe and Kerr 1982:69). Greenstone has also been used as a medium for the creation of shell effigies. At Barton Ramie two greenstone effigies representing small bivalves were found in association with burials in structure BR-123 (Willey et al. 1965:482-483, 480). Each of these specimens had two biconical perforations at the

hinge. Unlike the ceramic representations, stone effigies are not common in the lowlands.

There is also evidence that in certain areas marine and freshwater shell was being used to meet some of the more basic, utilitarian needs of the community. For instance, shell middens are a common occurrence in coastal regions around the Yucatan Peninsula (Andrews 1969; Andrews et al. 1974; Eaton 1974, 1978; Graham 1989; Graham and Pendergast 1989). These dense concentrations of shell suggest that coastal inhabitants were using marine mollusks to fulfill at least some of their subsistence needs, a pattern that is apparent in coastal communities throughout the world. A wide variety of bony fishes were also commonly found in these middens, as were smaller numbers of mammals, birds, and reptiles. As mentioned in Chapter Four, large concentrations of shell have also been found at inland sites throughout the lowlands, although freshwater mollusks make up the largest percentage of these deposits.

In addition to their use as food items, shell was also being used as a raw material for the production of utilitarian tools in coastal communities. Eaton (1974, 1978) has noted the presence of shell celts and shell production debris in Preclassic deposits at the Rio Lagartos sites. He argues that these items were used for chopping and cutting tasks since high quality chert was not available in the area. Eaton also adds that these items were most likely produced for local consumption given the absence of similar items at inland sites. Dreiss (1994:191) reports four possible utilitarian items from Colha, including two scoop-like artifacts that may have been used as spoons or shallow bowls, one celt fragment, and one possible hammering implement. Despite the rarity of these

tools in archaeological reports, it is possible that many fragmented shell pieces were used as expedient tools in a wide variety of utilitarian tasks.

CONSUMPTION OF SHELL ORNAMENTS AT PACBITUN

Shell ornaments have been recovered from a variety of archaeological contexts at Pacbitun. While the focus of this study is on the Middle Preclassic shell assemblage, it must be noted that shell ornaments have been found in deposits extending through the Terminal Classic period (A.D. 700-900) (Healy 1990a). As mentioned in detail above, shells appear to have had some symbolic importance to the prehistoric Maya. This significance is evident at Pacbitun by the Middle Preclassic when shell artifacts were included in burial and cache deposits. As Table 7.1 indicates, only a small percentage of the total worked shell assemblage was recovered from ritual deposits. To date only one burial and one cache have been securely dated to the Preclassic period at the site. With the exception of northern Belize, few Preclassic burials have been recorded in the Maya Lowlands. Burial C-1 was associated with late Middle Preclassic architectural features in sub-plaza deposits in the center of Plaza C (Arendt et al. 1996). This burial consisted of a single interment placed in a cist-type grave. A number of artifacts were found in association with this individual, including two disk beads, one mano fragment, one obsidian blade fragment, and three clusters of ceramic sherds that most likely represent small vessels. While each of these artifacts may have been intentionally placed with the interred individual, it is also possible that some of these artifacts may have been accidentally deposited when midden or other cultural deposits were used as burial fill. While clustering of shell ornaments has allowed some researchers to identify specific

jewelry pieces (i.e., armbands, bracelets, necklaces) that were worn by the decedent, similar identifications could not be made at Pacbitun.

Table 7.1: Pacbitun Middle Preclassic Shell Ornaments by Archaeological Context.

	Early Middle Preclassic		Late Middle Preclassic	
	n	%	n	%
Burial	0	0.00	2	0.08
Cache	50	7.40	0	0.00
Floor	95	14.05	13	0.50
Construction Fill	101	14.94	2141	82.82
Perimeter	143	21.15	311	12.03
Structural Fill	287	42.46	117	4.53
Special Deposits	0	0.00	1	0.04
Total	676	100.00	2585	100.00

Shell artifacts have also been found in an early Middle Preclassic cache deposits at Pacbitun, further reinforcing the belief that shell was of ritual significance to the early inhabitants of the site. The cache consists of fifty irregular beads stacked together in a posthole along the northern retaining wall of Sub-SA B1 (Hohmann and Powis 1999:8). The form and arrangement of these items suggests that they may have been strung together at the time they were buried. Given the placement of these beads at the base of a posthole, this cache most likely represents a dedicatory offering that was placed within the posthole during the construction of this residential structure.

As Table 7.1 clearly indicates, the majority of the shell ornaments at Pacbitun were not found in ritual deposits. Instead, they were found in a variety of archaeological contexts including floor deposits, structural fill, construction fill, and perimeter deposits.

While some of these artifacts were found in secondary contexts, a large percentage was recovered from what is argued to be primary use-related. While it is important to note that complete and incomplete shell ornaments, particularly beads, were found in large numbers in these contexts, their deposition in these contexts do not inform on the nature or level of demand for these particular items. This information can be used, however, to reconstruct various aspects of the organization of shell ornament production. These data will be discussed in more detail in Chapter Eight.

CONSUMPTION OF SHELL ORNAMENTS AT BELIZE VALLEY SITES

Shell ornaments have also been identified in Middle and Late Preclassic archaeological deposits at a number of sites in the Belize Valley, including Barton Ramie (Willey et al. 1965), Blackman Eddy (Garber et al. 1998), Cahal Pech (Aimers 1992; Awe 1992; Cheetham 1995, 1996; Ferguson et al. 1996; Lee 1996; Lee and Awe 1995; Powis 1996; Sunahara and Awe 1994), Dos Chombitos Cik'in (Robin 2000), and Zubin (Ferguson 1995; Iannone 1996; Schwake 1996). Like Pacbitun, these artifacts were recovered from a variety of depositional contexts, including burials, caches, construction fill, and middens (Table 7.2). As mentioned above, only burial and cache deposits can inform on the demand for shell ornaments in this region. While Table 7.2 lists the frequency of shell ornaments in each of the archaeological contexts mentioned above, only the burial and cache deposits will be discussed in detail in the following section.

Table 7.2: Contextual Data for Modified Preclassic Shell Artifacts from Belize Valley Sites.

Site	Burial		Cache		Midden		Construction Fill		Total	
	n	%	n	%	n	%	n	%	n	%
Barton Ramie	42	93.3					3	6.7	45	100
Blackman Eddy			2	33.3			4	66.7	6	100
Cahal Pech										
Cas Pek	4	9.3					39	90.7	43	100
Plaza B			32	43.8			41	56.2	73	100
Plaza C					52	100			52	100
Tolok	2	16.7			3	25	7	58.3	12	100
Dos Chombitos Cik'in					26	100			26	100
Zubin	12	57.1					9	42.9	21	100

Excluding the burial from Pacbitun, thirty-four Preclassic interments have been reported from Belize Valley sites: Barton Ramie (n=13) (Willey et al. 1965), Cahal Pech (n=18) (Song 1995), and Zubin (n=3) (Iannone 1996; Schwake 1996). While many of these interments contained no grave goods at all, others were accompanied by ceramic vessels, obsidian blades, spindle whorls, greenstone/jade beads, bone pins and needles, and/or modified shell. Of the 34 interments, only 5 (14.7 percent) were accompanied by one or more pieces of worked shell. Shell tinklers, beads, rectangulates, adornos, and pendants were each identified in the Preclassic burial assemblages. Shell ornaments have also been found in Preclassic cache deposits associated with public and residential architecture at Cahal Pech and Blackman Eddy. Each of these deposits contained one or more worked shell artifacts, including disk beads, irregular beads, and pendants. In addition to the shell artifacts, each of these caches also contained a number of objects

manufactured from raw materials such as bone, chert, clay, greenstone, obsidian, and slate (Awe 1992:339-343).

COMPARATIVE DATA FROM OTHER PRECLASSIC LOWLAND SITES

Shell ornaments have been recovered from Preclassic deposits at a number of lowland sites outside of the Belize Valley: Altun Ha (Pendergast 1982), Blue Creek (Haines 1997), Caracol (Cobos 1994), Cerros (Garber 1989), Chan Chich (Robichaux 1998), Colha (Buttles 1992; Dreiss 1982, 1994), Cuello (Robin 1989; Robin and Hammond 1991), K'axob (Isaza Aizpurua 1997; Isaza Aizpurua and McAnany 1999), San Jose (Thompson 1939), and Santa Rita (Chase and Chase, personal communication, 1999), in northern Belize; Altar de Sacrificios (Willey 1972), Nakbe (R. Hansen, personal communication, 2000), Seibal (Willey 1978), Tikal (Moholy-Nagy 1994), and Uaxactun (Ricketson and Ricketson 1937) in Guatemala; and Dzibilchaltun (Andrews and Andrews 1980; Taschek 1994) in the Mexican state of Yucatan. Like the Belize Valley sites, shell ornaments were found in a variety of depositional contexts.

While nearly all of the above mentioned reports provide some discussion of the contexts from which shell artifacts were derived, only a few reports provide comprehensive contextual data for individual artifacts that may be used for comparative purposes. Contextual data from five northern Belize sites will be presented for comparison with the Belize Valley Preclassic shell assemblage: Blue Creek (Haines 1997), Cerros (Garber 1989), Chan Chich (Robicheaux 1998), Colha, and K'axob (Isaza Aizpurua 1997; Isaza Aizpurua and McAnany 1999). At present, 4,090 worked shell artifacts have been reported from these sites. As Table 7.3 indicates, the data reveal that while worked shell artifacts were recovered from a number of different contexts (i.e.,

burial, cache, fall, fill, humus, midden, pit feature), their frequencies were typically greatest in burial deposits. Contextual analysis has revealed that 86 percent of the Colha and K'axob assemblages was derived from burial deposits. Unlike the Belize Valley, some of the northern Belize sites have produced significant assemblages of Preclassic human skeletal remains, including Cuello (n=124) (Robin 1989; Robin and Hammond 1991) and K'axob (n=91) (McAnany et al. 1999). The majority of these interments were located beneath the floors of domestic structures. A variety of shell artifacts were recovered from these burials (e.g., beads, pendants, figurines, tinklers), but disk beads consistently occurred with the greatest frequency. These artifacts are assumed to have been items of personal adornment that were worn as jewelry or sewn onto the clothing of the deceased. While some individuals were interred with a single shell artifact, multiple shell artifacts accompanied others. The frequent clustering of shell artifacts around different parts of the body indicates that shell items were often strung together as necklaces, bracelets, and armbands or as elements of composite pieces such as headdresses and belts. Distribution analyses have shown that these items were associated with male and female interments of all ages.

Table 7.3: Worked Shell Artifacts from Preclassic Contexts at Select Lowland Maya Sites

Site	Humus		Fill		Midden		Pit Features		Fall		Burial		Cache		Totals	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Blue Creek	0	0.0	75	93.8	0	0.0	0	0.0	0	0.0	4	5.0	1	1.3	80	100
Cerro	1	0.9	9	7.9	67	58.8	4	3.5	1	0.9	4	3.5	28	24.6	114	100
Chan Chich	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	100
Colha	0	0.0	18	1.3	33	2.5	13	1.0	0	0.0	1150	86.2	120	9.0	1334	100
Kaxob	10	0.4	95	3.7	210	8.2	25	1.0	0	0.0	2198	85.9	22	0.9	2560	100
Totals	11		199		310		42		1		3356		171		4690	

Isaza Aizpurua and McAnany (1999) have recently published information on the Formative period worked shell artifacts from K'axob. This article stems from Isaza Aizpurua's (1997) master's thesis on the same subject. The sample in this analysis consists of worked shell artifacts ranging in date from the Middle Formative to the Early Classic period. As Table 7.3 indicates, these artifacts were derived from various archaeological contexts throughout the site, including burial, cache, construction, midden, paleosol, pit, and surface (Isaza Aizpurua and McAnany 1999:122). In addition to providing classificatory data on the worked shell artifacts, the authors have also identified temporal and contextual trends in the distribution of worked shell at the site. Beads were the most common shell artifacts at K'axob, although a number of different types have been identified. The authors note a significant decrease in the presence of beads at the close of the Late Formative period while there is a corresponding increase in more elaborate shell artifacts such as tinklers and figurines. They argue that the more elaborate artifacts were used as symbols of status and authority within an increasingly formalized authority structure, while beads represented generalized wealth that was only indicative of status when grouped together in large quantities (Isaza Aizpurua and McAnany 1999:124-125). In other words, the larger the number of beads, the higher the status of the individual interred. The presence of shell in sub-adult burials further reinforces their belief that shell artifacts were used in the creation of social identities. While shell artifacts were included as burial furniture in many adult and sub-adult burials, the majority of the modified shell artifacts were derived from a single Late Formative burial (Isaza Aizpurua and McAnany 1999:120). Burial 43 contained a single adult male with 2,019 marine shell beads and 2 ceramic vessels. The abundance of shell ornaments has

led the authors to suggest that this individual was of high status, perhaps one of the founders of the community.

Although no specific contextual data have been presented for the worked shell artifacts from the neighboring site of Cuello, it is important to note that shell artifacts were commonly identified in Middle and Late Preclassic burial deposits at the site (Hammond 1991:183-187; Hammond 1999; Robin and Hammond 1991; Robin 1989). Cuello has recorded the largest number of Preclassic interments (n=162) in the lowlands; unfortunately, excavators at the site were not always consistent in their system of recording grave goods. While some excavators quantified the frequency of individual shell objects associated with interments, others recorded necklaces and/or bracelets composed of multiple shell artifacts as single items. Like Blue Creek, Cerros, Colha, and K'axob, shell artifacts were not the only items included in Preclassic burials at Cuello. The Cuello burial assemblage was more diversified, including such material types as bone, chert, greenstone/jade, obsidian, and pottery. Like K'axob, researchers at Cuello have addressed the social implications of Preclassic burial practices at the site (Hammond 1999; Robin and Hammond 1991). In regard to grave wealth, Robin and Hammond have noted that domestic burials show no age/sex differentiation in terms of type and number of grave goods, but that significant differences are present in burials in public settings. While they do not specifically address the inclusion of shell artifacts in burials, they do state that "the association of juveniles with as many grave goods as adults could indicate hereditary wealth, or, equally likely, grave goods were personal equipment that did not function as wealth" (Hammond 1999:62). Despite this ambiguity, they acknowledge that

by the end of the Middle Preclassic period, variability in burial format suggests that social differentiation was present at Cuello.

Tikal is another lowland site from which significant numbers of shell artifacts have been recovered. Although contextual data from Tikal are not presented in Table 7.3, researchers working at Tikal have noted some interesting patterns in the temporal, spatial, and contextual distribution of shell artifacts at this well-known lowland Maya site. Moholy-Nagy (1963, 1978, 1985, 1987, 1994, 1997) has written extensively on the modified and unmodified shell artifacts from Tikal. This assemblage consists of 13,520 shell artifacts, including unworked shell (n=4,042), complete and fragmented shell artifacts (n=5,542), shell debitage (n=3,707), and probable debitage (n=229) (Moholy-Nagy 1994:93). These materials range in date from the Middle Preclassic to the Terminal Classic period. Based on their recovery context, raw material type, and association with specific structure groups, Moholy-Nagy (1994:101-103; 1985: 147) divided the modified and unmodified shell artifacts into “higher status” and “lower status” complexes. Examples of high status artifacts include pendants, beads, whole tinklers, earflares, horsecollars, spangles, and inlay elements. Cut tinklers, rosettes, rings, trumpets, and pegs are among the few low status items identified by Moholy-Nagy. She proposes that, “the social value of a shell artifact was apparently not determined by the amount of labor that went into its production” (Moholy-Nagy 1994:97). Instead, she argues that raw material was the primary signifier of status. High status items were manufactured from *Spondylus* and nacreous marine shell while low status items were made of white marine shell or freshwater mussels (Moholy-Nagy 1994:102). High status shell artifacts, including modified and unmodified shell, were recovered primarily from burials and

cache deposits while low status artifacts were typically found in middens and construction fill (Moholy-Nagy 1994:101-103).

SUMMARY

Ethnohistoric, iconographic, and archaeological data provide evidence that shell was of great importance to the prehistoric and historic Maya groups that inhabited the lowlands. Ethnohistoric data from several sources reveal that shell items served multiple functions in Maya society on the eve of Conquest, including their use as a form of currency, jewelry, and ritual offerings. There is some evidence to suggest that certain shell items were only worn by high-ranking community leaders; these items may have been protected by sumptuary laws. While a few utilitarian objects made from shell have been identified in coastal regions of the Maya Lowlands, the majority of the shell artifacts identified in archaeological deposits are ornamental in nature. During the Preclassic period shell artifacts are most frequently recovered from burial and cache deposits, providing evidence that these items were of ritual significance by the time permanent settlements were established in the Maya Lowlands. The inclusion of shell ornaments in burial deposits and their representation on polychrome vessels and mural paintings from the Classic period indicate that at least some of these items were being used as personal adornment in both life and death. The inclusion of shell items in cache deposits reinforces this link with the supernatural.

CHAPTER 8

ORGANIZATION OF SHELL ORNAMENT PRODUCTION IN THE BELIZE VALLEY

In this chapter I will address the organization of shell ornament production during the Preclassic period in the Belize Valley. In the first section of this chapter the criteria used to identify the presence of shell working are discussed. This is followed by a presentation of the archaeological evidence from two Preclassic Belize Valley sites exhibiting evidence of shell working: Pacbitun and Cahal Pech. In the following sections this evidence is used to investigate the concentration and scale of shell ornament production in the Belize Valley. Standardization in the production of shell ornaments is discussed in the final section of the chapter, providing information on the relative degree of specialization in the shell ornament production system.

ARCHAEOLOGICAL INDICATORS OF SHELL WORKING

Evidence of production must be identified before the organization of production can be evaluated. Production locales are notoriously difficult to identify in archaeological contexts, particularly when cultural processes promote the removal of production debris from their primary use-related contexts. The case studies presented in Chapter Three provide examples of the different criteria archaeologists traditionally use to identify shell working areas, including the presence of formalized production facilities (Carlson 1993), microscopic and macroscopic shell debris (Feinman 1999; Feinman and Nicholas 1993, 1995, 2000; Feinman et al. 1993; Howard 1985, 1993; McGuire 1986; McGuire and Howard 1987; Middleton 1995), and/or production tools (Yerkes 1983,

1987, 1989). While these are often found in direct association with each other, archaeologists have not always relied on their co-occurrence to determine the presence of production activities. For example, in the studies presented from the Maya Lowlands, scholars frequently address the scale and intensity of shell ornament production even when they have only identified shell debris in secondary deposits (Cobos 1994; Moholy-Nagy 1978, 1987, 1994; Pope 1994).

To avoid the problems noted in the lowland studies just mentioned multiple criteria were used to identify shell-working activities at Preclassic sites in the Belize Valley. For the present study shell working is recognized archaeologically by the co-occurrence of (1) broken and incomplete shell ornaments, (2) shell detritus, and (3) chert microdrills, and (4) burin spalls in a single context. Unlike the other studies, no single criterion is considered sufficient in itself to be used as a sole indicator of shell-working activities. There are numerous reasons why this strict definition was adopted. First, as noted in Chapter Four, isotopic and archaeological evidence have indicated that some Preclassic Belize Valley residents were regularly consuming marine fish and shellfish (Powis et al. 1999; Stanchly 1995; White et al. 1996). Given this knowledge it is impossible to determine if the fragmented marine shell found in archaeological deposits resulted from breakage for consumption or ornament production.

Second, although chert microdrills and burin spalls have been found in direct association with other shell working materials at Preclassic sites in the Maya Lowlands (e.g., Colha), they also occur independently of these specialized deposits. They may have been part of a specialized lapidary toolkit or they may have simply been generalized multifunction tools that were used in a variety of drilling and/or cutting tasks. These

tools were widely distributed at Preclassic sites in the Belize Valley and northern Belize, including those with and without shell debris (Awe 1992:311-312; Shafer and Hester 1983; Iannone and Lee 1996:11-12; King and Potter 1994:71-74; Potter 1991:24). Using use-wear analysis, Lewenstein (1987:113-115, 185-187) identified chipped stone tools that were used to work shell at the northern Belize site of Cerros, but none of these tools resemble the microdrills identified in the Belize Valley. Closer to the Belize Valley Pope (1994) has identified use-wear indicative of shell working on flake drills associated with shell detritus at Caracol, south of the Belize Valley. Although these drilling tools are occasionally found in association with shell working debris, the mere presence of these tools cannot be interpreted as direct evidence of shell working activities.

Data on Preclassic shell working in the Belize Valley were gathered from excavations and analyses conducted by the author and from published and unpublished reports and manuscripts. It must be noted that while archaeological reports from the Belize Valley commonly mention complete and/or broken shell artifacts, for the most part shell detritus has been largely ignored. Unmodified shell was occasionally mentioned in early reports, but these materials were not quantified and no attempts were made to collect these materials for analysis; they were typically re-deposited with backdirt. Faunal materials such as these have only recently become a central focus of archaeological research. Based on the available data only two sites in the Belize Valley exhibit evidence of shell working activities: Pacbitun and Cahal Pech. Information on site location, layout, and history of archaeological investigations for each of these sites was presented in Chapter Four. In the following section I will present the archaeological

evidence for shell working at each of these sites, providing a basis from which discussions of production concentration and scale can be undertaken.

SHELL WORKING AT CAHAL PECH

During the nine seasons of archaeological research at Cahal Pech, intensive excavations were conducted in the central precinct and peripheral areas of the site (Figure 8.1). Like virtually all of the archaeological sites identified in the Belize Valley, the terminal phase of architecture for most cultural features dates to the Late-Terminal Classic (A.D. 700-900) period. Despite the significant amounts of Classic period construction throughout the site, much of this research was designed to gain a better understanding of the Preclassic period, the time during which the first permanent settlements were established in the region (Awe 1992; Healy and Awe 1995, 1996). Systematic testing in the central precinct and peripheral settlements revealed significant Middle and Late Preclassic architectural and artifactual deposits. As noted in Chapter Six, Preclassic modified shell ornaments were found in various contexts throughout the site. Evidence of Preclassic shell working has also been reported in two peripheral settlements: Cas Pek and Tolok.

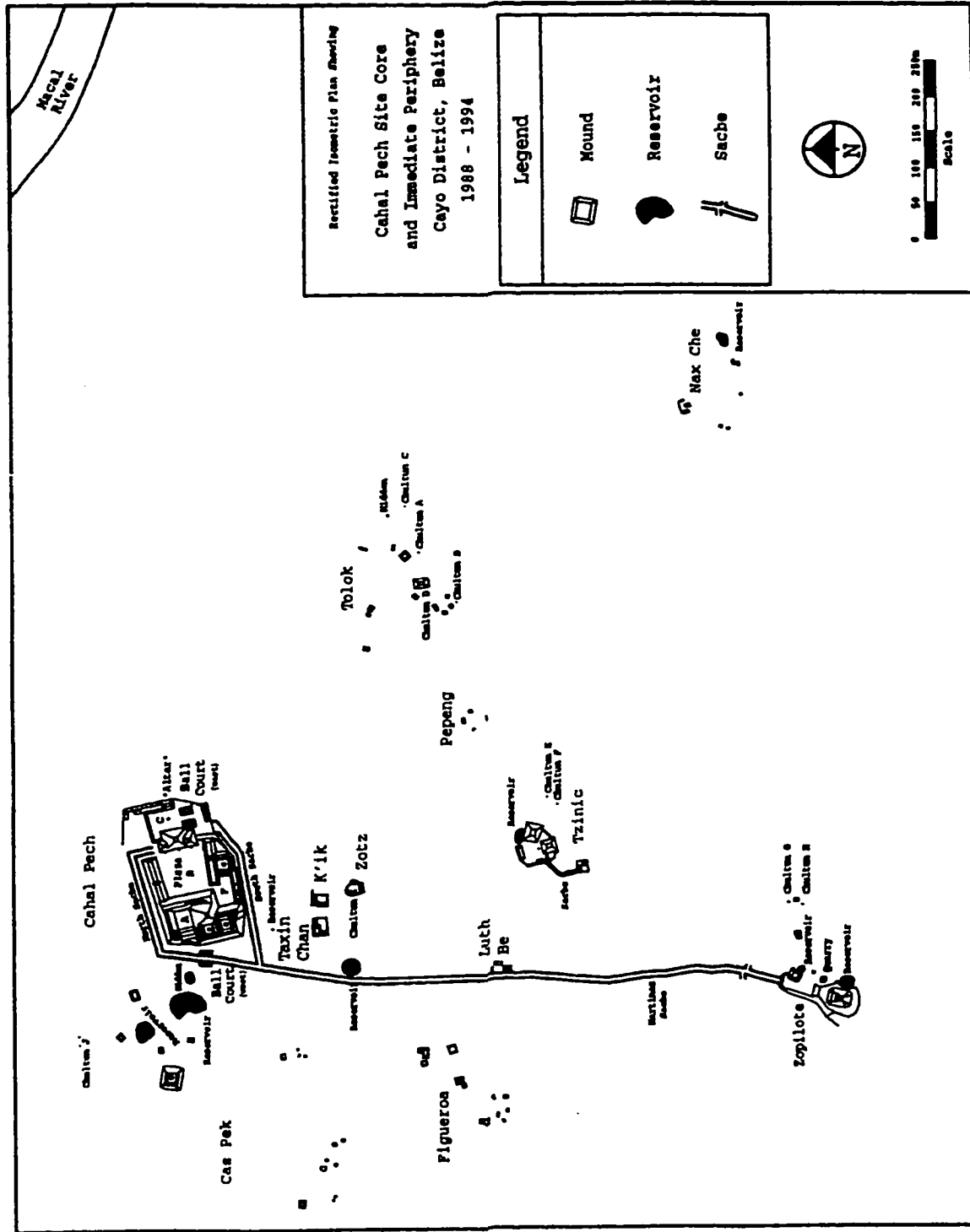


Figure 8.1: Isometric Plan of Cahal Pech Central Precinct and Peripheral Settlements (modified from Healy and Awe 1995, Figure 1).

Tolok is a large settlement cluster located 500 meters southeast of the central precinct. The Late Classic group consists of two dominant pyramidal structures surrounded by 15 solitary and grouped mounds (Powis 1996:34). Excavations were conducted at this peripheral settlement between 1991 and 1995, revealing a lengthy sequence of occupation extending from the Middle Preclassic through the Late Classic period (Powis 1996). During these excavations two circular platforms (Structures 14 and 15) and a large domestic midden (Structure 1) were exposed, each dating to the late Middle Preclassic. The presence of nine intrusive Late Preclassic and Classic period burials in and around the circular structures indicates that this area was ritually significant to the Tolok residents even after they were hidden from view by subsequent building activity. A single late Middle Preclassic burial (Burial 7) was found in association with Structure 15 (Powis 1996:B-7; Aimers et al. 2000:76-78). A wide variety of Preclassic artifacts were recovered from the structural fill inside these two circular platforms, including modified shell artifacts (Powis 1996:123-128).

Middle Preclassic artifacts were also recovered from a dense midden deposit located in an abandoned *chultun* or storage pit at the base of Structure 1 (Powis et al. 1999; Powis and Hohmann 1995:46-62). This deposit is believed to have been associated with Structure 1/4th, a small domestic platform located approximately 3-5 meters from the chultun. The dense midden deposit contained a wide variety of household refuse, including ceramics, lithics, animal bones, and freshwater shells (Powis et al. 1999:368-370). In addition to the freshwater shells that were most likely used as protein supplements, marine shell ornaments, marine shell detritus, and chert microdrills were also recovered from the midden deposit. Although this deposit does not represent the

location where production activities occurred, it is considered evidence of shell working based on the polythetic definition presented in the first section of this chapter. Frequency data for the Tolok shell working materials are given in Table 8.1.

Table 8.1: Distribution of Middle and Late Preclassic Shell Working Material at Cahal Pech

	Const. Fill		Midden		Burial	
	n	%	n	%	n	%
Cas Pek						
Shell Detritus	1812	76.5	0	0	0	0
Microtools	516	21.8	0	0	0	0
Ornaments	39	1.7	0	0	2	0
Cas Pek Totals	2367		0		2	
Tolok						
Shell Detritus	0	0	118	82.5	0	0
Microtools	0	0	13	9.1	0	0
Ornaments	7	4.9	3	1.4	2	1.4
Tolok Totals	7		134		2	

The second group to produce evidence of shell working activities is Cas Pek, a peripheral settlement located 150-200 meters west of the central precinct of Cahal Pech. The Late Classic group consists of twelve structures arranged around a large central platform. The site was identified and mapped in 1990, and in 1991 the northern half of the central platform was bulldozed during road construction, revealing a complex profile extending from the late Middle Preclassic through the Late Classic period. After the initial testing in 1990, large-scale excavations were conducted at this group between 1991 and 1995 (Cheetham et al. 1993; Lee and Awe 1995; Lee 1996; Sunahara and Awe 1994).

Excavations at Cas Pek revealed that this area had been the location of significant building activity since the late Middle Preclassic. Just above bedrock portions of three late Middle Preclassic platforms (Structures A, B, C) were exposed. Abundant Middle and Late Preclassic artifactual materials were found in the structural fill inside these platforms and in the construction fill used to level the area for subsequent building activity. Among the artifactual materials recovered from these contexts were marine shell detritus, chert microdrills and burin spalls, and a small number of modified shell ornaments.

Sometime during the transition from the late Middle Preclassic to the early facet of the Late Preclassic (300 B.C. – A.D. 250), extensive construction pens (D1, D2, D3) were erected on top of the earlier structures so that the area could be leveled. Each pen was subsequently filled with soil, large rubble, and artifactual deposits and covered with a thick plaster surface, creating an extensive platform on which Late Preclassic structures were erected. This construction event was of such magnitude that it is doubtful that a typical Maya commoner household would have undertaken this task. Since residential structures were erected on top of this platform, it is possible that the occupants of this peripheral group were of high status and able to enlist the labor of others to complete this feature. If this was the case, then it seems likely that construction fill would have been procured from areas throughout the site. Most of the artifacts from these construction pens were typical household refuse such as fragmented ceramics and lithic debris; however, shell working materials were also abundant. Frequency data for the shell working materials at Cas Pek are provided in Table 8.1.

Researchers excavating at Cas Pek have suggested that this peripheral group

was inhabited by specialists involved in the production of shell ornaments (Sunahara and Awe 1994; Lee and Awe 1995; Lee 1996). Based on the close proximity of this group to the central precinct, these researchers have further argued that the residents of Cas Pek may have been producing shell ornament for high-ranking individuals living in the central precinct. Unfortunately, since these materials were derived from construction fill there is little direct support for their statements regarding the precise identification of shell working locales and the presence of craft specialists.

Concentration of Shell Working at Cahal Pech

Excavations throughout the central precinct and peripheral zones have revealed that some of the Preclassic inhabitants of Cahal Pech were engaged in shell working activities. While modified shell ornaments and chert microtools have been identified in numerous contexts throughout the site, evidence of shell working is restricted to only two peripheral settlements: Cas Pek and Tolok. In both cases the shell working materials were not recovered from the areas where the production activities occurred. The artifacts unearthed in the Tolok midden were found in a transposed primary context which suggests that the items were deposited as refuse and remained in this depositional state until exposed by excavators. All of the shell working materials from Cas Pek were found in secondary contexts. As discussed in detail in Chapter Three, refuse can be discarded close to residential sites or at some distance. Given the close proximity of the midden and other late Middle Preclassic structures at Tolok, it is doubtful that refuse from other peripheral groups would have been deposited in this area. In this case the evidence of shell working can be attributed to the Tolok residents with some degree of confidence.

The evidence of shell working at Cas Pek is less secure since the materials were recovered from construction fill. The common use of domestic refuse as construction fill in the Maya Lowlands has complicated the identification of shell working locales since the original location from which midden deposits were procured can rarely be determined. Given the substantial construction efforts at Cas Pek during the late Middle Preclassic-early Late Preclassic transition, refuse may have been gathered from many areas of the site. Regardless of the context from which they were derived, the materials from Cas Pek do provide supporting evidence that shell working activities were being undertaken at Cahal Pech during the late Middle Preclassic and possibly Late Preclassic periods

Despite the contextual problems, the evidence presented above suggests that shell working activities at Cahal Pech were dispersed during the Preclassic period. The limited amount of production debris in the Tolok midden suggests that production was not an intensive large-scale industry at this particular residential group. Each household or residential group at Cahal Pech may have been responsible for producing the shell items it needed rather than obtaining them from a centralized production facility. While modified shell ornaments were recovered from many areas of the site during the Preclassic period, shell working debris has only been noted in two areas. If the presence of marine shell detritus were the only criterion used to identify the presence of shell working, there would still be little direct evidence of shell working activities at Cahal Pech. Outside of the materials found at Tolok and Cas Pek, approximately 150 pieces of marine shell detritus have been recovered in construction fill from numerous structures in the central precinct (Awe 1992:402-403).

SHELL WORKING AT PACBITUN

A systematic program of survey and excavation has been conducted at the site of Pacbitun, providing an excellent opportunity to evaluate temporal and spatial patterns in shell ornament production. Over a period of six field seasons (1984, 1986, 1987, 1995, 1996, 1997) architectural and cultural features within the central precinct were mapped and tested and a settlement survey and sampling program were undertaken in the peripheral zones at the site, including a one square kilometer core zone immediately surrounding the central precinct and peripheral zones beyond. Late-Terminal Classic architecture dominates the landscape at Pacbitun (Figure 8.2). Associated with these monumental constructions are equally elaborate stone sculptures (i.e., stelae and altars) and artifactual materials such as jade jewelry and mold-made figurines, carved slate, and shell ornaments (Healy 1990a). Preclassic artifacts and architectural features have also been identified at Pacbitun, including significant deposits of freshwater and marine shell. As discussed in Chapter Four, freshwater shell was likely being used as a protein supplement during the Preclassic period; thus, the large concentrations of freshwater gastropods (*Pachychilus* sp, *Pomacea* sp.) and bivalves (*Nephronaias* sp.) most likely represent waste from food consumption). While isotopic evidence indicates that at least some of the Preclassic inhabitants of the Belize Valley were consuming marine fish and shellfish, the abundant quantities of marine shell detritus and marine shell ornaments suggests that this raw material was being used for multiple purposes.

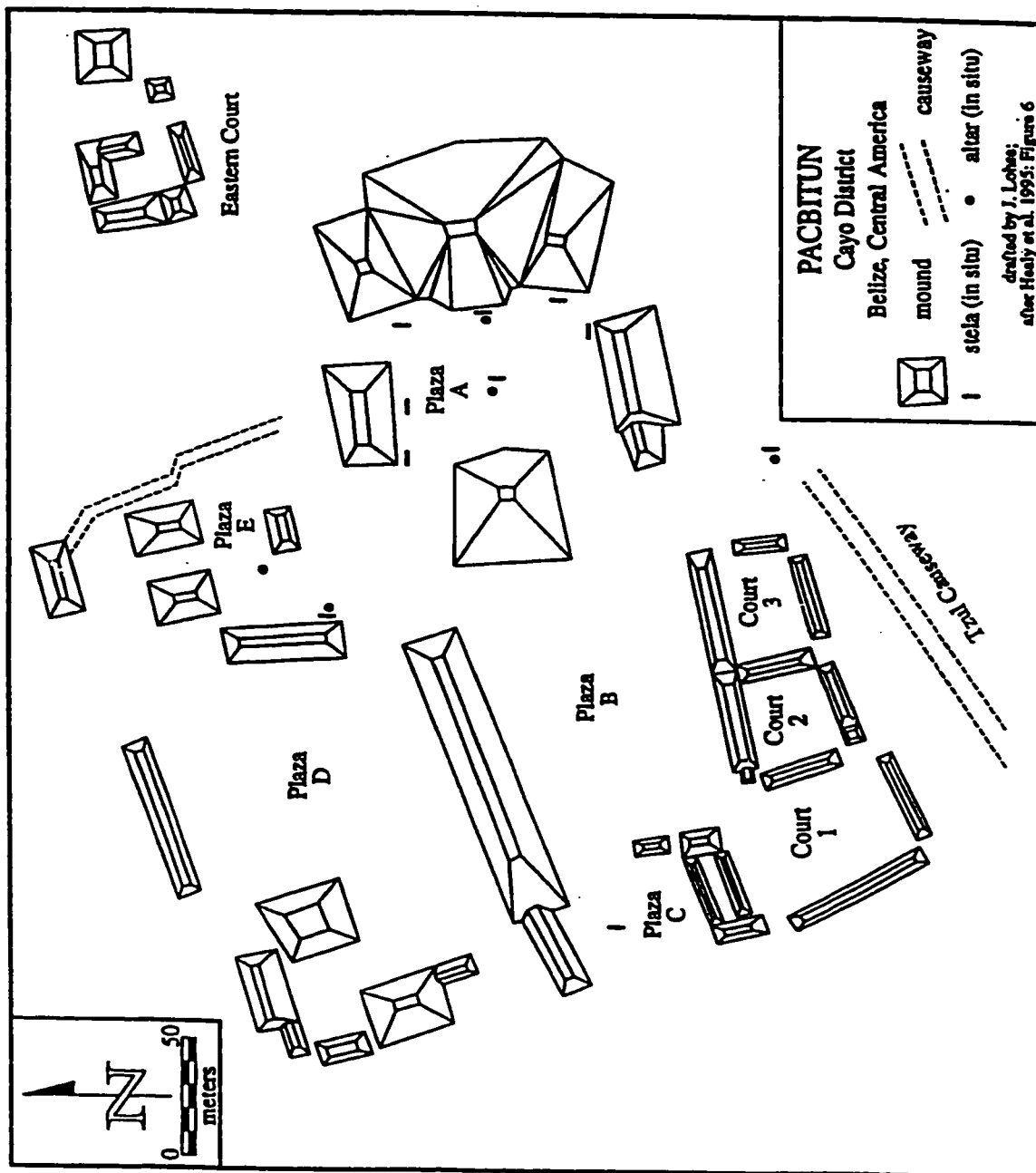


Figure 8.2: Isometric Plan of Pacbitun Central Precinct (modified from Healy 1990, Figure 3).

In the peripheral zones of Pacbitun, Middle and Late Preclassic ceramics were commonly identified in mixed deposits, but securely dated Preclassic occupation levels were rare. Within the 1 square kilometer core zone surrounding the central precinct, 185 mounded features were identified and mapped (Campbell-Trithart 1990). Of the twenty-one mounds tested only one mound (SE Quadrant 17) showed clear evidence of Preclassic architecture and artifactual remains. Survey and testing outside the core zone produced similar results, with only one mound (NW Transect 8) in the northwest quadrant showing evidence of unmixed Middle Preclassic deposits (Sunahara 1995:76-79). Preclassic shell working debris was not reported in either of these mounds, although a small number of Classic period shell materials were identified.

Middle and Late Preclassic architectural and artifactual materials occur with greater frequency in the central precinct of Pacbitun. During the earlier phase of excavations at the site, many pyramidal and range-type structures and plaza areas in the central precinct were tested. These excavations revealed Late Preclassic architecture in virtually every structure tested, but the configuration and dimensions of these features could not be determined due to the large amount of overburden from the later Classic period construction phases. These excavations produced substantial artifactual deposits, including ceramic, chipped stone, ground stone, shell, and bone artifacts; however, the majority of these items were recovered from construction fill, providing little information about use-related activities. Although marine shell artifacts were recorded in Late Preclassic contexts, no clear evidence of shell working materials was noted.

Securely dated Middle Preclassic architectural and artifactual remains were identified in sub-plaza deposits in Plazas B, C, and D of the central precinct. Excavations in these areas were conducted from 1995 to 1997 with the expressed purpose of investigating Preclassic occupation at the site (Healy and Awe 1996; Hohmann and Powis 1996, 1999; Hohmann et al. 1999). During the 1995 season a small unit was placed at the base of Structure 8, a large range-type structure on the north side of Plaza B, where a Middle Preclassic midden had been identified during the earlier field seasons (Healy 1990a:256). It was in this area that Middle Preclassic shell working debris was first noted at the site.

Plaza B is the largest plaza in the central precinct, measuring approximately 3,150 square meters. Excavation units were placed throughout the northern portion of Plaza B in an effort to expose the Middle Preclassic midden deposits that had previously been identified. Between 1995 and 1997 twenty-two square meters were excavated in Plaza B, revealing Middle Preclassic architectural features and artifactual deposits. Portions of 10 domestic structures (Sub-Strs B1-B3, B5, B6, B8, B10-B11, B13, B14) and 4 stone alignments (Sub-SA B4, B7, B9, B12) were identified in sub-plaza deposits in Plaza B (Figure 8.3). Architectural features were classified as structures if one or more corners were exposed and as stone alignments if no corners were exposed. Ceramic cross-dating and multiple radiocarbon dates have placed these structures firmly within the Middle Preclassic period (900-300 B.C.) (Healy et al. 1999 : 69-82). At Pacbitun the Middle Preclassic has been subdivided into early (900-650 B.C.) and late (650-300 B.C.) facets. As mentioned in Chapter Four, Mai is the local phase name for the Middle Preclassic period at Pacbitun. To avoid confusion when

multiple sites are being compared, period designations will be used rather than local phase names. Of the fourteen architectural features partially exposed in Plaza B, three (Sub-Str B1, Sub-SA B4, Sub-SA B12) have been dated to the early Middle Preclassic (900-650 B.C.) and eleven (Sub-Strs B2, B3, B5-11, and B13-14) have been dated to the late Mai phase (650-300 B.C.) (Hohmann and Powis 1996, 1999; Hohmann et al. 1999).

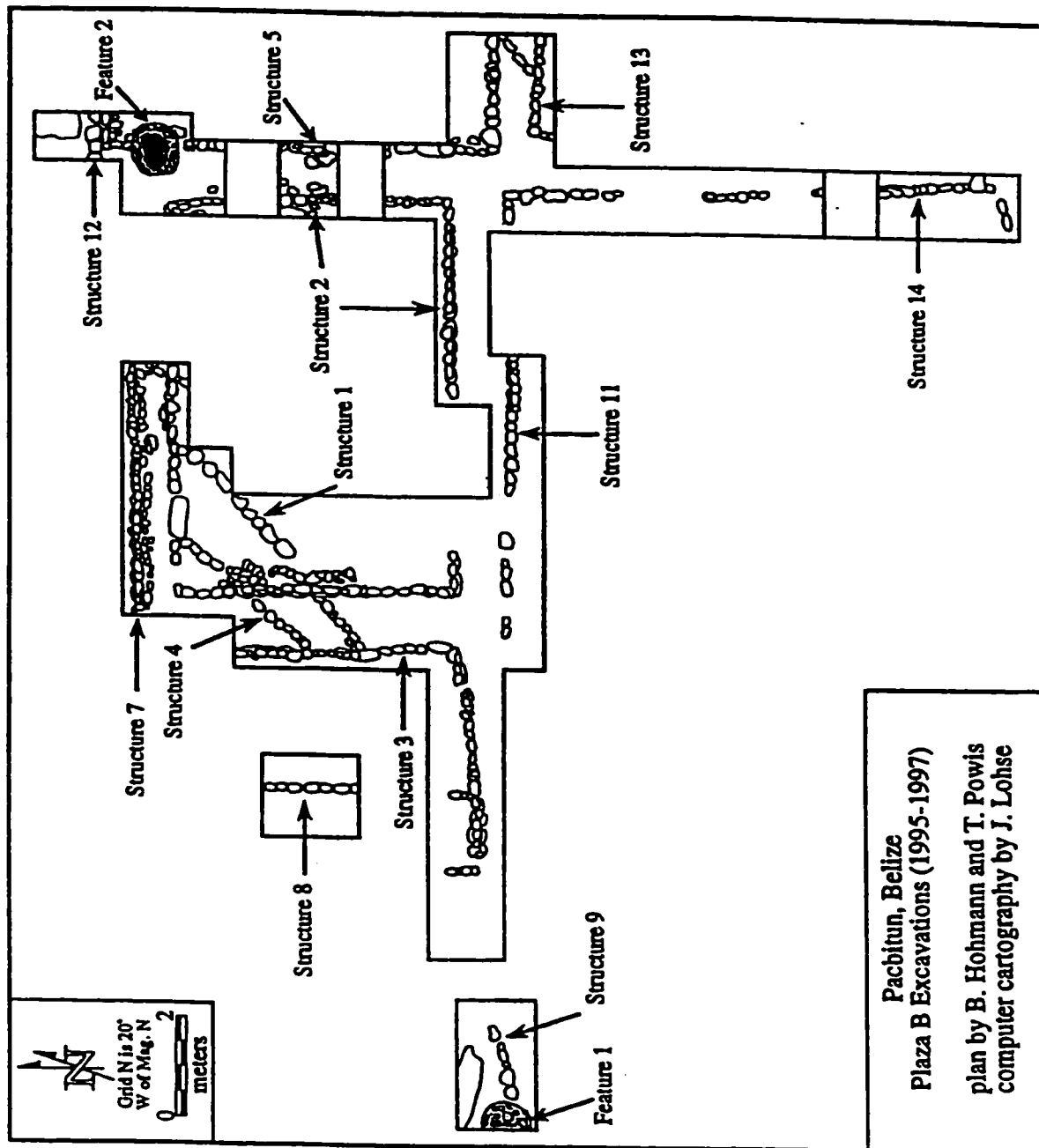


Figure 8.3: Plan View of Plaza B Excavations and Middle Preclassic Architecture at Pacbitun.

The early Middle Preclassic architecture was constructed on the same ground surface just above bedrock. Sub-Str B1 and Sub-SA B4 run parallel to each other with a narrow alleyway of tamped marl between them. These architectural features most likely represent basal platforms that would have supported perishable superstructures. Both features have retaining walls that are constructed of two courses of roughly shaped limestone blocks. The dimensions of these features are not fully known, but Sub-Str B1 measures at least 5 meters in length. A number of small postholes were identified in the tamped marl living surface inside the Sub-Str B1 platform. One of the postholes in this structure contained a cache of 50 irregular shell beads. The fact that the beads were vertically stacked suggests that they were strung together before being deposited. A large soil discoloration measuring approximately 2 square meters was identified in the floor surface along the western retaining wall of Sub-Str B1. The darkness of the soil suggests that organic materials may have been processed in this area. Marine shell detritus (n=143), microdrills (n=3), burin spalls (n=4), complete shell ornaments (n=44), and incomplete or broken shell ornaments (n=51) were recovered from this area as were abundant quantities of shell microdebitage. Given the limited exposure of this structure it is unclear whether this feature was located on the interior of a structure or in an external activity area such as a patio or plaza area.

Highly fragmented household debris and shell working debris similar to that noted in the floor deposits was also found embedded in the alleyway and abutting the foundation walls of these early architectural features, providing additional evidence that the residents of these early structures were engaged in shell working activities. Table 8.2 presents frequency data for the microdrills, burin spalls, shell detritus, and

modified shell artifacts found in a variety of contexts in and around these early Middle Preclassic architectural features at Pacbitun.

Table 8.2: Distribution of Middle Preclassic Shell Working Materials at Pacbitun

	Construction		Structural		Burial	Cache
	Floor	Perimeter	Fill	Fill	n	n
	n	n	n	n	n	n
Early Middle Preclassic						
Plaza B						
Shell Detritus	143	111	119	50	0	0
Burin Spalls	4	2	3	5	0	0
Microdrills	3	5	4	7	0	0
Complete Ornaments	44	111	76	206		50
Broken Ornaments	51	32	23	81	0	0
Plaza D						
Complete Ornaments	0	0	1	0	0	0
Broken Ornaments	0	0	1	0	0	0
Late Middle Preclassic						
Plaza B						
Shell Detritus	22	126	802	42	0	0
Burin Spalls	0	38	63	4	0	3
Microdrills	0	19	41	3	0	1
Complete Ornaments	11	291	1702	95	0	0
Broken Ornaments	2	21	435	17	0	0
Plaza C						
Shell Detritus	0	0	21	26	1	0
Burin Spalls	0	0	1	2	0	0
Microdrills	0	0	8	1	0	0
Complete Ornaments	0	0	6	2	0	0
Broken Ornaments	0	0	0	3	0	0

Around 600 B.C. the early Middle Preclassic architecture was abandoned and the hilltop area of Pacbitun was modified. The earlier structures were covered with a thin layer of soil and larger, better-constructed late Middle Preclassic structures were erected directly on top of them, indicating a preference for this location for a period of several hundred years. Like their predecessors many of the late Middle Preclassic structures (Sub-Strs B2, B3, B5, B8, B11) run parallel to each other and are separated by a one-meter wide alleyway. One of these structures (Sub-Str B2) measures roughly nine meters in length and is six meters wide. To date this structure represents the largest late Middle Preclassic example of domestic architecture unearthed in the Belize Valley. The walls of these structures are generally two courses deep and at least three courses high, measuring approximately 25 cm in height. These platforms are filled with earth, small stones, and cultural debris and are capped with a thick tamped marl surface. Although no postholes were clearly identified in the tamped floor surfaces of these platforms, each likely supported a perishable superstructure. The exact location of this superstructure on the basal platform cannot be determined without further excavation of this structure. Shell detritus, burin spalls, microdrills, and complete and incomplete shell ornaments were also found in association with these late Middle Preclassic structures. As Table 8.2 indicates, these materials were recovered from structural fill, floor deposits, and perimeter deposits surrounding these late Middle Preclassic architectural features.

The close proximity and common extramural areas suggests that the Middle Preclassic structures in Plaza B at Pacbitun were organized as a patio group with several structures situated around an open plaza or patio area. This is a common residential pattern that has been identified at lowlands Maya sites throughout the history of

occupation in the area (Ashmore 1981). While each of these buildings may have served a special function (e.g., kitchen, storage, residence), the presence of common domestic refuse both inside and surrounding these structures indicates that they all likely served domestic functions. This topic will be addressed in more detail when the scale of shell ornament production is evaluated below.

Some time during the late Middle Preclassic a dense midden-like deposit, most likely the one encountered during earlier excavations, was laid down over the top of the late Middle Preclassic structures. This thick deposit consisted of dark organic soil densely packed with artifactual refuse. Freshwater shells (*Pachychilus* sp., *Nephronaias* sp. *Pomacea* sp.) were the most common artifacts encountered in this deposit, but a wide variety of material types and artifact classes were also identified, including animal bones, marine shell ornaments, marine detritus, chipped stone tools and debris, jade ornaments, ceramic sherds, slate fragments, and groundstone tools (i.e., manos). The composition of this deposit suggests that it is a domestic midden, but it is unclear whether it is in primary use-related context or has been re-deposited as construction fill. All but one (Sub-SA B7) of the late Middle Preclassic architectural features were found sealed beneath this thick deposit. Excavations revealed that the midden deposit abutted the south face of the Sub-SA B7 wall, but the deposits did not extend over and beyond the wall. Further excavations are needed to clarify this relationship. Materials derived from this deposit were classified as construction fill given the ambiguity regarding its depositional context. The largest amount of shell working materials in Plaza B were recovered from this deposit, including large quantities of shell detritus (n=802), burin spalls (n=63),

microdrills (n=41), complete shell ornaments (n=1702), and incomplete shell ornaments (n=435) (Table 8.2).

Although the large horizontal excavations in Plaza B were the primary focus of the research at Pacbitun between 1995 and 1997, excavation units were also placed in Plazas C and D. The Plaza C excavations revealed portions of two early Middle Preclassic (Sub-Str C2, C3) and two late Middle Preclassic (Sub-Str C1, C4) structures (Arendt et al. 1996; Hohmann et al. 1999). These structures were similar in construction to those found in Plaza B, but no clear alleyways or perimeter deposits were identified. Small amounts of marine shell detritus, modified shell, and chert microtools were identified in Plaza C deposits; however, these materials were recovered from secondary deposits such as construction and structural fill. No floor or perimeter deposits were identified although tamped marl surfaces were exposed. A small test unit was also placed in Plaza D, revealing stone alignments (Sub-SA D1-D4) dating to the Middle Preclassic period. A small number of shell ornaments was identified in these deposits but like those encountered in Plaza C, these too were recovered from construction fill. See Table 8.2 for frequency data on these deposits.

Concentration and Scale of Shell Ornament Production at Pacbitun

Despite the widespread testing program at Pacbitun little evidence of Preclassic occupation was found outside the central precinct. The available evidence suggests that the Middle Preclassic community may have existed almost entirely within the confines of what is now the central precinct of the site, a pattern that has been noted at other sites where extensive Preclassic occupation has been identified like Cuello (Hammond. ed. 1991) and K'axob (McAnany and Lopez Varela 1999; McAnany et al. 1999) in northern

Belize. The Middle Preclassic artifactual materials recovered from Pacbitun reveal that the early site inhabitants had access to both local (e.g., chert, clay, slate, granite) and non-local (e.g., marine shell, obsidian, jade) raw materials. It is assumed that much of the production of everyday household items occurred at the household level based on the presence of production byproducts such as obsidian and chert debitage. Unfortunately, much of the Preclassic artifactual material recovered from the site was derived from secondary contexts, providing little evidence of the organization of the production of everyday goods. Fortunately, more substantial evidence exists for the production of shell ornaments.

Although small quantities of modified shell ornaments, marine detritus, and chert microtools were found in sub-plaza deposits in Plazas C and D, according to the polythetic definition presented above, only those materials found in Plaza B can be considered direct evidence of shell working activities. As noted in Chapter Three, ethnoarchaeological and archaeological studies have shown that artifacts often become embedded in floor surfaces where activities are conducted, including those undertaken inside and outside of structures. The abundance of shell working materials in floor deposits in Sub-Str B1 suggests that shell working activities likely were undertaken in this location, specifically the production of ornaments from marine and freshwater shell. Perimeter deposits found around the outside of the early and late Middle Preclassic structures provide additional evidence that production activities occurred in this location. Ethnoarchaeological and archaeological research have shown that refuse from household activities is frequently deposited in the areas immediately surrounding the residence. The one-meter alleyway between the early and late Middle Preclassic structures was probably

swept free of debris on a regular basis, a process that would explain the clustering of shell debris and highly fragmented household debris next to the retaining walls.

Throughout the history of permanent settlement in the Maya Lowlands the majority of the population lived in perishable wattle-and-daub structures constructed on raised earthen platforms with stone retaining walls (Ashmore 1981). The typical Maya residential compound consisted of two or more structures arranged around a patio or plaza area. In these residential units activities were conducted inside structures and in the open areas or patios between structures, a pattern that is supported by ethnographic and ethnoarchaeological research. Although only portions of the Middle Preclassic architectural features were exposed, their form and configuration suggests that they likely served as domestic structures. The presence of activity areas and household refuse in and around the Middle Preclassic architecture reinforces this hypothesis.

As discussed in Chapter Three, the scale of production describes the size and constitution of the production unit as inferred from the physical location where evidence for production activities is recovered (Costin 1991:29-30, 2000:25). In many typologies of specialized production scale and intensity are linked (Peacock 1982; van der Leeuw 1977) such that small-scale, household based production undertaken by kin-based groups is at one end of the continuum and large-scale, factory based production by unrelated individuals is at the other. In these typologies household based production is typically designed to replenish household goods. Feinman (1999) and colleagues (Feinman and Nicholas 2000) have recently challenged this link between scale and intensity. Using household level production data from the Valley of Ejutla, Feinman (1999) and Nicholas (Feinman and Nicholas 2000) have argued that high or low intensity production activities

can be conducted at the household level. Based on the evidence presented above, I would argue that shell ornament production at Pacbitun was undertaken by small kin-based groups organized at the household level.

CONCENTRATION OF SHELL WORKING AT THE REGIONAL LEVEL

To date evidence of Preclassic shell ornament production is limited to only two sites in the Belize Valley: Pacbitun and Cahal Pech. While each of these sites was occupied during the Middle and Late Preclassic periods, the evidence of shell working at these two sites is not entirely synchronic; shell working materials at Pacbitun date to the early and late Middle Preclassic while the Cahal Pech finds span the late Middle Preclassic and early Late Preclassic periods. The concentration of shell working activities in the Belize Valley is difficult to evaluate given the temporal differences and incomplete knowledge of the extent of Preclassic settlement in the region. The available evidence indicates that only Pacbitun and Cahal Pech were engaged in shell working activities. Since these two sites are located in the westernmost region of the Belize Valley, this could be considered a nucleated pattern of production. In their study of the Valley of Oaxaca communities, Flannery and Winter (1976:36) argue that shell ornament production was likely a regional specialization since virtually every household in two excavated villages was involved in shell ornament production. In the Valley of Oaxaca production activities were considered nucleated because all of the evidence for production was concentrated in one area of the region. Although shell working activities have not been identified at every Preclassic residential group at Cahal Pech and Pacbitun, this may be due to the lack of sampling in extramural areas surrounding Preclassic structures. Portions of Preclassic structures have been exposed in several areas of these

two sites, but given the depth of these deposits intensive sampling of peripheral areas has been limited.

PRODUCT STANDARDIZATION

While the distribution of shell working materials has provided evidence of the scale and concentration of Preclassic shell ornament production in the Belize Valley, indirect evidence obtained from the shell ornaments can also provide information regarding the production system. As mentioned in Chapter Three, standardization is an indirect measure that is often used by archaeologists to inform on the degree of specialization in a given production system, the assumption being that specialists will produce more standardized products than non-specialists (Costin and Hagstrum 1995; Crown 1995; Longacre 1999; Longacre et al. 1998; Rice 1991). Costin (1991:33; 2000:30-32) warns that items may be standardized because it is more efficient to produce them that way or because consumers demand it, not because they are produced by specialists. While there is some evidence to suggest a correlation between specialization and standardization, the exact nature of this relationship remains unclear and any statements regarding their association must be made with caution.

Among the Preclassic modified shell ornaments identified in the Belize Valley, disk beads exhibit a great deal of uniformity. As mentioned in Chapters Two and Three, production techniques and consumer demand account for some of the observed homogeneity among shell beads in some cultures. For example, historic and ethnohistoric evidence have revealed that shell beads served as a form of currency or media of exchange in many cultures at the time of European contact. In many of these cases, such as the *wampum* beads that were traded extensively throughout the eastern

United States and Canada, beads were of uniform diameter and standard lengths (Orchard 1975:71-86). Production techniques may also lead to more standardized products, even if the uniformity is not demanded by consumers. The shell beads produced by the Pueblo people in the American Southwest and the *wampum* manufactured by various Native American groups in the eastern United States were more standardized than those produced by other groups because strings of drilled beads were strung together and rolled across an abrasive surface, a technique that scholars argue was also used for bead making at Cahokia (Pauketat 1993).

Visual examination of the Preclassic shell disk beads from the Belize Valley reveals that these artifacts are quite uniform in size, particularly in reference to bead diameter. As mentioned above, the uniformity in disk beads may have resulted from consumer demand or it may have been a consequence or byproduct resulting from the production technique used in their manufacture. Of course, the obverse may be true. In other words, demand may have necessitated the development of techniques for producing more uniform beads. The assumption that more standardized assemblages resulted only from specialized production is too simplistic to be universally applicable. For example, many individuals and/or households were involved in the production of *wampum* beads and these items were highly standardized given their intended function as a medium of exchange.

In the Belize Valley few shell ornaments were recovered from primary use-related contexts; thus, there is little evidence regarding the demand for disk beads during the Preclassic period. In the absence of this evidence it is impossible to determine whether consumers demanded that disk beads be of uniform size. Ethnohistoric documents

indicate that shell beads served multiple functions in Maya society at the time of European contact. It is possible that beads used in specific exchanges were of standardized shape and size while those used as personal adornment or in ritual contexts (i.e., burial and cache) were more variable. Despite the lack of knowledge regarding the nature of the demand for disk beads, the degree of product standardization will provide useful information regarding the production of disk beads during the Preclassic period. The Pacbitun disk bead assemblage was chosen for this analysis due to the large size of the assemblage and the ability to clearly divide the assemblage into two temporal phases. The strong evidence for localized production also contributed to the decision to use this assemblage.

Using summary statistics such as sample means, standard deviations, and the coefficient of variation, the degree of standardization in disk bead diameter was measured. As reported in Chapter Six, the Pacbitun shell assemblage was divided into early Middle Preclassic and late Middle Preclassic phases based on ceramic cross-dating and multiple radiocarbon dates. Of the 1,519 disk beads identified in Middle Preclassic deposits at Pacbitun, bead diameter could only be measured on 1,387 due to fragmentation and breakage. Observations were made on 116 early Middle Preclassic artifacts and 1,271 late Middle Preclassic artifacts.

Graphical summaries such as histograms and boxplots are useful for making preliminary observations on samples under evaluation. The histograms presented in Figures 8.1 and 8.2 show that while the means of each of the samples are relatively similar, the spread of the data is clearly different. The observations for the late Middle Preclassic are tightly clustered around the median and reveal a normal distribution, while

the early Middle Preclassic sample shows a wider, non-normal distribution. The summary statistics presented in Table 8.3 reveal similar findings. While the sample means are similar at 7.958 for the early Middle Preclassic and 8.123 for the late Middle Preclassic, standard deviations differ considerably at 3.225 and 1.660 respectively. The combined visual and statistical data suggest that the late Middle Preclassic sample is more uniform than the early Middle Preclassic sample.

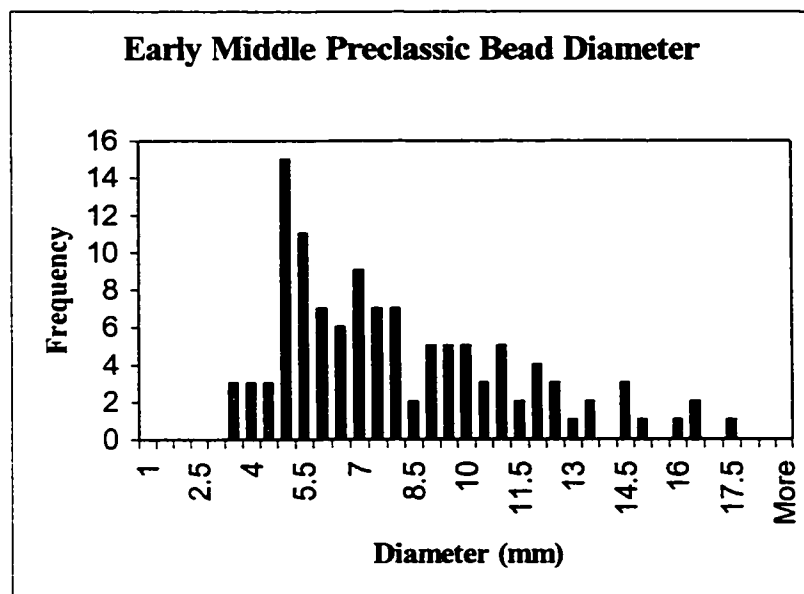


Figure 8.4: Diameter for Early Middle Preclassic Disk Beads at Pacbitun.

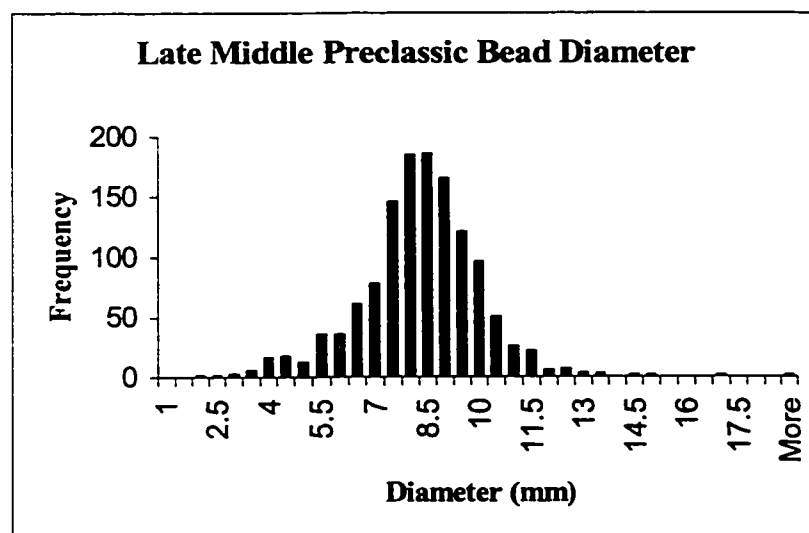


Figure 8.5: Diameter for Late Middle Preclassic Disk Beads at Pacbitun.

Table 8.3: Summary Statistics for Middle Preclassic Disk
Bead Diameter

	Early Middle Preclassic	Late Middle Preclassic
Mean	7.957758621	8.122659323
Standard Error	0.299432624	0.046551187
Median	7.1	8.2
Mode	5	8
Standard Deviation	3.224988058	1.659600419
Sample Variance	10.40054798	2.754273552
Coefficient of Variation	0.405	0.204
Kurtosis	0.137870539	2.537920224
Skewness	0.887075557	0.043121125
Range	13.9	16.6
Minimum	3.3	2
Maximum	17.2	18.6
Sum	923.1	10323.9
Count	116	1271

The coefficient of variation (CV) was used to evaluate the differences in variation between the early and late Middle Preclassic samples. The coefficient of variation is the sample standard deviation divided by the sample mean. This figure is typically multiplied by 100 and expressed as a percentage. In the present analysis the coefficient of variation for the early Middle Preclassic sample was calculated as 40.5 percent and the late Middle Preclassic sample was calculated at 20.4 percent. These differences indicate that the disk beads became more standardized through time.

Eerkens and Bettinger (2001) have recently discussed the use of the coefficient of variation statistic for evaluating the degree of standardization in artifact assemblages. They present information on the range of CVs calculated for various types of manually produced artifacts such as manos, microliths, projectile points, and ceramic pots. These are compared to the CVs calculated for manually produced, highly standardized items

(1.7 percent) and manually produced unstandardized items (57.7 percent). They state that while producers may have a mental template or an ideal of the item they want to replicate, scalar errors will occur in their reproductions due to errors resulting from limitations in human visual perception (Eerkens and Bettinger 2001:494). Given these limitations they argue that hand crafted items can have CVs no less than 1.7 percent. A CV value of 57.7 percent was calculated as the uppermost limit for unstandardized artifacts where a completely random sample was used to obtain the CV statistic. Since samples are rarely drawn completely at random, they state that in reality these high values would only occur when producers were intentionally trying to distinguish each of their products from the others.

Following the CV calculations presented by Eerkens and Bettinger, it would appear that the early Middle Preclassic disk bead sample at Pacbitun (CV=40.5 percent) is highly varied and approaching the 57.7 percent figure determined from their random sample. The late Middle Preclassic sample shows more signs of standardization with a CV of 20.4 percent. This percentage falls in line with those calculated for items such as Chaco Canyon manos, English Mesolithic microliths, and Great Basin projectile points as presented in Table 1 in Eerkens and Bettinger (2001:499). Following the arguments presented by Eerkens and Bettinger, the amount of variation within a sample may be due to the (1) number of producers, (2) accidental inclusion of artifacts from other classes, and/or (3) type of material being evaluated. In the case of the disk beads the decrease in variation between the early and late Middle Preclassic samples may be due to a decrease in the number of producers, a factor that most archaeologists would attribute to the development of specialized production. This decrease in variation may have also resulted

from a change in production techniques. During the early Middle Preclassic beads may have been ground and smoothed individually while they may have been strung together for final finishing during the late Middle Preclassic, a technique that would have produced more uniform products.

SUMMARY

Securely dated Middle and Late Preclassic shell artifacts have been reported from six sites in the Belize Valley, including Barton Ramie, Blackman Eddy, Cahal Pech, Dos Chombitos Cik'in, Pacbitun, and Zubin. While modified shell ornaments are relatively common in Preclassic deposits in the Maya Lowlands, evidence of shell ornament production is less evident. In this study multiple criteria were used to identify evidence of Preclassic shell working in the Belize Valley. Fewer criteria have been used in other studies, but it is argued here that these broad definitions may lead to misinterpretations regarding the level or importance of shell working at the site and regional levels. Based on the data available at the present time, direct evidence of shell working occurs at only two Preclassic sites in the Belize Valley: Pacbitun and Cahal Pech. Evidence from these sites indicates that shell working occurred at the household level and that no single group or site controlled access to marine shell or shell ornaments that were produced from this valuable material. No associations between individuals of high rank and the production of shell ornaments can be made at this time.

Indirect evidence obtained from the Middle Preclassic disk beads from Pacbitun has provided additional evidence regarding the production of shell ornaments during the Preclassic period. Coefficient of variation calculations on bead diameter have indicated that the late Middle Preclassic disk bead sample was more uniform than the early Middle

Preclassic sample. Based on the CVs many archaeologists would suggest that the industry became more specialized during the late Middle Preclassic or that fewer producers were involved in the production of shell ornaments; however, statements such as this must be made with caution since the decrease in variation may have simply been due to a minor change in production techniques.

CHAPTER 9

CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

The Preclassic shell ornament study has provided important new information on the production, distribution, and consumption of shell ornaments in the Belize Valley. While modified and unmodified shell artifacts have been found in Preclassic deposits at sites throughout the lowlands, most studies have only provided typological and taxonomic information on the worked shell assemblages. There have been few attempts to integrate all aspects of the industry and address larger issues such as craft specialization and the role of shell artifacts in the development of sociopolitical complexity. In this final chapter I will summarize the available data on the Preclassic shell ornament industry in the Belize Valley and discuss the larger implications of these findings. In the first section of this chapter a brief summary of the Preclassic shell industry will be presented, including comparative information from other lowland regions. Issues such as the identification of wealth or prestige items, specialized shell ornament production, and the role of shell ornaments in the Preclassic political economy will be discussed in the second section of the chapter. In the final section of the chapter directions for future research will be presented.

PRECLASSIC SHELL INDUSTRY

Shell artifacts are a ubiquitous artifact class found in Preclassic deposits in the Maya Lowlands. Modified and unmodified shell artifacts have been identified in securely-dated Preclassic deposits at a number of sites in the Belize Valley, including

Barton Ramie (Willey et al. 1965), Blackman Eddy (Garber et al. 1998, 1999), Cahal Pech (Lee and Awe 1995; Lee 1996; Sunahara and Awe 1993), Dos Chombitos Cik'in (Robin 1999), Pacbitun (Hohmann and Powis 1996, 1999; Hohmann et al. 1999), and Zubin (Ferguson 1995; Iannone 1996; Schwake 1996). The modified shell assemblage is diverse, including artifacts of many different sizes, shapes, and raw material type. Disk and irregular beads are the most abundant artifact types identified throughout the Preclassic period, but a number of additional types have also been found, including pendants, tinklers, perforated gastropods and pelecypods, whole scaphopods, and variety of bead forms (i.e., barrel, square, tubular). The utilization of different species and the range of variation in labor investment suggest that there may have been gradations of value within this assemblage by the beginning of the Middle Preclassic period. For instance, marine shell may have been of higher value than freshwater shell and tinklers may have been of higher value than disk beads.

Taxonomic data reveal that freshwater (e.g., *Nephronaias*, *Pachychilus*, *Pomacea*) and marine shell (e.g., *Strombus*, *Melongena*, *Prunum*, *Oliva*) were being utilized for the production of shell ornaments throughout the Preclassic period. Despite the inland location of the Belize Valley, marine shell was preferred for ornament production. The majority of the marine shell utilized in the Belize Valley was most likely derived from the Caribbean Sea since this coast would have been much closer than either the Gulf of Mexico or Pacific Ocean. The presence of abundant quantities of marine shell detritus indicates that at least some of the Preclassic shell ornaments were produced at the local level. Although only two Preclassic shell working sites were identified in this study (i.e., Pacbitun and Cahal Pech), more extensive excavations at other sites with

Preclassic deposits will likely result in the identification of additional shell working materials.

The Preclassic shell assemblage is relatively homogenous throughout the southern Maya Lowlands, perhaps suggesting a pan-lowland tradition of ornament production similar to that of the Mamom ceramic sphere that has been identified throughout the southern lowlands. Artifacts similar to those from the Belize Valley have been reported at sites like Blue Creek (Haines 1997), Cerros (Garber 1981), Colha (Buttles 1992; Dreiss 1994), Cuello (Hammond 1991), and K'axob (Isaza Aizpurua 1997; Isaza Aizpurua and McAnany 1999) in northern Belize and Nakbe (R. Hansen, personal communication, 2000), Tikal (Moholy-Nagy 1987, 1994), and Uaxactun (Ricketson and Ricketson 1937) in Guatemala. Disk beads are the dominant ornaments in each of these assemblages, but a variety of other types have also been identified. While a small percentage of the modified shell artifacts were manufactured from freshwater shell species, the majority of these items were made from marine shell. Unmodified shell artifacts or shell detritus have been reported at many of the sites just mentioned, but to date no comprehensive studies of Preclassic shell ornament production have been undertaken.

SHELL ORNAMENT PRODUCTION

Production activities are often described as being generalized or specialized depending on the quantity of items produced and the amount of time involved in their production. Generalized or non-specialized production is designed to replenish the household assemblage, while specialized production involves the distribution of items beyond the production locale. The organization of production activities in the Maya Lowlands has long been a topic of interest to archaeologists. The presumed

“homogeneity” of the tropical lowland environment led many researchers to argue that economic specialization would not have been possible in the Maya Lowlands (Sanders and Webster 1978). Subsequent research has provided substantial evidence contradicting this theory, but the organization of production activities in the Maya Lowland is still a topic of much debate among Mesoamerican archaeologists.

Despite the intensive archaeological research directed towards Classic Maya civilization, there is currently more direct evidence for shell ornament production during the Preclassic than there is during the Classic period in the southern Maya Lowlands. The lack of evidence for shell working may be due to sampling problems or it may simply reflect the declining importance of shell artifacts among the lowland Maya during the Classic period. Given the ubiquitous distribution of Middle Preclassic shell ornaments in the Maya Lowlands, it is safe to assume that these items were of social, political, and/or economic importance during this period of cultural development. In the Belize Valley two sites have provided secure evidence of Preclassic shell working: Pacbitun and Cahal Pech. Modified shell ornaments have been recovered from Preclassic deposits at other Belize Valley sites, but to date there is no direct evidence of shell working materials.

In the present study production scale and concentration were evaluated to provide information on the organization of shell ornament production in the Belize Valley. Given the limitations of the available data, production context and intensity could not be addressed in the present study. As discussed in detail in Chapter Eight, the distribution of shell working materials in the Belize Valley indicates that Preclassic shell ornament production was a dispersed activity at both the site and regional levels. The occurrence

of shell working debris at two sites indicates that no single site had control over the production of these high value items or the raw materials used in their production. The concentration of production sites in the westernmost portion of the Belize Valley may be significant since the two major river systems leading into Guatemala converge in this area, providing easy access to transportation routes. The association of shell working materials with Preclassic domestic architecture indicates that at least some of the production activities were undertaken at the household level, but it is unclear whether the shell items manufactured by these domestic production units were consumed in-house or were destined for exchange. The large amount of modified and unmodified shell materials at Pacbitun suggests that production may have been specialized, but further research is needed before this statement can be made with any confidence.

The Pacbitun assemblage is unlike those at most other sites with evidence of shell working because modified marine shell artifacts constitute a much larger percentage of the marine shell assemblage than shell detritus. Modified shell artifacts account for 70 percent of the Pacbitun assemblage, while shell detritus represents only 30 percent. At shell working sites like Ejuta, Tierras Largas, and San Jose Mogote in Oaxaca, shell detritus is much more common than finished products, suggesting to the excavators that most of the products were being exchanged or exported beyond the production locale. According to Feinman and Nicholas (2000:126-127), only 5 percent of the more than 24,000 pieces of marine shell at Ejutla were finished or incomplete artifacts; detritus accounted for the remaining 95 percent of the shell assemblage.

A number of factors may have influenced the proportional representation of modified and unmodified shell artifacts at Pacbitun. The modified shell ornaments may

represent production failures that were discarded with other production debris in refuse areas at the site. These items may have broken during the production process or were considered unsuitable for use because of manufacturing errors (e.g., off-center drilling, breakage at drill hole). It is also possible that these items were intentionally deposited during an important event such as the dedication or termination of a building or other construction events. Moholy-Nagy (1994:102, 264) reports that shell detritus was commonly deposited in burial and cache deposits associated with Classic period elite structures at Tikal, suggesting that it was not only the modified shell that was of ritual significance to the inhabitants of this site. The dense deposit of shell working material above the late Middle Preclassic structures at Pacbitun may represent such a deposit, although the large volume of associated household refuse seems to indicate that these materials were simply re-deposited as construction fill.

These findings bring to light an important question that must be addressed if we are to identify specialized production with any degree of accuracy: How do we know if items were intended for exchange or for the consumption of the production unit? As noted in the Ejutla example cited above, archaeologists often use the presence of shell working debris and absence of finished products to infer that finished products were destined for exchange beyond that of the production unit. Based on typological and stylistic similarities, Feinman and Nicholas (1993) have argued that the Ejutla producers were supplying individuals from Monte Alban with shell ornaments. Based on the small percentage of modified shell artifacts and the large volume of production debris in a domestic midden, Feinman and colleagues have argued that the production of shell ornaments at Ejutla was a specialized activity.

At the present time it is unclear how the finished shell ornaments from Pacbitun were being consumed. Shell artifacts have been recovered from a small number of burials and caches at Preclassic sites in the Belize Valley, but few of these special deposits have been identified so far at Pacbitun. The large volume of modified shell ornaments and production debris and the absence of any evidence for consumption may suggest that these high value items were destined for export. Unfortunately, the homogeneity of the Preclassic shell assemblage in the southern Maya Lowlands and present lack of analytical techniques to source shell to a specific area makes tracing lines of exchange difficult.

FUNCTION OF PRECLASSIC SHELL ORNAMENTS

In the anthropological and archaeological literature goods are traditionally classified as either wealth or subsistence items. Many scholars have argued that wealth items should be subdivided into at least two different categories based on the function of these items in the social and political realms. Hirth (1992) has used the terms “generalized wealth” and “badges of authority” to describe two categories of wealth items. Badges of authority or status insignia are visual symbols that unequivocally distinguish the rank or office of an individual, while generalized wealth is used by members of society in a number of social, political, and economic transactions at the intra- and inter-community levels. As noted in Chapter Seven, ethnohistoric data indicate that shell items served multiple purposes in Maya society at the time of European contact. Landa (Tozzer 1947) reported that shell items were (1) worn as jewelry by the high ranking members of Maya society, (2) used as a form of currency in market exchanges, (3) worn by children prior to “baptism”, and (4) used as ritual offerings. These

statements provide valuable information on the many uses of shell items during the early contact period, but the task of determining whether shell items were used as generalized wealth or badges of authority remains difficult. The fact that only high ranking individuals and priests were noted as wearing shell jewelry indicates that at least some items may have served as badges of authority, but the social and political contexts of their uses remain unknown.

Archaeological and iconographic data indicate that shell ornaments were also used in a variety of contexts during the Classic period. Mural paintings, scenes on painted polychrome vessels, and burial data provide evidence that shell was used as (1) jewelry items, (2) clothing adornment, (3) receptacles, and (4) musical instruments. While shell jewelry items may have been a form of generalized wealth that was used to visibly display an individual's prestige and power, there is currently no evidence to indicate that specific ornaments were used as badges of authority or office. Freidel and Schele (1988) have argued convincingly that certain jade pendants were used in this fashion during the Late Preclassic, but no comparable data exist for shell artifacts at this time.

Modified shell artifacts have been found in Middle and Late Preclassic deposits at a number of sites in the Belize Valley, but the majority of these have been recovered from secondary contexts, providing little information about the function of these items in the dynamic social setting. The presence of modified and unmodified shell artifacts in burial and cache deposits indicates that these items were commonly used in ritual contexts, but did these items serve only in this capacity or did they serve multiple uses? Richard Hansen (personal communication, 2002) has suggested that disk beads served as

a form of currency during the Preclassic. While this is one possible function, the frequent occurrence of these items in burial deposits provides evidence that particular items may have served multiple functions. In the Belize Valley, the widespread distribution of disk beads may indicate that these items served as generalized wealth, while the limited distribution of artifacts like tinklers may indicate that these items were used as markers of one's status or position in society. Isaza Aizpurua and McAnany (1999) have argued this point in reference to the Preclassic shell artifacts at K'axob, but additional distributional and contextual analyses are needed before this hypothesis can be formally tested.

SHELL AND THE PRECLASSIC POLITICAL ECONOMY

Archaeological and iconographic data indicate that during the Classic and Postclassic periods shell artifacts served as personal ornaments that were either worn as jewelry or as decorative items sewn onto clothing. While the social, economic, and political significance of shell items remains unclear at this time, it is generally agreed that the elite used shell ornaments as prestige goods to visibly display their power and position in Maya society. Some researchers have argued that items like shell and jade ornaments were exchanged between Maya elite as a way of establishing and maintaining alliances, but without knowledge of the production system this hypothesis is difficult to test. In addition to their uses in the dynamic social setting, modified and unmodified shell artifacts were also frequently deposited in burials and caches, suggesting that shell was of ritual significance to the Classic period Maya. Studies in Maya iconography and cosmology have provided evidence to support this statement. Information gathered from historic documents like *The Book of Chilam Balam of Chumayel* and the *Popul Vuh* have led iconographers to argue that shell and other water related items symbolized the

primordial sea out of which all life began, but iconographic evidence also suggests a link between shell and the watery underworld or Xibalba (Tedlock 1985). In either case, this information provides some explanation of the symbolic and ideological significance of these items in ritual deposits of the ancient Maya.

Archaeological research has revealed that shell ornaments were being produced and consumed by Maya groups in the southern lowlands by the early Middle Preclassic period, indicating a tradition of shell ornament production spanning approximately two millennia. The modified shell artifacts were recovered from both primary and secondary contexts at a number of Belize Valley sites. As mentioned above, similar findings have been reported at Preclassic sites in northern Belize and in the Department of Peten, Guatemala. The identification of modified and unmodified shell artifacts in burial and cache deposits suggests that shell was already of ritual significance to the lowland Maya by the Middle Preclassic period. The fact that some of the earliest examples of wealth items in the Maya Lowlands are made of shell is particularly significant since shell was of ideological significance to the Maya. According to Helms (1979, 1993), rulers or other politically motivated individuals often use symbolically charged items in their attempts to build power and prestige.

The question of interest here is what role, if any, did shell artifacts play in the Preclassic political economy in the Belize Valley and other lowland regions? As discussed in detail in Chapter Two, ethnographic research has revealed that shell artifacts and other high value items have played important roles in the political economies of non-state societies. These high value items are typically used in exchanges and competitive displays designed to establish and maintain alliances. It is possible that during the

Middle Preclassic politically motivated individuals began acquiring shell ornaments and other high value items to be used in competitive displays and exchanges designed to build power and prestige at the intra- and inter-community levels. According to Clark and Blake (1994) and Hayden (1998), new or foreign technologies are often introduced by political aggrandizers as part of their pursuit of prestige. These individuals may have begun importing marine shell and producing shell ornaments for distribution to their followers. Given the widespread distribution of marine species along the coast of the Yucatan Peninsula, access to marine shell could not be restricted like isolated deposits of high quality obsidian, jade, or chert. Given the great distance between the Belize Valley and the coast, it is possible that access to marine shell was restricted to only those individuals with durable watercraft. Since there is also clear evidence that some of the Preclassic Maya inhabitants of the Belize Valley were consuming marine fish and shellfish, this is a distinct possibility.

The fact that most inland sites were importing non-local marine shell, jade, and obsidian by the beginning of the Middle Preclassic period suggests that the early inhabitants of this region were involved in more than just agricultural pursuits. The identification of public architecture, differential burial treatment, and differential access to certain foodstuffs suggest that the Maya made the transition from an egalitarian to a ranked and/or stratified society by the Late Preclassic period (Awe 1992; Healy and Awe 1995, 1996; Hammond. ed. 1991). The evidence of shell working at Pacbitun and Cahal Pech may indicate that politically motivated individuals were controlling the production and distribution of shell ornaments as a means of establishing power and prestige by the

Middle Preclassic period, but additional research will need to be conducted to determine whether shell working was restricted to individuals of status.

DIRECTIONS FOR FUTURE RESEARCH

The present study has provided new information on the production, distribution, and consumption of Preclassic shell ornaments in the Belize Valley, but we are still far from understanding this industry and its importance to the early Maya inhabitants of this region. Intensive excavation of Preclassic occupation levels are needed if we are to accurately reconstruct the shell ornament industry in this region during this crucial period in Maya prehistory. Continued excavations at the shell working sites of Pacbitun and Cahal will provide additional information regarding this important industry. While only a few sites have exposed securely dated Preclassic architectural and/or artifactual deposits, archaeologists have reported Preclassic artifactual materials in mixed secondary deposits at most large centers in the region. Since refuse rarely moves great distances, it can be assumed that each of these sites was occupied during the Middle or Late Preclassic periods. Preclassic deposits will undoubtedly be exposed at these sites during future excavations.

Extensive horizontal excavation of the Preclassic architectural features and extramural areas at Pacbitun will provide additional data that can be used to address the scale, concentration, intensity, and context of shell ornament production. Analysis of patio and house floor deposits will be instrumental in these reconstructions since they provide direct evidence of production activities. Microdebitage analysis will be a useful tool in detecting shell working areas associated with the Preclassic architectural features. Using microdebitage evidence from floor samples at the Ejutla site, Middleton (1995)

found that chert, greenstone, and marine shell were modified in formal work areas inside domestic structures. Howard (1993) has reported similar findings for Hohokam sites in the American Southwest where aprons of shell working debris were identified around interior fire pits. Evaluation of the floor deposits inside the late Middle Preclassic structure at Pacbitun has already provided some evidence that shell was being modified inside domestic structures, but additional microdebitage analysis may reveal specific work areas within the structures or extramural areas. Several researchers have argued that the segmentation of domestic space or formalization of work areas occurs with increased economic specialization (Kent 1984, 1990) or production intensity (Arnold 1991; Middleton 1995). In conjunction with other methods, microdebitage analysis may be used to address the issues of production intensity and craft specialization at shell working sites in the Belize Valley.

The temporal and spatial distribution of shell artifacts and shell working areas were discussed in this study, but the means by which artifacts were distributed or transferred from producers to consumers was not addressed. The nature of the relationship between producers and consumers is difficult to reconstruct since exchange behaviors do not leave clear and unequivocal archaeological residues. Modes of exchange such as reciprocity, redistribution, and market exchange are commonly mentioned in archaeological and anthropological studies, but their archaeological signatures remain somewhat ambiguous. This task is further complicated when production locales have not been identified. As noted in the first section of this chapter, the shell artifacts produced at Belize Valley sites may have been distributed for local consumption or they may have been intended for inter-regional exchange. While sites

with evidence of shell ornament production have been identified, it is unclear whether the finished products were being retained by their producers or distributed to individuals at the local, regional, and/or inter-regional levels.

Researchers have been able to accurately trace the flow of certain artifacts or resources from their point of origin to their final deposition using chemical characterization analyses (e.g., X-Ray Fluorescence, Neutron Activation Analysis), but stylistic and typological analyses have also played important roles in determining the source of particular items. Given the homogeneity in the Preclassic modified shell assemblages throughout the Maya Lowlands, determinations based on stylistic or typological distinctions cannot be made. Taxonomic identifications can often inform on the area or region from which a particular shell was derived, but the high degree of modification on many Preclassic shell artifacts has made taxonomic identifications at the genus and species level difficult in most cases. The widespread distribution of many Caribbean shell species also contributes to the difficulty in determining the movement of artifacts. The natural distribution of most of the marine species utilized by the Preclassic Maya extend throughout the western Caribbean, meaning that a particular species can be found as far north as Isla Mujeres, Mexico, and as far south as Brazil.

Chemical composition analysis of shell may provide a means of determining the source location from which certain species were derived and tracing the flow of finished artifacts from their production locales. As mentioned above, the widespread distribution of many Caribbean species and the high degree of modification has made it difficult to pinpoint the location from which specimens might have been obtained by taxonomic identification alone. Since environmental differences are known to cause chemical

variation in the shells of mollusks, it may be possible to compare the composition of modified shells at inland sites with modern samples of the same specimens from different geographic locations. Currently no chemical database for shell exists for the Yucatan coastline. Although a complete discussion of shell sourcing is beyond the scope of this study, it is important to note that there have been significant temporal changes in marine environments with industrialization and other cultural modifications of the environment, making it difficult to make direct correlations between the chemical composition of modern and prehistoric specimens.

Although it is currently not possible to use chemical characterization analyses to determine the source of specific shells, it may be possible to compare the chemical characteristics of modified shell artifacts from different sites to trace the flow of artifacts from production units. It has been suggested that the shell working sites in the Belize Valley may have been strategically located to take advantage of the waterborne transportation routes leading into the heart of Guatemala. The evidence of shell ornament production at Pacbitun suggests that a significant number of shell artifacts were manufactured by the craftsmen at this site during the Middle Preclassic period, but there is still little evidence of their consumption. These items may have been exchanged with individuals from other sites in the Belize Valley or they may have been exported much greater distances. Comparing the chemical composition of modified shell artifacts from Pacbitun to those from sites like Nakbe, Tikal, and Uaxactun may provide some definitive evidence of the exchange of shell ornaments during this period.

SUMMARY

Analysis of the Belize Valley Preclassic shell artifacts has revealed some interesting patterns in the production, distribution, and consumption of shell ornaments during this dynamic period in Maya prehistory. The distribution of shell working materials indicates that the residents of two Belize Valley sites were involved in shell ornament production during the Preclassic period: Pacbitun and Cahal Pech. Production activities appear to have been dispersed at both the site and regional levels such that no single group controlled access to marine shell or the production of shell ornaments from this valuable, non-local raw material. The association of shell working materials with Preclassic domestic architecture indicates that at least some of the production activities were undertaken at the household level, a pattern of production that has frequently been noted among Preclassic and Classic period shell workers in other areas of Mesoamerica, particularly Oaxaca.

While there is some evidence to indicate that the Maya made the transition from an egalitarian to a ranked and/or stratified society by the end of the Middle Preclassic period, the role or function of shell ornaments in the dynamic Preclassic social setting remain unknown. It is suggested here that politically motivated individuals began importing this ritually significant material and producing shell ornaments to be used in competitive displays and exchanges designed to build power and prestige at the intra- and inter-community levels. The role of prestige goods in the development of political economies is frequently addressed in political models, but further research is needed before any firm statements can be made regarding the role of shell in Preclassic Maya society. It is hoped that this research is a step in the right direction.

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