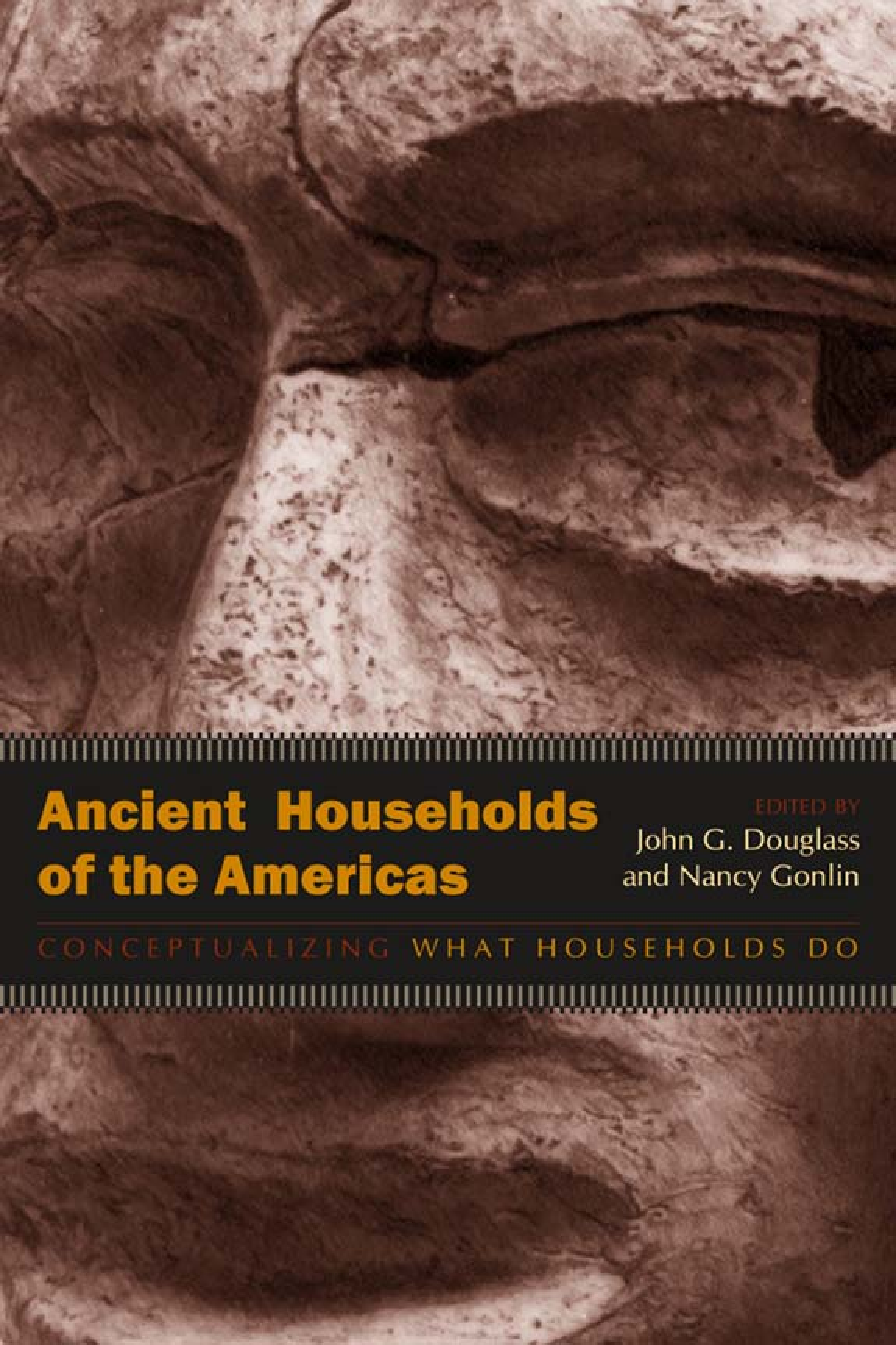

Ancient Households of the Americas

EDITED BY
John G. Douglass
and Nancy Gonlin

CONCEPTUALIZING WHAT HOUSEHOLDS DO

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To the spouses of the houses,
we dedicate this book to Jill and Vishy,
with heartfelt gratitude and love.

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Preface

The idea for this volume originated over a decade ago, in 1999–2000, when John Douglass was finishing a year as a visiting assistant professor at the University of California, Riverside. During that time, he organized a session for the 66th Annual Meeting of the Society for American Archaeology (SAA) in New Orleans that was centered on Wilk and Netting's (1984) innovative work on how households are conceived, using the phrase they coined "what households 'do.'" Hence, the title of the SAA symposium was What Households Do: Recent Research on Household Organization in the Americas. As a fresh Ph.D., Douglass was interested in the household research that had been conducted by Nan Gonlin in Copán, Honduras, just a couple of hundred miles from where Douglass had done his dissertation work in the Naco Valley of northwestern Honduras. Douglass and Gonlin met for the first time in San Francisco at the American Anthropological Association meetings, before the household session had occurred. Over lunch, Douglass and Gonlin agreed to co-chair the session at the upcoming SAA meeting and to move forward with a volume on the topic if participants agreed.

The presentations at the 2001 SAA session in New Orleans were well received thanks to the thought-provoking work of our colleagues. The room was packed with archaeologists interested in the cross-cultural comparisons on the economic aspects of household organization. Soon after the session, a prospectus for an edited volume was forwarded to the director of the University Press of Colorado (UPC), Darrin Pratt, who encouraged us to pursue a publication with his press. Several members of the original session, including Jeanne Arnold, Sue Kent, Tom Killion, Anna Noah, Linda Neff, Cameron Smith, and K. Anne Pyburn, were not able to be a part of the subsequent volume for a variety of reasons, but we appreciate their important contributions to the original SAA session. Several members who were not in the original session were subsequently invited to participate in this volume, including Chris Beaule, Richard Ciolek-Torrello, Robby Heckman, Hope Henderson, Víctor González Fernández, and Dean Snow. We appreciate these authors contributing important case studies to this volume from across the Americas and helping round out the volume geographically. Time in preparing the volume has been lengthy for a number of reasons (serious family illnesses, changing jobs, moving, and a variety of other aspects of household life), and we appreciate the patience and understanding of the volume's contributors and UPC, who have stuck with us through the process. Douglass and Gonlin have enjoyed getting to know the contributors and their research, as well as each other. Over the past few years, we have exchanged a series of funny postcards from various vacations. Working together has also led to other research collaborations, each of which we have enjoyed.

We hope that readers of this volume enjoy learning more about household economic organization among a variety of cultures across the Americas, both past and present.

John Douglass, Tucson, AZ
Nan Gonlin, Bellevue, WA
April 2012

Acknowledgments

First and foremost, we thank all of the contributors to this volume, who have made it a success. They have waited patiently for the publication of their work and we sincerely appreciate their tolerance. Darrin Pratt of the University Press of Colorado embraced this project from the beginning and has been a source of encouragement and critical feedback. We are grateful for all of those scholars who have developed theory and method in household archaeology and ethnography, some of whom have provided us with guidance in reference to the current work. Statistical Research, Inc. (SRI) has provided administrative support and professional development to Douglass for completion of this volume, for which we are grateful. At Belleveue College, Gonlin received administrative support and professional development. In particular, the Executive Dean Tom Nielsen, Director of Human Resources Cesár Portillo, the Dean of Social Science Virginia Bridwell, Administrative Manager Deanna Veyna, and Anthropology Chair Anthony Tessandori have been particularly supportive. During much of the time this volume was in preparation, Douglass was affiliated with the Department of Anthropology at UC Riverside and he appreciates the conversations and encouragement offered by the faculty in the department, including Wendy Ashmore, Scott Fedick, Tom Patterson, and Karl Taube. We appreciate both SRI and Bellevue College offering financial support to help complete this volume. The comments of anonymous reviewers for the volume have strengthened the chapters and the volume as a whole. During the production process, we appreciated the good cheer and technical help of the staff at the University Press of Colorado, including Darrin Pratt, Dan Pratt, Laura Furney, Beth Svinarich, and Jessica d'Arbonne.

Finally, our spouses deserve special gratitude for their continuing support and patience as we spent time away from them on weekends and evenings to get the volume completed. It is to our spouses, Jill Onken and K. Viswanathan, that we dedicate this volume.

ANCIENT HOUSEHOLDS OF THE AMERICAS

O N E

The Household as Analytical Unit

Case Studies from the Americas

JOHN G. DOUGLASS AND NANCY GONLIN

INTRODUCTION

The study of that small, but universal, component of society, the household, is now a global pursuit. Scientists who work in all parts of the world are addressing diverse research concerns for various times and places (see, e.g., Beck 2007; Carballo 2011; Christie and Sarro 2006; Falconer 1994; Fortier et al. 1989; Hendon 2010; Holschlag 1975; Kramer 1979, 1982; MacEachern, Archer, and Garvin 1989; Schwarz 2009; Stanish 1989). Household archaeology, however, is a relatively new field, coming of age in only the past few decades. While household studies in archaeology certainly go back much further than the mid-1980s (e.g., Flannery 1972; Flannery and Winter 1976; Hunter-Anderson 1977; Winter 1976), much of the theoretical and methodological study of households has its place in that decade (e.g., Ashmore and Wilk 1988; Netting, Wilk, and Arnould 1984a; Wilk and Netting 1984; Wilk and Rathje 1982). Fundamentally, household archaeology has its theoretical base set firmly in sociocultural anthropological theory, with the vast majority of contemporary theories of household archaeology having roots in functional analyses of households (e.g., Netting, Wilk, and Arnould 1984b).

This ethnographic framework has been modified and supplemented to fit archaeological contexts, and the contents of this volume are no exception.

The documentation of this analytical unit—whether small or large, rural or urban, commoner or elite—has generally been overlooked by much of the written record. Household archaeology offers insight into both the mundane as well as the unusual, illustrating the social, economic, political, and ideological realms of the most fundamental unit of society. By offering insight into the daily lives of households, archaeologists have been able to make visible the relatively invisible within society. Household archaeology, through excavation, analysis, and interpretation of the material culture of past societies, reveals the hidden transcripts (Scott 1985, 1990) of the diversity of experience, thoughts, and actions of household members.

Although the ethnological and archaeological definitions of the household differ in emphases (Kramer 1982), the household is the most fundamental spatial/activity unit of human society. It is responsive to social, economic, and political change, and it functions as a unit of adaptation. By studying the household through time and space, it can be used as a measure of cultural change and an indicator of social norms. The best way to obtain information on daily life in prehistoric societies is to excavate the remains of houses and their contents, the material correlates of the household. Numerous definitions of the household are employed by ethnographers and archaeologists alike. Those that are most useful to the archaeologist are the ones that relate to the material world and are recoverable in the archaeological record. We do not dig up kin relations or modes of production, but we do excavate houses, their contents, and very often the people themselves. The relation that a house has to a household may or may not be one-to-one. Several households may live in one large house, as among the Yanomamo (Chagnon 1997), or one household may live in several structures, as the Yoruba do (Lloyd 1955).

CONCEPTUALIZING HOUSEHOLDS AND THEIR FUNCTIONS

Netting and colleagues (1984a) and Wilk and Rathje (1982) have contributed substantially to the field of household studies and they are generally credited with popularizing the field of household archaeology. As a fundamental unit of society (Ashmore and Wilk 1988; Netting, Wilk, and Arnould 1984a, 1984b), the household is bound by both social and economic ties. Because of differences and variables among cultures, both across time and space, it is important that we have a pan-cultural definition of households. Following Wilk and Rathje (1982:618), the household is conceptualized here as

> the most common social component of subsistence, the smallest and most abundant activity group. This household is composed of three elements:

> (1) social: the demographic unit, including number and relationship of the members; (2) material: the dwelling, activity areas and possessions; and (3) behavioral: the activities it performs. This total household is the product of a domestic strategy to meet the productive, distributive, and reproductive needs of its members.

A dwelling, the activities performed by its members, and the members themselves define and create the household. To avoid thinking about households as simply the remains of material goods that might be excavated by an archaeologist, it is necessary to think about households as spheres of activities—that is, viewing them based on what households "do" (Ashmore and Wilk 1988:4–5; Wilk and Netting 1984:5–6). A household, then, can be viewed as an activity area (Ashmore and Wilk 1988:3). More specifically, Wilk (1991:chapter 3) has argued that a household can most readily be functionally defined as the maximal overlap of activities, including the physical shelter, which is generally viewed as a mediating factor for social relationships among household members.

Households are often confused with families (Netting, Wilk, and Arnould 1984b:xix–xxi), which are social units defined by kinship relationships, whereas households are based on behavior (Lightfoot 1994:12). While family members are tied by fictive or actual kin relationships, household members may be related to one another or may be simply acting cooperatively. It is quite possible that all household members are related to one another, but this may not always be the case; if so, it may be more likely in small rather than large households, as larger ones may in part be bigger by attracting non-related household members in a variety of ways. By basing the analytical unit of the household on function and behavior rather than kinship, cross-cultural comparisons are facilitated.

There are five widely recognized functions of the household: production, distribution, transmission, reproduction, and coresidence (Wilk and Netting 1984).

1. *Production* is "human activity that procures or increases the value of resources" (Wilk and Netting 1984:6). This activity can range from farming the land or grinding maize to raising a house or fetching water. Households are not generally passive in their production but, rather, have much to gain from meeting their subsistence needs. As Hirth (2009:19) points out, when households do not meet their subsistence and production needs, their very survival may be threatened. Tasks may be divided according to a gendered division of labor, a cross-cultural universal. The household acts as a corporate group in various activities, but each member need not participate in all activities. There can be several domestic task forces in action simultaneously. Production is closely related to the function of households, or what households do.
2. *Distribution* is another widely recognized activity of the household and involves moving material from producers to consumers. The exchanges

and transactions within and among households fall into this domain, as does consumption of food and goods. Reciprocal behavior best describes exchanges within the household, especially between related individuals, while other types of exchanges may characterize non-kin.

3. *Transmission* of material wealth and non-material items, such as titles or positions in a sociopolitical system, is colloquially referred to as inheritance. Inheritance is affected by such variables as amount of land, degree of agricultural intensification, population density, family preferences, and a host of other criteria.
4. *Reproduction* encompasses the generation of new family members by birth. Although this activity is common to most households, it does not have to occur within the domains of the household, nor does it occur between most members of a household. As Hirth (2009:18) points out, a main objective of households is to increase their economic well-being, which leads to larger households that are able to harness more labor for production. Generally, wealthier households are equated with higher, more successful reproductive rates (Netting 1982). Infant mortality rates directly affect successful reproduction of the household. Subsumed under this functional category is the socialization of children (Baxter 2008; Wilk and Netting 1984). Unlike reproduction, socialization requires participants to be in residence for a period of time. Another meaning of reproduction refers to social reproduction, that is, the continuity of culture (Gillespie 2000a). Generation after generation, traditions are carried out, sometimes with modifications. Evolution of such characteristics is often reflected in the material record. Ritual is a form of social reproduction and can be studied in domestic contexts (Gonlin and Lohse 2007; Plunket 2002).
5. *Coresidence* is not necessary for many functions of the household, though it has previously been assumed to be a criterion of households. Definitions of the family are explicitly characterized by coresidence (Murdock 1966:1), although there are exceptions. The structure of the household relates to family type, and members of the family may live together or apart. Likewise, members of one household may live in separate dwellings, but both families and households do seem to coincide more often than not (Bender 1967). In excavating houses, we assume coresidence of the household based on this general principle, while recognizing that coresidence of the family may not occur (as discussed above in the definition of the household). In fact, coresidentiality is a working assumption for the archaeologist who excavates dwellings. The family unit, much harder to identify, need not be localized since it consists of kinship ties that transcend time and space. As Wilk and Netting (1984) point out, the household is defined on behavioral terms, or how it functions, while families are described in structural terms, or the nature of kin relations. Following Murdock (1966:91), a kinship system is not a social group and does not correspond to an organized aggregation of individu-

> als. Through these five functions of households, archaeologists and ethnographers are able to identify what makes the household a valid unit of analysis.

The concept of house societies has gained increased interest since the 1970s, when the concept of house societies (*sociétés à maisons*) emerged as a theme in studying social organization of groups (e.g., Beck 2007; Gonzalez-Ruibal 2006; Joyce and Gillespie 2000; Lévi-Strauss 1982, 1987). Rather than focusing on lineal descent, house societies have their fundamental social and cooperative unit focused on the house, with social relations among individuals and larger social units also focused on the house. Interestingly, Lévi-Strauss still considers house societies as another kinship type (Gonzalez-Ruibal 2006:144). Here, the house "may represent social, economic, political, and ritual relationships among various individuals, who may form a permanent or temporary collectivity" (Gillespie 2000a:6). The corporate body referred to as a "house," however, is not the same as a household; rather, it is "a corporate body organized by reference to shared practices and common estate (which may or may not include a physical house)" (Robin 2003:333). While this concept is not used in this volume, it has gained importance as a concept for studying ancient societies, such as the Maya (Gillespie 2000b; Hendon 2000, 2001, 2002; Joyce 2000).

While many archaeologists, cultural anthropologists, and other researchers have focused their study on households, the terms used to describe them, or the particular contexts of them, vary a great deal. For example, some researchers have focused on physical aspects of households to describe them, such as houses and dwellings, using such diverse terms as "camp" (Kent 1999), "compound" (Hayden and Cannon 1982; Santley and Kneebone 1993), "courtyard group" (Howard 1985; Roth 2000; Wilcox, McGuire, and Sternberg 1981), "domestic structure" (Manzanilla and Barba 1990), "dwelling unit" (Killion 1987), "house compound" (Killion 1987), "household cluster" (Winter 1974), "house mound" (Clark and Blake 1994), "patio group" (Sheehy 1991), "patio groupings" (McAnany 1992), "patio units" (Tourtellot 1988), "pithouse cluster" (Diehl 1998), and "spatial residential units" (Santley and Hirth 1993) to describe elements of households. Other scholars have taken a more economic approach to discussing households, describing them more in terms of their economic organization and cooperation, using terms like "activity area," "coresidential work units" (Stanish 1992), "domestic domain" (Smith 1993), "overlapping activity spheres" (Wilk 1991) and "production/consumption units" (Wilk and Netting 1984). Either way, these scholars are describing varying aspects of households, although the terms perhaps suggest differences in the type of data collected. In the end, however, these various scholars are referring to the household or domestic unit, which refers to behavior-oriented, coresiding social groups that are "the next bigger thing on the social map after an individual" (Hammel 1984:40–41). Certainly, however, as discussed above, defining households in more economic terms, such as activity areas or overlapping activity spheres, allows for greater cross-cultural comparisons than simply defining them based on the proximity of dwellings or other physical forms.

DWELLING ARCHITECTURE, ECONOMIC ORGANIZATION, AND HOUSEHOLD FORM AND FUNCTION

For virtually the entire history of anthropology, there has been an interest in the form and function of domestic architecture and structures in both undifferentiated and complex societies. As far back as Morgan (1963 [1877]) in the late nineteenth century, the study of domestic space has been seen as intrinsically important to understanding social processes. As he stated in his famous book *Ancient Society*, "House architecture, which connects itself with the form of the family, and the plan of domestic life, affords a tolerably complete illustration of progress from savagery to civilization. Its growth can be traced from the hut . . . through . . . communal houses . . . to the house of the single family" (Morgan 1963 [1877]:5). While current anthropologists would no longer argue for Morgan's rigid and deterministic developmental stages of cultural evolution, his point that the structure of society can be viewed through the study of domestic architectural forms is clear. This argument is one still used today as a basic premise for studying domestic architecture (Kent 1990, *inter alia*).

Over the past three decades, the issue of substantial architectural change, such as round to square house shapes or other related processes, has been an essential issue to scholars in understanding household size and household social organization, including whether households are nuclear or corporate (e.g., Feinman, Lightfoot, Upham 2000:456–465; Flannery 1972, 2002; Gilman 1987, 1997; Hegmon 1996; McGuire and Schiffer 1983; Rocek 1995a, 1995b; Whalen 1981; Wilshusen 1989). In several parts of the world, including the Levant and the American Southwest, the transition from round to square houses is significant because it links the architecture and economic organization of households to the social and political organization of larger communities (see chapters in this volume by Beaule, Ciolek-Torrello, Snow, and Varien, among others, for additional discussions of the form and function of household architecture). In essence, the heart of the debate is one of how form follows function, as well as how architecture represents different aspects of society from the viewpoint of the household. Whereas architecture contributes to the integration of society by defining social boundaries and reinforces societal norms, the society will construct a built environment based on historical and social contexts (Hegmon 1989:7).

The shape of structures has been a research theme in archaeology and sociocultural anthropology for decades, beginning in the modern period with early researchers such as Morgan. Issues of shape—for example, whether a structure is round or square—were initially thought to have been related to functional characteristics of households and larger groups. Robbins (1966) and Diehl (1992) and Diehl and Gilman (1996), for example, argue that increased investment in structures may relate to increased sedentism. Circular structures tend to be efficient in design and the easiest to produce in a larger volume (Fitch and Branch 1960), whereas rectangular structures tend to have more interior space and, therefore, require more investments in time and labor (Robbins 1966). Although early studies like these were helpful, they were primarily descriptive in identifying relationships, rather than analytical.

Flannery (1972) constructed a much more elaborate understanding of the relationship between architecture and social organization, focusing both directly and indirectly on household organization. He argues that one of the differences between circular and square structures was not only the shape but also the size: circular structures tended, across time and space, to be smaller units occupied by smaller groups of people (households) than rectangular ones. Square or rectangular houses were square-cornered because of this different composition of the household that occupies such units: rectangular houses were easier to add to and partition, enabling households to evolve along with the developmental cycle (Goody 1972; Tourtellot 1988; Wilk and Rathje 1982). The critical point Flannery makes is that the actual form of the house reflects the composition and organization of the household (see chapters by Ciolek-Torrello and Varien, this volume). Flannery (2002) has more recently reanalyzed this problem and concludes that changes in architecture in many early agricultural societies in both the Old and New Worlds resulted from the evolution of household organization from nuclear to extended. He argues this was the case because nuclear households, in the face of increased labor needs associated with sedentism and domestication, were "not a viable economic unit" (Flannery 2002:424). Although there were certainly multiple causes for this architectural shift, according to Flannery, they all relate back to economic organization of the household (see also Feinman, Lightfoot, Upham 2000:463).

Various other archaeologists have built on Flannery's (1972) initial study over the past several decades. For example, Redman (1982) elaborates on Flannery's (1972) views, in his study of the early (7300–6700 BC) Coyoenue Tepesi site in Turkey. In studying the group's increased dependency on domestication, Redman concludes that increased storage needs, along with new patterns of labor organization, led to changes in architecture. Redman (1982) argues, in essence, that economic organization, especially changes in the base of labor organization, is reflected in the household's architecture. Fundamentally, house form is determined by three variables (Hunter-Anderson 1977): the number of people living in the space, the degree of economic heterogeneity encompassed by household members, and the volume of materials stored in the house. The higher degree of heterogeneity in the house, the more architecturally complex the space will become (see also Kent 1990). This issue of house shape and structure and the relationship to household configuration and organization has been researched to a great degree in the American Southwest in understanding the pithouse-to-pueblo transition and whether this fundamental change in household architecture was related to demographics (Plog 1978; Whalen 1981), sedentism and land tenure (Ciolek-Torrello, this volume; McGuire and Schiffer 1983), durability of architectural styles (Wilshusen 1988), changes in subsistence (Gilman 1987, 1997; see also Rocek 1995a, 1995b), or the economic organization of the household.

CURRENT HOUSEHOLD RESEARCH ISSUES

Here, a broad review of household research issues is detailed and discussed, including topics related to households as reflections of larger social trends, households as primary producers, gender and social relations within the household, inequality and distinctions among households (including ritual and ideology), and, finally, the organization of production within households.

Households as Portals into Societal Trends

Households, as discussed above, have become recognized as an elemental topic of inquiry in archaeology over the past several decades. As the first order of social organization above the individual (Hammel 1984:40–41), households offer essential information for researchers on not only the internal dynamics of individual households but also larger societal dynamics. Households may be generally conservative in nature and interested in self-sufficiency, but internal household dynamics of labor, wealth, gender, distribution, and other attributes likely are mirrors of the larger society of which they are a part. Households, in essence, are portals to understanding larger communities.

Households are increasingly seen as critical to understanding the rise of social complexity and the organization of societies (see chapters in this volume by Beaule, Henderson, González Fernández, and McCormack, among others, for examples). Household studies have been shown to be essential, for example, in studying the transformations and ebb and flow of evolving societies (e.g., Ashmore 1988; Flannery 1976, 2002; Flannery and Marcus 1983). One of the noteworthy aspects of this type of research is the different scales used to identify and study households, including both detailed intrasite analyses of household remains (e.g., Allison 1999), as well as bird's-eye views of households through regional settlement-pattern data (Drennan 1988; Sanders, Parsons, Santley 1979). While the view of settlement-pattern studies (generally viewed through survey data) usually conceptualize the remains of households as a settlement classification that functions in specific ways, the perspective of household archaeology (generally viewed through excavations of remains of households) commonly views these same settlements as having more diverse functions and internal distinctions (see Yaeger and Canuto 2000:4). Both stances offer significant insights that complement one another. At the level of the individual household, numerous studies have shown both the role households play in the transformation of evolving societies as well as how studying individual households mirrors these transformations through time (e.g., Bermann 1994; Manzanilla and Barba 1990; Rice 1988).

As one example of many, Bermann (1994) illustrates the usefulness of applying household data to understanding larger regional trends, such as the political evolution of a society. Through studying the site of Lukurmata in the Bolivian Andes and focusing on households through time, Bermann (1994:253) argues that (1) there was a shift from simple households focusing on a limited range of activities to those with intensified production as they entered the Tiwanaku system; (2) there was a subsequent shift from simple to more complex and differentiated households once the site of Lukurmata became a second-tier center in the Tiwanaku system; and (3) after the collapse of the Tiwanaku state, household units shifted from larger to smaller. He argues that these differences in household size and the range and intensity of production were the result of demands on households for surplus mobilization by the Tiwanaku state. While the rise of the Tiwanaku system had effects on households, Bermann (1994:254) also argues that much of the effect it had on households at Lukurmata appears to correspond to the rise of the Tiwanaku III polity (likely a chiefdom), rather than the subsequent Tiwanaku IV state.

At the level of settlement-pattern data, Drennan (1988) studied the dispersed or compact nature of Mesoamerican settlements across time to understand the relationship between households and larger communities. His results indicate that households in the southern Maya Lowlands were relatively dispersed, whereas higher density could be found at the Aztec center of Tenochititlan and the city-state of Teotihuacan, among others. Drennan argues (1988:281–284) that possible explanations for nucleation and dispersion of households include community size, agricultural practices (including swidden vs. more intensive forms), defense, political control, and economic central-place functions. He concludes that the most likely explanation for why Late Formative and Classic period Maya households are so much more dispersed than those of other periods and regions across Mesoamerica was because of the intensive nature of their agriculture practices. Drennan's study of regional patterns connects well with case studies of household agricultural production to better understand the underlying reasons for nucleated or dispersed household settlement. Sanders and colleagues (1979) working the Basin of Mexico provide another good example exemplifying the use of settlement-pattern data to better understand household organization through time as it relates to larger community trajectories. As the Teotihuacan state emerged, households became more interdependent with larger social structures, including production, trade, and interaction (Hastorf and D'Altroy 2001:13). These studies, from a bird's-eye view, allow for useful connections with more intensive studies of individual households to understand the connections to their larger communities.

Households as Primary Producers

First and foremost, households are responsible for providing household members with sustenance (i.e., subsistence) for the continued reproduction and success of the group (e.g., Netting, Wilk, and Arnould 1984b; Wilk and Netting 1984). In many societies, especially those in less rural environments, household members may undertake additional activities other than primary production of food and instead rely on other activities, such as craft production, to manufacture goods for which household members can then trade or exchange for subsistence goods. However, as Hirth (2009) has pointed out, the undertaking of craft production on a full-time basis is an inherently risky undertaking, given the pitfalls of the ebb and flow of supply and demand for items that household members may create. As a result, household members, especially in agrarian societies, may produce crafts on only a part-time basis during agricultural downtimes (e.g., D. Arnold 1975, 1985; P. Arnold 1991; Graves 1991), as has been discussed elsewhere in this chapter. By doing so, agrarian households may be able to create additional income to supplement their primary activity of food production.

There are two basic types of agriculture that households can undertake: extensive and intensive practices. Extensive strategies generally rely on expansive areas of land, where farmers may be able to cultivate plants without much capital improvement. Extensive farming usually requires minimal field preparation and crop tending and normally requires that fields are fallow more often than they are in cultivation. In tropical regions of the world, the most prevalent form of extensive farming is known as slash-and-burn. In extensive agriculture, farmers use the natural surrounding landscape to their advantage with few improvements. In the American Southwest, two types of extensive agriculture are arroyo (or *ak chin*) farming, where rain and runoff are harvested for watering plants, and dryland farming, where fields are prepared ahead to take advantage of seasonal rains. Intensive agricultural practices have a higher labor input per unit of land and utilize intensive agricultural techniques, such as terraces, check dams, raised or drained fields, and other methods to increase output (e.g., Douglass and Pyburn 1995; Dunning and Beach 1994; Fedick 1996; Harrison 1993; Harrison and Turner 1978; Scarborough 1993). Collectively, these methods are known as landscape capital (Brookfield 1972). These types of constructions are viewed as the physical evidence of higher labor investment per unit of input (Farrington 1985) and, thus, are evidence of intensification. Some groups, such as the prehispanic Hohokam and the ancient Maya, used both extensive and intensive systems simultaneously (see chapters by Ciolek-Torrello, Gonlin, Henderson, and Neff, this volume, for examples).

Fields may be located only near settlements or they may be both distant and near, a strategy known as an infield-outfield system (e.g., Netting 1977). A number of ethnographic studies have shown that many outfields are within a 45-minute walk from the residence (Killion 1992; Wilk 1983; *inter alia*). If farmers cultivate fields farther away from their homes, and if this land is heritable, this choice may affect household members' decisions about fissioning and forming a new household elsewhere, which in turn will affect the household's developmental cycle (Douglass 2002:44). In a recent archaeological study, Douglass (2002:44–46) found that because good agricultural land was in high demand in one part of a valley, it is likely that the residents chose to densely occupy adjacent land that was poor for agricultural purposes. Some studies have shown that households in agrarian societies will have a kitchen garden near where they live (Doolittle 1992; Fish, Fish, and Downum 1984; Killion 1992; Sheets 2006; Szuter 1991) and create a variety of features to enhance and protect the garden, such as walls, fences, water-management features, especially if there is a high competition for land. In the American Southwest, Szuter (1991) argues that the abundance of small animal remains at prehispanic Hohokam household sites suggests that hunting small game within the confines of house gardens provided an important food source.

Recent studies of household food production have suggested that this focus is a prime area to explore gender (e.g., Gonlin, this volume; Hendon 2010; Neff 2002, this volume; Robin 2002 ; Wiewall, this volume). Topics such as the gender division of labor have proven to be highly useful in understanding prehistoric household labor organization. In addition, studies related to household agriculture have contributed to our understanding of differences in wealth and political inequality within a society (e.g., González Fernández, this volume; Hastorf 1993).

Engendered Households

Gender and social relations within the household and society have also become the focus of research over the past few decades. During this time, the sheer volume of publications on gender and social relations within households has greatly expanded (e.g., Arden 2002; Bruhns and Stothert 1999; Brumfiel and Robin 2008; Claassen and Joyce 1997; De Lucia 2008; Goldstein 2008; Gustafson and Trevelyan 2002). Overall, gender research is not perceived as the investigation of only women but, rather, people of all genders (Brumfiel and Robin 2008;

Dean this volume; Gonlin 2007 and this volume; Gougeon, this volume). That is, gender is seen as the intersection of different aspects of people, including their sex, gender, age, and social status and how these different elements of life create larger social processes (Goldstein 2008:39). In the case of gender and household research, it is the exploration of how these different elements compete, complement, and interact within the context of the household unit. It is critical, as well as a distinct challenge, to separate gender from biological sex so that gender can be identified as a social construct (Hendon 1996:49). It is also just as important to understand how gender can be mirrored through material culture. Much of the gender research has focused on the domestic realm and household economies and has emphasized the importance of women's labor to the household (Gustafson and Trevelyan 2002; Hendon 1996:49).

As Brumfiel and Robin (2008:2) argue, there has been a "remedial" recovery of women in ancient societies over the past several decades, identifying women alongside men in complementary ways (e.g., "Man the hunter," "woman the collector"). It is increasingly clear that throughout prehistory, women's and men's roles overlapped and women's roles were well outside the domestic sphere. In prehistoric societies, women played essential roles that were not always incorporated into research questions. At the Maya site of Copán, for example, the elite female ruler buried in the Margarita royal tomb was not documented in written records, though her male counterparts were, yet offered substantial insight into women's roles and activities through the analysis of her burial goods (Bell 2002). By the 1980s, with the rise of household archaeology, it became increasingly clear that perceived "public" and "private" spheres created a false dichotomy. As Brumfiel and Robin argue (2008:4), "[t]he dynamism of the household domestic economy forces us to recognize that the domestic domain was not simply a passive and devalued version of the male public domain but was an integral part of the public and political life of a society." Some of the emphasis on gender in household archaeology, beyond the household economy in general, has focused on food, as it is a fundamental function of households (Henderson, this volume; Neff, this volume; Robin 2002). While food production could be seen as mundane, there is nothing more critical as it not only creates sustenance for household members but is also part of larger political dimensions. Brumfiel's (1991) study of the role of food and weaving during the Aztec period is an excellent example of the type of strength gender analysis plays in understanding households. Many of the chapters in this volume (see, e.g., Arnold, Douglass and Heckman, Gonlin, Gougeon, Henderson, Snow, and Wiewall) incorporate the concepts of gender and household to better understand the division of labor that existed in production of goods and services. As is evident from the chapters in this volume, gender roles are neither static across cultures nor rigid within a culture.

Household Inequality and Differentiation

Social differentiation among and between households has also been a vital topic of research in household archaeology. Fundamentally, household size and composition can have a great deal of influence on, and also reflect, its wealth or status (see, e.g., chapters in this volume by Beaule, Henderson, González Fernández, McCormack, and Wiewall). Wealthier households generally tend to be larger (i.e., more people) than less fortunate ones (Hayden and Cannon 1982; Netting 1982; Wilk 1983, 1991), perhaps in part because of family members wishing to inherit land (Wilk and Rathje 1982) or the addition of non-family members to the household for additional labor (Hendon 1987, 1991; McAnany 1993, 1995; Wilk and Rathje 1982). In agrarian societies, household size may be determined in part by the ability of households to produce surplus and attract and keep household members (Netting 1982; Wilk and Rathje 1982) (see chapters in this volume by Beaule, Henderson and McCormack). Wilk and Rathje (1982) have argued that "task simultaneity," the simultaneous performance of different, diverse domestic activities, is a driving force in the creation of large, complex households. In areas where there may be seasonality of resources, larger households are useful for dividing the household into smaller, task-oriented groups to undertake the various tasks necessary (Coupland and Banning 1996:2). Much of the ebb and flow of household size relates to the developmental cycle of households (Goody 1972; Tourtellot 1988), in which household size grows or shrinks as members stay or fission off, creating new households elsewhere (Pasternak, Ember, and Ember 1976). Archaeologically, the size of the remains of households is generally seen through the differences in the number of structures that constitutes a household, as well as the number of cooking and production areas (Hendon 1991). The social and economic connection among household members may be reflected, in part, in the proximity displayed among structures.

Smith (1987:298), in an important cross-cultural review on this subject of household possessions and wealth in agrarian societies, follows Netting and colleagues (1984b) and Yanagisako (1979) in arguing that household wealth is closely related to family size and structure, occupants of household members, and the development cycle of households. Following Haller (1970), Netting and colleagues (1984b) define wealth as "access to goods and services" and argue that no single measure can adequately define or measure household wealth. However, Smith (1987) argues that, following Haviland (1981) and Rathje (1983), residential architecture, burials, and household artifacts are three types of data that can lead to information on wealth. Smith cautions that household inventories can be influenced by a variety of other factors besides wealth. In addition to these three types of data, Hastorf and D'Altroy (2001:13; see also Hirth 1993) argue that the social and political position of the household will influence and reflect wealth. Smith (1987:308–310) also suggests that furniture, clothing, tools and household equipment, and utilitarian goods are good indicators of household wealth, as these items may change more quickly than dwelling architecture and may be a more refined set of attributes that will more closely reflect household wealth at any point in time. Blanton (1994:189–190) has pointed out that house architecture may not be a useful indicator for wealth, as he found many residents, both the wealthy and the poor, lived in similar types of simple structures within many agrarian societies. Blanton (1994:190) argues that within highly integrated agricultural communities, wealth may be expressed in other channels besides architecture.

Overall, then, while there may be a particular set of variables to understanding the wealth of a household, no one variable should be a determining factor in analysis, as it is the totality of the data that helps one determine the relative wealth of a household. Hirth (1993:143–144), in a case study of measuring rank and socioeconomic status, agrees with this general conclusion and argues that there are two hurdles to be resolved to help better understand household socioeconomic status: (1) there need to be large, representative samples used to help make inferences; and (2) archaeologists need to create and refine non-arbitrary standards for measuring and interpreting results. By explicitly operationalizing one's definition and criteria of what constitutes "wealth," archaeologists can hope to avoid talking at cross-purposes about this concept. It is equally important, however, to draft a definition particular to each time and place, as each society determines "wealth" on its own terms, and an emic perspective is essential for understanding the past.

What may create situations of wealth differentiation among households? In agrarian societies, many argue that access to good agricultural land is a primary factor in accumulating wealth and or status (e.g., McAnany 1993, 1995; see also discussion in González Fernández's chapter in this volume). In more sociopolitically complex societies, access to prime agricultural land may be restricted, thus allowing some households to have an advantage over others (Fried 1967). McAnany (1995) has argued that founding agrarian households in some areas may settle on the most productive agricultural land, thus creating land tenure rights for future generations of households that create a monopoly on those prime lands. This principle of first occupancy (see Isaac 1996; McAnany 1995) suggests that through migration from other areas, as well as the creation of new households via fissioning, new generations of households may not have the same base for surplus that these other, wealthier households may have. As a result, some of these future generations may choose to join these wealthy households, thus increasing the productive potential of the coresidential unit and creating a heterogeneous household. Heads of wealthier households may attract more members, and thus additional labor, through aggrandizing (Hayden 1992; Hayden and Gargett 1990). While this model appears to work in some parts of the world, it has been shown in other areas that the social hierarchy among chiefdom- or state-level societies was likely not based on elite control of agricultural land (Douglass 2002; Drennan and Quattrin 1995; see also González Fernández's chapter in this volume). Related to the connection between control of agricultural land and wealth accumulation, there also appears to be a general correlation between households on poorer agricultural soils and intensified craft production to make up any shortfalls in sustenance (D. Arnold 1975, 1985; P. Arnold 1991; Cook 1982; Graves 1991; Hirth 2009; Stark 1995; and see discussion of household production below).

In addition to these types of concepts, Blanton (1995:122–123) has argued that inequality and wealth differentiation among households may have its foundation in symbolic behavior and "its expression in the ritualized everyday behaviors of the habitus" (see also González Fernández, this volume). Following Shanks and Tilley (1982), Blanton argues that archaeologists ought to understand the role of symbolic communication as they study household inequality. Blanton (1995:112) agrees with Bell (1986–1987) that at its base, the foundation for the inequality of households is related to ideology. Currently, ideology is often considered as a means by which households may create and maintain a social imbalance through elite manipulation (Joyce and Weller 2007; Mehrer 2007:283). The monopolization of prestige goods or knowledge, for example, which may be required for social reproduction of junior households, lays a foundation for inequality among households. Blanton argues that if, for example, elder members of households either completely control ideology or symbols that are required within society for high status or wealth or share this knowledge only if junior household members remain within the household, there are few opportunities for junior members to fission and create their own households with that same base of wealth or status. As a result, Blanton argues, postmarital residence choices for junior household members are limited. This argument may relate in part to McAnany's (1995) model of founder households; these founder households will, in part, use symbolism and ideology to create a significance of place through such activities as worshiping ancestors buried at that locale. To maintain that same status and wealth accumulation, junior household members will have little choice but to remain in that same location, as the symbolism of the location in part reinforces household status. It is through ritual and habitus that "an order of household inequality is made to appear powerful and holy" (Blanton 1995:113).

The role of ritual, ceremonies, and ideology at the household level and higher has been a key focus of researchers of societies of both egalitarian and complex societies (e.g., Blanton et al. 1996; Earle 1997; Fogelin 2007; Gonlin and Lohse 2007; Gossen and Leventhal 1993; Lohse 2000; Lucero 2010; Marcus and Flannery 2004; Masson 1999; McAnany 1993, 1995; Plunket 2002; Wells and Davis-Salazar 2007). Certainly, ritual and ideology were at the heart of societies at many levels, and rulers and elites manipulated rituals to communicate a highly symbolic system of ideas and meaning while simultaneously maintaining their high status. Elites across societies are generally viewed both as the sources of sacred knowledge and as those who performed them (Lohse 2007:6). As Lohse (2007:5) has pointed out, scholars in general have viewed ideology and religion in similar ways, offering them as common examples of symbolic behavior. Ritual is the common element of the two, the performance and material expression of ideology and religion. Among the ancient Maya and the city-state of Teotihuacan during the Classic period (AD 250–900) of Mesoamerica, iconography across urban centers offered everyday references to these belief systems.

But what about households in non-urban areas? How did household ritual activity differ from those performed by the society as a whole, by rulers instead of commoner households? How did the religious beliefs of commoner households differ from the ruling elite? As noted just over a decade ago by Johnston and Gonlin (1998), we then had a poor conceptualization of commoner household ritual, but today we have a much stronger understanding of household ritual and ideology (e.g., Gonlin and Lohse 2007). Questions regarding differences between household ritual in rural and urban settings and of households in communities/societies of different sociopolitical organizations are important to consider. It is clear, however, that commoner household ritual, at least in Mesoamerica, was primarily focused on three basic realms: (1) burial and ancestor worship; (2) feasting; and (3) dedication and termination rituals (Robin 2003:322). Common types of artifacts across time and space used by households in ritual include different types of censors or other objects used in the creation of smoke, fire, figurines or sculpture, food, mirrors or other types of reflective objects, shell, stones, as well as objects that are both common and unique (e.g., Douglass 2007; Gonlin 2007). Objects used in household ritual originally from other places may be important in understanding how they came to be used as agents in ceremony (Bradley 2000; Spielmann 2004:211). The origin of ritual objects from elsewhere and the particular location of origin are two aspects of this "otherness" of objects that may have been meaningful to household members (Bradley 2000; Spielmann 2004).

Feasting, among all classes of society, according to Robin (2003), allowed connections with supernatural powers, created solidarity among both household members and the greater community, and created and maintained political and ritual connections beyond local communities. To some researchers, however, feasting in general is a social activity that is performed above the scale of the household, at least in the American Southwest (Wills and Crown 2004). There is also debate about whether feasting is solely a ritual activity, or if, since there is such a wide variety of contexts of feasting, this activity should not be considered related to only ritual performance (Dietler and Hayden 2001:3–4). Across both time and space, feasting, at both the household and supra-household level, has been a popular topic of research in the past decade (Cameron 1995; Dean 2001;

Dietler and Hayden 2001; Graves and Spielmann 2000; Grimstead and Bayham 2010; Hayden 1995, 2001; Mills 2004, Mills 2007; Potter 1997, 2000; Spielmann 1998; Van Keuren 2004).

In some state-level societies, it is clear that household-level ritual was different in kind and degree than ruling elites. In the Naco Valley, northwest Honduras, for example, Douglass (2007) argues that rural households differed in kind from elites primarily in access to economic, social, and political spheres. Naco elites emulated certain Maya ritual practices, whereas commoner households were more likely to maintain traditional local practices, using what Douglass refers to as a ritual toolkit (see also Gonlin 2007). Commoner households, while removed from urban elites, still performed supernatural ritual, albeit different than that performed by elites. Overall, household ritual and ideology help create and maintain social identity, are aspects of household differentiation and inequality, and are rich research topics, across both time and space.

Households as Craft Producers

Finally, household production has continued to be a main topic in household archaeological studies for the past several decades. This emphasis can include diverse tasks such as cooking, farming (see Ciolek-Torrello, Henderson, and Neff, this volume), and also craft production and specialization, which are the focus here (see Arnold, Douglass and Heckman, Gonlin, Gougeon, and Wiewall, this volume, among others). A pertinent question to ask within the context of household craft production is what are the scale and degree of production? Within many agrarian societies, household production is classified as ad hoc, part-time, or full-time (Clark and Parry 1990:298–299). Hirth (2009:23) has recently argued that the scale of production (full- or part-time) is less important than understanding how labor was organized in past societies, as most production in societies was performed at the household level rather than in specialized settings, such as elite workshops (e.g., Widmer 2009). Just as critical, however, is the scale of production, which is a continuum from small, informal, kin- or household-based production to large, formal, independent workshops (Costin 1991; see also Arnold, this volume). Although specialization can be defined in a variety of ways, Costin's (1991:3) definition of this term is helpful: "the regular, repeated provision of some commodity or service in exchange for some other." In both degree and scale of production, size is an important variable. Independent craft production (Brumfiel and Earle 1987) may allow households to use small-scale labor surpluses to their advantage (Hirth 2009:20). Because full-time craft production can be a risky venture (Hirth 2006, 2009), many agrarian households undertake craft production on a part-time basis. Along these lines, Hirth (2009:20–21) argues that there are four benefits of domestic craft production to households: (1) large households are able to increase and expand their productivity during agricultural downtimes; (2) it expands diversification strategies for households that are essential for survival; (3) it allows households to use small-scale labor surpluses in creative ways; and (4) it protects artisans from the ebbs and flows of product demand, as it helps create stability. Households by their nature are generally conservative; performing craft production on a part-time basis allows for flexibility in terms of both household labor and market demand fluctuations. As a result, if households do undertake craft production, they may do it intermittently or engage in multiple crafts within the same household (see Hirth 2009:21–23).

Among many households, especially with independent specialization, there can be diversity within household membership in terms of skill, participation in particular activities, and overall activities and this diversity may lead to increased opportunities for household members. Especially in larger households, there may be different types of specialization occurring at different times of the year, depending on resources, household membership stability, and outside influences. As Mills (1995) points out, for the modern and historical period Zuñi, participation in particular types of craft specialization among household members is partially dependent on outside demand for particular products, as well as the income that different objects create. New types of craft production will likely be related to complementary and intersecting technologies (Hagstrum 1999, 2001) in which household members can use skills already mastered to create related items and technologies. At times, it is possible that craft specialization may be undertaken because it leads to increased social status of individuals (Bennett 2007; Hruby 2007). Craft production at the household level allows households to diversify their production strategy by producing goods that are exchanged and circulated among other households. This distribution also creates social interaction and reciprocal ties between households and the wider community. Overall, then, household production, including craft production, is an ongoing and central issue in current archaeological research on households.

ORGANIZATION OF THE VOLUME

We have chosen to focus the present volume on the role that production played in prehistoric and historic American households. Several methods are used to determine the nature and distribution of activities, the meanings behind those activities, the division of labor responsible for those activities, and answers to larger evolutionary questions. This volume attests to the success of using the household as an analytical unit and the wide range of knowledge we can gain by studying this unit.

The volume presented here brings together archaeologists from across the Americas (including North, Central, and South America) to study the theme of ancient household functions; what Wilk and Netting (1984) have referred to

Figure 1.1. Map of the Americas, showing the location of case studies detailed in this volume; numbers in the map legend correspond to chapter numbers in the volume (map created by Luke Wisner)

as what households "do" (Figure 1.1). Presented as a series of case studies in thirteen chapters, researchers use a variety of methods to investigate household functions and, in particular, production. Household organization of production is fundamental to every society in the Americas and elsewhere, whether pre-Columbian or contemporary.

Commoner or producer households form the largest part of an agrarian settlement system in ancient or modern societies (e.g., Douglass 2002; Webster and Gonlin 1988). By including research from all of the Americas, we hope to foster a wider understanding of the household outside one's own area of specialization or culture area. Chapters are divided into three broad sections: (1) a consideration of the household at the micro-level, or individual household; (2) macro-level household studies; and (3) research of the interaction of households with the greater communities of which they are parts. Section I reflects on the spatial and social organization and context of household production; Section II looks at the role and results of households as primary producers; and Section III investigates the role of and interplay among households in their greater political and socioeconomic communities.

SECTION I: HOUSEHOLD PRODUCTION ORGANIZATION: SPATIAL AND SOCIAL CONTEXTS IN THE PAST AND PRESENT

Household archaeology has a long history of analyzing the spatial and social contexts of household functions, which may include such diverse concerns as architecture, midden deposits, activity areas, and social relatedness among household members. These variables are all the result of household cooperation in production strategies and allow for cross-cultural comparisons. This section draws together some of these fundamental household features to better understand household organization and production variables in the past and present. It is divided into five chapters that cover four specific regions of the Americas: the American Southwest, Northeast and Southeast, and Mesoamerica.

In Chapter 2, Mark Varien examines the changing forms of household residences in the northern San Juan River drainage in the American Southwest during the AD 600–1300 period, focusing on the central Mesa Verde region. He examines the relationship between the length of occupation and the spatial organization of the major cultural features at these residential sites using ethnoarchaeological and cross-cultural studies to understand the changing forms of household residences and to develop a model that describes how increasing occupation span affects site structure. Varien measured the occupation span of household residences in the central Mesa Verde region and found that it increased through time. Changes in the spatial organization of these sites that accompany the increasing occupation span are consistent with the cross-cultural model. In his work, Varien examines the archaeological features associated with household residences and documents the continuity and change in these features over a period of seven centuries. Results indicate that there is continuity throughout this interval in the basic residential site, but Varien also sees considerable change in the form of these residences. Varien measures the occupation span of nineteen residential sites, documenting how their length of occupation changed through time. His results show that occupation span increased from approximately ten years at sites dating to the AD 600s to over fifty years at sites dating to the 1200s. In sum, Varien concludes that specific features at household residences changed over time and were accompanied by increasing occupation span. Varien determines that the relationship between the form of these residences and their increasing occupation span is consistent with patterns identified by the cross-cultural model.

In Chapter 3, Nancy Gonlin delves into issues of gender at the Classic Maya site of Copán, located in western Honduras. Extensive archaeological research at both urban and rural household sites at Copán allows Gonlin to examine aspects of the low-status component of a hierarchically organized society. Her chapter is a theoretical hybrid of household archaeology and the archaeology of gender and examines the contribution that men and women made at the household level of the rural agriculturalist. Just as the concept of "gender" has no single set of meanings (Conkey 2001), Gonlin argues that the concept of "household" has no single set of meanings to societies in which they exist. From the perspective of an engendered archaeology, Gonlin contends that a household consists of the people within it, for they are the women, men, and children who produce, consume, and perform other activities or, in standard parlance, who live as a coresidential activity group. Gonlin focuses on three main lines of evidence in this chapter: artifacts, architecture, and bioarchaeological studies. In her study, the distribution of likely gender-specific artifacts—such as grinding stones, spindle whorls, celts, and projectile points—is examined to understand if it coincides with expectations of gender ideology and symbolism. Through studying gender among households at Copán, the nature of the relationship between men and women in Late Classic Maya commoner households and whether that relationship was complementary or hierarchical are addressed.

Next, in Chapter 4, Dean Snow studies the internal organization of activities in longhouses in the northeast United States. The Mohawk site of Otstungo, occupied in the period AD 1450–1525, was a compact fortified village containing at least ten classic Iroquoian longhouses. Snow details the results of controlled excavation of one complete longhouse that has revealed architectural details that allow correction of previously misinterpreted historical descriptions of standing longhouses, including wall and roof details, as well as the internal segmentation of space for sleeping berths. In addition, Snow argues that excavations at Otstungo have revealed details of the internal organization of activities in longhouses. Most activities, he argues, were controlled and carried out by women, around whom the matrilocal households were organized. Each six-meter-long longhouse contained a residential area that was partitioned into compartments. Two nuclear families averaging five persons each shared a single fireplace in the aisleway, with sleeping berths, storage shelves, and work areas of each nuclear family occupying one side of the compartment. Areas for food storage were located in lightly built end sections of the longhouses, where they also served as anterooms to buffer cold weather during winter. Facilities for food preparation were discovered in sections of compartments not taken up by sleeping berths. The evidence included ash scatters, mullers, and post-mold features. Small pit features, which were probably personal storage places, and very large post molds probably reflect male activities. Snow concludes his chapter with a discussion of the household organizational implications of these longhouse details.

Ramie Gougeon studies household remains from the Late Mississippian Little Egypt site in northwest Georgia in Chapter 5. Research reconstructing the route of Hernando DeSoto's 1539–1542 expedition through the Southeast has determined that Little Egypt is the site of Coosa, the capital village of a paramount chiefdom. This chiefdom, a confederate of smaller chiefdoms, extended from eastern Tennessee to northeast Alabama and was visited briefly by the DeSoto expedition. To study household organization, Gougeon reanalyzes data from three house floors excavated in the 1970s to identify where specific activities occurred within each structure. By drawing on ethnographic and ethnohistoric sources, gender-based activities were identified. Many artifacts normally recovered from house floors are associated with female activities. For example, ceramics, often thought to be produced and used almost exclusively by females, are ubiquitous in two of the three structures excavated and are second only in quantity to evidence of lithic production. While originally thought to be an exclusive realm of male activities, lithic production has been recently illustrated to have been undertaken by both men and women. In this light, examination of artifact distributions within these three structures is contrasted with current models of Late Mississippian households, as well as implications of gender-based production models within chiefdom-level societies.

Next, in Chapter 6, Dean Arnold studies contemporary populations of potters in the Yucatán, Mexico, to identify production patterns that transcend both present and past societies. Arnold argues that archaeologists have used ceramics to infer changing patterns of the organization of craft production and distribution. But how precisely does the organization of ceramic production change through time? One way to approach this problem is to examine the changes in the social organization of populations of contemporary potters and see how they change through time. Arnold thus traces the changes in social organization among potters of Ticul, Yucatán, Mexico between 1965 and 1997. During this period, ten visits were made to Ticul and the data from these visits were collapsed into seven different "time events." Since ceramic production occurred in both "household" and "workshop" contexts, and such production contexts are not easily distinguished socially, he uses the concept of the "production unit" as the unit of analysis to assess the changes in those units through time. This study thus details the changes in the populations of potters as a whole and in the composition of the production units and documents the changes along lines of gender and production units. Arnold concludes that although there are changes because of increased commercialization of the craft over a thirty-two-year period, the producing population is probably the most conservative aspect of the craft even in light of massive technological, social, and cultural changes. This conservatism is the result of what are essentially processes of household continuity, such as the use of the nuclear family as production personnel, the processes of household segmentation and fissioning from patrilineal inheritance of household land, and virilocal post-nuptial residence. These conclusions suggest that even in massive technological change in ceramic production, the composition of the producing population can be very conservative and organized socially by households even with highly specialized production space.

Following in this theme of spatial organization and household function, the final chapter in this section, Chapter 7, addresses questions of community size and household production activities. Here, John Douglass and Robert Heckman examine a small, rural agrarian household located on the northern edge of Black Mesa, in the northern American Southwest, to investigate what activities primarily farming households occupying seasonal homesteads during the Pueblo II period (ca. AD 1000–1150) would have undertaken beyond agriculture. Across time and space, households that were primarily focused on agriculture have been pushed into other activities, such as ceramic production, if they lived in marginal areas. However, in the American Southwest, this relationship has been questioned and argued to have a poor correlation, especially if households are simply producing goods for their own consumption. Research in the American Southwest has focused on identifying the locus of ceramic production and has suggested that ceramic vessels were distributed within and between regions on a regular basis. While ceramic production by households at all levels of settlement is generally accepted, other studies for particular areas of the American Southwest argue strongly in other directions. One recent model proposed for the Black Mesa area, surrounded by what are today Navajo and Hopi Nations, suggests that only large, permanent villages hosted ceramic production, with trade of these vessels for use by smaller, more seasonal habitation sites. Household size and connection to larger social systems in villages appear to be two variables in determining which households will produce ceramics. Douglass and Heckman test these competing models to further understand these relationships between household production and larger social systems and offer a case study with much wider implications than the American Southwest.

SECTION II: HOUSEHOLDS AS PRIMARY PRODUCERS: IMPLICATIONS FOR DOMESTIC ORGANIZATION

In this second section of the volume, households are studied in their role as primary producers in part because food production is fundamental and essential for household continuity. All households during prehistory, with few exceptions, across time and space are responsible for the production of their own sustenance. As a result of differences in environments and cultures, there is a tremendous amount of diversity in the household organization of production and how this variation is expressed at the micro- and macro-levels. The chapters presented here offer insights into these household processes from numerous cultures across the Americas to better understand this fundamental function. In these three chapters, authors discuss case studies of prehispanic groups in two regions: the Hohokam in the American Southwest and two different Maya communities in Belize.

Richard Ciolek-Torrello in Chapter 8 studies agricultural intensification strategies of the Hohokam. Recent anthropological theories, he argues, have emphasized the economic role of households as the primary units of production and their significance as the basic adaptive unit in human society. These theories have linked changes in the structure and organization of households to economic processes such as agricultural intensification. According to one of these theories, intensification of agricultural strategies influences the degree of sedentism, the make-up of the units of production, and the systems of land tenure in which households participate. Changes in the degree of sedentism and units of production are reflected in household and settlement structure. One popular theory relates mobility patterns, organization of production, and control of key resources to different types of household and settlement structure, as described earlier in this chapter (Flannery 1972, 2002). Flannery's theory has great appeal in interpreting changes in Hohokam household and settlement structure in the Phoenix Basin and surrounding desert valleys of central Arizona. The span of time from the Late Archaic period, around 1000 BC to the Classic period (beginning ca. AD 1200), witnessed the transition from a residentially mobile, broad-based foraging/farming society (with loose arrangements of small circular structures home to small household groups) to one of large sedentary, agriculturally dependent villages (with a highly structured and formalized modular residential system for households). This social transformation was associated with important economic changes, including the development of what is now considered the largest and most technologically advanced irrigation system in North America, in addition to large, dry-farming field systems in the uplands. Both technologies led to more frequent use of farmlands and the construction of physical improvements that left durable evidence of ownership. When viewed from the long-term perspective of the more than 2,000 years of agricultural development in the region, it is apparent that changes in the structure of households and settlements parallel these technological changes and may be causally related. Closer inspection of the prehistoric record, however, reveals a much more complicated picture, suggesting that these social and technological changes may represent independent developmental trajectories. In this chapter, Ciolek-Torrello explores these relationships using data from the Phoenix Basin and surrounding desert valleys.

Next, in Chapter 9, Hope Henderson evaluates Wilk and Netting's (1984) ethnographic model of household economic organization that predicts how households organize production based on differences in household size. By focusing on the relationship between household size and the production and consumption of staple foods, Henderson directly examines changes and continuity in the ways that lowland Maya farming households from the community of K'axob, Belize, managed labor and resources from the ninth century BC to the ninth century AD. Long-term patterns in staple crop production and consumption are reconstructed by comparing three types of bone isotopes identified from twenty-five adults in twenty-one separate households across time and space. The results of this analysis suggest that larger corporate households, which began to form in the fourth century BC, were able to pool labor and diversify staple crop production and consumption. All other-sized households at K'axob followed a slightly less diverse pattern of production and consumption. These findings support the ethnographic model that envisions the household as a social group that cooperates in a variety of overlapping activity spheres. Henderson's contribution to this volume not only offers insight into fundamental questions of economic organization of households but also questions whether production and consumption are necessarily tied to unity and cooperation within households.

Finally, in Chapter 10, Theodore Neff studies terrace gardening of the Classic Maya in western Belize. Settlement survey in the lowland Maya area has documented numerous agricultural terraces dispersed among residential and civic-ceremonial structures that date to the Late Classic period (ca. AD 550–800). Terraced areas constitute a component of the built environment beyond the residential core. How does terracing fit into the larger agrarian landscape and how are they related to households? Research on preindustrial, small-scale agrarian landscapes indicates that distance from residential structures is the basic factor that conditions land use and artifact patterning. Drawing on this basic premise, researchers in Mesoamerica have proposed models that characterize agrarian land use from the larger top-down landscape perspective as well as from the more focused bottom-up household viewpoint. These perspectives tend to characterize agricultural areas adjacent to and interspersed among households as either areas of permanent or semi-permanent cultivation from the perspective of the larger landscape or as garden areas beyond the structures and cleared areas of the household proper. In this chapter, Neff focuses specifically on these permanently cultivated areas that surround and merge with the structural household. Little research attention has been paid to this context generally and even less to the agricultural terraces that make up large portions of these areas in many parts of the lowland Maya area. In an effort to remedy this lack of research attention, Neff presents a model of household activity in agriculturally terraced areas of the prehispanic lowland Maya landscape that recognizes a spatial continuum of household gardening activities extending beyond the domestic compound proper. Points along this continuum are defined as "adjacent agricultural space," "transitional agricultural space," and "outlying agricultural space." Neff then evaluates this model using terrace excavation data from areas near Dos Chombitos, a lowland Maya minor center in far west-central Belize, Central America.

SECTION III: INTER- AND INTRAHOUSEHOLD ORGANIZATION OF PRODUCTION: HOUSEHOLDS AND COMMUNITIES

In this last section, larger contexts of household organization and production are developed. Rather than studying households at the individual level, contributors in this section study the broader issue of production organization as it relates to households within larger communities. Household organization, such as nuclear or corporate groups, interaction between rural hamlets and larger villages, the political and economic strength of larger communities, and the imposition of conquering groups have all had varying effects on the organization of household production. By presenting such case studies, the authors offer new insight into the internal and external organization of residential groups of varying sizes.

In Chapter 11, Valerie J. McCormack examines conditions under which multifamily corporate groups formed at the Formative community of La Joya, Veracruz, Mexico. During a 1,500-year span of continuous occupation, community organization alternated between independent household units and multifamily corporate groups. Multifamily corporate groups tend to form during periods prior to chiefdom formation. Their formation may indicate (1) they were an archaic form of social organization, (2) an approach to meet scheduling constraints, (3) a strategy to cement kinship ties ensuring that obligations will crosscut generations, or (4) that they are simply clusters within a site defined by archaeologists. Intrasite settlement analysis at La Joya shows that community organization fluctuated between independent households and multifamily corporate groups. McCormack documents that initial occupation includes individual household units, and this occupation corresponds to a period of shifting subsistence strategies with the adoption of agriculture and environmental stress associated with a volcanic eruption, only to subsequently dissolve just as the frequency of prestige items increase. Multifamily corporate groups form later for a second time during the Late Formative period when a regional chiefdom emerges. In her chapter, McCormack compares these multifamily corporate groups to illustrate that they were ranked and had connections to different trade networks and unique ceramic production techniques. McCormack's contribution offers important insight into identifying different organizing principles of multifamily corporate groups and determining why they formed.

Victor González Fernández in Chapter 12 focuses on the relationship between households and larger communities in the Alto Magdalena region of southwest Colombia. Here, the development of communities at the core of small polities has been traced in regional settlement-pattern surveys to around 1000 BC. Since that time, groups of households began to cluster together around locations that were to become central mounded funerary sites of the San Agustín chiefdoms during the subsequent Classic period (AD 1–900). González Fernández focuses his chapter on two key questions: (1) What were the interrelationships among households within such central communities? (2) What kinds of forces shaped and held these communities together while they became the central places of Classic period chiefdoms? To answer these fundamental questions, he focuses on an archaeological reconstruction of the development of Mesitas, one of the largest mounded prehispanic communities in the region. Results of his study indicate that resource control, population growth, and craft specialization seem not to have been important in bringing about changes in the household sequence at Mesitas. Rather, the development of social differentiation and inequality among households is related to the very early clustering of some households around agricultural activities during a period when these activities were not important economically. A traditional ritual role that some households undertook in the community since very early times may explain, in part, the shape of the community and the greater differences among households later in the sequence.

In Chapter 13, Christine Beaule studies artifact assemblages recovered from household units, features, and deep excavations at the Bolivian altiplano site of Jachakala (ca. AD 150–1200) to document the gradual development of interhousehold wealth differentiation. Beaule evaluates the origins of complexity with shifts in the domestic economy of these prehispanic Andean households. Changes in artifact patterns are studied in two ways by Beaule. First, she tests the correspondence among differences in the domestic economy of different households and differential distributions of the markers of social status through an index of assemblage diversity, for which there is ideal data through well-preserved household unit remains. The results of this analysis reveal, however, that few markers of status and wealth correspond with each other or with architectural dimensions of ranking. In fact, house floor assemblages are more likely to consist of materials deliberately left during the structures' abandonment; small, easily overlooked items; or ones accumulated during post-abandonment events. The second approach Beaule takes is to investigate larger domestic processes and patterns rather than individual household units. Comparing zones of the community, or spatially distinct groups of households, clearly reveals spatial and diachronic differences in domestic patterns corresponding to the origins of complexity. In contrast to house floors, exterior midden deposits reflect many years of steady accumulation from a range of domestic activities, thereby mitigating some of the idiosyncrasies characteristic of floor assemblages. Beaule's interzonal comparisons offer analytical advantages in allowing archaeologists to ignore the palimpsest nature of individual house floors and generally document a notable case study for the rise of inequality among households.

Finally, in Chapter 14, the last chapter in Section III and the volume, Darcy Lynn Wiewall creates a predictive model for understanding the political-economic relationship between Maya households and the Spanish colonial regime during the Postclassic-Colonial transition in the Maya Lowlands. In the year 1546, the Yucatán peninsula was officially deemed conquered and claimed for the Spanish Crown. As a result of the limited number of natural resources and the relative abundance of human labor, the Spanish State and Church quickly embraced, and further exploited, the preexisting labor and tribute system established by the Yucatec Maya elite. Current historical research indicates a heavy Spanish reliance on the local Maya tribute economy, which invariably affected Maya household economies much more so than historians purport. Recent archaeological research hints at the real possibility of identifying the degree of continuity and change in proto-colonial Maya household economies. The Spanish colonial tribute economy revolved around Maya labor and production in agriculture, cloth production, and animal husbandry on a cottage-industry level. Wiewall's research suggests that both state and household decisions resulted in the increased importance of household labor and production located within the houselot. As a result, women's labor and products supported the Spanish export economy, while the agricultural surplus of the men mainly fed local indigenous communities and Spaniards through urban markets. Wiewall suggests that Maya women provided the main sources of economic stability for the household. She argues that by identifying and comparing various household activities, one may begin to consider the degree of cooperation and specialization of labor, differential access to resources, and the choices of individual households on how best to allocate resources. By doing so, Wiewall states, one will be better able to understand the complex social and economic relations among households, communities, and the larger society.

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SECTION I

Household Production Organization

Spatial and Social Contexts in the Past and Present

TWO

Occupation Span and the Organization of Residential Activities

A Cross-Cultural Model and Case Study from the Mesa Verde Region

MARK D. VARIEN

INTRODUCTION

The anthropological study of households was revitalized during the 1980s when researchers began to examine household organization from a behavioral perspective (Netting, Wilk, and Arnould 1984a; see also Douglass and Gonlin, this volume). Archaeology was well equipped to meet the challenge posed by this emphasis on what households do. There was a long tradition of identifying and interpreting activity areas at archaeological sites, and a robust method and theory for undertaking these studies had developed as a result of this intense scrutiny (c.f. Binford 1976, 1981; Kent 1984, 1987, 1990a; Schiffer 1972, 1975, 1976, 1987). These factors combined to produce a renewed interest in the study of household organization in the past through the excavation of residential sites and the reconstruction of the activities that occurred at these residences (c.f. Lightfoot 1994).

The study presented in this chapter builds on this tradition. I examine the organization of activities at residential sites with a focus on one of the most important activities undertaken by a household: the construction of a new resi-

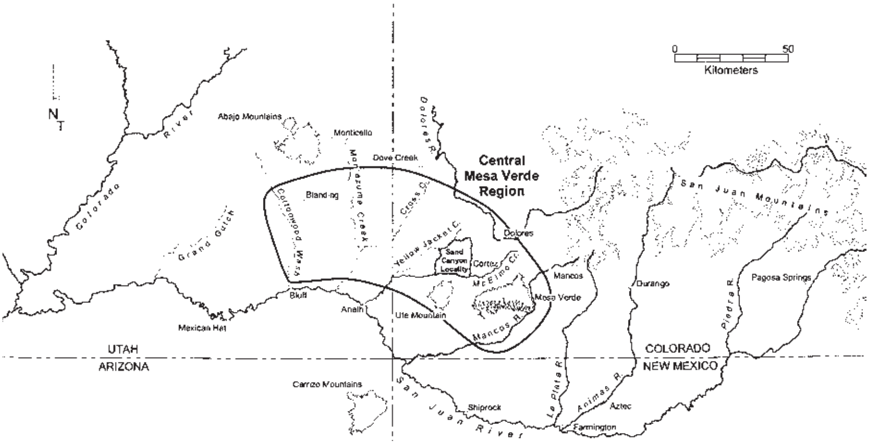

Figure 2.1. Map showing the location of the central Mesa Verde region in the northern San Juan drainage of the southwestern United States

dence. I show how the organization of activities and aspects of the construction of residences were influenced by the anticipated occupation span of residences and the length of time the residences were actually occupied. I also examine the effects of restricted space at residential sites.

This study combines two approaches. The first is a cross-cultural study of the spatial organization of residential sites (see also chapters by Beaule, Ciolek-Torrello, Henderson, McCormack, and Snow for other types of studies of households related to architecture). I develop this study by synthesizing numerous ethnoarchaeological analyses. This cross-cultural study suggests that there are general principles that structure the organization of activities at residential sites. I test the applicability of this cross-cultural model by comparing it to a case study from the central Mesa Verde region of the northern San Juan River drainage in the US Southwest (Figure 2.1). In so doing, I achieve two goals: I demonstrate the general applicability of the cross-cultural model with the central Mesa Verde region case study, and I explain the changing organization of selected activities that occurred at ancient Pueblo residences over a period of seven centuries.

To better understand Pueblo household archaeology I examine nineteen residential sites that were constructed and occupied at different times between AD 600 and 1300. My analysis of these sites unfolds in several parts. I begin by examining the relationship among three key concepts: household social organization, coresidence, and the organization of activities at residential sites. Next, I examine the archaeological features found at residential sites in the central Mesa Verde region and discuss how households are identified in the archaeological record of this area. Then I discuss the continuity and change that occurred in the form of these features over a period of seven centuries. To complete the study

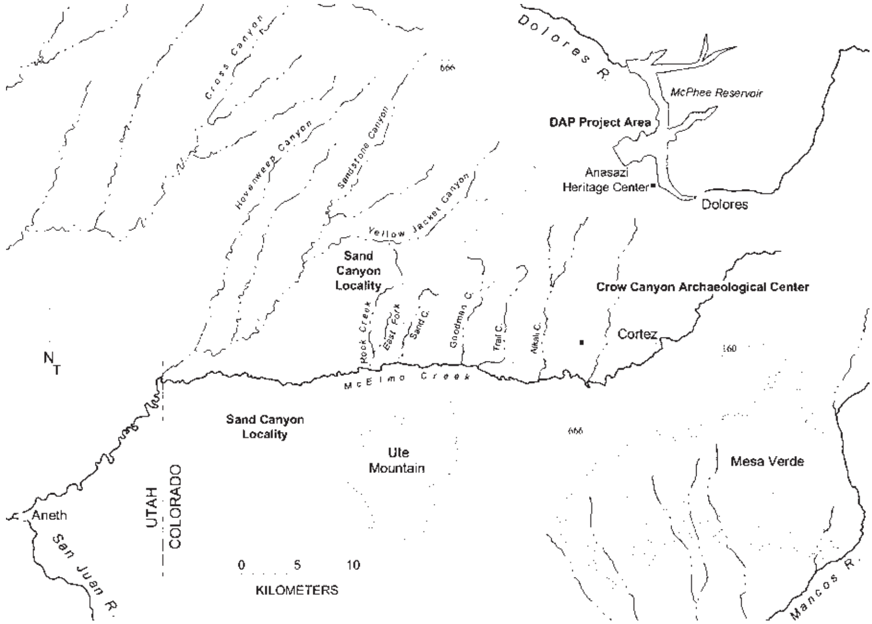

Figure 2.2. Map showing the location of the Dolores Archaeological Program (DAP) project area and the Sand Canyon locality, Colorado

of household residences in the central Mesa Verde region, I measure the length of occupation of these sites and document how their occupation span changed through time.

After presenting these archaeological data, I summarize the ethnoarchaeological studies and develop a cross-cultural model that specifies how the spatial organization of selected activities at residential sites changes as occupation span increases and as space becomes more restricted. Finally, I examine the archaeological case study in light of this cross-cultural model to evaluate the link between occupation span and the changing form of ancient residences in the central Mesa Verde region.

To examine household archaeology in the central Mesa Verde I examine nineteen excavated residential sites. These sites are located in two study areas, the Dolores River valley and the Sand Canyon locality (Figure 2.2); those in the Dolores River valley were excavated as part of the Dolores Archaeological Program (Breternitz 1993) and those in the Sand Canyon locality as a part of the Sand Canyon Archaeological Project, which was sponsored by the Crow Canyon Archaeological Center (Lipe 1992; Varien and Wilshusen 2002). The period during which each residence was occupied is established using tree-ring dates or pottery dating. The sample includes one residence that was occupied in the AD

600s, five from the AD 775–900 interval, two from the AD 900–1100 interval, and eleven from the AD 1100–1300 interval. I determine the occupation span of these nineteen sites using two approaches. General estimates are obtained by using data on the relationship between the structure use life and the type of building materials (i.e., earthen vs. stone-masonry buildings). Refined occupation span estimates are calculated by quantifying the amount of cooking pottery discarded by each household using a method that has been described in a series of publications (Varien 1997, 1999a; Varien and Mills 1997; Varien and Potter 1997).

The analyses, presented below, show three things: (1) the occupation span of residences increased through time; (2) there were concomitant changes in the spatial organization of activities at these sites; and (3) these changes are consistent with patterns identified in ethnoarchaeological and cross-cultural studies. This study documents how the changes in the organization of activities were conditioned by increasing occupation span and, to a lesser degree, by limitations in available space. The development of a cross-cultural model and the application of this model to the Mesa Verde region suggest that the relationships identified in this study have general applicability and they provide new insights into the changing household organization of a specific area. As such, this study fosters a better understanding of the organization of activities undertaken by households and provides a basis for future studies of household organization that are even more detailed.

HOUSEHOLD ORGANIZATION, CORESIDENCE, AND RESIDENTIAL SITES

Many early studies of households viewed household membership and coresidence as coeval, but critical examination of the household concept focused on the relationship between the household and coresidence and demonstrated that the two are not isomorphic (Netting, Wilk, and Arnould 1984b:xxvi–xxviii; Wilk and Netting 1984:17–19). In particular, analysts encountered problems when coresidence was used to determine household membership, when household membership was used to categorize households into structural types, and when structural types were used in comparative studies and evolutionary frameworks.

The presumed link between coresidence and household membership was undermined by a series of empirical studies that demonstrated that the group that resides together is fluid and has impermanent social boundaries (Netting, Wilk, and Arnould 1984a, 1984b; Wilk and Netting 1984). As has been discussed by many authors in this volume, the household as a coresidential group can include kin and people who are not biologically related, and it can include kin who temporarily reside elsewhere but who nonetheless make an important contribution to household affairs. The spatial dimension of the physical residence should not be conflated with the social, demographic, or conceptual dimensions of the household. The fact that household membership and coresidence are not isomorphic was a key factor that led to the call for behavioral, as opposed to structural, analysis of the household. This critique of the household concept led to the distinction between families as kinship units as opposed to households as task-oriented residence groups. This led to the call for the empirical study of household activities.

This critique clearly uncoupled coresidence and household membership, but the focus on activities gave the residence a new salience as the spatial unit for the analysis of household organization because it provided a nexus for the activities that define households in behavioral terms. This is especially true for archaeology, in which the residential site is virtually the sole focus for household studies. The residential site comprises the buildings that served as the house and the artifacts and features that resulted from the activities conducted by householders during their occupation of the residence. The nature of house construction, the use of the residence, and the spatial organization of residential activities are therefore among the most useful data available for the analysis of household organization. Decisions involved in building a house and creating associated activity areas are rarely made or acted upon by a single individual because these decisions affect, and in turn are affected by, the entire household (Netting, Wilk, and Arnould 1984b:xxii).

Study of the spatial organization of activities at residential sites offers insights into the interaction among household members that occurred by virtue of their coresidence. There is nothing universal about household composition or the arrangement of specific activities that occur at a residence, but residential sites and households are among the most universal analytical units that can be observed. For this reason they remain important for comparative and cross-cultural research that is designed to elucidate the practices and processes that define household relations.

HOUSEHOLD RESIDENTIAL SITES IN THE NORTHERN SAN JUAN REGION

Some of the earliest archaeological research on households anywhere in the world was T. Mitchell Prudden's work in the central Mesa Verde region (Prudden 1903, 1914, 1918). Prudden focused on household residential sites that had the greatest archaeological visibility—those constructed with stone masonry—which we now know dated to the final century of Pueblo occupation in the region, the AD 1200s. Prudden (1903:11–16) presented a diagram of a typical residential site and emphasized the remarkable uniformity in their layout. This layout includes a roughly north-south orientation and the recurring association of a small block of aboveground rooms on the north, a pit structure south of the roomblock, and a midden south of the pit structure. Given the consistent patterning in their orientation and layout, Prudden (1903:11) called these residential sites "unit type" pueblos, a label that remains in use today. Roberts (1939) subsequently demonstrated that unit pueblos developed in the AD 600s, and he documented the continuity and change in the unit pueblo over the subsequent seven centuries.

There is variation among unit pueblos (Gorman and Childs 1981), but equally striking is the widespread distribution and relentless modularity of this basic residential unit. In some cases, unit pueblos were isolated residential sites that were a part of dispersed, multisite communities. In other cases they were the basic building block for larger, nucleated villages. Studies that describe and attempt to explain the changing form of this residence unit span decades (Brew 1946; Bullard 1962; Gillespie 1976; Gilman 1987; Lipe and Breternitz 1980; McGuire and Schiffer 1983; Morris 1939; Roys 1936; Wilshusen 1988a). A detailed examination of the use of individual structures at residential sites—and how this use changed over time—is beyond the scope of this chapter, but I will briefly summarize recent research that provides the necessary background for my study.

In a particularly important work, Lightfoot (1994) examined household organization at the Duckfoot site, a remarkably well-preserved hamlet that was occupied between AD 850 and 880. Major features at Duckfoot include a roomblock with nineteen contiguous structures, four pit structures to the south of the roomblock, and a midden south of the pit structures. Duckfoot is an exceptionally strong case study because of the completeness of the excavations, the precision of a chronology based on almost 300 tree-ring dates, and the abundance and diversity of artifacts that were found on structure floors. A detailed site report (Lightfoot and Etzkorn 1993) and a series of publications present interpretations of architectural patterns, artifact assemblages, and household organization at the site (Lightfoot 1992a, 1992b, 1993, 1994; Varien and Lightfoot 1989).

Lightfoot used architectural and artifactual data to reconstruct activity areas at the site. Following the approach outlined by Wilk and Netting (1984), he analyzed these activities to examine household organization at Duckfoot. He identified the smallest spatial-architectural unit that contained a full set of activities and showed how this full set of activities was repeated in each of the households at the site. He demonstrated that a pit structure and its associated rooms and extramural areas composed the spatial-architectural unit that contained a full set of activities, and he showed that this set of activities was repeated in each of the pit structure-room-extramural units at Duckfoot. He concluded that one large household had used each of these spatial-architectural units and that the hamlet was constructed and occupied by three such households (Figure 2.3). He argued that within each unit the front rooms of the surface roomblock were living areas used by different segments of the household, and that back rooms were storage

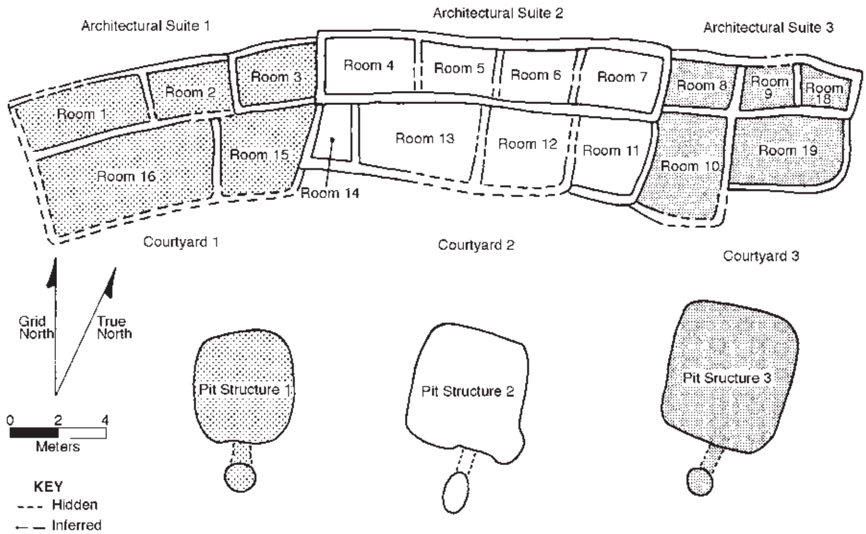

Figure 2.3. Plan map of the Duckfoot site (5MT3868) showing the architectural suites used by three households, central Mesa Verde region, Colorado

areas used by the entire household. Each household also used a pit structure for domestic and ritual activities (Lightfoot 1994; Varien and Lightfoot 1989).

Lipe (1989) examined the temporal depth of this pattern in the central Mesa Verde region and concluded that this spatial-architectural unit was the residence for an extended family or some other small coresidential group throughout the Pueblo occupation of the region. Synthesizing data from the region, he showed that the average number of rooms associated with a single pit structure varied from 7.6 to 6.5 to 9.0 in three successive periods: AD 850–900, 1050–1150, and 1150–1300, respectively (Lipe 1989:56). These data indicate that the size of the household remained relatively consistent through time and that the variation that did exist was constrained to a relatively narrow range. To provide general estimates of household size, Lightfoot (1994:147–148) examined ethnographic data on Pueblo household size and concluded that, on average, the range was five to eight individuals. A similar range is derived by using Lipe's (1989:56) data on the average floor area for architectural suites in conjunction with Naroll's (1962) often-cited estimate of ten square meters per person. Doing so produces a range of 5.1 to 8.7 individuals per household during the AD 850–1300 period.

At each of the residential sites examined in this chapter, a single pit structure or kiva is associated with a roomblock containing fewer than ten rooms. The size of these spatial-architectural units suggests that they were used by a single, large household. In the remainder of this chapter, I examine how the changing form of ancient Pueblo residences corresponds to their increasing occupation span.

ESTIMATING OCCUPATION SPAN

One of the things members of a household do is build and occupy residences. In terms of labor expenditure, the house was the most expensive artifact created for daily use by Pueblo people. Based on Pueblo ethnography, and consistent with vernacular architecture worldwide, the construction of a house is typically a corporate undertaking that is shaped by household membership (Cameron 1999; Mindeleff 1891). The house in turn structures the activities that occur there. Activity areas in and around the house were formed and modified during the use of the residential site and are a reflection of the daily practices of household members.

Measuring the length of occupation of residential sites is one essential step in evaluating the relationship between variation in occupation span and changes in the organization of activities through time. I examine occupation span in two ways. First, cross-cultural analyses demonstrate that the maximum use life of individual structures depends in part on the type of building materials used in construction, and these data can provide a general upper-limit estimate for the occupation span of a particular residence. Second, I obtain a more refined estimate of the occupation span of specific residential sites by quantifying the amount of broken cooking pottery that accumulated at that residence.

CONSTRUCTION MATERIALS AND OCCUPATION SPAN

Residential architecture in the central Mesa Verde region changed in important ways during the AD 600–1300 period. There were changes in the form of the pit structure, which has been labeled the pithouse-to-kiva transition (Gillespie 1976), and there was an increasing use of more substantially constructed surface rooms through time, which has been labeled the pithouse-to-pueblo transition (Gilman 1983, 1987; Lipe and Breternitz 1980; McGuire and Schiffer 1983; Whalen 1981; Wilshusen 1988a). Less attention has been given to the transition from earthen architecture to masonry architecture, although I have argued that this was a change of even greater importance (Varien 1999b, 1999c).

To examine the development of masonry architecture in the central Mesa Verde region, a distinction must be made between structures in which masonry was incorporated into the lower portions of walls, but whose upper portions were predominantly adobe and vegetal materials, and structures with full-height masonry walls. This distinction is important because the former—which I will call "composite earth-and-masonry walls"—are non-load-bearing walls that do not support the roof. Virtually every excavated example of rooms with earthen walls and composite earth-and-masonry walls has roofs that were supported by upright posts. In contrast, full-height masonry walls are almost always load-bearing walls that do support the roof. Thus, changes in architectural form that mark the pithouse-to-kiva transition and the pithouse-to-pueblo transition are similar in an important respect: both are characterized by a shift from earthen and composite walls that were non-load-bearing to masonry load-bearing walls.

Cross-cultural studies demonstrate that earthen structures have a shorter use life than stone masonry buildings (Diehl 1992; see chapters by Ciolek-Torrello, and Douglass and Heckman, this volume). Cross-culturally, earthen buildings like those found in the central Mesa Verde region typically last from six to twelve years, although some last as many as thirty years with extensive remodeling (Ahlstrom 1985:83–84, 638; Cameron 1990, 1999; Diehl 1992; Diehl and Gilman 1996; McIntosh 1974; Schlanger 1987:586). A factor that limits the use life of these buildings is the use of upright posts that support the weight of the roof; these posts are one of the first things to wear out in earthen buildings.

Masonry buildings with load-bearing walls lasted much longer. Ahlstrom (1985:642) inferred, on the basis of tree-ring data, that sixty years is a reasonable use-life estimate for masonry buildings in the ancient Southwest. Thus, the occupation span of residences constructed of earth was less than thirty years, but residences constructed with masonry buildings could have far exceeded this thirty-year limit. In the central Mesa Verde region, the transition from earthen to masonry architecture occurred during the early AD 1100s at most residences (Varien 1999b).

ACCUMULATION RATES AND OCCUPATION SPAN

I used the total amount of cooking pottery at residential sites to measure the occupation span for individual residences. My methods have been reported in detail elsewhere (Varien 1997, 1999a, 1999d; Varien and Mills 1997; Varien and Potter 1997); here I merely provide a summary of the procedures. First, I relied on sites that were excavated using a random sample and calculated statistical point estimates and confidence intervals for the total weight of cooking pottery discarded at each site. Second, I developed an annual discard rate per household for the accumulation of cooking potsherds using data from the Duckfoot site. Third, I estimated the number of households based on the number of pit structures or kivas at each residential site. Occupation span estimates were calculated by dividing the estimates for the total weight of cooking potsherds by the annual discard rate per household. I use the point estimate and the 80 percent confidence intervals, which illustrate the precision of the statistical estimates for the total amount of cooking potsherds at each site. At sites with more than one household, the occupation span estimates were divided by the number of households to obtain the occupation span per household.

I calculated these spans at nineteen residences excavated as a part of the Dolores Archaeological Program (Breternitz 1993; Kane 1986; Robinson, Gross,

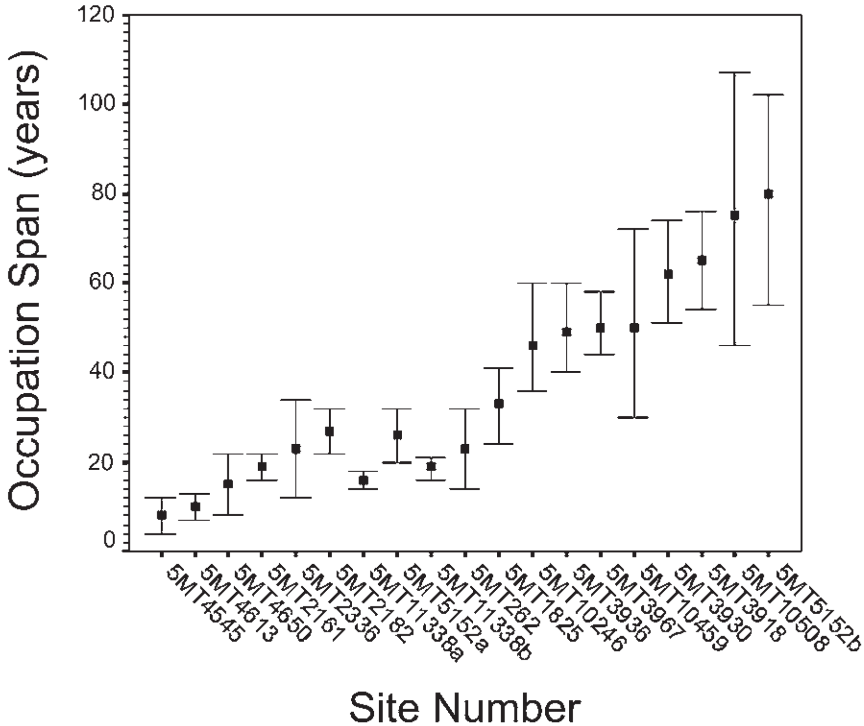

Figure 2.4. Occupation span estimates for household residential sites in the central Mesa Verde region, Colorado

and Breternitz 1986) and the Sand Canyon Project Site Testing Program (Varien 1997; Varien 1999a). Figure 2.4 illustrates the point estimate and 80 percent confidence interval for the length of time households occupied their residences at each of these sites. From left to right along the x-axis, the first site was occupied during the AD 600s. The next five residences were occupied sometime between AD 775 and 900. The next two residences were occupied sometime between AD 900 and 1100, and the final eleven sites were occupied sometime between AD 1100 and 1300.

Although the sample is limited, the trend is clear: occupation span increased through time (see Figure 2.4). Figure 2.5 presents the mean for the point estimates and 80 percent confidence intervals for the household occupation span in each of the four time periods; it shows that the largest increase in occupation span occurred at residences that were occupied after AD 1100. This corresponds to the transition from earthen to masonry residences. I now turn to ethnoarchaeological and cross-cultural research to develop a model that specifies how increasing occupation span affects the spatial organization of residential sites.

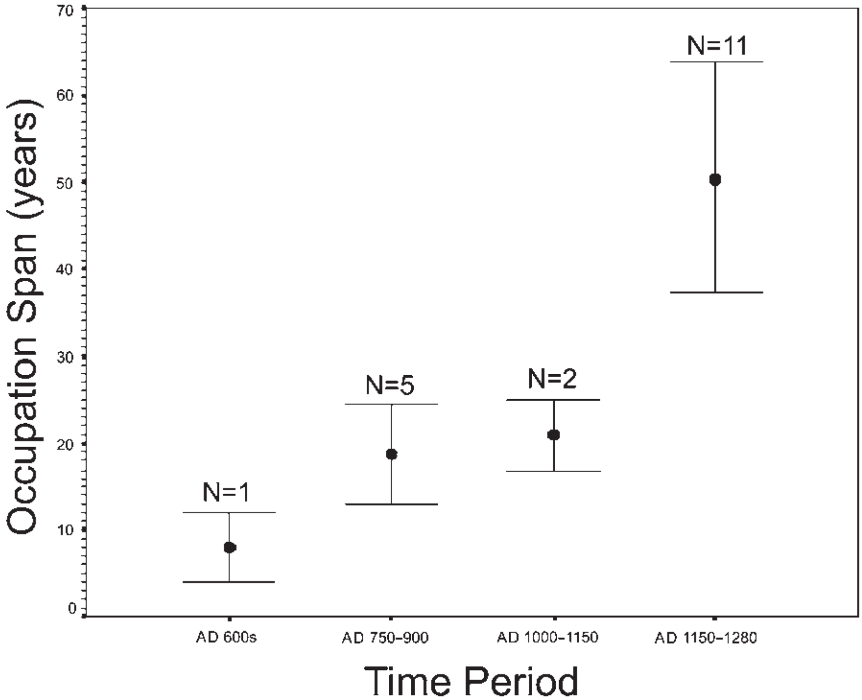

Figure 2.5. Mean occupation span estimates for each time period for household residential sites in the central Mesa Verde region, Colorado

CROSS-CULTURAL GENERALIZATIONS: OCCUPATION SPAN AND THE ORGANIZATION OF ACTIVITIES

Several ethnoarchaeological and cross-cultural studies have examined the spatial organization of household activities at residential sites. These studies examine the factors that affect architecture, site layout, and refuse disposal at these sites. This includes studies of mobile groups that rely on hunting and gathering as a mode of subsistence as well as more sedentary agricultural groups.

The cross-cultural studies include Gilman's (1983, 1987) research on the use of pithouses, pueblos, and storage facilities, which examines a sample of groups living throughout the world and a sample of groups in the US Southwest. Diehl (1992) and Diehl and Gilman (1996) use a worldwide cross-cultural sample to examine the relationship between occupation span and the types of buildings found at residential sites. Kent (1990b, 1991, 1992) uses a worldwide cross-cultural sample and ethnoarchaeological research that she conducted among EuroAmericans, Northwest Coast Native Americans, Navajo groups in the US Southwest, and Basarwa and Bakgalagadi groups of the Kalahari Desert, Botswana, Africa. Her wide-ranging studies examine a variety of issues including the segmentation and use of residential space and the relationship between occupation span and the organization of activities at these sites. Her work builds on Yellen's (1977) classic study of spatial patterning and site structure among the !Kung in the Kalahari, which examines, among other things, the relationship between site size and occupation span.

Other ethnoarchaeological studies have focused on the disposal of refuse, including Hayden and Cannon's (1982) study of trash disposal and Deal's (1985) study of pottery disposal by Maya households in Mexico and Guatemala. Arnold (1990) built on that research by studying refuse disposal and pottery production among households in Veracruz, Mexico. Finally, Killion (1990) examined the relationship between cultivation intensity and residential site structure among households in Veracruz, Mexico.

The generalizations culled from these studies form a valuable body of middle-range research that provides a starting point for a model that identifies the general principles that structure the organization of activities at residential sites. This model can then be used to interpret household behaviors in the central Mesa Verde region. The generalizations that are the basis for this model can be summarized as follows:

1. Increasing length of occupation results in increasing amounts of material, both artifacts and architecture, resulting in increasing site size (Yellen 1977), although Kent (1990a, 1991, 1992; Kent and Vierich 1989) argues that it is *anticipated* occupation span rather than the actual length of occupation that conditions site size and the amount of material at sites.
2. Increasing length of occupation correlates with the construction of formal, as opposed to informal, storage areas and an increased investment in the labor and materials used to construct storage facilities (Gilman 1983, 1987; Kent 1990a).
3. Increasing length of occupation correlates with increasing investment in the labor and materials used in the construction of architectural facilities designed as habitations (Diehl 1992; Kent 1990a).
4. Increasing length of occupation and increasingly restricted space at residential sites results in increasing specialization and segmentation of space and activities (Arnold 1990; Kent 1990a).
5. Increasing length of occupation and increasingly restricted space at residential sites results in increasingly formal refuse disposal (Arnold 1990; Deal 1985; Hayden and Cannon 1982; Kent 1990a, 1992; Killion 1990).

THE SPATIAL ORGANIZATION OF ACTIVITIES AT RESIDENCES IN THE CENTRAL MESA VERDE REGION

These five cross-cultural generalizations can be used to interpret changes in the organization of activities at household residential sites in the central Mesa Verde

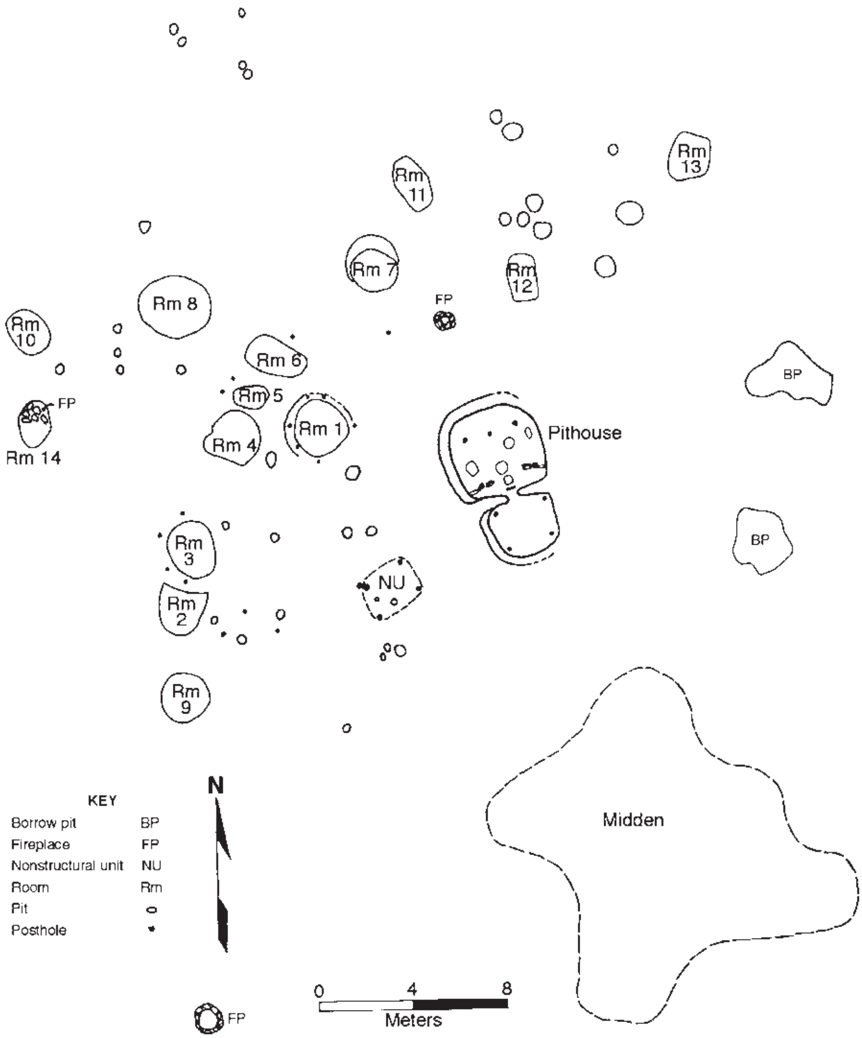

Figure 2.6. Plan map of Tres Bobos (5MT4545), a household residential site occupied around AD 650, central Mesa Verde region, Colorado

region. In this section, I review those changes by beginning with the earliest site in my sample and moving through successive periods.

The earliest site, Tres Bobos Hamlet, or 5MT4545 (Figure 2.6), was a single household residence with earthen architecture that was occupied at approximately AD 650 (Brisbin and Varien 1986). The occupation span estimate is eight years with a range of four to twelve years. Tres Bobos is the only site dating from this period from which a random sample was collected that could be used to estimate occupation span by calculating the total accumulation of cooking pottery. There are several other residences from this period for which construction episodes of sequentially occupied structures have been tree-ring dated. These dates indicate that pithouses were occupied for a maximum of fifteen years (Errickson 1995), which suggests that the accumulation-based occupation span estimates for Tres Bobos are reasonable and representative of sites dating to this period.

Tres Bobos was a typical seventh-century residence in the central Mesa Verde region (Wilshusen 1988b). All of the structures at Tres Bobos and at other residential sites that date from this time period were built with earth and timbers. The pit structure is the only building that was large enough to have served as a domicile, and the artifacts and features on the floor indicate that the structure was used for a variety of activities, including short-term storage, corn grinding, cooking, tool manufacture, and other domestic activities. The surface rooms were noncontiguous structures that appear to have been used primarily for long-term storage. There was no formal courtyard, and the extramural area between the pit structure and rooms was cluttered with many different types of pit features, indicating it was used for a wide range of activities. The refuse area was a thin layer or scatter of artifacts termed "sheet trash."

Five residences in my sample date from the subsequent AD 750 to 900 period. These residences were occupied nearly twice as long as those in the previous period; cooking-pot sherd accumulation demonstrates that the mean occupation span was nineteen years, with an 80 percent confidence interval range of ten to twenty-seven years (see Figures 2.4 and 2.5). The five residences in this sample were similar to each other and representative of the habitations occupied during this era. These residences had earth-walled pit structures and roomblocks constructed with earth and posts, although masonry is present at the base of the walls of some rooms. These residences do exhibit several changes in architecture and layout when compared to those of the earlier period, changes that are consistent with the general changes documented cross-culturally.

Pit structures in this period are deeper and almost fully subterranean. Artifacts and features on the floor indicate these pit structures were used for many domestic activities including short-term storage, corn grinding, cooking, and tool manufacture (Lightfoot 1994). There is also evidence that pit structures in this period were used for episodic household ritual, and some were used as the location for burials (Lightfoot 1994; Stodder 1987; Varien and Lightfoot 1989; Wilshusen 1986, 1988b, 1988c, 1989).

There were important changes in the surface rooms during this period (Wilshusen 1988b). For the first time, individual rooms were constructed in roomblocks of contiguous rooms with shared walls. These roomblocks are formed by two rows of rooms, as can be seen in Figure 2.7. There are smaller rooms on the back, north row, and these are fronted by a single larger front room to the south. The back rooms have almost no artifacts and features on

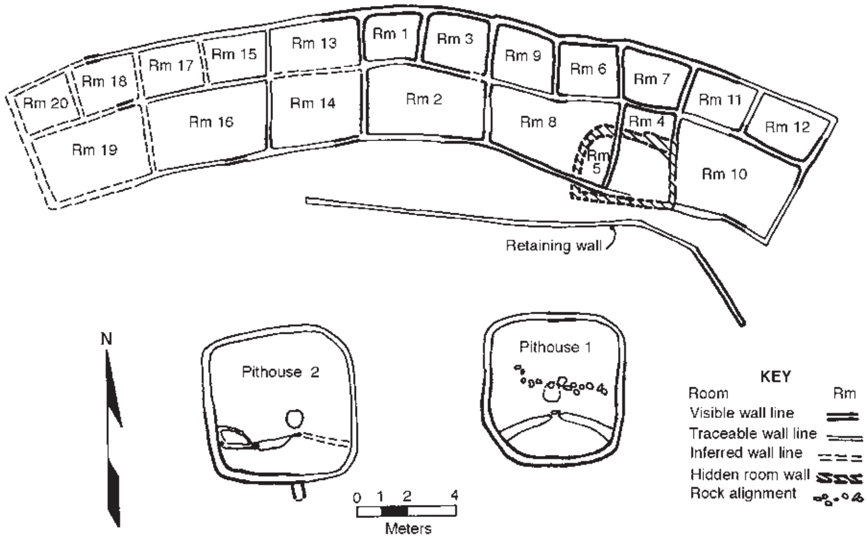

Figure 2.7. Plan map of Prince Hamlet (5MT2161), a household residential site that was occupied during the AD 750–900 interval, central Mesa Verde region, Colorado

the floor and they are interpreted as long-term storage facilities. These storage rooms incorporate the most masonry in the lower walls, and there was a far greater labor investment in these facilities when compared to the long-term storage facilities of the earlier period. The front rooms have artifacts and features on the floor that indicate they were used by intrahousehold groups as living areas (Lightfoot 1994). As in the pit structures, living activities in the surface rooms included cooking, corn grinding, short-term storage, and tool manufacture (Lightfoot 1994). Courtyards located between the roomblock and the pit structure contains numerous features.

The presence of multiple structures that were used as living areas indicates greater segmentation of space as compared to residences in the earlier period. On the other hand, the presence of activity areas for cooking, storage, and corn grinding in pit structures, rooms, and courtyards suggests a flexible and unspecialized organization for these domestic activities (Hegmon, Ortman, and Mobley-Tanaka 2000:68). As in the earlier period, refuse at these residences was deposited in broad areas of sheet trash, although this sheet trash covers a larger area and is deeper when compared to the middens of the earlier period. In the subsequent period, AD 900 to 1100, there are only two sites from which a random sample was collected that could be used to calculate the total accumulation of cooking pottery (Kuckelman 1999a, 1999b; Varien 1999a). The occupation spans at these two residential sites, an average of twenty-one years, are slightly longer than the estimated spans for the previous period. The buildings at both sites were earthen structures, including earth-walled pit structures and surface rooms constructed of posts and earth.

The random samples from these sites do not expose large areas and therefore do not allow an assessment of activity organization. For this information, I turn to data from other sites in the central Mesa Verde region that date from this time period and that were excavated in a manner that exposed entire structures and associated features (e.g., Kuckelman and Morris 1988). Like the two sites above that were used to calculate occupation span, the buildings at these sites were earth-walled pit structures and surface rooms constructed of posts and earth. At some sites, these architectural features were enclosed by a stockade constructed with posts and earth (Kuckelman 1988a:68–71).

As in the previous time period, pit structures occupied during this era were used for both domestic and ritual activities (Kuckelman 1988b:425). Domestic activities in pit structures included cooking, tool manufacture, and short-term storage. The aboveground roomblock was used as additional living space (Morris 1988a:126) and for long-term storage (Kuckelman 1988b:425). As in the previous period, refuse was deposited in relatively broad areas as sheet trash.

The most important change in spatial organization at these sites as compared to earlier residences was further specialization and segmentation of architectural space. For example, the organization of corn-grinding activities changed by the installation of metates into fixed bins constructed with slabs and adobe mortar. The earliest mealing bins have been found in subterranean mealing rooms located adjacent to pit structures (Hegmon, Ortman, and Mobley-Tanaka 2000:72; Kuckelman 1988b:425; Morris 1988b:162–169); this suggests that the organization of domestic activities and the use of space became more formal and specialized in this period (Hegmon, Ortman, and Mobley-Tanaka 2000:72). Figure 2.8 illustrates the structures and features at a residence from this period.

The change to masonry construction occurred by about AD 1100 in the central Mesa Verde region, and masonry buildings were found at each of the eleven sites in my sample that date from the AD 1100 to 1300 interval. The adoption of masonry architecture was accompanied by a dramatic increase in the length of occupation of residential sites. The mean occupation span estimate for the eleven sites is fifty years, more than double the estimate for the previous period. The 80 percent confidence interval range is 14 to 102 years. Figure 2.9 illustrates a masonry residence unit from this time period.

Construction of masonry buildings represents an increased labor investment in all types of architectural facilities, and the shift from earthen to masonry architecture almost certainly indicates that these households anticipated living in these residences for a longer period of time. The masonry-lined pit structures are called "kivas." Kivas have traditionally been interpreted as specialized structures used for ritual in this period; however, a variety of studies demonstrates that kivas occupied during this era were still used for domestic activities (Cater

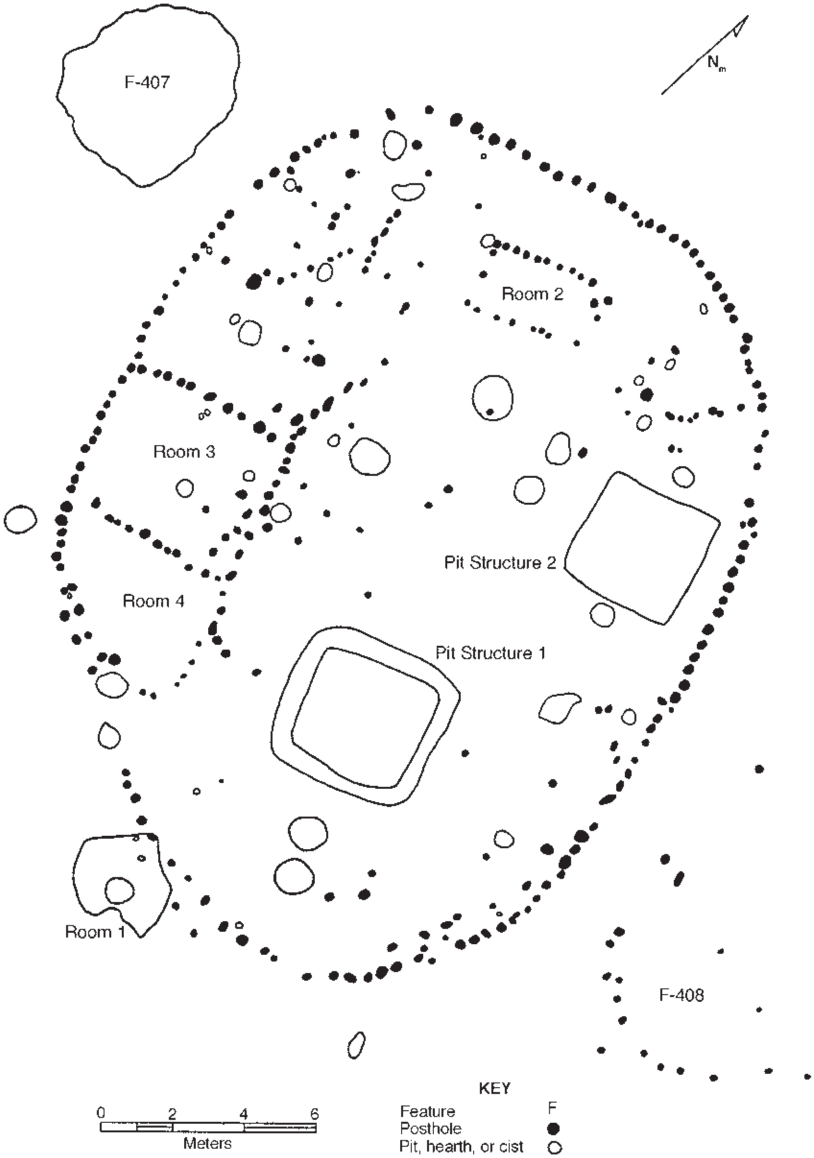

Figure 2.8. Plan map of Dobbins Stockade (5MT8827), a household residential site that was occupied during the AD 900–1100 interval, central Mesa Verde region, Colorado

and Chenault 1988; Lekson 1988; Ortman 1998), and macrobotanical remains from hearths in the kivas indicate they were used for cooking (Adams 1999). Kivas do contain fewer features than pit structures built in earlier time periods,

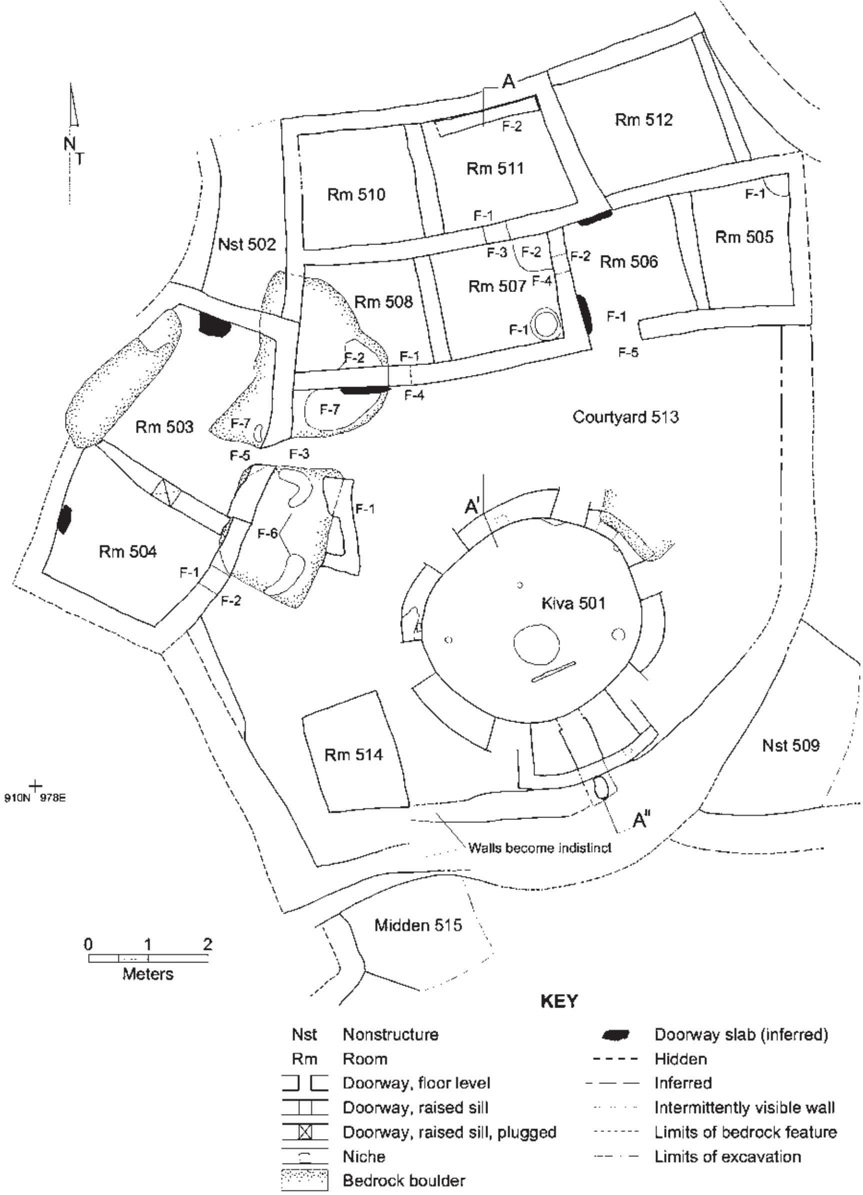

Figure 2.9. Plan map of Architectural Block 500 at Sand Canyon Pueblo (site 5MT765), a household residential unit that was occupied in the AD 1100–1300 interval, central Mesa Verde region, Colorado (© 2001 by Crow Canyon Archaeological Center. All rights reserved.)

and features for short-term storage are seldom found in kivas. Corn grinding continued to be a fixed and specialized activity, and mealing bins are found in specialized aboveground mealing rooms, subterranean mealing rooms, and occasionally kivas and courtyards (Cater and Chenault 1988; Ortman 1988). In my sample, and in most excavated residences that date to this time period, the only long-term storage facilities were in the surface roomblocks. Most roomblocks also contain structures that appear to have been living areas that were used for a variety of activities.

An important difference in these residences is that they have a more compact layout when compared to earlier residences. Kivas were constructed closer to the roomblock and were fully subterranean; the top of the kiva roof was level with the surrounding extramural surface enlarging the courtyard in front of the roomblock. The courtyards are for the most part free from refuse and contain few or no features.

Refuse disposal at these sites was different from that at earlier residences in ways that are consistent with the observations made during ethnoarchaeological studies. One difference is the presence of areas of higher artifact density around the perimeter of the courtyard. Ethnoarchaeological research has indicated that the regular maintenance of courtyard areas—usually daily sweeping—resulted in a high concentration of debris around the courtyard that has been termed the "toft zone" (Arnold 1990:918; Deal 1985:262; Hayden and Cannon 1982:126). Ethnoarchaeological research demonstrates that courtyards were cleaned periodically to keep this space clear and available for multiple activities that occurred regularly. Most studies of Southwestern unit pueblos have neither recognized nor investigated the toft zone at the margins of the courtyard. This lapse is unfortunate because analysis of the artifacts from these areas is the only evidence of the types of activities that occurred in the courtyard.

There is a second difference in refuse disposal at the later, masonry residential sites with longer occupation spans: the primary midden is not a broad area of sheet trash but rather a circumscribed, discrete trash mound. Depositing refuse in these discrete mounds contributed to the compact layout of these late unit pueblos. In Killion's (1990) ethnoarchaeological research, he examined refuse disposal at forty household residential sites in Veracruz, Mexico. He found that some households created middens that were broadly dispersed sheet trash while others deposited trash in discrete mounds. His research showed that the formation of discrete mounds correlated with residences that were surrounded by intensively cultivated agricultural fields. As with the regular maintenance of courtyards, the creation and maintenance of discrete middens increase the amount of useable outdoor space at a residence, space that remains free from debris and available for other activities. Killion found that this was particularly important for households that were surrounded by intensively cultivated fields, because cleared open space was needed for a variety of activities that were not spatially segregated. These included activities related to agricultural production as well as other domestic activities. As Killion points out, this observation is an important one because it is difficult to find archaeological evidence of agricultural intensification. The change from refuse disposal in dispersed sheet trash at the earlier residences to discrete mounds at the post–AD 1100 residences suggests that these Mesa Verde households had intensified agricultural production in fields that surrounded their residence.

This inference is supported by independent evidence for agricultural intensification during this period (Varien and Kuckelman 1997; Varien, Van West, and Patterson 2000). The eleven residences examined in this sample include six sites that are located in upland settings and five that are in canyon settings. The residences in the upland settings are located on deep loess soils that retain moisture; these are the most productive soils for agriculture in the region, especially direct precipitation farming (Van West 1994). The direct association between the upland residences and the best agricultural soils suggests that fields surrounded these houselots. In fact, these households were likely staking their claim to this land through the placement of their residences (Adler 1990, 1996; Varien 1999b).

The residences located in canyon settings were on shallower, less moisture-retentive soils; however, irrigation from rainfall runoff was possible in these settings. There are agricultural features at three of the five sites in my sample that are in canyon settings, including rudimentary stone terraces and water control features (Kuckelman 1999c, 1999d; Varien 1999d). The terraces were not large enough to have been the primary fields for these households, but their presence indicates that some type of cultivated area was located in proximity to the residence. But perhaps a more important restriction on space than the gardens is the canyon setting of these residences. The setting itself restricted space at these residences because there were smaller areas appropriate for construction, and this restricted space likely caused the more compact layout and changes in the organization of activities that are observed.

SUMMARY AND CONCLUSIONS

I have tried to illustrate how residential sites in the central Mesa Verde region exhibit evidence of both continuity and change in the spatial organization of household activities over a period of seven centuries. There was continuity in the layout and orientation of the residence, which was composed of surface rooms, a pit structure or kiva, and a trash area typically oriented on a northwest-southeast axis. Yanagisako (1984) pointed out that households are units of cultural meaning; they are a symbolic and conceptual unit—a cognitive model—and not merely a functional group. Addressing the issue of meaning in ancient Pueblo households, Ortman (1998) has argued that the redundant layout of twelfth- and thirteenth-century unit pueblos symbolized the cultural ideal of large, multigenerational extended family households. The persistence of the basic form of the household residence for seven centuries suggests that this cultural ideal was a deeply rooted aspect of ancient Pueblo society. History matters, and this continuity in layout and orientation illustrates how historically derived structure shaped household organization in the central Mesa Verde region.

In spite of this continuity, there was also considerable change in the form of Mesa Verde residences. Ethnoarchaeological and cross-cultural data were used to create a model that identifies the general principles that structure the organization of activities at residential sites, and the changing form of Mesa Verde residences were examined in light of this model. My study shows how these changes in form were conditioned by an increase in occupation span and restricted space at residential sites in ways that are consistent with the general principles derived from the cross-cultural model.

An important and straightforward accomplishment of this study has been to measure the change in the length of occupation of residences between AD 600 and 1300. The increase in occupation span alone is a fundamental change in household organization. At the seventh-century sites, the occupation span was relatively short, about one half of a generation. Length of occupation increased gradually over the next few centuries to a span that approximated a human generation; between AD 750 and 1100 residences were used for about twenty years. During this interval, the construction and occupation of a new residence may have been linked to the domestic cycle, with new residences being built when new households formed at marriage. Average occupation span more than doubled during the final two centuries of occupation of the region. During this era, the occupation of residences spanned multiple generations; elsewhere I have argued that this corresponds to the development of the heritable transfer of property from one generation to the next in Mesa Verde society (Varien 1999b).

This study goes on to show how increasing length of occupation conditioned other important changes in the form of the residence. The most obvious change was the shift from earthen to masonry architecture, which was accompanied by a striking increase in occupation span. The adoption of masonry architecture is likely to have occurred as households anticipated a longer period of occupation of residences, although variation in occupation span at these sites indicates that anticipated occupation was not always realized (Kent 1992; Varien 1999b). This link between increasing occupation span and the changing form of residential sites may seem obvious, but, with the notable exception of Sue Kent's work (1992), occupation span has scarcely been mentioned during a century of research on the changing form of unit pueblos.

In addition, increasing occupation span and restricted space have rarely been identified as factors that conditioned the organization of activities at residences. This study, however, shows a patterned relationship among increasing occupation span, the restriction of available space, and site structure. It is somewhat surprising to find that these factors appear to have affected architectural space and extramural areas differently. Within buildings, increased occupation span co-occurs with greater segmentation and specialization in the use of space; this is illustrated by the construction of mealing rooms. Extramural areas, on the other hand, were more intensively maintained so that they could accommodate multiple activities that were conducted on a regular basis but that were not spatially segregated. Changes affecting extramural areas at residential sites include the following: creating more compact site layouts with more formal courtyards; minimizing the number of features in the courtyard; cleaning courtyards on a regular basis, which resulted in the formation of toft zones around the courtyard perimeter; and changing the pattern of refuse disposal from sheet trash to discrete trash mounds, which created more usable extramural space at the residence. Wilk and Netting (1984:20) point out that the morphology of a household is often a compromise among different functional imperatives. The fact that increased occupation span and restricted space affected the organization of architectural and extramural space differently indicates that the organization of activities at residential sites was also a compromise.

Wilk and Netting (1984) argue that different activities vary in importance when households seek this compromise among functional imperatives. They further suggest that there is a general relationship between the subsistence economy and the types of activities that are emphasized by households. Hunter-gatherer households perform mostly distributive and reproductive tasks, while the emphasis among horticulturists is on productive activities. Further, as agriculture is intensified, the role of households in the transmission of goods and lands increases. The Mesa Verde case study supports these observations. Households in the central Mesa Verde region did emphasize activities related to production, and the form of the residence changed in ways consistent with the interpretation that agriculture was being intensified. Occupation span eventually increased to an interval that spanned multiple generations, which was likely associated with the transmission across generations of both the house and the agricultural lands adjacent to the house. Agricultural intensification occurred in the context of population growth and increased competition for the best agricultural land (Mahoney, Adler, and Kendrick 2000; Varien 2002; Varien, Van West, and Patterson 2000), and these factors, combined with higher levels of conflict and warfare (Kuckelman 2002, 2010; Kuckelman, Lightfoot, and Martin 2002), promoted longer occupation of residences and the transmission of property across generations.

This study has examined household organization in the central Mesa Verde region by focusing on broad patterns of site structure and how they changed through time. I believe this approach is justified because residences are a focal point for the activities that constitute households in behavioral terms. Formation processes have affected residential sites in many complicated ways, but they do not undermine our ability to interpret the buildings, features, and artifacts at these sites as the aggregated residue of the activities, or practices, undertaken by the individuals who lived there (c.f. Shennan 1993). Ethnoarchaeological and cross-cultural research has been helpful in identifying how occupation span and restricted space conditioned site structure and the organization of activities at residential sites. Demonstrating that these factors influence site structure in similar ways in a variety of societies helps us understand the general principles that govern site structure and the organization of activities at residential sites, and archaeologists should be able to apply this general model in a wide range of cultural contexts.

Occupation span and restricted space, however, *conditioned* site structure, and this is not the same thing as producing the specific changes observed at residential sites in the central Mesa Verde region. It was the individuals occupying those sites who produced the observed changes. Just as continuity in the basic components and layout of residences was a reflection of the historically derived structure of Mesa Verde region society, changes in form and in the organization of activities were an expression of the agency of the householders who occupied these sites.

Although this study lays useful groundwork for continued research on household organization in the central Mesa Verde region, it examines issues at a general level and much remains to be done. I hope future research examines specific changes in the organization of activities at residences in greater detail, detail that would allow us to better understand how the processes of structuration played out among Mesa Verde Pueblo households. For example, occupation span and restricted space conditioned the formation of toft zones, but these factors do not inform us about the specific types of activities that occurred in courtyards. To understand this we need to conduct detailed studies of the artifact assemblages from these areas. Similarly, increasing occupation span resulted in greater segmentation and specialization of architectural space, but this does not tell us about the gendered use of this space and how the activities of men and women were organized at these sites and how the organization of these gendered activities changed over time. A full understanding of changing household organization in the Mesa Verde region therefore requires continued research that reconstructs activities in greater detail. These activities need to be interpreted in terms of the changing social context in which these householders were situated. In this way, the activities of householders at residences reflect the complex interplay of structure and agency, and a continued focus on the behavioral aspects of household organization will produce important new insights into Pueblo society in the central Mesa Verde region.

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THREE

Production and Consumption in the Countryside

A Case Study from the Late Classic Maya Rural Commoner Households at Copán, Honduras

NANCY GONLIN

INTRODUCTION

Producer households are the backbone of agrarian societies and make up the bulk of the domestic economy, an observation that holds through time and space.[1] Anthropologists routinely investigate the nature of production, its organization, what goods or services are produced and by whom, and whether the domestic income is supplemented with extra-household production. These questions reflect a cross-cultural interest in what Hirth (2009b) calls "housework" and can be answered in both archaeological and ethnographic contexts (e.g., Robin 2003; Wilk 1991). The perspective of household archaeology offers a way to explore these issues through the material expressions of cultural practices.

This chapter presents an archaeological case study drawing from eight "Type 1" sites[2] (Gonlin 1993, 1994, 1996; Webster and Gonlin 1988) that were inhabited by Maya people who lived in the hinterland of the Copán kingdom during the Late Classic period (AD 650–900) (Figure 3.1). Most, but not all, people who lived in rural areas of Classic Maya polities were commoners (Lohse and Valdez 2004), as reflected in the particular material signature seen throughout

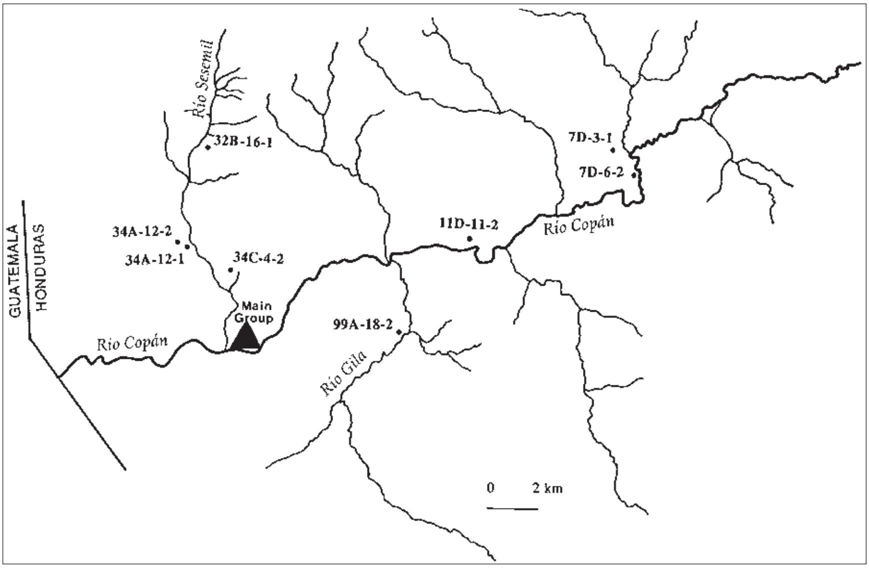

Figure 3.1. Map showing the locations of eight rural sites that were excavated during 1985–1986, Copán Valley, Honduras; site names are indicated (from Gonlin 1993:77)

Mesoamerica (e.g., small, simple structures; utilitarian artifacts; lack of hieroglyphics; and lack of elaborate burials; see Lohse and Gonlin 2007 for a discussion of the commoner concept in Mesoamerica). While it is presumed that farming was the primary occupation of rural commoners, a wide variety of activities took place, some of which have been traditionally assigned exclusively to elites.

These eight rural sites[3] offer a particularly rich database to explore issues of household production and consumption for a number of reasons. They are well contextualized since they were excavated as a continuation of Pennsylvania State University's urban zone excavations and rural survey and testing program, co-directed by William T. Sanders and David Webster.[4] Like the urban excavations, this project strove for complete horizontal exposure of all architecture, clearing of structure floors, excavation of extramural space (behind buildings and in the courtyard), excavation to sterile soil in many cases, and testing of the toft area (see Varien, this volume, for a discussion of the toft area in the American Southwest and Stanton, Brown, and Pagliaro 2008 for an informative discourse on refuse disposal). This strategy ensured a large sample of artifacts, features, architecture, and extramural space (average = 80%) where activities were likely to have taken place (Hendon 1987, 1996). As increasing numbers of sites in the hinterlands are investigated, an emerging view of the complexity of such settlement is coming into focus for the Classic Maya (Dixon 2011; Douglass 2002;

Iannone 2005; Iannone and Connell 2003; Yaeger 2000; inter alia), which will undoubtedly refine our reconstructions of these kinds of ancient households.

Furthermore, comparisons between rural and urban areas, and commoners and elites, are possible at Copán because of the various types of research and the long history of investigation that has taken place over the past centuries. Western explorers in the 1800s (Galindo 1836; Gordon 1896; Stephens 1841) recorded preliminary information about the city and its surroundings. Since then, many projects have focused on Copán's grand temples, palaces, sculptures, iconography, and hieroglyphics (Agurcia 1996; Andrews and Bill 2005; Baudez 1994; Doonan 1996; Fash 2001; Sharer et al. 1999; Traxler 2001; inter alia), urban neighborhoods (Ashmore 1991; Diamanti 2000; Gerstle and Webster 1990; Hendon, Fash, and Aguilar P. 1990; Maca et al. 2011; Sheehy 1991; Webster 1991; Webster et al. 1998, Widmer 2009; Willey et al. 1994; inter alia), outlying occupation of the valley (Baudez 1983; Canuto 2002; Diez 2011; Fash 1983a; Freter 1998; Gonlin 1993; Saturno 2000; Webster 1985; inter alia), and projects that incorporate technological advances (e.g., Aoyama 1999; Bill 1997; Richards-Rissetto and von Schwein 2011; Whittington and Reed 1997), all adding immensely to our understanding of the kingdom's history. Several recent publications nicely summarize this vast database (Andrews and Fash 2005; Bell, Canuto, and Sharer 2004; Fash 2001; Webster, Freter, and Gonlin 2000).

THE HOUSEHOLD CONCEPT

Production and consumption within society can be investigated by focusing on the household. Anthropologists see these two functions as intrinsically connected and often analyze them together (e.g., Kramer 1998). As the title of this volume suggests, what households do is of fundamental importance to the economy of a society. As archaeologists we must first identify "the household" from material remains. We look for, and expect to find, the physical embodiment of social, economic, ideological, and political processes, and ideally, all in one location. Households in ancient Mesoamerica are most often identified by clusters of buildings found together in courtyard groupings. These groupings can range from the closed courtyards of Teotihuacan to the more open pattern of associated buildings often found in the lowland Maya region. The buildings within any particular cluster may have been residences or ancillaries, the deduction of which can be problematic, even in the best of conditions (e.g., El Cerén, El Salvador [Sheets 1992, 2002]). Structure function figures importantly in the task of assessing production and consumption but is addressed elsewhere (Gonlin 2004). While the excavations in rural Copán are of houses, not households, there is sufficient evidence to make the theoretical leap from material remains to socioeconomic unit (see Varien, this volume, for further discussion). In rural areas especially, the Classic Maya have neatly packaged themselves into discreet settlements. Thus, for the purposes of this chapter, it is assumed that the spatially isolated groupings of houses found on the rural landscape throughout the Copán Valley are indeed indicative of ancient households and the activities and processes that occurred within them during their lifetimes. While archaeologists realize that this conclusion is not entirely correct, we can productively employ it with caution. The relative geographical isolation of groups combined with the close proximity of building remains within groups, as well as the nature of the artifact assemblages, points to self-contained units of operation (Lucero 2001, 2002). This statement of course does not indicate complete social, economic, ideological, or political isolation or self-sufficiency, however, as a household is a part of a larger community. (The value of community studies is well-known in archaeology [Canuto and Yaeger 2000; Stomper 2001] but is not emphasized in this chapter.) As we attempt to understand the household and its operations, we must recreate institutions, relationships, and ways of life from the artifacts, features, and architecture of the past. Maya household archaeologists (Gonlin 1993; Haviland 1985; Hendon 1987, 2010; Lohse 2001; Tourtellot 1983) have long focused on socioeconomic organization, with more recent work specifically considering the criterion of gender (Beaudry-Corbett and McCafferty 2002; Gustafson and Trevelyan 2002; Haviland 1997; Hendon 1997; Neff 2002; Robin 2006; Robin and Brumfiel 2008; Sweely 1999). This chapter too shall consider gender, a variable of household consumption and production (other chapters in this volume that consider gender include those by Douglass and Heckman, Gougeon, Henderson, Neff, Snow, and Wiewall, among others). The division of labor in every society breaks down along the lines of age, gender, ability, and status. Hence, consideration of these variables will enrich our understanding of the past and paint a more complex picture.

A standard definition of a household, one that is used by many authors in this volume, is that it is a coresidential activity group (Ashmore and Wilk 1988), which includes the women and girls, and men and boys, who produce, consume, distribute, and perform other activities. If we assume that there is a universal gendered division of labor, that this division is expressed in household activities, and that the evidence for these activities is recoverable through artifacts, features, and reconstructable patterns, then it may be possible to determine who the performers were in such activities, the locations of these activities, and the contribution of these activities to the domestic economy. If particular artifacts are associated with certain activities, then theoretically, it may be possible to determine which gender was more likely to have used certain tools. Ideally, production of goods and services may be assigned to one gender or another and household space may be partitioned along the lines of gender. In reality tools are multipurpose, tasks may be interchangeable between genders, there may be overlap in the use of space, there may be more than two genders (Storey 2005), many productive activities leave behind little trace, children may contribute substantially to productive efforts, and cultural and natural transformations obscure patterns.

GENDER: A CONSIDERATION OF CHRONOLOGY, GEOGRAPHY, STATUS, CLASS, AND AGE

Additional criteria should be evaluated to understand the connection between gender and production and consumption for the Classic Maya: chronology, geography, status, class, and age. The Late Classic period at Copán spanned hundreds of years, from AD 650 through AD 900. Given the dynamic nature of culture, patterns may very well have changed over this time period, which encompassed the dramatic decline of the kingdom. Earlier patterns during the Early Classic (AD 100–400) and Middle Classic (AD 400–650) may have differed from household strategies employed later in Copán's history. This chapter looks at small rural households occupied throughout the Late Classic period. In addition to chronological variation, geographical differences need to be considered in an area as diverse as the Maya lowlands. Recent work (Ardren 2002a; Gustafson and Trevelyan 2002; McAnany 2010) highlights both chronological and geographical variability, particularly with respect to gender roles. This chapter focuses on the southernmost expression of the grand style of Classic Maya culture, as expressed at Copán, Honduras.

Gender in a complex society encompasses many different classes and statuses. For the Classic period Maya of Mexico and Central America, archaeologists have been fortunate to have depictions of women and men from pottery vessels, figurines, jadeites, murals, sculptures, and architectural features (Freidel and Schele 1993; Schele and Miller 1986). While epigraphy and iconography offer snapshots primarily of elite Late Classic men and women, their value for understanding non-elites may lie in the symbolism that we derive from these portrayals (Lucero 2010). For example, from these depictions, a concept of gender complementarity has been used to explain the differences perceived in male and female roles. Rosemary Joyce (1992, 1993, 1996), Christopher Fung (1995), Joel Palka (1999), and others subscribe to this reconstruction of complementarity. However, these depictions are primarily of royal and elite women and men. It cannot be assumed that people of low status would have had similar roles and have been similarly portrayed or that the relationships between the genders or age-specific roles were identical from one class or status to another. As Vail and Stone (2002:204) have stated, "Classic Maya imagery, dating to c. 250–900 C.E., says little about the lives of the commoners because it is narrowly focused on the elite who commissioned such artworks." This situation is perceived by others as well. In referring to Maya women, Ashmore (2002:234) has aptly noted, "If the material traces of women's lives are generally subtle relative to other categories of evidence, the traces of commoner women are subtler yet."

When examining productive activities in an agrarian economy, one must account for age and the early recognition of adulthood. Kramer (1998) studied intensively both age and gender in the division of labor in a modern agrarian context and found both characteristics to be of vital importance. Netting (1993:71) used cross-cultural information to conclude that in many societies, by the time a child reached adolescence, he or she was already performing at the adult rate of work. Furthermore, biological aspects must also be considered. Vail and Stone (2002:204) note, "Our analysis suggests that Maya women were broadly divided into two categories according to an age-based dichotomy: premenopausal women, whose sexuality was seen as a threat to men and in need of control, and grandmotherly figures associated with the security of the home." Many questions need to be addressed. Did gender complementarity, a concept largely derived from elite portraiture, exist among the rural commoners of Late Classic Maya Copán? Were productive tasks carried out at farmsteads in a complementary fashion and were goods consumed likewise? Is there archaeological evidence that supports this model or another? And where did children fit into the picture of production and consumption (Ardren and Hutson 2006)?

To answer these questions and many others, an agrarian model of production is examined to shed light on the types of activities performed by swidden and intensive agriculturalists in a gendered context. Three main lines of evidence from the archaeological record of rural Copán, consisting of artifacts, architecture, and analyses of human remains, will be drawn upon. The presence of some artifacts that are often viewed as gender-specific, such as grinding stones, spindle whorls, celts, and projectile points, will be examined to analyze their distribution. The style, function, and layout of architecture can provide insights about the distribution of production and consumption since buildings provide physical places for harboring activities. Osteological studies involving isotopes and paleopathological analyses are useful in determining patterns of consumption within the household.

AN AGRARIAN MODEL OF PRODUCTION: CHILDREN AND ADULTS

As members of an agrarian society, ancient rural Copán householders performed innumerable agricultural tasks, and the household figured prominently in the implementation and completion of such tasks. The chores on a farm are never-ending and the production of food is of prime importance while supplemental income may be derived from intermittent crafting and multicrafting (Hirth 2009a). All able-bodied members, regardless of age, may have contributed in some fashion, as a wide range of activities occurred on a daily basis. As others who have addressed the topic of household labor and gender have done, particularly in relation to Maya farmsteads (Neff 2002), a listing of associated activities is in order. There are several studies of agriculturalists that provide information on productive tasks, and here I refer to a couple of these works (Kramer 1998; Wilken 1987). Kramer focuses on the productivity of children, since the additional criterion of age should be added to gender studies, and Wilken examines resource management of traditional agriculture in Central America and Mexico.

According to Kramer (1998), children do a variety of productive tasks on a regular basis as members of a subsistence agricultural society, such as the one she studied ethnographically in Xculoc in the Puuc region of Mexico. Children generally are neglected in anthropological studies (Hirschfeld 2002) and probably more so in archaeological contexts (Ardren 2006; Kamp 2001), where their presence is even less visible than in ethnographic situations. What we can learn from Kramer's work is not what Maya children specifically contributed to the household in terms of production 1,500 years ago, but the general pattern of contribution of children living in agrarian societies throughout the world. Kramer (1998:appendix B) provides a list of tasks that were likely performed by children anywhere, given the similarity of subsistence strategies: household activities; maintenance and manufacture; food processing and preparation; tending animals; resource acquisition; child care; personal maintenance; social activities; garden work; other labor; education; milpa work; and ritual activity. The types of artifacts associated with these activities that children perform would differ little, if at all, from the artifacts used by adults. In other words, it is highly likely that it will not be possible to determine the age of the user of such implements, such as a spindle whorl, a metate, or a knife. It also may not be possible to determine the gender of the users either, especially when tools, such as obsidian blades, are general purpose in nature.

Kramer has inferred the following patterns from her work. Not surprisingly, "[d]omestic work is largely sex-patterned and, although young boys may allocate some time to domestic work, girls' investment far surpasses that of boys" and "[f]emale children 12 and older spend between 49% and 52% of their time in domestic work, which is comparable to their mother's work effort" (Kramer 1998:131). These quotes and list of activities allow us to envision the work of children, as well as women and men, on the farmstead. Our Western twenty-first-century ideas of "adulthood" and "childhood" and productivity are a poor model for ancient agrarian societies, or even modern agrarian ones. We cannot assume that a person in Classic Maya society would had to have reached twenty-one years of age to be considered an adult and to be a productive member of the household. Both production and physical reproduction probably happened much earlier in life, and adult patterns of consumption of goods and services may have also occurred. Whittington's (1989) extensive osteological work at Copán on remains of Type 1 and Type 2 inhabitants has shown the mean age at death for individuals ages 20 and above to be 31.67 (95 percent confidence interval is 20.00 to 48.97). A cautious interpretation of this figure (keeping in mind the osteological paradox [Wood et al. 1992]) means that lifespans were short for the Classic Maya and cultural recognition of adulthood may have been accelerated. In Storey's (1992) analysis of the Copán sample, she considers subadults to range in age from newborns to fourteen years.

Wilken (1987:22), in reference to agriculture, makes an important observation for the purposes of this study, stating that "generally, traditional technology consists of ways of doing things rather than equipment for doing them," and that most traditional tools are general purpose. Field preparation first involves clearing, which consists of tree felling, clearing shrubs and grass, and bush felling (Wilken 1987:13), all of which are physically demanding chores. In prehispanic Mesoamerica, the lack of beasts of burden precluded field preparation involving the animal-drawn plow. The most likely implement for field preparation may have been a stone hoe, the remains of which are found at some Classic Maya sites (especially in Belize; see, e.g., McAnany 1992; Neff 2002). Digging sticks, usually made of perishable materials, would have been the tool of choice for planting. There is limited evidence for intensive forms of agriculture in rural Copán (see Davis-Salazar 2006 for a discussion of flood control) involving terracing, raised fields, or permanent irrigation canals, but according to Wilken (1987), there can be other forms of intensification, such as maize mounds and manual irrigation using water jugs (as in Oaxaca), basins, or gourds for watering crops. These types of intensification would leave little trace in the archaeological record. So although the major productive activity for Classic Maya farmers was food production, there may be little direct evidence of the related activities (i.e., weeding, planting, harvesting).

In addition to food production, other chores of farming families include cloth production, toolmaking, woodworking, house building and maintenance, the chopping and gathering of firewood, hunting, trapping, gathering, beekeeping, cooking, and craft production. Ritual and religious practices may also be carried out by individuals within households (Blackmore 2011; Gonlin 2007). Typical activities assigned to pre-Columbian Mesoamerican women and girls are cloth production (Hendon 2006), including spinning by females of most ages (Ashmore 2002:240) and weaving by women (McCafferty and McCafferty 1991); food preparation and cooking (Brumfiel 1991); tending to animals; child care; gathering; aiding in agricultural tasks; and gardening. Hunting, trapping, warfare, construction activities, toolmaking, ritual activity, resource procurement, beekeeping (Vail and Stone 2002:216), and heavy agricultural tasks are usually activities assigned to men and boys. One may argue that such a division of labor represents a stereotypical view, but we may ask if there is archaeological evidence to support these reconstructions. The study of figurines by Joyce (1993) shows women employed in maize-grinding tasks. The linguistic survey by Clark and Houston (1998) indicates that all craft activities (except for cloth production) contained male prefixes, indicating that such crafts were the products of men (however, see Ardren 2002b:77–78). A discussion of the archaeological evidence from rural Copán follows.

AN ANALYSIS OF ARTIFACTS

Most often, particular types of artifacts are tied in with particular types of activities, and archaeologists rely upon the correlation between tool and action to reconstruct production. It may be tempting in gender studies to assign certain artifacts to certain genders, but Karen Bruhns strongly advises against this practice. The ubiquitous metate illustrates this idea well.

> [E]very household from the period of incipient agriculture to the present had its metate or metates. This is because the metate is your pre-electricity blender, food processor, mouli julien and grinder: in the kitchen one grinds spices, herbs, chocolate, nuts, vegetables and fruits, makes baby food, mashes cheese for papas a la huancaina, grinds up dried fish, mashes meat, and so on ad infinitum. Everything that needs to be pulverized, flattened, mashed, squashed or ground is processed on that metate. (Bruhns 1991:422)

Aside from food preparation, a list of non-culinary uses of metates, including industrial and pharmaceutical applications, is given (see also Hayden 1987). It is also noted that women or men may perform these activities. Specific attention to details such as class, status, cultural situation (Bruhns 1991), and chronology (Haviland 1997) may identify the users and the context. With Bruhns's cautionary note in mind, the artifact distributions in rural Copán can be examined.

While some archaeologists have used monuments, murals, and figurines to successfully extract information about ancient Maya gender and economic activities (e.g., Hendon 2003; Joyce 1993, 1996; and many others), a recent find sheds clear light on what may be one of the very few depictions of commoners. A literal picture of Classic Maya production and consumption was found in the remains of a mural at Calakmul, Mexico (Vargas, Vásquez López, and Martin 2009). Drawings of women, men, and a child portray activities and glyphs name various roles, such as the "maize-gruel person," "maize-bread person," "maize-grain person," "salt person," "tobacco person," "clay-vessel person" (Vargas, Vásquez López, and Martin 2009:19248).

The basic artifact assemblage found in rural Copán is also found in urban Copán, particularly in the high-ranking neighborhood of Sepulturas (Diamanti 1991; Hendon 1987, 1997; Willey et al. 1994). From ceramics to lithics to ground stone, these items represent essential household equipment, regardless of class or status and regardless of who used them. What differs from rural to urban contexts is the diversity of artifacts (sometimes referred to as richness; Leonard and Jones 1990). The urbanites of Sepulturas utilized more specialized tools and a greater range in style for a particular artifact. Besides higher status, a greater diversity of artifacts may correlate with a longer occupation. Overall, however, it is clear that activities carried out were of a similar nature in all areas of the Copán polity, based on the similarity of tool assemblages (Gonlin 1993).

The task now is to examine the rural Copán homesteads to see if their assemblages include the evidence for the above activities and if artifact distributions within a site reveal anything about a gendered use of space. Nearly all artifacts were recovered from secondary deposits making interpretations about a gendered use of space tenuous at best. For example, in rural Copán, at all residences in this sample, ground-stone artifacts are ubiquitous, with metate fragments slightly outnumbering mano fragments (136 to 105, from Gonlin 1993:table 4.17). Shown in Figure 3.2 is the artifact distribution of Site 7D-6-2, displaying fragmentary manos and metates. If only one gender used these objects in particular areas of the house, it cannot be determined from this distribution map. Cultural and natural processes have so transformed the record of small habitation sites to the extent that few in situ remains are recoverable. What is really being mapped is the distribution of refuse behavior and postoccupational events rather than the behavior of food preparation or industrial or pharmaceutical production, since most remains are fragmentary and are found in secondary deposit types (LaMotta and Schiffer 1999). At Aguateca, Guatemala, where in situ materials have been recovered in the site core, it is clear that women utilized certain parts of elite structures for their domestic tasks, including food grinding and textile production (Inomata et al. 2002). Inomata and colleagues (2002:325) make a good point when they observe, "The apparent lack of divisions of male and female spaces at the Copán residential compounds, then, probably reflects the lack of resolution of the data rather than the reality of past practices," in reference to Sepulturas activities. Likewise, at Cerén, domestic activities seem to be compartmentalized (Sheets 1992).

The pattern evident in Figure 3.2 does highlight, however, that every structure is associated with the remains of grinding stones, possibly indicating that women and girls performed food preparation in each of the buildings and then disposed of their broken implements just outside of their houses. This statement involves another assumption, that is, that the refuse associated with a building came from activities that occurred within and around that building. The presence of manos and metate fragments in relatively great numbers indicates the prevalence of grinding activities. Grinding maize by hand was a laborious chore. In addition to other tasks associated with maize, such as processing, food preparation would have consumed much of a woman's waking hours, especially since maize was the staple food source. It has been documented through isotopic means that the Copaneco diet consisted of between 62 percent and 78 percent maize (Reed 1998). In addition, almost 60 percent of ceramic remains are associated with cooking and storage activities in rural Copán (Gonlin 1993:table 4.8). The symbolism of manos and metates, as well as many other mundane artifacts,

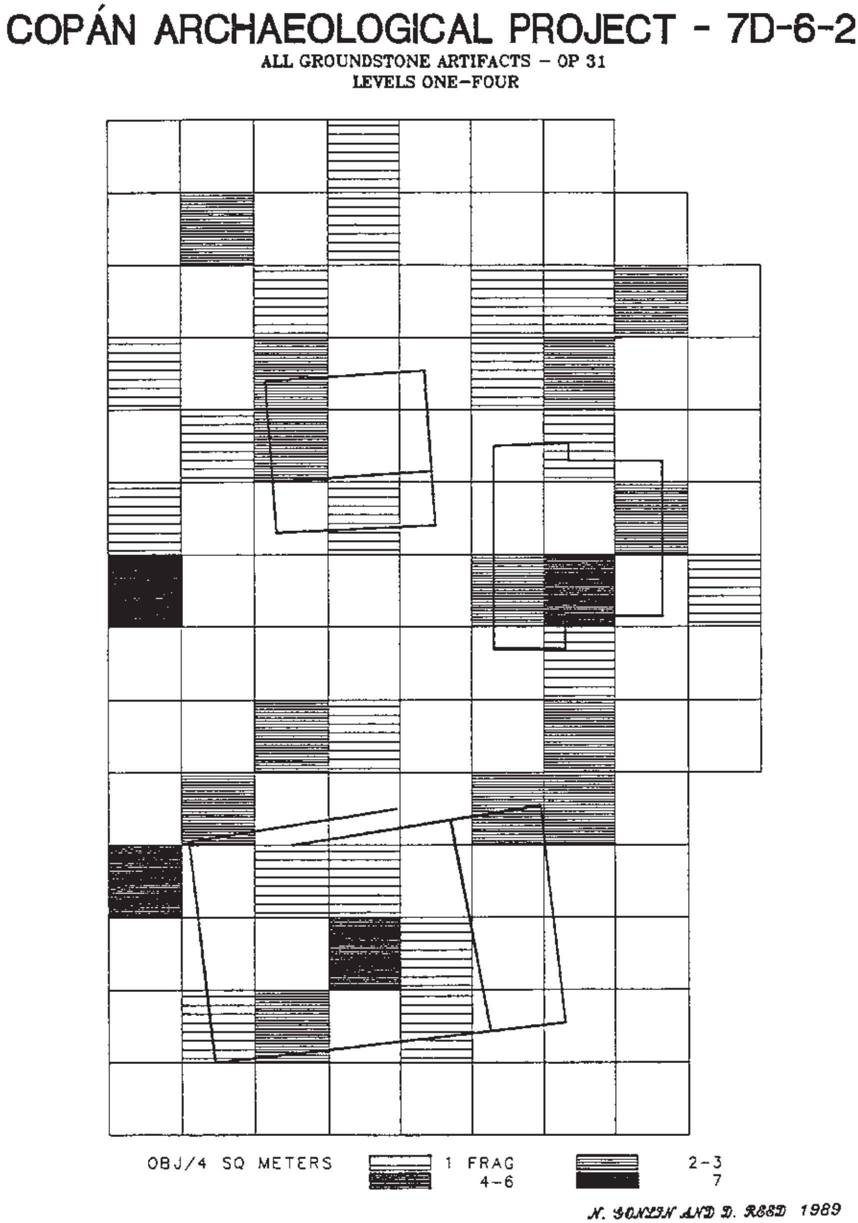

Figure 3.2. Spatial distribution of grinding-stone fragments at Site 7D-6-2, Río Amarillo, Copán, Honduras; note that each structure is associated with this type of artifact (from Gonlin 1993:807)

are meaningfully discussed by Hendon (2010:88), who states that metates "index the labor of women and girls."

Evidence for spinning was found in five of seven rural commoner residences in the form of ceramic spindle whorls, worked sherds, or discs (Gonlin 1993:389). Although the overall count is extremely low, it is on par with the percentages of these types of artifacts found in the densely populated Sepulturas by both the Harvard (Willey et al. 1994) and Penn State excavations (Diamanti 1991). There is no distinguishable intrasite distribution that shows the activity of spinning being performed in particular areas of buildings, terraces, or outdoor areas. Had such a spatial arrangement existed in the past, it has long been blurred by the elements of time and nature. Hendon's (1997) data for Sepulturas show a greater frequency of textile production tools in larger residences, perhaps indicating a larger population of women and girls. Though present, the frequency of textile manufacturing tools found in rural areas is extremely low. It is possible that textile production was not a "defining activity of nonelite females" (McAnany and Plank 2001:96), although they did engage in it. Alternately, based on the recovery of organic spindles and whorls at Cerén (Beaudry-Corbett and McCafferty 2002:59–60), where some types are made of wood and coyol palm endocarp, spinning tools may be underrepresented in archaeological contexts. Needles, which indicate weaving, were not recovered in the rural area; however, bone needles and awls were recovered from Sepulturas (Diamanti 1991:236). According to Vail and Stone (2002:211), weaving likely took place in the dry season months of November and April, which correlates with the agricultural off-season, a form of production that Hirth (2009a:20) calls "seasonal crafting." Weaving is an activity that would have required more skill than spinning and may have been practiced by adults rather than children.

There is artifactual evidence from rural Copán, in the form of grinding stones and spinning implements, to support the activities stereotypically assigned to Classic Maya women and girls. The presence of "male" activities may be examined in a similar fashion, by looking for artifactual evidence of farming, hunting, house building, and warfare. McAnany and Plank (2001:95) suggest that a monolithic role did not exist for males or females, with status or class being an important element for consideration. They cite the fact that Classic Maya rulers have never been portrayed as farmers, although some have been portrayed in deer hunts (McAnany and Plank 2001:93), indicating that the farming role most likely was confined to the non-elite sector of society. Ethnographical and ethnohistorical observations support the reconstruction of men as farmers; in rural Copán, however, there is little direct evidence in the way of artifacts to confirm this activity. The standard biface, ubiquitous at other Classic Maya sites (McAnany 1992) for land-clearing activities, has not been recovered from rural or urban Copán (Willey et al. 1994:264) or in areas just outside the Maya region, such as the Naco Valley, Honduras (Douglass 2002). In the absence of direct artifactual evidence, it pays to keep in mind Wilken's (1987:22) observation that traditional technology may not involve equipment but rather knowledge.

Another way to approach the reconstruction of agricultural production is through an analysis of ecofacts. When we look at the particular agricultural regime at Copán, and specifically in rural Copán, paleoethnobotanical evidence, being site-specific, can be used to further our knowledge. Lentz (1989, 1990, 1991) examined remains from both urban and rural areas of Copán to gain insight into commoner and elite diets and to determine plants that were cultivated and the ones gathered as wild species. By using this information, we can determine the kinds of crops that were grown and consumed by the populace.

Not surprisingly, Lentz (1991:272–273) found the remains of *Zea mays* at Copán from sites of all statuses and time periods, and estimates that corn was likely the main staple. In particular, grains and cupules were recovered from rural sites 7D-6-2, 7D-3-1, 34A-12-1, 34C-4-2, and 99A-18-2. Given the ubiquity of grinding stones and isotopic analysis cited above, it is clear that maize comprised the major portion of the diet for people of all statuses. The diet was supplemented with beans (*Phaseolus vulgaris*), squash (*Cucurbita moschata*), chayote (*Sechium edule*), and tree fruits like avocado (*Persea americana*) and nance (*Byrsonima crassifolia*) (see Lentz 1991:table 1 for a complete listing of macroremains from Copán).

In addition to these cultigens, there were numerous tree species that were either cultivated or their products gathered from wild-growing ones. More than any other plant remains at Copán, the carbonized seeds or endocarps of the coyol palm were recovered in great abundance. Lentz (1990) has studied the coyol palm (*Acrocomia mexicana*) and Heather McKillop (1996) has examined it along with other palm species from archaeobotanical and ethnobotanical sources. At Copán, coyol was found in numerous contexts, such as middens, house floors, vessels, platforms, and patios. Since the seeds are extremely durable, this abundance may result from preservation factors rather than their use as a staple food source.

The coyol can be used as a food source in a variety of ways (Lentz 1990). The kernels or endosperms can be eaten or made into a beverage and it is possible to extract the oil from the kernels for use in cooking. McKillop (1996:280, 288) reports that the trunks of palm trees can be burned to produce salt, and that the sap may be extracted for wine-making. The seeds have a high fat and caloric content (Lentz 1990:189) and it is estimated that they may have provided up to 7 percent of the calories in the diet. Though this percentage is small, the coyol may have supplemented the diet in important ways, especially during the latter half of the Late Classic period, when ecological stress and population pressure put harsh demands on the food supply.

Apart from the direct evidence of coyol, the presence of particular artifacts indicates that coyol may have been processed within the household. Stone slabs with small circular depressions the size of a coyol nut were found at two larger-sized rural Type 1 sites, 11D-11-2 and 34C-4-2, in front of structures in the courtyard. Additionally, nutting stones were found at several rural (11D-11-2, 34A-12-2, and 32B-16-1) and urban sites and may have been used to process coyol nuts. The meat is particularly difficult to extract. Ethnographically, the coyol is found in kitchen gardens, as reported by McKillop (1996:288). An infield-outfield system of agriculture is suggested by the types of plant remains recovered. At one site, 7D-6-2, the remains of "chich" mounds may be indicative of arboriculture (Kepecs and Boucher 1996, in Ashmore 2004), providing additional evidence for the existence this type of agricultural system. Women may have been responsible for the kitchen gardens, while the milpa may have been the primary responsibility of the men of the household. These conclusions, however, are not based on archaeological evidence, nor are they new insights (Netting 1977).

The presence of wild species at some sites indicates that gathering may have played a subsidiary role in the diet. Wild beans and wild grapes (Lentz 1991) may have been collected and then brought home to be consumed. Weedy species were also recovered, indicating that they may have been intentionally brought in and used as bedding or matting material (Lentz 1991:278). Alternatively, they may have been inadvertently carried or blown in.

One wild creature that was captured and brought home was a species of freshwater snail, called *jutes*. The gathering of jutes was notable at some homesteads (386 jutes at 34A-12-2 and 676 jutes at 99A-18-2) where abundant remains of these snail shells were recovered (Gonlin 1993:table 4.24). The shells are intact, save for a hole at the distal end of the shell where the creature was extracted, a form known as "spire-lopped" (Halperin et al. 2003:208). Lawrence Feldman analyzed mollusks from the Harvard Sepulturas excavations at Copán and notes that the jutes belong to the freshwater genus of *Pachychilus*. According to Feldman (1994:478), *P. corvinus* is today used as a snack food and consumed raw or boiled in its shell. The shells of this species, as well as those of *P. largillierti*, are useful as a source of lime, a substance valuable for maize processing, plaster making, and pottery temper. Healy, Emery, and Wright (1990:178–179) have discussed at length the domestic uses in both modern and ancient Maya contexts, noting that these types of mollusks are most often prepared as a thick, spicy soup. According to Halperin and colleagues (2003), jutes were not only used for subsistence but figured importantly in cave rituals. After consumption in the household, their remains were gathered and deposited in caves, returning them to Mother Earth. This activity may explain why some ancient Copán households have abundant remains of shells (34A-12-2, 99A-18-2), while other households have little (two jutes at 11D-11-2, three jutes at 34A-12-1) or none (7D-6-2, 7D-3-1, 32B-16-1, 34C-4-2). Healy, Emery, and Wright (1990:178) also note that snail harvesting today is most often a male activity, one that can be conducted as men go to and from their fields or on the return trip from a hunt.

Hunting and warfare, supposedly male activities (cf. Reese-Taylor et al. 2009), may be connoted by the presence of arrowheads, projectile points, darts for blowguns (Ventura 2003), or other points (Aoyama 2005), or hunting may be recognized through the identification of hunting shrines (Brown and Emery 2008). In rural Copán, all sites in this sample had these types of artifacts (Gonlin 1993:409), albeit in low numbers. To what degree commoners participated in military activities is unknown, and as McAnany and Plank (2001:93) state, "[i]n the absence of warrior burials, it is difficult to characterize the frequency of military activity among Classic Maya males of either the royal court or households." McAnany and Plank (2001:94) further state, "Additional evidence for a military role for males from households has been garnered from an analysis of the seasonality of recorded military events that revealed dates of engagement coinciding with agricultural downtime (Child 1999)." Conscripted labor requirements for commoner males have long been proposed (Abrams 1994, 2010; Abrams and Bolland 1999), so it is not inconceivable that military labor may also have been required. Aoyama (2004:291) has noted the notoriously difficult task for recovering archaeological remains of conflict, but sufficient evidence from across the Copán polity suggests that the participation was valley wide. All eight sites in this study produced low numbers of obsidian or chert points (Gonlin 1993:tables 4.22 and 4.23), which could have been used in conflict or hunting. The subject of the role of hunting is addressed below in a discussion of the Copán diet.

Another typical activity for Classic period Maya men and boys probably included construction, such as building of houses and monuments. Celts, hammerstones, and polishers are artifacts commonly attributed to these activities (Fung 1995; G. McCafferty 2001; Pohl 1991). Celts are found at all rural sites, but hammerstones and polishers are less common (Gonlin 1993:table 4.18). Just as grinding stones were common to each structure within a site, a similar pattern holds for supposedly male artifacts as well. Shown here is the distribution of hammerstone and polishing stone fragments (Figure 3.3, from Site 7D-6-2 in Río Amarillo). Hammerstones are multifunctional tools that serve equally well for cracking open nuts as for pounding construction elements into place. Likewise, polishers have more than one purpose and are often assigned a function in ceramic production. Freter (2004) hypothesized that it is possible Copán rural ceramic production was performed by community cooperatives, along the lines of the Chorti *sian otot,* per Wisdom (1940). Recently, Landau (2011) has tested several models of social interactions in the Copán Valley, of which the sian otot is one of several different possibilities.

The social organization of construction activities likely varied with the size of the task at hand. One can envision work groups of related or unrelated males organized by bureaucratic administrators for the tasks involved in monument building. Elliot Abrams (1994) has broken such tasks into quantifiable energetic costs and their associated organizational correlates. The family or lineage (or *sian*

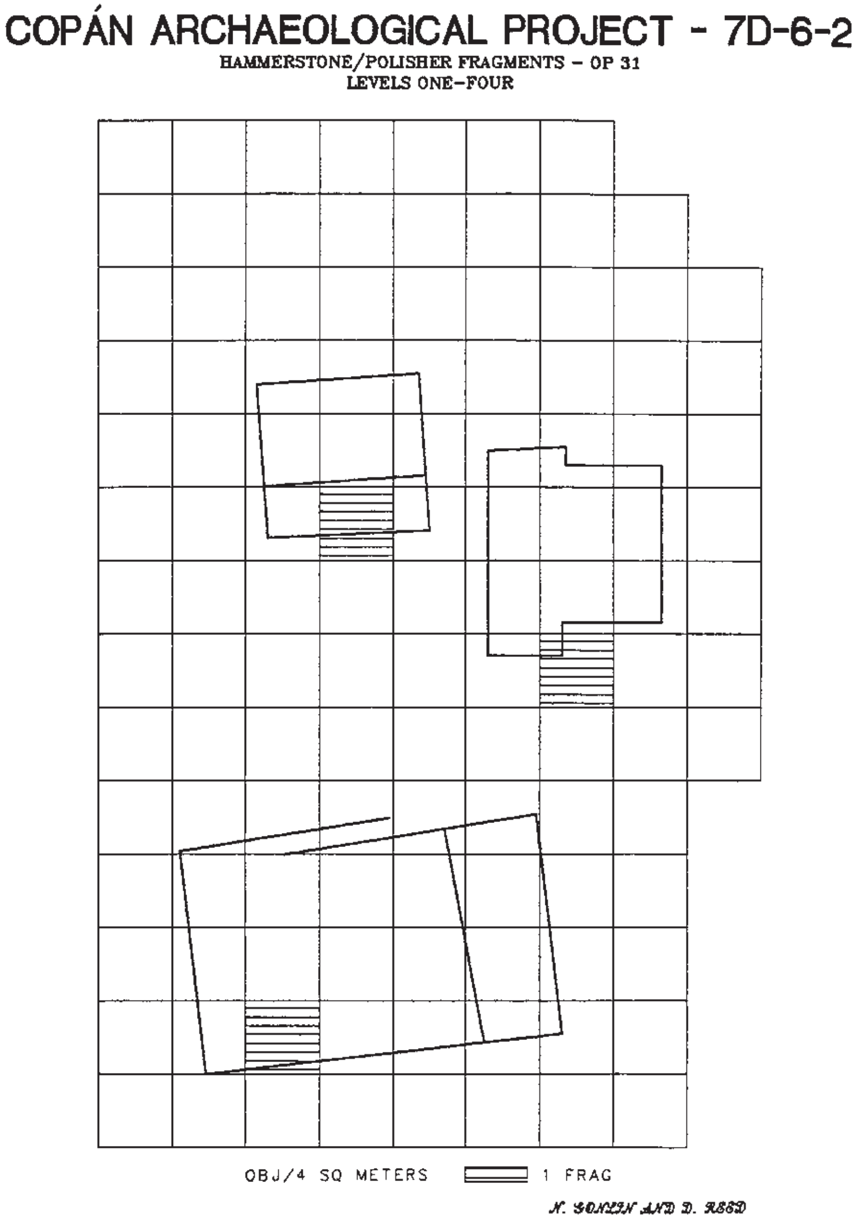

Figure 3.3. Spatial distribution of hammerstone/polisher fragments at Site 7D-6-2, Río Amarillo, Copán, Honduras; each structure is associated with this type of artifact

otot, per Fash 1983b and Freter 2004) likely played a part in construction activities in both rural and urban areas and for small and large projects. Organization ranged from various forms of familial recruitment (familial reciprocal, familial contractual, and community contractual) to custodial recruitment (including festive custodial and corvée) (Abrams 1994:97–101). This pattern is likely common to other areas of Mesoamerica as well (see Carmean, McAnany, and Sabloff 2011).

In what other productive activities did rural commoners engage? There is evidence of papermaking in the form of bark beaters. Bark beaters may have been used to produce cloth and paper (McAnany and Plank 2001:96), but bark beaters are not ubiquitous in rural commoner households at Copán and do not seem to be an essential tool in the domestic assemblage. From our sample of eight sites, three contained one bark beater each (Gonlin 1993:table 4.18). Bark beaters are found in Sepulturas (Diamanti 1991; Willey et al. 1994) but in small quantities. Whether paper or cloth was the end product of these implements, the ultimate consumer of these products is not known, although depictions of royalty in bloodletting rituals are shown to employ paper. Just as likely, paper could have been manufactured and used by the inhabitants themselves in their own rituals (Gonlin 2007).

The prolific amount of sherds recovered from Lowland Classic Maya sites provides a general picture of activities. Hendon (1987) organized the wide variety of vessel forms for Copán and, based on ethnographic analogy, assigned meaningful functional classifications to various forms. Her broad categories of "cooking/storage," "serving/eating," "ritual consumption/ceremonial," and "other" are useful for understanding past activities in a general way, especially when the original locations of such activities no longer exist in the archaeological record. After sherds, obsidian prismatic blades are the most numerous artifacts at Copán sites, rural or urban, low or high status. Blades are truly multipurpose tools used for all sorts of cutting activities, from slicing open ears of corn (Neff 2002:36), to bloodletting (Marcus 1996:288), to weapons (Clark 2001:553). These tools are easily tailored to specific requirements but on archaeological sites are most often found broken, and most often use-wear analysis is not performed on the majority of broken blades. It would be illogical to assign this particular artifact to one gender or to one task.

AN ANALYSIS OF ARCHITECTURE

An examination of architecture within a site shows trends that may lend clues to gender relations. Houses, like other artifacts, have styles that can be identified. At some rural sites, it is evident that the same style was followed in house construction, at least for the intact remains of the substructures that were built of cobbles. At Site 7D-3-1, located in Río Amarillo (Figure 3.4), it is evident that

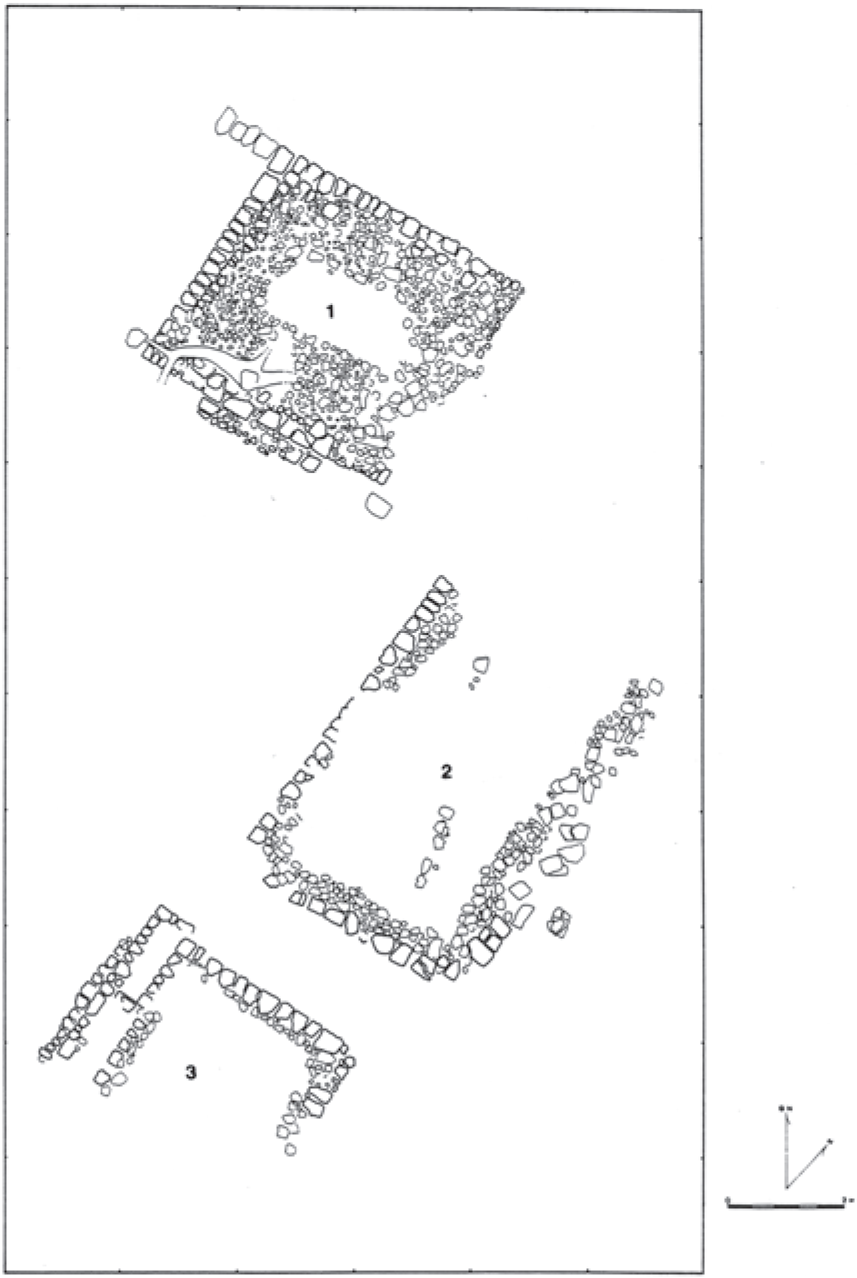

Figure 3.4. Plan map of Site 7D-3-1, Río Amarillo, Copán, Honduras; note the similarity in construction of each building (from Gonlin 1993:166; original by David Webster)

the three buildings, one of which served primarily as a kitchen, were built in a similar style. Most likely they were probably not all built at the same time over the multiple decades of occupation of the site (Gonlin 1993:472). The length of occupation means that different generations inhabited the site and maintained the style of building. If men were the primary house builders, then it may be tenuously hypothesized that patrilocal residence was practiced at this homestead, with generations of men passing on their knowledge and style to their kinsmen. Alternatively, regardless of residence, family members contributed to maintaining the farmstead.

Lentz provides some guidance as to the species that may have been selected by ancient Copanecos for house building. In his analysis of charcoal remains, "[p]ine predominates throughout all phases in middens, cooking areas, hearths, activity surfaces, and in construction collapse. It may have been a preferred wood for building construction as well, since it was the most common charcoal in post molds and construction collapse" (Lentz 1991:280). Hardwoods were also used for firewood and construction, but not as often as pine. The remains of burnt clay, some of which is pole or grass impressed, also lend clues to construction (Gonlin 1993). We can glean from this information the types of firewood collected by the rural inhabitants.

Kitchens and hearths are considered to be the domain of women, yet as Graham (1991:474) has observed, neither has been the focus of intensive study in the Maya region. Identifying structure function is difficult because functions change over time, refuse may not be related to structures, and architecture may be multifunctional. Just as kitchens are difficult to identify archaeologically, hearths too provide a challenge to the excavator, a point addressed elsewhere (Gonlin 2004). Nevertheless, kitchen signatures may be identified if long-term use prevailed and if chemical analysis of soils has been undertaken (Manzanilla 1987; Manzanilla and Barba 1990). Both Diamanti (1991) and Hendon (1987, 1997) have identified kitchens at Sepulturas, and it has been possible to identify them at rural sites, too. For rural commoners, kitchens are almost always located to the magnetic north or east, not to the south or west, as one might expect from concepts of gender ideology derived from ethnographic observations (Palka 1999). Nevertheless, the identification of women's space is important in understanding household organization, since it reveals the physical location of their activities.

Identification of the number of contemporaneous kitchens or hearths within a group may reveal more than the location of women's space. According to Sabrina Chase (1991), who studied polygyny in a cross-cultural fashion with relation to architecture, it is common for each wife to be provided with her own hearth, if not her own living space. The existence of polygyny has not been given serious consideration for the commoners of Classic Maya society, but it is a pattern taken for granted among the royalty and elite. For example, it has long been proposed that polygyny existed, given the layout of architecture and the predominance of female burials at the elite Type 4 site in Sepulturas (Sanders 1989:96). With increasing research on commoners (Lohse and Valdez 2004), it may be possible to determine just how widespread this cultural practice was.

In terms of overall size, the variation within rural Type 1 sites warrants comment with relation to agricultural production. In this sample of residences, Type 1 structures may number from two to five around a plaza, and vary in substructure area from a low of around 13 square meters to a high of 66 square meters (Gonlin 1993:table 5.5). According to Netting (1993), larger households may signal bigger farms that are more productive. The larger Type 1 sites (11D-11-2 and 34C-4-2) are also located on better agricultural land that is well drained and relatively flat. A strong correlation between length of occupation and type of habitat was found by Paine and Freter (1996; Paine 1992) for the Copán Valley. The soils of the valley (Wingard 1992, 1996) have played a dynamic role in the evolution of the Copán kingdom and its households. In particular, the Copán pocket soils have supported relatively large populations since these ones are the most fertile in the region. As population densities increased during the Classic period, farmers moved to less desirable soils and cropped more frequently. Perhaps they grew root crops as well as maize, as suggested by the recent finds at Cerén, El Salvador (Dixon 2011). By the very end of the Late Classic, Copán farmers were probably working harder than their counterparts did during the beginning of this time period.

HUMAN REMAINS: ANALYSIS OF CONSUMPTION

Another approach to gender studies is through the analysis of human remains. Brian Hayden (1992) views the field of skeletal and mortuary studies as a fruitful approach to understand prehistoric gender. To accurately interpret skeletal or isotopic data and to perceive pan-Maya (Gerry and Krueger 1997) or pan-Mesoamerican trends, one must ideally have large sample sizes from single sites rather than few samples from many sites. If we examine the work carried out at Copán, where one of the largest and best samples of burials exists, there are a number of different approaches that researchers have taken. First, Stephen Whittington (1989, 1992, 1999) has studied many osteological characteristics, including dental caries and tooth loss. In one of his studies, the sample included forty-two low-status males and forty-five low-status females (Whittington 1999). He concludes that the difference in the presence of caries, 14.3 percent for males verses 26.0 percent for females, is statistically significant and represents different behavior (ibid.:158). The formation of caries is positively correlated with consumption of carbohydrates in the diet, but it is the frequency, rather than the amount consumed, that is important. In other words, women had more opportunities to eat probably maize-based foods throughout the day than did men. Perhaps women's snacking behavior is the result of their activities centering on the residence and kitchen rather than farther afield.

David M. Reed (1998; Whittington and Reed 1997) has examined carbon and nitrogen isotopes on Copán skeletal data. Paraphrasing from Reed (personal communication, March 15, 2001), it is accurate to state that "[a]dult women and men had similar diets, but women's diets appear more varied than men's diets." This conclusion accords well with the results from Whittington stated above. It is likely that women had access to a greater variety of foods in the preparation and cooking of them, and also perhaps in the gathering of them. Recall that paleoethnobotanical evidence indicates the use of wild species and perhaps the existence of kitchen gardens.

The role of protein in the Classic Maya diet has been approached in a variety of ways. If we rely on isotopic data, Reed (personal communication, March 15, 2001) states that another difference in men's and women's diets is that "women's diets appear to be lower in protein relative to men's." If foods with protein were distributed unevenly according to gender, this pattern would not be unexpected. These conclusions indicate that perhaps an unequal rather than an egalitarian distribution of more prestigious foods was the norm, presuming that meat was a more prestigious food (White 2005).

The role of deer in the ancient Maya diet has been debated by archaeologists (Carr 1996). Ever since Bishop Landa was quoted as observing Maya women raising deer in sixteenth-century Yucatán (Tozzer 1941:127), archaeologists and others have wondered if Classic Maya women reared deer as well. In Ardren's (2002b:78) analysis, she states that "[a] number of lines of evidence suggest that deer and women may have been linked in an economic and symbolic capacity." These lines of evidence include portrayals of women and deer together on ceramic vessels, figurines of women and deer, and ethnographic and ethnohistoric observations of women raising deer.

Direct evidence for deer consumption in the form of bones is not found in rural Copán, although the remains of deer (*Odocoileus virginianus*) are quite frequent in the Harvard excavations in the Sepulturas urban zone (Pohl 1994). It is premature to comment on the few faunal remains from the rural contexts (six bones at 11D-11-2 and two bones from 34A-12-2) since the species have not been identified. The following comments are derived from Pohl's (1994) analysis of faunal remains from a Type 1 site (9N-5 or CV-16), a Type 2 site (9M-27 or CV-20), and a Type 3 site (9M-18 or CV-43), all located within Copán's urban core. She states that "the primary animal consumed at all social levels was white-tailed deer. This finding reflects a strong food preference among residents at Copán, who may have raised deer in their house compounds to meet demand for venison, as well as for deer sacrifices, dance headdresses, skins, and bone tool blanks" (Pohl 1994:459). Close behind deer bones in terms of numbers were the remains of dogs, which were used for food, sacrifice, and hunting (Pohl

1994:459). There was a clear association between the status and frequency of large animal remains, with sites of higher status containing higher numbers of bones and greater species diversity. Other species utilized at Copán were tapirs, peccaries, pacas, coatis, ocelots, opossum, birds, and turtles.

Given the paucity of non-human bones found in rural contexts, it is difficult to say with certainty that women raised deer within their compounds. If deer were penned up and habitually kept in one area, chemical analysis might show the existence of such an area, especially given the lack of faunal and architectural evidence. From random testing at some rural sites for pH levels, with values ranging from slightly acidic to alkaline, there is nothing to suggest from these limited tests that animals were penned and kept for extended periods of time on any of these farmsteads (Gonlin 1993). Ardren (2002b:80) realizes that there is no morphological evidence to suggest this practice, even though the possibility of women opportunistically raising deer in the household compound should be considered.

Isotopic evidence by Reed (1998:183) contradicts the prevalence of deer remains at elite and urban sites. According to his data, if deer were a major food source, then the C3 signature for humans should be much stronger than observed. Also, it is quite possible that the large numbers of floral and faunal remains at elite sites are indicative of their longer occupations and the use of particular species in ritual activities. Of fundamental note is that "[i]nferences from the isotopic evidence lead to the conclusion of equivalent diets across social strata and reliance on maize with little faunal supplements" (Reed 1998:183–184).

However, when other criteria are used to examine gender differences of consumption using paleopathological evidence, Storey (1998, 1999) concludes that status may be a more important determinant than gender, with commoners suffering more than elites. She examined human skeletal remains that fell into different socioeconomic categories for evidence of childhood stress. Dental enamel hypoplasias, markers of anemia (porotic hyperostosis / cribra orbitalia), and adult stature were used as measures of this stress. Her findings show that "there is little evidence that males were preferred and females neglected during childhood" (Storey 1998:146) in any class or status at Copán, perhaps because of the value of both males and females within the household and their complementary roles.

SUMMARY AND CONCLUSIONS

In summary, there are various lines of evidence to support gender complementarity among non-elite Copán Maya. The distribution of artifacts shows that households, to function properly, had to contain essential tools that consisted of typically male and female artifacts in addition to numerous multipurpose tools. However, the layouts of buildings within a site, especially the kitchens or kitchen areas, do not conform to expectations based on gender ideology. Some osteological data suggest gender complementarity while other data support a different relationship. McCafferty's (2001) suggestion that probably both gender hierarchy and gender complementarity existed simultaneously and was adopted situationally may provide a realistic picture of the complicated past.

The criteria used in this exercise—artifact distributions, architectural function and style, and bioarchaeological data—are only a few of the ways in which gender can be explored at the household level. This exercise has shed light on who the ancient inhabitants were and their daily lifestyles during Late Classic times in the kingdom of Copán. The information presented here also illuminates the annual pattern of activities for Classic Maya farmers. Some tasks, such as cooking, gathering firewood, or hauling water, would have been performed on a daily basis, while other tasks, such as military conscription, construction, or textile production, may have occurred at certain times during the year.

Although it is not likely that production and consumption were identical from household to household, given the similarity in artifact assemblages from rural site to rural site and from the urban to rural areas of Copán, it may be logical to conclude that similar activities were repeated across the polity. Robin (2002:26) has observed similarly, "At Chan Nòohol [Belize], artifact inventories from each farmstead indicate that the same set of basic domestic and agricultural tasks was conducted at each farmstead." With archaeological data from ancient households of Mesoamerica growing by the day, we can hope to see patterns of production and consumption in a broader comparative fashion, lending insight into the similarities and differences across time and space of the domestic economy.

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NOTES

1. Shorter versions of this chapter were published in *Yaxkin* (Gonlin 2000) and presented at the 66th Annual Meeting for the Society for American Archaeology (Gonlin 2001).

2. Copán's site hierarchy, detailed in Willey and Leventhal (1979), is given briefly as follows. The "Main Group" in the Copán pocket, where the monumental remains

of palaces, temples, ballcourts, and grand plazas are located, is referred to as a Type 5 site. There is only one such site in the settlement hierarchy. The Type 4 sites are those that have several courtyard groupings of structures, some of which may have a height of ten meters or more; remains of sculpture may be present as well as corbelling stone and dressed stone. Type 4 sites are primarily located near the Main Group in the Copán pocket, the largest alluvial deposit in the valley. Type 3 sites may have six or more structures arranged around one to three courtyards, with a mound height of less than five meters, and dressed stone and vault stones are likely present. Type 2 sites typically have six to eight mounds with one to two courtyards. Mound height is less than five meters and construction may include dressed stone with cobbles. Type 1 sites are by far the most numerous and typically have three to five mounds around a single courtyard. Remains are less than one meter in height and cobble construction predominates, although dressed stone may be present. Freter (1988:75) added the category of "aggregate site" to connote Type 1 structures that have no formal courtyard arrangement and no presence of dressed stone. Single mound sites may be the remains of large tall temple buildings or small isolated fieldhuts. In addition, artifact scatters are labeled non-mound sites.

3. The sites or groups included in the present analysis are 11D-11-2 in El Jaral; 7D-6-2 and 7D-3-1 in Río Amarillo; 32B-16-1, 34A-12-1, 34A-12-2, and 34C-4-2 in the Sesesmil Valley; and 99A-18-2 in the Río Gila Valley.

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FOUR

Iroquoian Households

A Mohawk Longhouse at Otstungo, New York

DEAN R. SNOW

INTRODUCTION

In the seventeenth century the Mohawks were the easternmost of five Iroquois nations strung in an east-west line across what is now the state of New York. West of them resided the Oneidas, Onondagas, Cayugas, and Senecas, from east to west. They were the five nations of the League of the Iroquois, a weak confederation of former enemies who had found a way to put aside their aggression toward each other and redirect it collectively toward other native nations of the Northeast. Current evidence indicates that the League emerged sometime in the years AD 1590–1605 (Kuhn and Sempowski 2001). The legend of this process comes down to us as one of the three great components of Iroquois cosmology, the other two being the origin myth and the Handsome Lake religious revival (Snow 1994). Both oral tradition and archaeology indicate that the period leading up to the formation of the League was fraught with violence between the Mohawks and their Iroquoian relatives as well as between them and Algonquian-speaking nations in New York, New England, and elsewhere in the Northeast. We see archaeological evidence of this aggression by AD 1450. Small scattered

Figure 4.1. Northern Iroquoian village site clusters in the fifteenth and sixteenth centuries. The location of the Mohawk village site of Otstungo is denoted by a large star

villages began nucleating into a few large communities situated on defensible hilltop sites around that time (Snow 1995a:85–91). This pattern persisted for over a century, until the rise of the League reduced the threat of attack and towns gradually relocated back toward less protected but agriculturally more productive sites.

In this chapter I will describe a Mohawk Iroquois household. The village site known as Otstungo (Figure 4.1) was but one of several sites that crews under my direction excavated through the course of the Mohawk Valley Project, which spanned from 1982 to 1995. This site was the most exciting and rewarding of them all. Our testing and excavation at Otstungo started in 1984 and ended in 1987 (Snow 1995a:115–142). We left the place reluctantly, pressing on with the demographic objectives of the larger research program but knowing that we would not likely work again on such an evocative place, for Otstungo was a pristine site untrammeled by modern agriculture and still laden with a primordial evanescence that captivated me, my students, and our Mohawk friends. This site revealed details of the internal operations of a typical Mohawk longhousehold (a cumbersome but convenient neologism).

The Northern Iroquoians—which included nations in Pennsylvania, Ontario, and Quebec, in addition to the five that formed the League of the Iroquois proper—were all swidden horticulturalists. They depended on a trio of key domesticates: maize, beans, and squash. Their fields were patches of forest that they cleared by girdling the trees and burning the underbrush. Without domesticated animals, the fertilizer those animals would have produced, and pesticides to control insects, Iroquoian farmers were compelled to open new fields nearly every year to make up for the declining productivity of older fields. The practice led them farther and farther afield; over the course of a decade or two their active fields were so remote from the village as to prompt relocation of the village itself. Consequently, Iroquoian villages were designed to last only a decade or two. The Mohawk Valley Project documented the relocations of Mohawk communities through more than four dozen village sites and over the course of three centuries of occupation. Because each site was occupied for only a relatively short time and because Mohawk village populations can be computed from village areas, I was able to measure demographic change from precontact times through catastrophic epidemics and colonial wars, to the final expulsion of the Mohawks from their valley during the American Revolution (Snow 1995b). That, however, is only an aside to the purposes of this chapter.

All Northern Iroquoian nations were, and to some extent still are, strongly matrilineal and matrilocal. Kinship is reckoned through the female line, and prior to the eighteenth century, residence was in multifamily longhouses governed by senior women, their sisters, and their daughters. The longhouse also was and is a symbol for the League of the Iroquois. A vast invisible longhouse stretched metaphorically across what is now New York State, with the Mohawks and the Senecas the keepers of the doors at either end. Each Iroquois village comprised a few to a few dozen of the real longhouses—spindly structures of thin posts, bent saplings, and elm bark—that inspired this image.

THE LONGHOUSE STRUCTURE

Although Northeastern archaeologists have been fascinated for decades by the longhouse and have peeled back the soil to reveal the post patterns left by many of them, attempts to build convincing replicas have often failed. I have examined and photographed over a half dozen serious attempts at replication and found them all wanting. There are several reasons for these failures, but the most important of them is that English-speaking scholars have too often depended on flawed translations of French descriptions of longhouses. We know from archaeology and even the inaccurate translations that longhouses tended to be about six meters wide and of variable lengths, depending on the sizes of the families they were designed and built to hold. Nuclear families were arrayed in pairs along the main axis of each longhouse, each pair sharing a hearth in the center aisle. Access to each house was typically only through doors at either end. Hearths were spaced about six meters apart, and they could number from

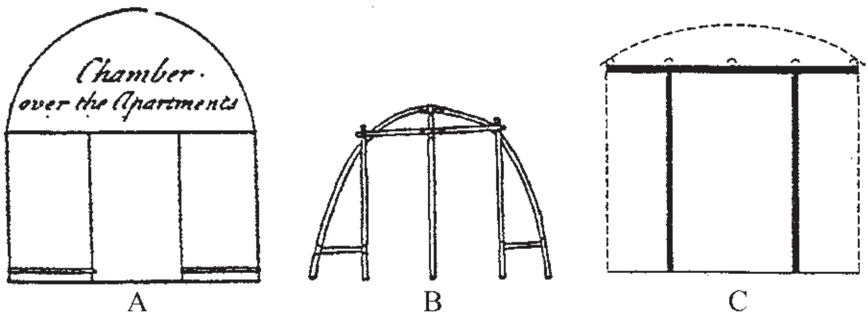


Figure 4.2. Northeastern American longhouse cross sections (from Snow 1997:77)

as few as two to a dozen or more. Thus each hearth was in the aisle of a compartment shared by two families. Some archaeological longhouses exceed 100 meters in length. Quite often the end compartments were storage areas that also buffered the interior compartments against the cold during the winter months. Longhouses built in densely packed hilltop villages like Otstungo typically lack end storage compartments. We know from archaeological evidence that most of the house posts were about ten centimeters in diameter. These posts were laced together in a framework aboveground and sheathed with large sheets of elm bark. (For discussions of large social units in other cultures, see chapters in this volume by Ciolek-Torrello, González Fernández, Henderson, McCormack, and Varien.)

It might seem a small matter to project the aboveground structures of longhouses based on what archaeologists can see in the ground and infer from early written descriptions, but that is not the case. The most common error is to assume that long posts were set in the ground to form the outer walls and then bent over farther up to form a series of arched ribs to hold the elm-bark roofing. In practice the result is a Quonset-style structure having a half-circle cross section (Figure 4.2b) (Snow 1997:77). Neither surviving illustrations nor narrative descriptions indicate that Iroquoian longhouses were constructed this way, yet this form is the erroneous solution that has been adopted in many attempted reconstructions. A second common error is to assume that each longhouse had two long continuous benches for sitting and sleeping, one along each side of the structure's interior. Compartment partition walls are typically assumed to have divided the long benches into six-meter segments. Finally, even those reconstructions that have correctly used straight outer walls surmounted by an arched roof composed of separate roof members typically make the walls too high and the roofs too flat (Figure 4.2c). While the foregoing discussion might seem overly negative, it is necessary because so much of the literature on the Iroquois as well as various reconstructions have perpetuated the errors I have described.

I have examined all of the available early descriptions in English and French, as well as all of the relevant early illustrations of longhouses (Snow 1997). When I corrected the mistakes of translators unfamiliar with Iroquois ethnography, a much more coherent vision of Iroquoian longhouses emerged. Passages that are misleading or make no sense in Standard English translations are clear in the original French. I will not repeat all that evidence here. Instead I offer only my main conclusions.

A standard longhouse compartment was about six by six meters in floor plan. An aisle two meters wide held a shared hearth and separated two living areas, one on either side. Outer bark-sheathed walls were 3.5 to 4.0 meters high and wall posts were ideally made of rigid but rot-resistant cedar. More flexible woods were used to build an arched roof structure above. The arch was nearly a half circle, six meters across and 2 to 2.5 meters high, giving the entire structure a height of about six meters. Bartram's careful cross section dating to 1751, reproduced here as Figure 4.2a, is consistent with other early images and with narrative descriptions of longhouses (Snow 1997:77).

Benches for sitting and sleeping did not extend the entire length of the compartments' outer walls. The benches were about two meters deep and two to three meters long, no more than half the length of the compartment, leaving space for storage and other activities on the floor of the living area. The benches were raised about a half meter above the floor, high enough to raise people above the damp earth but low enough to allow small children to climb up unaided. Each bench had its own roof about two meters off the ground, on which were stored pots and other household objects. There were also side walls to the little structure such that the whole unit was a kind of snug berth or cubicle in which the nuclear family relaxed and slept. Food preparation, tailoring, and other daily activities were carried out in the aisle or inside areas to one side or the other of the berths. The documents alone make it clear that simpler interpretations of interior structural features of longhouses are erroneous.

THE LONGHOUSE SOCIAL UNIT

Typically, before more improvised and expedient rearrangements brought on by catastrophic seventeenth-century epidemics came about, the women who shared fires within compartments were close female relatives. Indeed all of the women in a longhouse were typically members of the same clan segment. In the case of the Mohawks there were three such clans: the Wolf, Bear, and Turtle clans. Thus each Mohawk longhouse, regardless of the number of longhouses in the village, was identified as being occupied by one of these clans. Harmen van den Bogaert visited Mohawk and Oneida villages in the winter of AD 1634–1635 and noted that houses were identified by wooden totem signs above their doors (Gehring and Starna 1988:13).

A senior woman presided over the clan segment (matrilineage) that occupied each longhouse along with in-marrying male spouses. Nuclear families tended to average five people (Snow and Starna 1989). Thus each compartment, typically containing two cooperating nuclear families, had an average population of ten people. One can reasonably compute the population of a longhouse by multiplying the number of hearths (fires) by ten. Early documentary sources such as the *Jesuit Relations and Allied Documents* often report the number of fires in houses or even entire villages, which makes computation of local population sizes in such cases much easier than it might otherwise be.

Longhouses built in the fifteenth century often had three to five fires, implying populations of thirty to fifty people. Women tended to bear and raise three or four children each at that time. Assuming for the moment that every woman had exactly two daughters, that they invariably married and bore children, and that generation time was twenty years, one can envisage the development of a "longhousehold" made up of forty people and containing a senior woman about seventy years old, her two daughters, her four granddaughters, sixteen great-grandchildren (both boys and girls), and various in-marrying men. Presumably such a household would split into two smaller ones with the death of the matriarch, a repackaging that probably would have occurred most often at the next village relocation. The two daughters would then preside over the construction of two new longhouses of their own, and the birth of a new generation of babies would push the total population of each new longhouse toward forty or fifty. This ideal scenario was probably not played out often in the real world of Iroquois life, of course. Some women were childless while others had only sons. Marriages sometimes failed, sons sometimes died far from home, and so forth. Some households flourished and grew while others shrank, their occupants forced to merge with other less fortunate households and to invent fictive kin ties that would allow them to operate as single households. But overall the archaeology of Iroquois sites suggests that things tended to balance out. There are many examples of villages in which most of the longhouses had three to five compartments warmed by an equivalent number of fires.

Something happened in the late fifteenth and sixteenth centuries to change the dynamic equilibrium just described. Small villages came together to form towns that could be more easily protected, and at the same time newer longhouses were built to sizes much larger than earlier ones. An Onondaga house at the Schoff site was built to a record length of a 122 meters (Tuck 1971:95). Apart from that unique example, longhouses with twelve or more compartments came to be much more common (Snow 1994:74; see also chapters by Ciolek-Torrello and Varien, this volume, for discussions of architectural change in the American Southwest). A longhouse having twelve fires would have housed about 120 people, based on the above stated average of ten people per fire. Because each of twelve compartments would have had two in-marrying men from other clans (one for each nuclear family), ninety-six of the household's residents were related women and their children belonging to the same clan. Given the nature of lineage growth I described above, it is unlikely that such a large household could have been presided over by a single individual, usually a senior woman, the common ancestor of over ninety women and children. At the rate that even the most fortunate Iroquois lineage grew in that era, such a size could not be reached within the lifetime of one woman. In other words, any twelve-compartment longhouse must have been occupied by women and children whose common ancestor was no longer living, which implies that the household matriarch of the late sixteenth century presided over not just her daughters, granddaughters, and great-grandchildren but over at least a few sisters and perhaps some cousins as well. We do not know how such a matriarch was chosen from what was probably a handful of eligible senior women.

We do not know the details of how this social innovation worked, but its existence seems hard to deny (Snow 1994:74). The most economical hypothesis available to explain the change is that it was a consequence of the prolonged occupation of more densely packed Iroquois villages and towns during this period of heightened warfare. The Otstungo site, on which this chapter focuses, might have been occupied for as many as seventy-five years. Prolonged village occupations and less frequent relocations would have meant that there were fewer opportunities for longhouseholds to split, even after senior matriarchs died and supervision passed to their daughters.

Support for the prolonged occupation hypothesis comes from linguistic research. Prior to the sixteenth century all Iroquois children called their aunts by the same term they used for their biological mothers, regardless of which of the five Iroquois languages they spoke. Sometime before 1635 they all began to distinguish once again between their biological mothers and other women in their household belonging to their biological mother's generation (Mithun 1988). We know this fact because Mohawk terms recorded by Van den Bogaert in that year indicate that the shift had already occurred in that language (Gehring and Starna 1988:54). The specific linguistic solution was different for each of the Iroquois languages, but the general principle was the same across Iroquoia. The best current explanation is that the growth of residential matrilineages had simply generated too many "mothers" for a single term to serve (Snow 1994:74).

The shift presaged the effects of demographic collapse occasioned by the first smallpox epidemics in 1635. Mohawk village populations fell by 63 percent in less than a year. Four Mohawk villages were abandoned and four new replacement villages built over the course of a few months. I am compelled to infer that for longhouses of more-or-less standard size to have been constructed and occupied in the new villages, the social fragments forming the surviving 37 percent of the earlier population must have been consolidated and repackaged in a number of improvised ways (Snow 1995a:300–304).

Archaeological evidence from the Mohawk Valley Project indicates that from AD 1635 on, longhouses became standardized at three to four fires each and they no longer expanded and contracted to accommodate variably sized and changing matrilineages. This was also a period in which all Iroquoian nations attempted to offset the population losses caused by repeated waves of smallpox and other epidemic diseases by taking in prisoners and refugees as adoptees. The symbolically potent longhouse still stood, but it became the durable container for increasingly fictive matrilineages, not the flexible container for durable, evolving matrilineages it once had been.

This new role for the longhousehold persisted for nearly a century, until the economic and military realities of the eighteenth century caused the Mohawks to move to dispersed settlements of one- and two-family houses built along European lines. The best example of this new format from the Mohawk Valley is the site known as Caughnawaga, which was occupied from AD 1679 to 1693. Here the Mohawks constructed twelve longhouses, each having three or four fires. The orderly layout of the longhouses in two rows within a square palisade resembles a modern mobile-home court than it does the much more random settlement patterns of sixteenth-century sites (Snow 1995a:434).

The above brief description of the longhouse as social unit is not new, with the exception of the hypothesis regarding the emergence of much larger households and the probable collective leadership of them by sets of sisters. The previously published information in this section (Snow 1994, 1997; Snow and Starna 1989) provides the context that sets the stage for the interpretation of the Otstungo longhouse, a site that has revealed details of the internal operations of a typical Mohawk longhousehold. It is to that discussion that I turn now.

OTSTUNGO LONGHOUSE 1

The Otstungo site is located on a cliff overlooking Otstungo Creek, a tributary of Otsquago Creek, which is itself a tributary of the Mohawk River. The site is about six kilometers southwest of the Mohawk River in the town of Minden, Montgomery County, New York. It was founded as early as AD 1450 and might have been occupied continuously until AD 1525. The period of its occupation thus almost certainly included AD 1492, the year of the first voyage of Columbus. This circumstance led to the inclusion of Otstungo in a National Geographic magazine article on four North American Indian settlements that were occupied on the eve of Columbus's voyage (Bruchac 1991).

The setting of Otstungo is dramatic. The peninsula on which Otstungo is sited is elongated, about 180 meters long and 50 meters wide, oriented northwest-southeast. The southwestern and northwestern approaches are protected by Otstungo Creek and a twenty-four-meter cliff. The northeastern side is protected by a less steep but still protective slope. Only the narrow southeastern

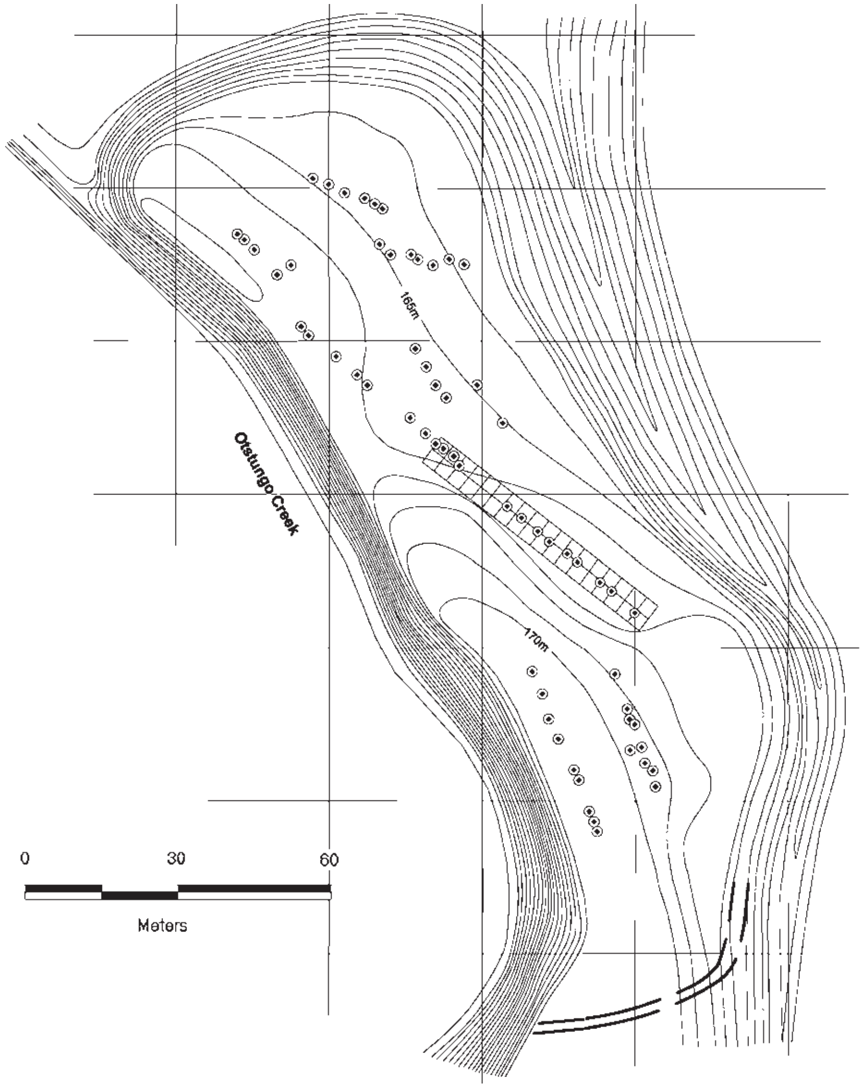


Figure 4.3. Contour map of the Otstungo site, New York, showing thirty-meter grid, hearths, house grid, and defensive ditch (contour interval = 1 m)

side is easily approached, and this was protected by an artificial ditch and palisade (Figure 4.3). The living area of the village measures 7,572 square meters. Because of the location of the creek and its steep banks, it seems likely that the active fields tended to be located to the south and east of the village.

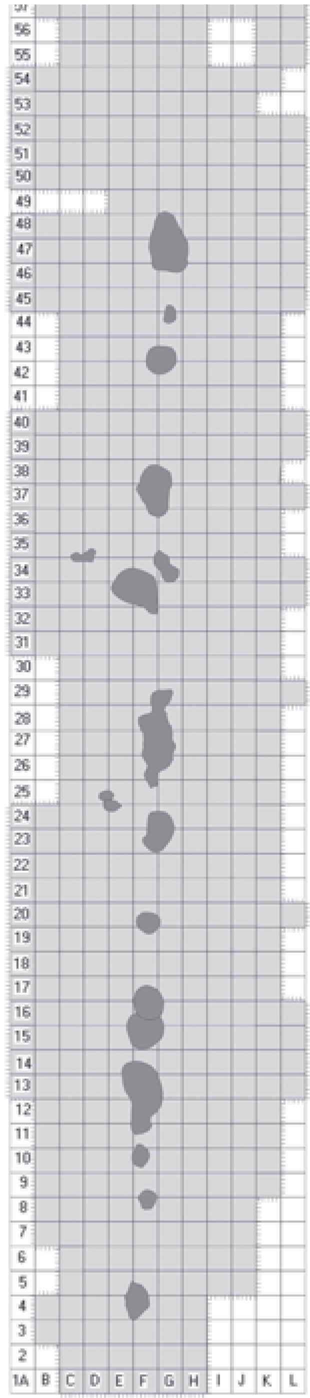
The site was first described by Ephraim Squier, who visited it in 1848 (Squier 1849:59–60). Collectors and amateur archaeologists visited it many times in the years following. Research teams under my direction first tested the site in 1984. Our preliminary work suggested that although the site had been logged repeatedly, there was no evidence that it had ever been plowed. This presented a unique opportunity for us to investigate one or more relatively undisturbed longhouse floors inasmuch as no other Mohawk sites offered such intact preservation.

The topography of the site suggested that most longhouses would have been oriented roughly northwest-southeast. Beginning in 1985 we conducted detailed magnetometer surveys to locate lines of hearths by nonintrusive means. We probed subtle magnetic anomalies in search of confirming fire-reddened soil and eventually mapped nine lines of hearths that we took to be evidence of at least that many longhouses. The dots on Figure 4.3 show the distributions of hearths. One line was selected for detailed excavation and the centerline of the excavation grid was laid down along the axis of the hearths as shown on Figure 4.3. The excavation grid was oriented northwest-southeast, roughly 45 degrees off cardinal directions. This decision gave us excavation units that mapped closely to the original longhouse floor plan and enabled us to acquire unprecedented detail about life inside a single household.

Excavation continued through all or parts of three field seasons, from 1985 to 1987. We began with a traditional three-meter grid, chosen because it approximated the ten-foot grids used previously in Mohawk archaeology. These were divided into 1.5-meter quads for purposes of record keeping. We soon discovered that the quality of the provenience information we were getting justified even smaller excavation units, so the quads were further subdivided into 75 centimeter subquad units. Personal computers and spreadsheets were not available at this time so the cumbersome manual system of squares, quads, and subquads was used through the entire three seasons. I later translated all the records into a single, much simpler computer file in which each of 864 subquads is a cell in a simplified grid. Figure 4.4 shows the alphanumeric coordinate system on the x- and y-axes. I have included confirmed hearths to allow the reader to see the connections between this and other figures. The excavation actually extended beyond the northwest end of Longhouse 1, across an open area and into the southeastern end of Longhouse 2, but my discussion in this chapter is restricted to the contents of the six compartments of Longhouse 1.

There were some serious impediments to our excavation. Figure 4.5 shows the roots of trees that hampered standard cell excavation. Shallow shale bedrock was often encountered and the clay soil overlying it was difficult. Artifact recovery varied even among adjacent excavation cells because of almost daily differences in light, temperature, and humidity. The expertise of my student excavators varied by ability and length of experience. Some of the variations in artifact concentrations discussed below must be attributed to these variables in our ability to recover evidence. Figure 4.5 also shows the distribution of artifactual debris recovered from the floor of Longhouse 1, each dot representing ten

Figure 4.4. Excavation grid showing excavated cells (gray), the cell coordinates, and confirmed hearths of the Otstungo site, New York



objects. Despite variations in recovery success, clusters of objects of different kinds, all of which are aggregated in Figure 4.5, are clear enough to draw inferences about activity areas.

Post molds were easily confused with root stains, decayed shale, and animal burrows in the shallow Otstungo soil. Every suspected post mold was cross-sectioned and deliberately subjected to as much general argument among my assistants and me as was needed for confirmation by consensus. Many features that probably were indeed post molds did not survive this rigorous process. The result is that the pattern of 110 post molds is less complete than it might otherwise have been (Figure 4.6). However, it is also less confused by the large number of fraudulent post molds that muddle so many published longhouse post patterns. Gray ash was found coating the floor across some parts of Longhouse 1; this too was mapped. Apart from post molds and ash thirty-seven features in the floor of Longhouse 1 were uncovered (Figure 4.5 and Table 4.1).

DIVISION OF LABOR

We know much about Iroquoian division of labor from written sources. Sagard (1968), for example, provides considerable detail. In some places he talks about the daily activities of the Hurons, implying that he is talking about men much of the time and mentioning women and girls only when he refers to their specific activities. Fortunately he is repetitive and more explicit in other places, indicating that in the village some activities are primarily or exclusively men's while others are primarily or exclusively women's. For example, he explains that women and girls make cordage and that men use it to

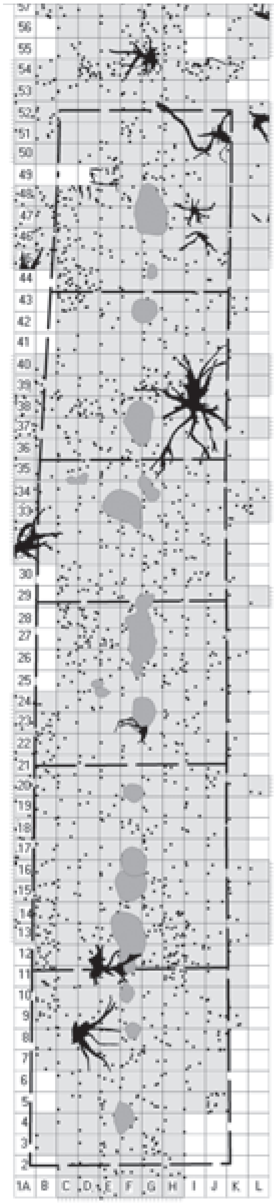


Figure 4.5. Longhouse 1 plan showing the probable outline of the house, tree roots, excavation limits, confirmed hearths, the probable locations of six residential compartments, and artifactual debris of the Otstungo site, New York (each dot represents ten objects)

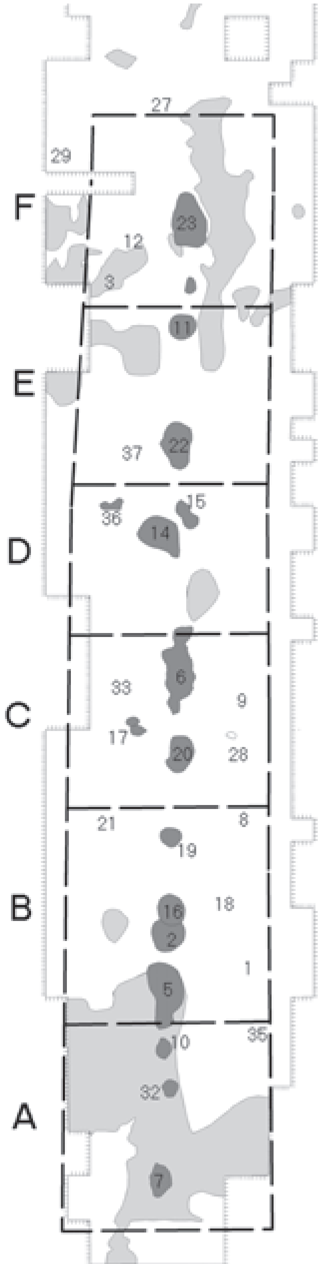


Figure 4.6. Longhouse 1 plan showing ash (light gray), hearths, compartment outlines (A–F), and features (numbers key to Table 4.1), Otstungo site, New York

Table 4.1. Features from the Otstungo Longhouse 1, New York

Feature No.	*Description*	*Comment*	*Feature No.*	*Description*	*Comment*
1	Personal cache pit (cubbyhole)		20	Hearth	Shallow
2	Roasting pit		21	Storage pit	
3	Storage pit		22	Hearth	Deep
4	(Invalidated after examination)		22a	Roasting pit	
5	'Hearth	Deep	23	Hearth	Shallow
6	Hearth	Shallow	24	Hearth	Shallow
7	Hearth	Shallow	25	Hearth	Shallow
8	Personal cache pit		26	Roasting pit	
9	Refuse pit		27	Storage pit	
10	Hearth	Shallow	28	Personal cache pit	
11	Hearth	Shallow with intrusive pit	29	Storage pit	Small
12	Personal cache pit		30	Hearth	Shallow
13	Storage pit		31	Personal cache pit	
14	Hearth	Shallow	32	Hearth	Shallow
15	Ash pile		33	Storage pit and hearth	
16	Roasting pit		34	Milling stone basin	
17	Hearth	Deep	35	Refuse pit	
18	Personal cache pit		36	Personal cache pit	
19	Hearth	Shallow	37	Personal cache pit	

make nets and snares (Sagard 1968:101). Things are different outside the village, for in all-male groups men must cook for themselves, an exclusively female activity in the village. Within a complete and functional village household, however, the standard division of labor is clear.

Table 4.2 lists those activities that Sagard clearly assigns to both women and girls on the one hand and men and boys on the other (see discussions of gender divisions in household labor in other cultures in chapters in this volume by Gonlin, Gougeon, Henderson, and Wiewall). Missing from the two lists are those activities explicitly attributed to both (snowshoeing, gambling, feasting, and dancing) and those activities that are of uncertain assignment (painting, house construction). Many other contemporary sources support Sagard's generalizations and their applicability to the Mohawks in particular. Some of these references are of special importance to the conclusions I draw below. Megapolensis tells us in 1644 that men smoke and that they make their own pipes (Snow, Gehring, and Starna 1996:45). In his long 1654 narrative, Pierre Esprit Radisson mentions tobacco smoking several times but attributes the activity to only men

Table 4.2. Iroquoian division of labor according to Sagard (1968)

Female	*Sagard page no.*	*Male*	*Sagard page no.*
Bark preparation	101	Club making	98
Basket making	102	**Knapping**	98, 323
Chewed bread making	98, 101	Net making	98
Cordage making	98, 101	Shield making	98
Corn shelling	104	Singing	65, 96
Crop harvesting	101	**Smoking**	96
Crop sowing	101	Snare making	98
Flour grinding	101	Snowshoe making	98
Food preparation	72		
Hide dressing	102		
Pottery making	102, 109		
Tailoring	102		
Wood gathering	94		

Note: Activities of particular importance to this chapter are in boldface.

(Snow, Gehring, and Starna 1996:69). Adriaen Cornelissen van der Donck similarly describes smoking as a male activity (Snow, Gehring, and Starna 1996:120). Paolo Andreani, who passed through Mohawk country in 1790, explicitly says that men "stay at home lying about, smoking pipes and playing games while the wives ruin themselves at hard labor in the field" (Snow, Gehring, and Starna 1996:322).

Apart from Sagard, sources are generally silent about who does the chert knapping. Bows and arrows are mentioned, but most early narratives about the Mohawks postdate the introduction of firearms, so the manufacture of knapped points and knives does not get mentioned. Women were responsible for hide preparation and food preparation, so I infer that they would have engaged in at least some scraper and knife resharpening. However, Sagard is quite clear in attributing the making of chert-tipped arrows and chert knives to men (Sagard 1968:98, 323). Careful reading of his original French confirms that this assignment is not a consequence of mistranslation.

DEBITAGE AND PIPES

Given the clarity of Sagard's narrative, it is reasonable to hypothesize that Iroquois men were primarily responsible for the manufacture of chipped-stone tools. This implies that concentrations of chert debitage should identify male work areas within the longhouse. Figure 4.7 shows the distribution of debitage, each small dot representing a single flake.

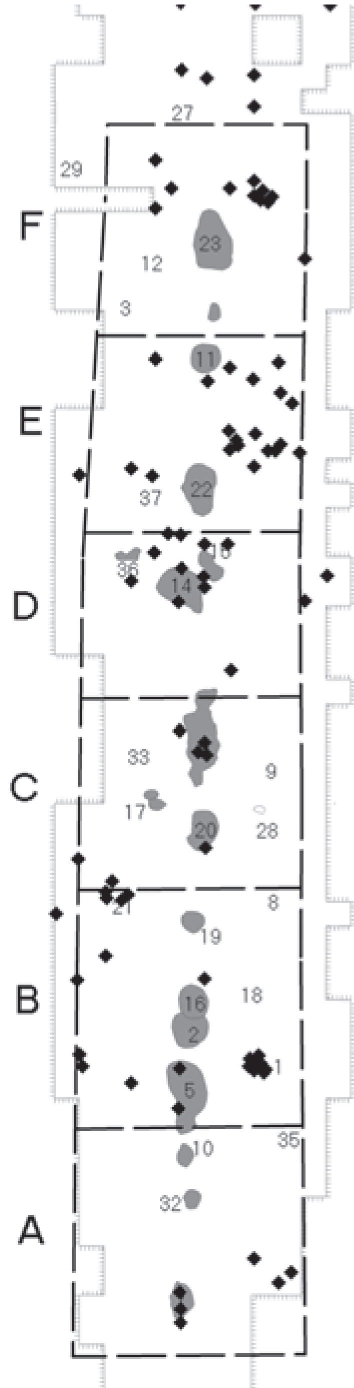


Figure 4.7. Artifact distributions at Otstungo site, New York; black diamonds show the locations of smoking-pipe fragments

We know from various sources cited above that men made pipes for smoking tobacco. If men were the primary makers of pipes and primarily responsible for knapping, and if they carried out both activities in specific areas of the longhouse, then pipe fragments should cluster with debitage in male work areas. The distribution of pipe fragments within Longhouse 1 is shown by black diamonds on Figure 4.7. Pipe fragments tended to be located in or around hearths or in or very near dense clusters of debitage. These distributions support the hypotheses that pipes and chipped-stone tools were both made and used primarily by men and that certain areas within longhouse compartments were male work areas.

One cluster of pipe fragments was found in a small storage pit or cubbyhole (Feature 1) in Compartment B. When mended, these turned out to be pieces of a single striking pipe depicting a human effigy mask (Figure 4.8). The pipe was featured in the 1991 *National Geographic* article on Otstungo (Bruchac 1991:69) and is on the book jacket of the current volume. I infer Feature 1 and others like it to be small personal storage cache pits. Although this one appears to have been used by a man, we cannot be certain that all eight of those identified were used by only men.

ASH

The distribution of ash on the floor of Longhouse 1 can be seen on Figures 4.6, 4.7, and 4.8. These carpets of ash were concentrated in the end compartments and to a lesser

Figure 4.8. Human effigy mask smoking pipe from Otstungo site, New York (drawing by Gene Mackay; Snow 1995a:130)

extent in the adjacent ones. I infer that the ash came largely from the cleaning of hearths and that spillage was cumulatively greater as people carrying away the ash moved toward the end doorways.

Smaller patches of ash near the sides or corners of Compartments A, B, D, E, and F might mark places where cooks added ash to soaking corn, a common technique for breaking down the kernels. Thus, I tentatively infer these patches

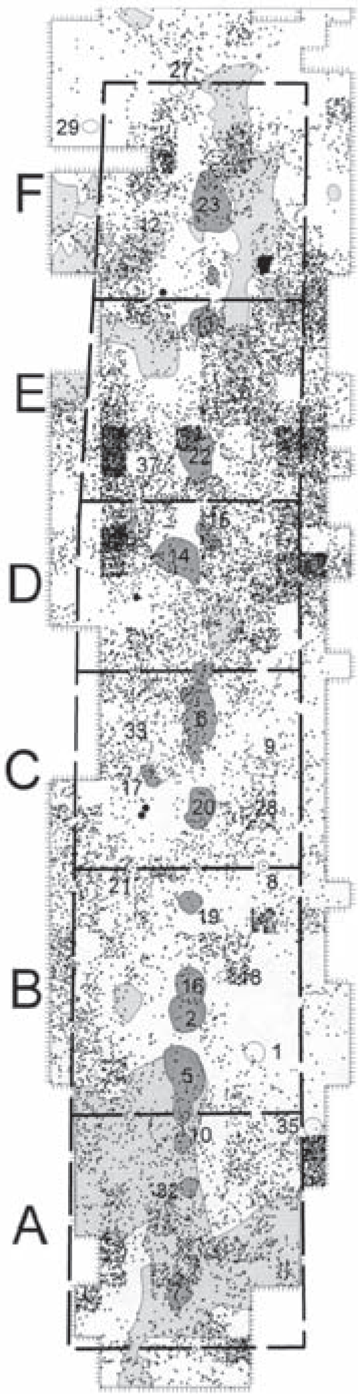


Figure 4.9. Artifact distributions at Otstungo site, New York; rim sherds are shown as small dots with each dot representing a single sherd

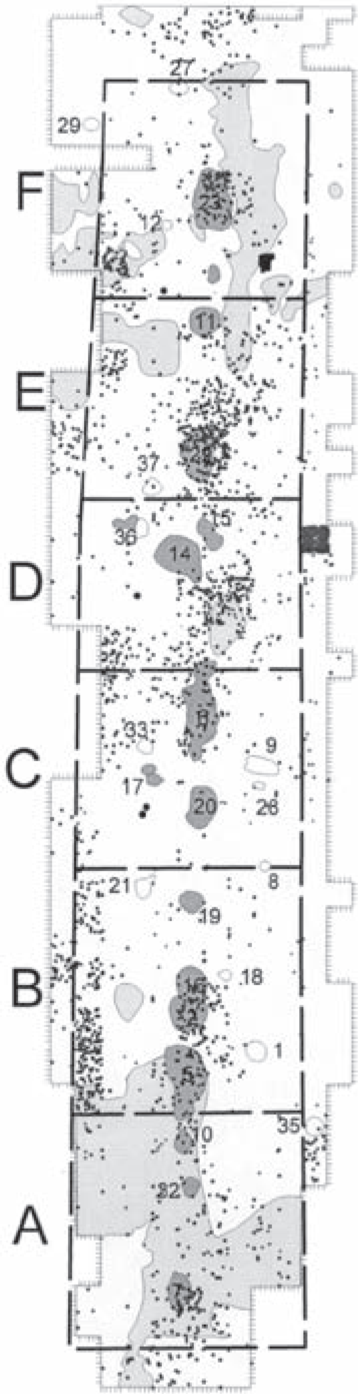
to mark food-preparation areas. All contemporary documentary sources make it clear that women were primarily responsible for food preparation in the village, so it is reasonable to conclude that these were largely female activity areas.

POTTERY

Sagard is quite clear in telling us that women made and used pots (Sagard 1968:102, 109). The distribution of sherds in Longhouse 1 is informative even though this artifact class was more subject than others to variations in recovery during excavation, as mentioned above. Three tendencies can be noted from the distribution shown in Figure 4.9. First, the sherds of broken pots were often gathered and dumped against the wall outside the longhouse. Such concentrations can be seen outside Compartments A, D, E, and F. Second, sherds tend to concentrate around hearths, where breakage was presumably high and some fragments were quickly trampled into the earthen floor. Third, larger sherds tended to concentrate inside the longhouse but away from the center aisle in places where we can infer sleeping berths were located. Sherds that were kicked under the berths often escaped trampling and cleanup.

The irregular black shape in the lower right corner of Compartment F is a large milling stone. The distribution of ash near it also suggests that this was a cooking area. That inference is further supported by the concentration of sherds in the same area.

Figure 4.10. Artifact distributions at Otstungo site, New York. Food-bone fragments are shown as small dots; each dot represents a single fragment



Unfortunately, if one looks just at the distribution of sherds as shown in Figure 4.9, one cannot easily distinguish between berth areas where sherds were easily kicked and forgotten and food preparation areas where sherds were produced by breakage in large numbers but then were incompletely cleared by subsequent cleaning. However, if average sherd size is considered, the distinction becomes clear. Sherds found in high traffic areas were small and those lost under berths were larger.

BONE

The distribution of bone fragments reveals a different and interesting pattern (Figure 4.10). Large concentrations were found in and around hearths. The locations are where one should expect bone fragments because raw food was added to the pots here and people eating from them tended to discard bone fragments into the fire. Other concentrations were found in some, but not all, areas already inferred to have been food-preparation areas. A few concentrations, one very dense, were found outside the house, further indication that refuse was dumped there. A concentration of bone refuse was found inside the house along the left wall of Compartment B. The ground outside the house sloped up and away from the house in this area and the builders had cut into the hillside to flatten the floor of the house. It is possible that the bone refuse in this part of Compartment B resulted from fragments washing downhill and under the house wall into the interior.

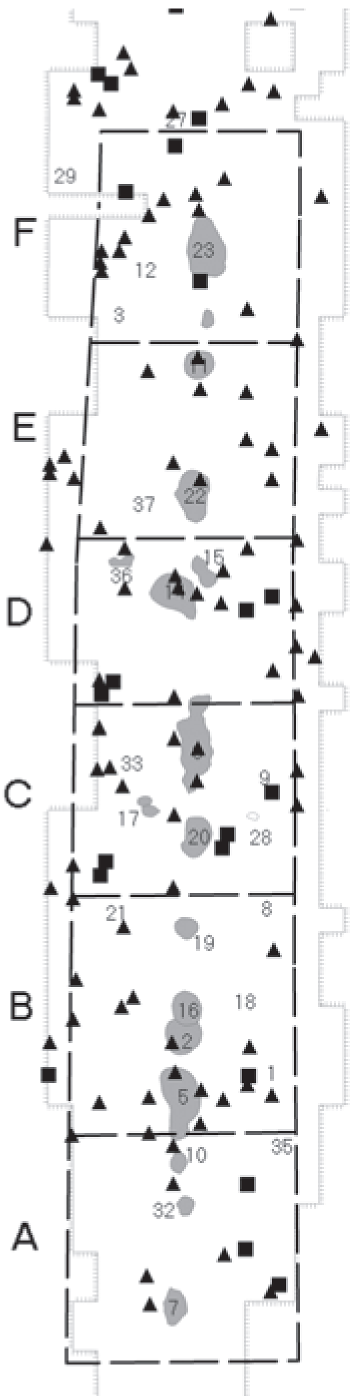


*Figure 4.11. Artifact distributions at Otstungo site, New York; distribution of scrapers (*black squares*) and projectile points (*black triangles*)*

CHIPPED STONE TOOLS

We found 96 cores, 34 scrapers, 10 knives, 168 projectile points, and 30 other bifaces in Longhouse 1. It is common in North American archaeology to hypothesize that women used most of the scrapers and that men used most of the projectile points. This hypothesis receives strong support from Sagard's documentation of Iroquoian division of labor (Table 4.2). As can be seen on Figure 4.11, the points do not cluster in any obvious way, suggesting that their distribution is not as informative as chert debitage in indicating male work areas. It is likely that post-manufacture use, breakage, and discard of points randomized their deposition.

The most interesting observation regarding the distribution of scrapers is that many of the thirty-four recovered were found outside the longhouse beyond Compartment F and therefore outside the area covered by Figure 4.11. This suggests that much of the work done with scrapers, hide preparation, and the like was done outside the house. As is the case for projectile points, the distribution of scrapers does not tell us much about who might have been using them.

The distribution of ground-stone tools did not supplement interpretation of other patterns because there were too few stone tools to show any clear pattern.

SHELL AND TEETH

We recovered 1,634 shell fragments from the floor and immediate exterior of Longhouse 1. These were mostly mussel-shell fragments, which I infer to have been mostly food debris.

We found no marine quahog (*Venus mercenaria*) or whelk (*Buccinum undatum*) shell fragments, which were popular a century later. These sticks were used to make wampum beads in the seventeenth century, but there is no evidence that they were already being so used at Otstungo. The mussel-shell fragments were distributed mainly around hearths and in areas already identified by ash and food bone fragments as probable food-preparation areas.

We recovered ninety animal teeth, some of which were food debris while others probably were used as pendants. Still others, especially beaver incisors, were used as cutting tools. Their distributions did not provide any insight into household activities.

CRYSTALS

We found twenty quartz crystals, the so-called "Herkimer Diamonds," for which the Mohawk Valley has been known since pre-Columbian times. The Mohawks valued the crystals and many found their way in trade to other nations in the region. The Mohawks called themselves the "Kanyenkehaka," which is often translated "People of the Place of the Flint." But local flint (more properly "chert") was not of particularly good quality, and it is more likely that the term referred to quartz crystals (Snow 1994:86). The crystals were highly charged symbolically, and their distribution in Longhouse 1 is therefore of special interest. All but one of the crystals was found inside or just outside the exterior door of Compartment F (Figure 4.12). The lone exception was found outside longhouse Compartment D.

The distribution of crystals in Compartment F corresponds to a concentration of pipe fragments in the same area (Figures 4.7 and 4.12). This suggests that the crosshatched area shown on Figure 4.12 approximates the location of the berth of a senior male. Pipe fragments and crystals would have fallen easily through the platform of sticks that made up the bottom of the berth. Another concentration of pipe fragments without associated crystals across the aisle suggests that the berth of a less senior couple was located there. A personal cache pit (Feature 12) was found in this second probable berth area. Ash, food bone, potsherds, the milling stone, and a storage pit (Feature 3) all suggest that both of the open areas below the two berths (on this representation) were food-preparation areas. Curiously, one crystal was found near the milling stone. While one might hypothesize that senior families would live near the center of a longhouse like this one, perhaps in Compartment C or D, the evidence of the crystals does not support such a hypothesis.

SUMMARY AND CONCLUSIONS

One can use the distributions of pipe fragments, debitage, sherds, bone, and ash to map the probable locations of berths in the other compartments of

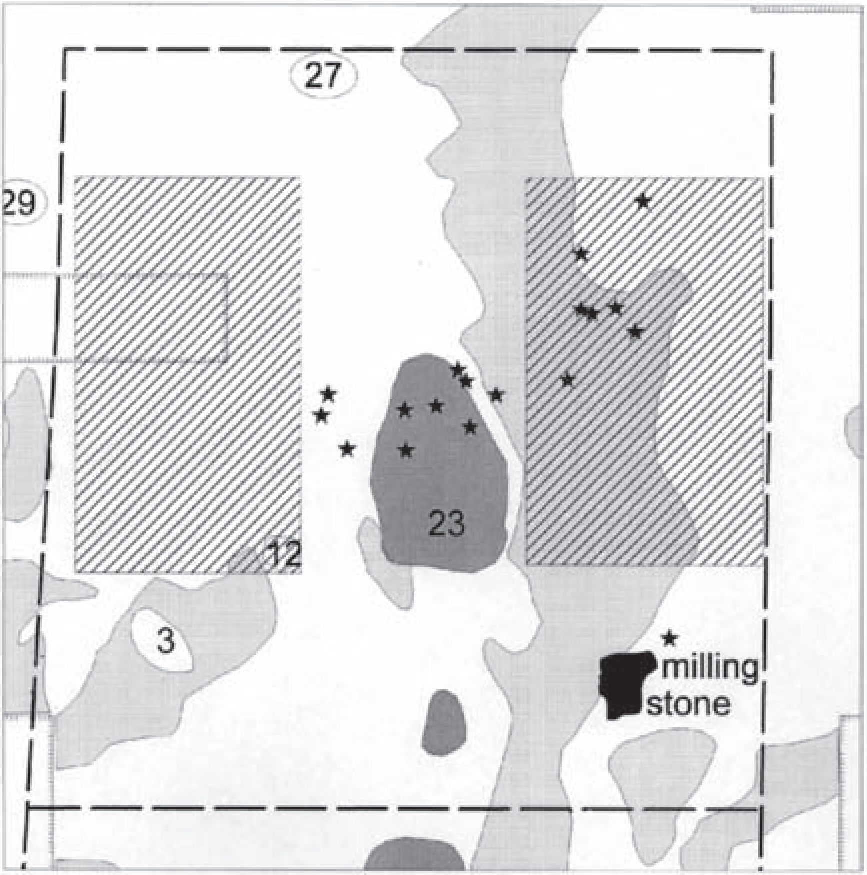


*Figure 4.12. Distribution of quartz crystals (*black stars*) and other features in Compartment F at Otstungo site, New York; crosshatched rectangles indicate probable berth locations*

Longhouse 1. The example of Compartment F, however, is sufficient to demonstrate archaeological support for the inferences I have drawn from documentary sources regarding the internal structuring of longhouseholds. There were identifiable work areas on one or both sides of sleeping berths, and each berth took up only about half the area allocated to each family.

Longhouse 1 was probably occupied for a long time compared to other Iroquois longhouses, yet spatial patterns persisted in the distributions of key artifact types. Support for the length of occupation can be found in the details of the hearths. Hearths were begun as surface fires, but repeated cleanings gradually turned them into basins twenty centimeters deep or more. I have referred to the deepest of them as "roasting pits" in Table 4.1. There were two such pits in Compartment B (Figure 4.6, Features 2 and 16), one intruding into the other. Feature 2 was clearly old when Feature 16 was begun, and Feature 16 also had a long life. There was also a deep hearth (Feature 5) and a secondary shallow one (Feature 19) in that compartment. All of this evidence points to a long occupation.

We recovered 27,162 sherds from Longhouse 1 and other excavations at Otstungo. Of those, 2,071 were rim sherds, resulting in a ratio of about 13 to 1. I used 864 rim sherds from the longhouse floor to plot the distribution pattern shown on Figure 4.9. I used rim sherds from Compartments A and B to determine how many vessels were present, mending rim segments whenever possible. Only seventy-four could be joined to others, and these represented no fewer than twelve vessels. This suggests that the 864 rim sherds represent at least 140 vessels, almost a dozen per family. I can only guess at production and breakage rates, but a minimum of a dozen vessels broken, discarded, and missed by cleaning per family implies a long occupation. These numbers are much higher than those for longhouses on other Mohawk sites that have closely dated occupations of a decade or two. I have estimated the occupation range of Otstungo to be AD 1450–1525 based on radiocarbon dates (Snow 1995a:133–138). It is reasonable to infer that Longhouse 1 was occupied for much or all of that period.

Male and female activity areas can be identified in Otstungo Longhouse 1. We can also identify the compartment in which quartz crystals were stored and from which they were presumably distributed to destinations outside the longhouse. I infer that this was the compartment occupied by the senior nuclear family in the household, probably a woman and a man of considerable standing in the community as a whole and perhaps beyond.

The Otstungo site has provided us with a unique view of the internal structure of a Mohawk longhousehold. No other Mohawk site and few other Northern Iroquoian sites offer such an undisturbed record of the organization of daily life in a multifamily dwelling. Perhaps sixty Mohawks lived in Longhouse 1 by the end of its occupation around AD 1525. Many more Mohawks than that walked through the longhouse as guests of the project during the years it was being excavated. The longhouse was almost certainly occupied in AD 1492, when Columbus first touched America far to the south. At that time there was an immense white pine at the southern entrance to the site, undoubtedly an important symbol to the Mohawk villagers, whose descendants still revere the tree. The pine, which was gone by a century ago, measured 2.2 meters in diameter, larger than any surviving white pine in New York. Its multiple trunks were cut into thirty-six logs, not one of them shorter than three meters.

While loss of the white pine is a sad point in the recent history of the site, Otstungo seems safe for the future. The site remains under the stewardship of John Schuyler and his family, who have owned it and the surrounding land for many years. Several other longhouses remain virtually undisturbed at Otstungo and are available for further research as new techniques emerge. I go back there whenever I can. My son and I had the honor of hearing the Iroquois Thanksgiving Address recited there by Chief Jake Swamp one perfect summer evening, and for me it remains one of the most evocative places on the face of our continent.

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FIVE

Activity Areas and Households in the Late Mississippian Southeast United States

Who Did What Where?

RAMIE A. GOUGEON

INTRODUCTION

The topics of household archaeology, activity area analysis, and gender research are combined here to explore production at the household level. Prehistoric Late Mississippian households in the southeast United States comprised men, women, and children performing activities within and around their domestic structures. Outside of the much-debated realm of specialized production of elite or status items, the majority of activities that occurred at the household level were arguably involved in production for domestic needs and consumption. It has been argued, however, that looking at households as "black boxes" hides the contributions of individuals within them (Wilk 1990). It becomes important then, when discussing household production, to examine the role of the individual. One way of accomplishing this goal is through an examination of activity areas and the division of labor by gender.

The analysis of activity areas is an integral part of household production studies. Households comprise activity groups (Ashmore and Wilk 1988; Carter 1984; Netting, Wilk, and Arnould 1984; Wilk and Netting 1984; Wilk and Rathje

1982); thus, it follows that archaeologists excavate the remains of their activities and the loci of activities. The analysis of activity areas can contribute to studies of household production, consumption, craft specialization, and the gender division of activities and space.

This chapter reanalyzes data from three house floors to discern where specific activities occurred within each structure (Gougeon 2002). By drawing on ethnographic and ethnohistoric sources, gender-based activities are identified. These findings are compared with current models of Late Mississippian households, and some implications of gender-based production models within chiefdom-level societies are discussed.

STUDY SITE

The Little Egypt site (9MU102) was located at the confluence of the Coosawattee River and Talking Rock Creek in Murray County, Georgia, but is now under a reregulation reservoir adjoining Carters Lake that was created in 1976 (Hally 1979, 1980) (Figure 5.1). Three physiographic areas meet here—namely the Piedmont, Blue Ridge Mountains, and Ridge and Valley provinces—creating a nexus of a wide variety of natural resources within relatively easy access. Little Egypt is located where the Coosawattee River leaves the Piedmont, crosses the Cartersville Fault, and enters the Great Valley District of the Ridge and Valley provinces. The site is located in a small cove-like valley that is separated from the Great Valley by a line of small hills to the west.

Little Egypt is likely the location of Coosa, the capital village of a chiefdom and a supposed paramount chiefdom occupied during the Late Mississippian Barnett phase (AD 1500–1625). Coosa was visited by Hernando de Soto late in the summer of 1540, as noted by chroniclers of the expedition (Hally 1994; Hudson 1997; Hudson et al. 1985; Langford and Smith 1990). In the decades following de Soto's visit (AD 1600–1650) the chiefdom collapsed and people along the upper Coosawattee River began a migration to sites in Alabama and later formed the Upper Creeks (Smith 1998, 2001). The Little Egypt site was later reoccupied by Cherokee groups and is referred to in early maps of the region as Coosawattee Old Town, a Cherokee village. The name "Coosawattee" may be a derivation of a Cherokee word *kusawati-yi*, meaning "old creek place." EuroAmerican settlement of the area began after 1830.

EXCAVATIONS AND SAMPLE

David Hally conducted archaeological excavations at Little Egypt from 1969 through 1972, followed by a brief revisit in spring 1974. Excavations revealed the remains of three domestic structures and focused on recovering evidence of daily activities of households.

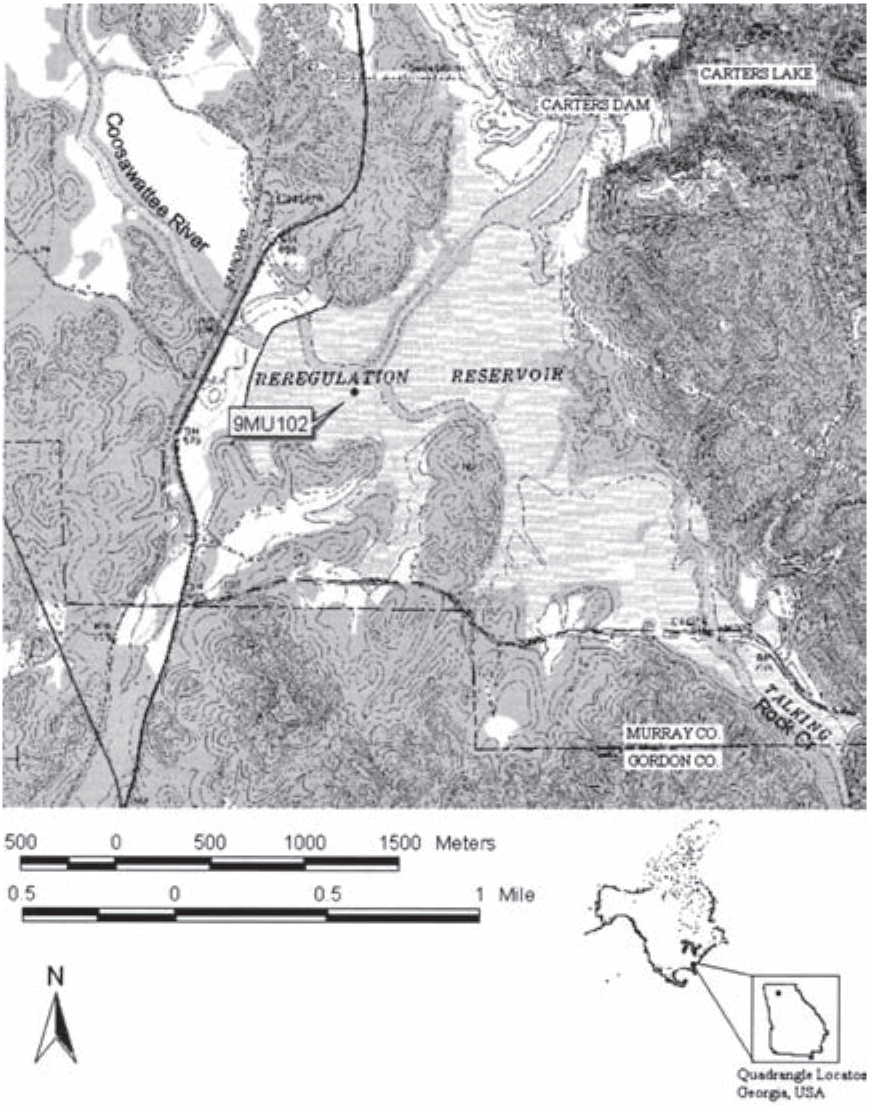

Figure 5.1. Location of Little Egypt (9MU102) Murray County, Georgia (Oakman, GA, 1971 [photo revised 1985], 7.5-minute topographic quadrangle)

The three structures are winter domestic structures, which were constructed in shallow basins. The exterior walls were constructed using single-set posts. Soil excavated from the basin was piled against the exterior of the wall. A thatched roof with a plastered smoke-hole was supported by four central posts, which

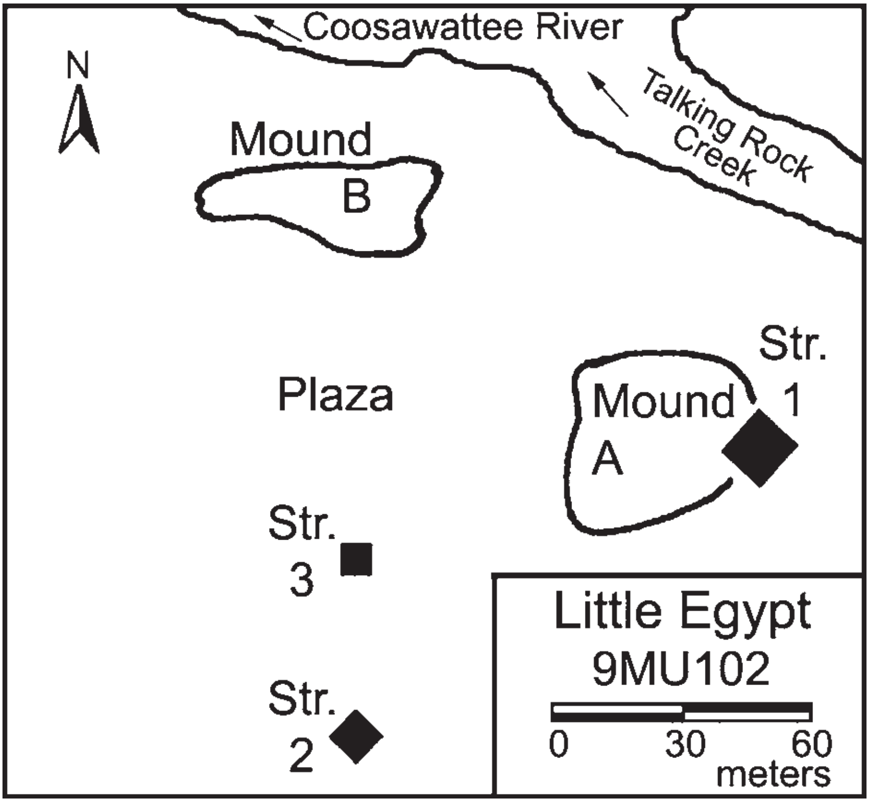

Figure 5.2. Site map of Little Egypt, Georgia, showing locations of mounds and structures.

also enclosed an area of the floor containing the central hearth. The three structures at Little Egypt vary in size from eighty-nine to forty-one square meters. Structures 2 and 3 are located in the village area, while Structure 1 is located on a low terrace on the east side of Mound A (Figure 5.2). Structures 1 and 3 were destroyed by fire. Structure 2 was abandoned and appears to have stood unoccupied for a time before collapsing.

Part of the challenge of investigating households at Little Egypt stems from the incomplete picture we have of the "household unit" (Netting, Wilk, and Arnould 1984; Polhemus 1987; Sullivan 1987). A household unit in this area of the Late Mississippian Southeast consisted of closely spaced summer and winter structures, outdoor activity areas, and sometimes smaller structures that likely served as storage buildings and shaded work areas. Summer structures varied in size and composition by culture area but are generally marked by a rectangular post pattern that supported a roof (an open-air portico or shed). Winter structures were more substantial and are more easily recognized archaeologically. The household unit has been observed at different sites across the Late Mississippian Southeast and was used during several different phases by several different cultures. For instance, this pattern of paired structures and outdoor activity areas has been found at Dallas, Mouse Creek, and Overhill Cherokee phase sites in eastern Tennessee; various prehistoric Lamar culture sites in northwest Georgia; early historic Cherokee sites in western North Carolina; and historic Creek sites in Alabama.

At Little Egypt only winter domestic structures were excavated. No summer structures, elevated granaries, outdoor activity areas, or any other associated features were excavated near these domestic structures. Identification and analysis of households at Little Egypt is conducted with the understanding that many daily activities and physical features of household units are not available for study. This does not mean, however, that there is not much to learn about Late Mississippian households at Little Egypt. Presumably during the cold winter months many household activities were conducted indoors, in the more substantial and better-insulated winter structures. In a way, winter structures may resemble a microcosm of household activities, with some of the dispersed activities of warmer months brought indoors under one roof. Furthermore, since it is possible that some outdoor activity areas were shared by multiple households (Hally and Kelly 1998; Polhemus 1987), analyzing winter domestic structures almost ensures that individual, independent households performed the activities within them.

METHODS AND TECHNIQUES

Analysis of activity areas within the three Little Egypt domestic structures by David Hally (1980) utilized intuitive pattern recognition techniques. This was accomplished by visually inspecting where clusters of artifacts overlapped. Hally also attempted to identify the gender of the user(s) of some of the activity areas, largely through the use of historic descriptions and ethnographic examples. Visual techniques rely on cognitive abilities to recognize patterns in what are often huge and complex data sets (Kintigh and Ammerman 1982). Archaeologists continue to utilize intuitive visual inspections, though it is now common to apply some data-reduction techniques to simplify the data (Blankholm 1991) or to perform exploratory data analyses (Carr 1991; Tukey 1977). In my research, statistical analyses of artifact classes and the specialized mapping functions of a geographic information system (GIS) were added in an attempt to create a better and more complex picture of household activities in domestic structures (Environmental Systems Research Institute 1998).

The first phase of research was to determine whether there is evidence for discrete, discernable activity areas within the domestic structures. This step was accomplished through a series of analyses, beginning with a review of

Table 5.1. Classes of artifacts analyzed from house floors

Ceramic artifacts	*Lithic artifacts*	*Botanical remains*	*Faunal remains*
Ceramic vessels Sherds Clay pipes Clay beads	Flaked tools Percussive tools Ground tools Stone pipes Minerals/pigments	19 species identified	24 species identified

household activities. The activities carried out in domestic structures for which there is artifactual evidence were discerned by examining classes of artifacts found in association with other classes of artifacts that might have been utilized during a particular activity (Table 5.1). For instance, food-preparation areas are marked by more than just the presence of preserved plant and animal remains. There are also the tools used to process foods, including cutting blades, grinding stones, and percussion tools. Other evidence includes vessels used to store and cook foodstuffs. Studies of specific artifact functions were also considered during this stage of activity area analysis (Conner 1985; Hally 1980, 1983a, 1983b; Pennington 1977).

Second, a Pearson's r test was used to explore the data for relationships among classes of artifacts. The classes of artifacts from each structure were tested independently. In this way, relationships among classes of artifacts that exist in one or two of the structures would not be blurred or hidden, which might occur if the data sets are examined as a single sample. The Pearson's r test returns a correlation coefficient, a measure of the strength of an association between two variables (Burt and Barber 1996). I then calculated the coefficient of determination (r^2) for artifact classes with strongly correlated distributions (generally $r > 0.6$). The coefficient of determination is the proportion of the sum of the squares of deviations of the y values about their mean that can be attributed to a linear relationship between x and y (McClave and Dietrich 1985). The coefficient of determination can be thought of as the percentage of variation in y that can be explained by x. With the results of the Pearson's r test, the distributions of strongly related artifact classes could then be visually examined within each structure using artifact distribution maps generated in ArcView.

Third, the original field maps were digitized into ArcView (ESRI 2000). Each structure was digitized as a separate view, and a separate theme was created for each artifact class within each view. Piece-plotted artifact and feature locations were digitized from original copies of field maps. Artifacts recovered in systematic flotation sampling of each structure were entered in a database. These data were linked to a theme of points marking the location of each sampled excavation unit. Isopleth distribution maps of each class of artifacts recovered through flotation, as well as those that were piece-plotted, were then generated in ArcView (Figure 5.3). By first analyzing the data for strongly correlated arti-

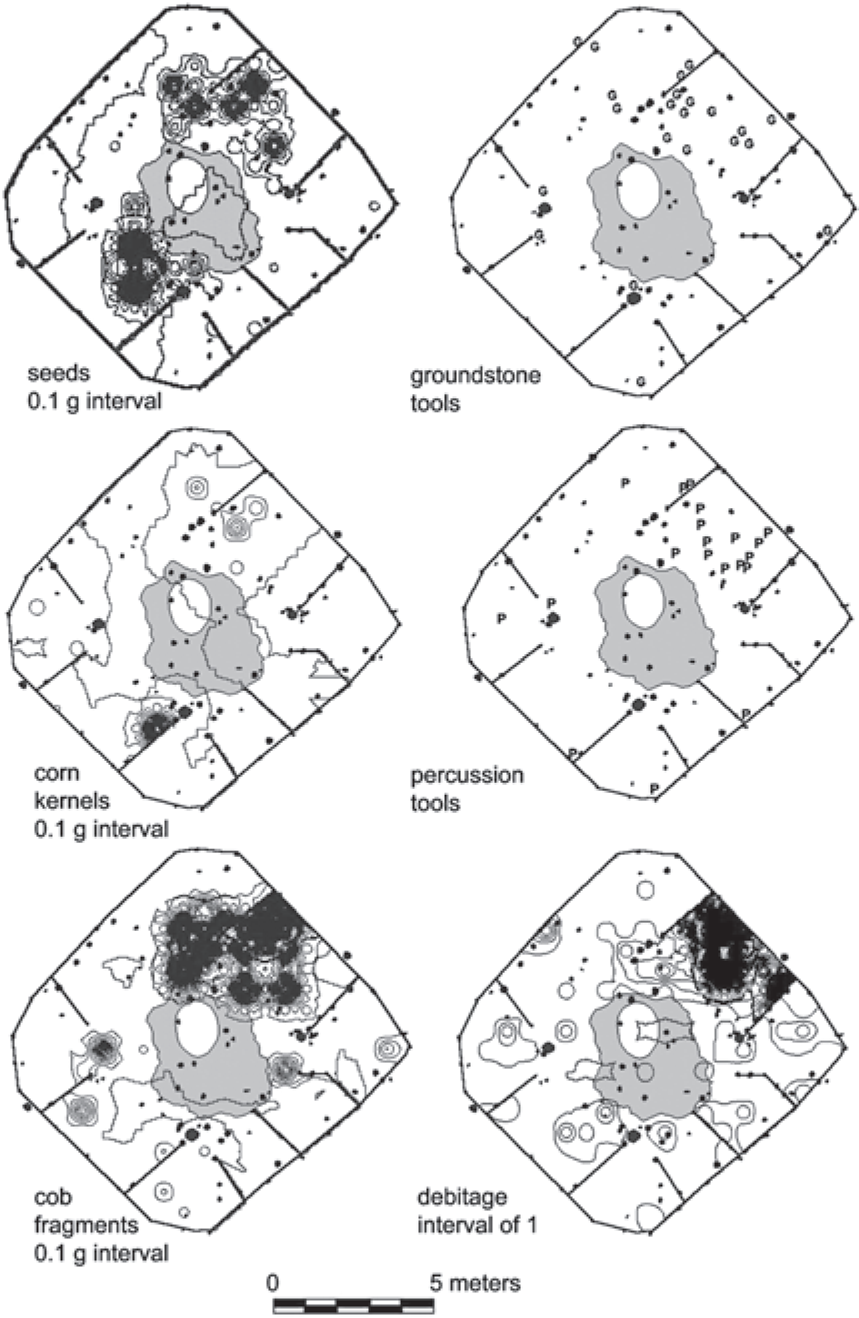

Figure 5.3. Isopleth distribution maps of classes of artifacts at Little Egypt, Georgia.

Table 5.2. Household activities by age and gender

Household production task	*Child*[c]	*Adolescent*[c]	*Adult*[a, b, c]	*Elder*[c]
Lumbering			♂	
Hunting large fauna			♂	
"Garden" hunting		♂[d] / ♀[d]	♀	
Working in wood		♂[d]	♂	
Fowling			♂	
Making musical instruments			♂	
Catching small fauna		♂[d]	♂	
Boat building			♂	
Stone working		♂ / ♀[d]	♂ / ♀	♂[d] / ♀[d]
Fishing		♂ / ♀[d]	♂ / ♀	
House building			♂ / ♀[d]	
Fuel gathering	♂ / ♀	♀[d]	♀	
Pottery making		♀[d]	♀	♀[d]
Gathering wild plant foods	♂ / ♀	♀[d]	♀	
Water fetching	♂ / ♀	♀	♀	
Cooking		♀	♀	♀[d]
Preparation of plant foods		♀	♀	
Working in bone, horn, or shell		♂[d]	♂	♂[d]
Butchering		♂ / ♀[d]	♂ / ♀	
Spinning		♀[d]	♀	♀[d]
Manufacture of cordage		♂[d] / ♀[d]	♂ / ♀[d]	♂[d] / ♀[d]
Net making		♂[d]	♂	
Hide working		♂[d] / ♀[d]	♂ / ♀	
Weaving		♀[d]	♀	♀[d]

[a] Based on Smith (1978).
[b] Based on Murdock and Provost (1973).
[c] Based on Swanton (1946).
[d] Inferred from ethnographic, archaeological, and other sources.

fact classes and then visually examining the distribution of these related artifacts, I defined areas within each structure that were the locations of specific repeated domestic activities.

The second phase of research sought to identify the gender of the individuals working in the discrete activity areas. This required knowledge of not only the tasks commonly performed in domestic structures but also whether each gender was responsible for different household activities. Fortunately for the sake of this study, Southeastern Indian cultures, like many cultures around the world, practiced a somewhat strict division of labor by gender.

The gender division of labor in prehistoric Southeastern societies has been examined in several studies (Polhemus 1998; Smith 1978, Thomas 2001), primarily through the use of data collected by Swanton (1946) and Hudson (1976). Notable among these is Bruce Smith's (1978) use of data compiled by Murdock and Provost (1973) on gender division of labor from ethnographic studies of 185 societies. For the purposes of my research I have refined Smith's work to also include butchering and leather working, in addition to tool production and maintenance activities carried out by women (Table 5.2).

THE "WHAT" OF HOUSEHOLD ACTIVITIES AT LITTLE EGYPT

Food preparation is the most common activity performed in domestic contexts at Little Egypt. These activities comprise several stages, from procurement through consumption. There is ample evidence to suggest that some initial processing of plant materials occurred in the houses. Evidence of these types of activities takes many forms, including botanical remains found in conjunction with percussion tools. Some wastes (e.g., large fragments of nutshell and corncobs) may have been reserved for use as fuel (Hally 1981). Tools for removing kernels from cobs include deer mandibles and corncobs. Vessels exhibiting wear from leaching corn with lye and different types of storage vessels are also indicators of plant-processing activities that occurred within domestic structures.

Preparation of game likely included such activities that may have been performed at the kill site, particularly gutting activities, but possibly also including some initial butchering and skinning (Reitz and Wing 1999:204). These activities alter the "completeness" of the faunal assemblage recovered from domestic contexts, introducing another level of complexity to archaeological analysis. However, some evidence for butchering activities can be found in domestic structures at Little Egypt. These include faunal remains found in association with flaked-stone tools (scrapers, blades, projectile points / knives [pp/k]) and some percussion tools.

Cooking food was accomplished in several ways. Stews, soups, gruels, and other forms of boiling plant and animal foods were common in the prehistoric Southeast. Other techniques included roasting, frying, and, to a lesser degree, baking. Evidence for each of these types of cooking techniques takes different forms. For instance, stews and similarly boiled foods required a large-mouthed vessel capable of being placed in or near the direct heat of a fire (Hally 1984). Soot deposits on the sides and shoulders of bowls and jars with wide orifices are strong evidence for this type of cooking. Large vessel fragments were used as griddles as evidenced by distinct sooting and oxidation patterns left on the side of a large pinched-rim jar fragment recovered from Structure 1 (Hally 1983b).

In addition to activities related to food preparation are those activities associated with production and maintenance of flaked-stone tools. Evidence for these

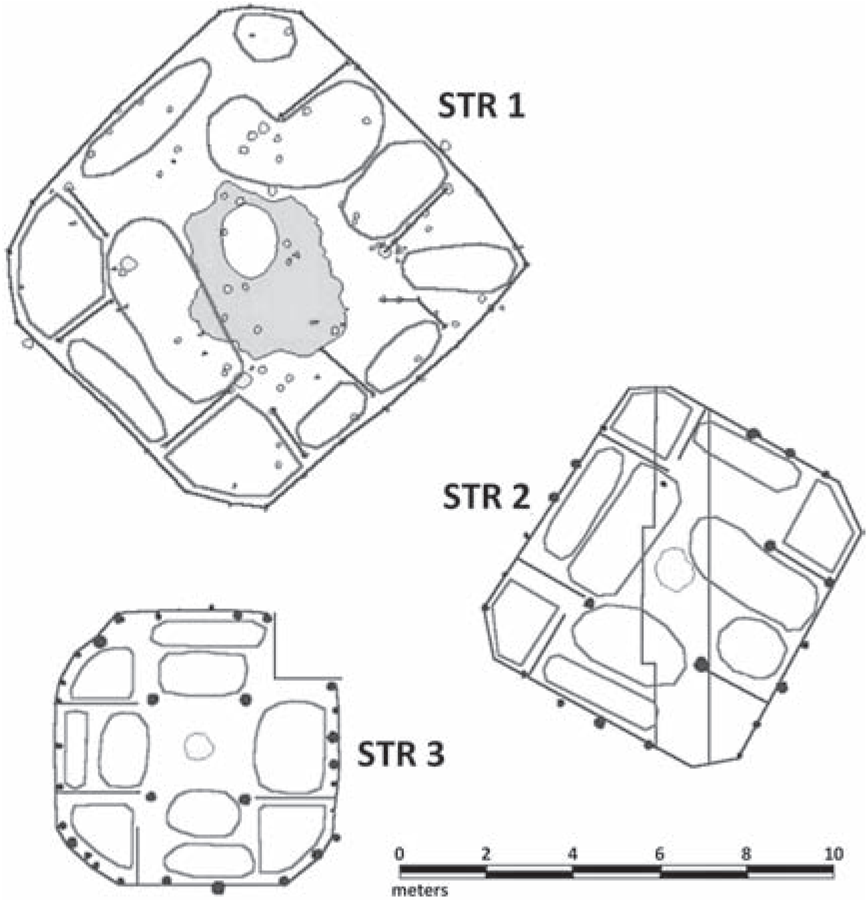

Figure 5.4. Model of Barnett phase household activity area structuring, Little Egypt

types of activities includes concentrations of retouch or tertiary flakes, formal tools in various stages of production (preforms through reworked tools), generalized percussion tools, and specialized stone-working kits. Flint-knapping kits often include specialized pressure flakers of antler tines, round hammerstones, abrading discs for preparing edges prior to flake removal, cores, and preforms.

Other activities for which there is evidence within domestic structures at Little Egypt include hide-working and stone-pipe production. Evidence of possible hide-working activities includes specialized tools and particular faunal elements found in Structure 1. Stone-pipe production in Structure 3 is evidenced by the presence of unworked phyllite and broken fragments of stone-pipe bowls/stems in mid-production.

THE "WHO" AND "WHERE": GENDER AND SPACE IN HOUSEHOLD ACTIVITY ANALYSIS

The distribution of artifacts across areas of the house floors suggests that different activities were carried out in different areas of the structures (Figure 5.4). The pattern seen in the three structures excavated at Little Egypt suggests there was a cultural template or norm for where certain people worked. By extension, this also influenced where particular activities were performed, given the division of labor by gender that existed in prehistoric Southeastern Indian societies (for discussions of gender and the household in other cultures, see chapters in this volume by Beaule, Douglass and Heckman, Gonlin, Henderson, Neff, Snow, and Wiewall). In this way it is particularly difficult to make the argument for discrete activity areas without also discussing the issue of division of labor by gender.

The central hearth area was the focus of many household activities, primarily those requiring heat but also any activities requiring light. This area was kept clean of debris, and we can assume that any large vessel fragments and tools recovered in this area were in use when the structures were abandoned. This being the case, the central hearth area was not a discrete activity area per se but a temporary extension of peripheral work areas located at the openings of the compartments. One can imagine the bulk of traffic within the structure passed through this central area, thereby making permanent work areas a hindrance or hazard and incongruent with the movement of people.

Evidence for division of household space can be found in the construction of the structures themselves (see discussion of the function of architecture in chapters by Ciolek-Torrello and Snow in this volume). Domestic winter structures were physically divided into compartments through the use of partition walls. Partition walls at Little Egypt are represented by posthole alignments extending from the exterior walls toward the center, sometimes with adjacent concentrations of fired daub. Partition walls for which there is no direct evidence can be inferred through analysis of artifact distribution. Walls would have prohibited the even distribution of artifacts across the floor of the structure and would also be areas where tools, vessels, and refuse would have likely been deliberately placed or eventually come to rest. Linear clusters of artifacts in areas that lack direct evidence of structural elements (e.g., postholes or daub) are probable indicators of partition walls. Some of the partition walls proposed for the structures at Little Egypt were inferred in this manner.

Further support for the argument of discrete activity areas by gender can be found within single large compartments. There is evidence to suggest that when two or more individuals of different genders shared a compartment, the division of activity areas was still practiced. In both Structures 1 and 2 a compartment to the right of the entrance appears to have been utilized by a female and a male, perhaps simultaneously. Food waste, raw materials, broken ceramic vessels, tools in various stages of completeness, and other items that might have interfered with the activity being performed were deposited between the two activity areas. This demarcation of a "no-man's-land" with refuse demonstrates that the two activity areas were viewed as separate from each other. If activity areas were not separate, we would likely observe refuse deposits along walls and partitions exclusively and not in a pattern resembling a partition wall of trash in the center of a large compartment. Where compartments were the locus of single activities or multiple activities performed by a single person, no deposits of refuse are observed in potentially usable space. Here wastes are pushed to the edges of activity areas, along walls, and under benches.

While partition walls served to delineate some male and female areas within Late Mississippian domestic structures, other gender-specific areas were known to be men's or women's areas by the individuals who commonly used them (e.g., women preparing food by the central hearth). Upon entering a domestic structure at Little Egypt, visitors would almost assuredly know which areas were used by males and which areas were used by females.

In her study of late prehistoric Siouan communities in the western piedmont of North Carolina, Jane Eastman (2001:58) proposes that women "experienced more profound changes in their gender roles and identities as they aged than did men." She argues that these changes were marked in many ways, including expectations in behavior, specific dress, and division of labor. These changes may be evident in burials through the presence of tools associated with gender-specific tasks and items of dress or decoration. I suggest that these changes in gender role and identity through a life cycle would also be seen in the spaces they occupy in domestic structures. Children might occupy one common area or sleeping bench while adults would occupy another. However, as girls and boys matured and their responsibilities changed, the areas where they worked and lived would change. For a female this might culminate in the establishment of her own household.

Large compartments that were utilized by one gender usually have evidence of several activities within them, although most of these activities relate to the completion of a larger task. For example, a large activity area for females in Structure 1 contains percussion and grinding stone tools, flaked-stone tools, botanical remains in the form of nutshell fragments and corncobs, and pigment mineral fragments and palettes. Most of these artifacts are related to various stages of food production. The presence of pigments and palettes, however, suggests that other activities may have also occurred in this same area. All of these activities were performed by a woman in a space that was considered to be a female activity area.

The presence of multiple types of activities within a single gender-specific activity area is likely an indication of the age of the person utilizing the space. Adults undertook more types of activities than subadults or children (Eastman

2001). Subadults were taught specific skills by adults, likely within or near adult activity areas. Thus, we might expect to see activity areas with evidence of fewer types of activities within them located apart from more complex adult activity areas. These can likely be interpreted as activity areas of older subadults performing the additional gender-appropriate duties that came with changes in age.

HOUSEHOLD PRODUCTION AT LITTLE EGYPT

What does the exploration of activity areas and gender contribute to the examination of Late Mississippian household production? First, because of the size and location of Structure 1, I assumed there would be some differences in the activities of this presumed elite or higher-status household when compared with the two structures from the village area. Instead, my findings show remarkable similarities among all three households with all performing the same basic household production tasks. Additionally, in spite of the greater size of Structure 1, it appears as though the same cultural template was used to order activity areas and living spaces. David Hally (1981) found no significant differences in the botanical samples from the three structures, suggesting the diets of elite and commoner households were similar. It is possible that status markers at Little Egypt may have been expressed in ways other than those that left evidence in the archaeological record.

Gero (1991:170) states that women are portrayed as the most visible in household contexts, perhaps even "disproportionately represented" in household middens. This appears to be the case at Little Egypt. In all three structures women's activities dominate the assemblages and occupy the most space. This stands to reason, because upon examination of the lists of activities commonly performed by women in Southeastern Indian societies, one can see that the majority of them take place within or near domestic structures. Men's activities commonly occurred outside of structures or away from village settings entirely (Spain 1992). A brief discussion of female and male activities follows.

Evidence of food-preparation activities is the most common in domestic contexts at Little Egypt. These activities occur exclusively in female activity areas in all three structures. Whole vessels that functioned as cooking pots and storage containers are found in female activity areas. Partial vessels are also located in these areas and indicate that they functioned as tools (e.g., lids, scoops, and griddles) (Hally 1983a). Other tools, plant parts, and faunal remains are also found primarily in female activity areas. Plant and animal remains found outside of female activity areas arguably represent the consumption of food, as they are not found in association with storage and cooking vessels or processing tools (Hally 1981). It can be argued that activities related to the production of food for domestic consumption occupied not only the bulk of female activity areas but also the majority of women's time.

Perhaps the most surprising result of this reanalysis of Little Egypt households is the discovery of lithic production areas within female areas of the structures. I propose that women produced and maintained some of the flaked-stone tools found in domestic structures. The evidence for this includes the presence of chert and quartz debris in female work areas, often in association with percussion tools. The notion of female production of flaked-stone tools has been addressed in recent decades, most notably by Gero. She states that it is "inconceivable that they [women] sat and waited for a flake to be produced or that they set out each time to borrow one" (Gero 1991:170). Flaked-stone tools recovered from female work areas at Little Egypt include formal scrapers in several forms and projectile points that have been reworked into specialized scraping and cutting tools.

The user of a tool is the best judge of the adequacy of the tool for a particular task (Gero 1991:170). It stands to reason that if females were making a variety of vessel forms to suit particular needs, so too would female knappers produce points that suited tasks not performed by male knappers. Whether females produced the original tools they later altered through use and resharpening cannot be stated with much certainty. All of the Mississippian point forms are found in male and female areas of the domestic structures at Little Egypt, particularly in the shared production areas. Male knappers sharing this area may have produced generalized cutting tools along with the more finely flaked projectile points used for projectiles, knives, and even exchange. It is possible, though, that women also produced some of the tool forms while working in these heavy processing areas adjacent to male knapping areas. Males and females may have flaked stone with a general understanding or template of the shape the tool would eventually take. This would make distinguishing the points of male and female knappers as difficult as identifying the works of different female potters (Gougeon 2000).

It is also interesting to note that curated formal flaked tools from earlier Archaic and Woodland periods are found primarily in female and shared activity areas. In some cases these tools appear to have been reworked, perhaps by the last Mississippian period users of the tools. The fact that curated tools do not often occur in male activity areas may be a reflection of different cultural attitudes toward flaked-tool production by each gender. Males used projectile points not only for hunting and warfare but also as a medium of exchange with other males (Matthiesen 1994:90, 92). Like males, females used formal tools for specific cutting and scraping activities but do not appear to have exchanged them in the same ways that males did. That is to say, if women were exchanging tools, they were then used as tools by the women receiving them. Finely flaked Mississippian projectile points traded among men are found in male burials, suggesting that they were exchanged for social and not functional reasons (Matthiesen 1994). Women may have viewed Archaic, Woodland, and Mississippian tools as tools and not as objects that could potentially be identified as their handiwork. Certainly males and females recognized some finely flaked points and blades as culturally loaded items that symbolized relationships or alliances among men. The exchange of tools may have been the act that separated these projectile points from nearly indistinguishable copies found in fragments or retouched into new forms in domestic activity areas.

Evidence for male activity areas in domestic structures at Little Egypt is highly geographically limited. A flint-working area containing debris from the production of flaked-stone tools is found in Structures 1 and 2, but this area is not as clear in the final stage of Structure 3. In both Structures 1 and 2, males apparently shared a compartment to the right of the entrance with females. As previously discussed, a line of debris divides the large compartment into two work areas. Flint-knapping kits, or tools commonly associated with them, are found in the male half of the compartment. These smaller activity areas are located away from a larger shared adult bench and might reflect the users' desire to keep sharp and hazardous flakes out of sleeping areas. This behavior has been noted in an ethnoarchaeological study of refuse disposal among the Lacandon Maya of Chiapas, Mexico (Clark 1991). There knappers worked into a cloth to prevent debris from scattering across other living spaces, usually the kitchen. The debris was collected and removed to out-of-the-way places. All surveyed knappers cited the importance of keeping sharp flakes away from barefeet. The close proximity of a stone-working area and an initial food-processing area in winter structures at Little Egypt is somewhat unexpected. If, however, the foodstuffs coarsely processed in the shared activity area were taken across the structure to a female activity area for cooking and consumption, the hazards of flake debris becoming incorporated into food may have been somewhat mitigated.

MODELS OF LATE MISSISSIPPIAN HOUSEHOLD ACTIVITY AREAS

Several studies have provided models of Late Mississippian household activities and are reviewed briefly here. In Hally's (1980) analysis of house floors at Little Egypt he suggested that areas of the structures were used for specific activities, including storage, flaked tool production, and food preparation. Gender assignments for particular activities were made based on ethnohistoric accounts. No attempt was made, however, to present a formal model of households for the site, region, or time period.

Through his work at the Toqua site Richard Polhemus (1987, 1990) devised a model of Dallas phase household activity structure. In this model the domestic structure was divided into public and private areas. A central hearth demarcated a public area where a number of activities took place, including preparation of food and activities requiring light from the fire. Private areas consisted of beds and storage areas. Beds were located along the walls. Corners were used for storage, with foodstuffs commonly found in the southeast corner, "non-food" in the northwest corner, and "general" storage in the northeast and southwest corners. Ethnographic accounts report individuals were buried near the bed they used in life. Polhemus used burial placements and associations between genders and specific activities to support claims for engendered areas of the structures. He suggested females were most often associated with the north and south walls, and males were associated with the west wall.

Polhemus (1998) revised this model in his doctoral dissertation, based on analysis of the Loy site. In the new model adult males are associated with the wall opposite the entrance. Adult females utilized the bed and area to the left of the entrance, and subadults were associated with the bed opposite the adult females. Storage areas are assigned to each gender in this refined model. Males utilized the storage area in the right rear corner of the structure, and females used the left rear corner. Food was stored in the front left corner. The right front corner was used for lithic reduction, plant food processing, and other "heavy" or initial coarse processing.

The model of Barnett phase household activity structure suggested by my reanalysis of Little Egypt households is similar to Polhemus's model. In the diagram of the Barnett phase household model presented here I have utilized some of the terminology presented by Polhemus to facilitate comparisons. As in the model of Dallas phase households, the Barnett phase domestic structure is divided into public and private areas. The area enclosed by the four central roof support posts and containing the central hearth (Area VI) demarcates a public area where a number of activities took place, including preparation of food and activities requiring light or heat from the fire. Private areas consist of those areas along the outer walls containing benches (Areas I, II, III, and IV) and storage areas (Area V).

In the Barnett phase model the compartment immediately to the right of the entrance (Area I) contains both male and female activity areas. In Structures 1 and 2, evidence suggests males used the area adjacent to the entrance, while females and males used the far end of the compartment. In Structure 3 this same compartment appears to have been cleaned prior to the fire that destroyed it, and evidence for these separate areas is sparse. The compartment across from the shared compartment is a female activity area (Area II), as seen in all three structures. It is possible that this second female activity area was utilized by older subadult females, perhaps an older daughter of the female head of the household.

The compartment to the rear and right of the entrance is a shared bench area, likely utilized by the adult male and female heads of the household (Area III). While this area was likely the loci of some activities (e.g., phyllite pipe production in Structure 3), it appears as though the primary activities were eating and presumably sleeping. In the model the compartment to the immediate left of the entrance is associated with subadults (Area IV). Storage areas (Area V) are found in the corners to either side of Area II. Both of these corners appear to have been used to store food items, vessels, and vessel fragments (potential tools) and were also areas where trash accumulated.

Slight differences between Little Egypt households and the model are likely reflections of different household compositions. In Structure 1 the compartment to the immediate left of the entrance was divided into two smaller rooms by a partition wall. These areas might have been utilized by subadults of different genders or by subadults of substantially different ages. No activities related to household production appear to have occurred in either of these smaller rooms. In Structures 2 and 3 this compartment is open but marked by evidence of female activities, suggesting that older female subadults utilized this area. If changes in age and status were also marked by changes in location within domestic structures, it is likely that the compartments to the left and rear left of the entrance (Areas IV and II, respectively) were flexible in their function. Occupants of these areas changed throughout the use-life of the structure (e.g., older daughter moving to occupy the compartment to the rear left of entrance as other children are born and utilize area to the left of the entrance), or the activities that occurred within them changed with the added responsibilities of the occupants.

A comparison of Polhemus's and my models suggests substantial similarities between Dallas and Barnett cultures. For example, Polhemus (1998:300) identifies a large area just inside the entrance as a heavy processing area used by both males and females. This type of activity area is also seen in Structures 1 and 2 at Little Egypt. Minor differences include where adult female, adult male, and subadult activity areas are located. This appears to be influenced by the placement of the entrance (i.e., mid-wall at Toqua and Loy and at the corner at Little Egypt). The designation of separate areas for household members based on gender, however, is more significant than their specific locations within the structures.

In spite of the small differences in the physical layout of Dallas and Barnett phase structures, the pattern of female activity areas and male activity areas is similar in both models. This similarity is likely a reflection of exogamous marriage structuring, matrilineal and matrilocal principles, the division of labor by gender, and the ubiquity and importance of female activities in households in the Late Mississippian Southeast.

In the Late Mississippian Southeast, rules of exogamy dictated that individuals married outside of their lineage (Hudson 1976). Matrilineal practices likely included a matrilocal postmarital residence pattern, dictating that the husband move into his wife's household. Apart from the young unmarried sons of the households, adult males were "outsiders" to the lineage. Females attached to the household, including unmarried daughters, grandmothers, and the female head, were all related and part of the matrilineage that gave the household its identity. Females did not marry out of the household. Rather, they formed new households attached to their mother's, resulting in a pattern of household clusters centered on a common patio-like area (Hally and Kelly 1998; Kelly 1988; Polhemus 1987). As discussed above, females may have occupied several areas of the domestic structure as they matured and took on new roles. An unmarried male likely only occupied one area in his mother's house, and upon moving into his wife's house, immediately occupied those areas utilized by the adult male head of the household.

SUMMARY AND CONCLUSIONS

To summarize, through the use of statistical analysis and intuitive pattern recognition techniques, I have demonstrated that there is evidence of discrete activity areas within winter domestic structures at the Little Egypt site. By further examining the activities commonly performed by each gender in Southeastern Indian societies and discerning the tools, materials, processes, and expected artifacts for each activity, I have identified these activity areas with specific genders.

My findings at Little Egypt were used to develop a model of activity-area structuring for Barnett phase households in northwest Georgia. This model is comparable to Polhemus's models of Dallas phase households in east Tennessee and suggests a wider pattern of activity-area structuring may have been in place in other regions during the Late Mississippian period.

Opening the "black box" of Late Mississippian households has important implications for the study of production within chiefdom-level societies, namely by considering the contributions of individuals to household production activities. As seen in the analysis of house floors at Little Egypt, nearly all of the activities that occurred within domestic winter structures were involved in production for domestic needs and consumption. The evidence strongly suggests that artifacts normally recovered from house floors are associated primarily with activities performed by females, namely those involved with food production. My research on activity areas paints a picture of individuals performing very different tasks for the common good of the household. Within domestic structures, however, it appears that females were the dominant forces behind production.

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S I X

The Social Evolution of Potters' Households in Ticul, Yucatán, Mexico, 1965–1997

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INTRODUCTION

This chapter provides two answers to the question, What do households do? First, their members participate in craft activities, and second, the social composition of these craft households evolves and changes through time. One type of craft activity that households practice is pottery making, but what happens to potters' households through time? How do they change? To answer these questions, I will trace the changes in the composition and location of potters' households in Ticul, Yucatán, Mexico, between 1965 and 1997. By describing these changes, I hope to provide some insight into the processes that affect the organization of potters' households through time, and how those processes might be applicable to the study of ancient households.

Ticul is one of the major cities in southern Yucatán and, like many cities in Latin America, it has experienced a surge in population during the last forty years. In 1960, its population was 14,789 (Salas 1967:50), and in 1965, the production of pottery, hats, and shoes were major cottage industries. By 1997, a sign outside the city proclaimed that the city had 22,900 inhabitants, an increase of

155 percent of the 1960 population. Hat making had disappeared, the production of shoes had greatly diminished, but the production of pottery had flourished and grown.

THE NATURE OF HOUSEHOLDS

Households should be understood from two different perspectives. First, they need to be understood in terms of the way in which they utilize space (see, e.g., the chapters by Ciolek-Torrello, Douglass and Heckman, and Snow, this volume). This perspective involves the way in which the household space is subdivided and allocated to the activities that are performed within it. Do these areas consist primarily of general, multipurpose space, or do they consist of a set of specialized areas reserved for specific activities? All households utilize both types of space, but the amount devoted to each type varies across time and from culture to culture. The space used for food preparation and cooking, for example, often consists of an area devoted exclusively to those activities and includes a hearth and specific locations for the storage of food, water, and service ware.

Craft activities, however, provide a challenge to households because they often require additional space for the storage of tools, raw materials, and completed and partially completed craft products. Furthermore, weather conditions may require that some craft activities (such as forming and drying pots) take place inside in a protected environment (see Arnold 1985:61–98). As craft activities become more important to a household's economic well-being and replace subsistence activities located away from the household, more time must be devoted to craft production. This increased amount of time often requires more space for craft activities and this increased space competes with that needed for other, more general household activities.

The second perspective necessary to understand households consists of the way that they are organized with a focus on the relationships of the people within them. While the ways in which households utilize space is a critical dimension for craft production and one that is important to archaeologists, this chapter focuses on only one craft activity (making pottery) and the households that perform that activity. This paper thus utilizes the potter's household as the unit of analysis and then describes what happens to the number, location, and composition of such households through time.

While the focus of this chapter is the social composition, location, and continuity of households, the utilization of household space cannot be ignored. The main issue concerns the amount of space devoted to craft activities that may increase to such an extent that the term "household" becomes an inadequate way to describe the locus of production without some change in terminology, such as "household production," "individual specialization," "workshop," "household workshop," "dispersed workshop," or "workshop industry" (Costin

1991; Peacock 1982; Van der Leeuw 1976). The use of the term "household," for example, to describe the locus of ceramic production over the thirty-two years of my research in Ticul is inadequate. Households expand and change, and production (or some aspects of it) may move outside of them. One can not simply call the production locus a "household" over such a period because so many changes have occurred to the locus of production since 1965. From a material and spatial perspective, production organization in 1997 looks very different than it did thirty-two years previously.

I struggled with this issue as I tried to categorize and quantify my data. Initially, the term "household" seemed to be a useful way to describe the social unit of ceramic production. As the craft evolved and production facilities expanded, however, a few production facilities moved outside the household into what could be best described as workshops and small factories. These facilities utilized task segmentation with specialists in activities such as mining raw materials and procuring firewood and within production units assigned to forming, firing, and painting (Arnold 2008). This observation led me to use the term "workshop" for such units. But then it became clear that the line between "households" and "workshops" was fuzzy depending on the criteria used for each category. As I saw household after household evolve into "workshop-like" production facilities between 1965 and 1997, it was obvious that trying to separate the two was unproductive and unnecessary. Regardless of the way that they had changed, expanded, and evolved, however, all production units that appeared to be "workshops" were still household-based. In fact, using *any* criterion to define the production units in Ticul as "households," "workshops," or anything else was useless because they were changing so fast and at any one moment of time, there were several different "types" or "modes" of production present in the community, depending on how they were defined.

As I struggled with the description and categorization problem, it was evident by 1997 that none of the production units were "households" of the kind I had observed thirty-two years earlier, even though many had developed from those same households. The only way around this problem was to use a different descriptive terminology. I thus decided to simply describe the locus of ceramic production as a "production unit" and did not worry about categories that archaeologists had tried to use (e.g., Costin 1991; Peacock 1982; Van der Leeuw 1976). This change freed me from the fuzziness of categorization but allowed me to describe how the locus of production units that began as the potters' "households" in 1965 had changed.

This categorization problem revealed a larger, rather obvious issue about the relationship of social categories and cultural evolution. Preoccupation with categorization may obscure fundamental processes of change because evolution varies according to how one defines the social "types" involved.[1] The Ticul data thus demonstrate that even through the tiny span of thirty-two years (from an archaeological perspective), describing social evolution simply in terms of changing fixed categories invented and imposed by the investigator may provide few insights about underlying evolutionary processes. This awareness thus challenges one to describe change in deeper and more profound ways.

Costin (1991) also struggled with the categorization problem, and her response was the development of a set of parameters that underlie the organization of craft specialization. These parameters are probably the most important outcome of the specialization literature in the last twenty years and provide a useful way to think about specialization, but they give specialized meanings to words already in common use and can easily create confusion, potentially obfuscating the great significance of her work. Using Costin's parameters conceptually (rather than labels for those parameters) thus helps to uncover the underlying processes of the evolution of craft production and craft specialization. This chapter explores Costin's (1991:15–16) parameter of "scale," which consists of the composition of the production unit and includes the number of individuals working in the unit and the way in which it recruits labor for production.

MAYA HOUSEHOLDS

A traditional Yucatec Maya household usually consists of a lot with a house more or less in the center of the property. Such a lot may also be occupied by an extended family consisting of more than one nuclear family related by descent. Each family, however, may have its own house. In cities and towns, a stone fence defines the limits of the property and the house may occur next to the street so that access to the lot behind is possible only through the house. The open space around the house (or in the back of the lot) usually contains ornamental and economically important plants[2] and trees, a pole-and-thatch structure for cooking and eating, and perhaps other small structures such as a shaded basin (pila) for washing clothes, a storage structure for maize (if the family grows its own maize), and occasionally other structures. Craft activities, such as making pottery, may occur inside the house; outside in the shade, weather permitting; or sometimes in one of the small structures on the houselot.

Spatial configurations of traditional Maya households have changed greatly since 1965. In Ticul, Maya houses in the center of houselots have been replaced by Spanish-style houses with flat, cement roofs that are adjacent to one another along the street. As families grow, households segment into smaller nuclear families, and if the children and their families remain on the land of their parents, the land might be subdivided to accommodate new houses on the property. Such adjoining houses may be spatially distinct, but the rear portion of the lot may have a common patio for all of the houses on the subdivided property.

When the potter's craft becomes economically more important for a family, however, the use of space in the household changes. One of the most dramatic changes in potters' households between 1965 and 1997 came with the kind and amount of space used for production. First, the use of general space for craft production has evolved into highly specialized space. In the late 1960s, almost all production occurred in multipurpose household space that was used for a variety of activities, not just ceramic production. By 1984, the space for production became more specialized with specific interior spaces set aside for the storage of raw materials, mixing, forming, and drying vessels. Except for painting and the sale of pottery, which has grown into space outside of households, most of the actual ceramic production has remained in the houselot and expanded with the construction of new facilities.[3] The result was that the amount of space for ceramic production (its "spatial footprint") has increased dramatically.

SOCIAL AND CULTURAL CHANGES, 1965–1997

Traditionally, Ticul pottery production was primarily oriented to the local Yucatec population with vessels fabricated for utilitarian, service, and ritual purposes. In 1965, much of the craft was oriented around the production of vessels for water transport and storage, which were sold throughout much of the northern Yucatán peninsula. Some potters also produced ceramic coin-banks that had been introduced in the 1940s.

Beginning in the late 1960s, a number of social changes had a significant impact on the craft. First, piped water was installed in the cities and towns on the peninsula. When this task was complete in the early 1970s, the demand for water-storage and water-carrying jars plummeted. About 1975, construction began on the tourist resort of Cancún, located 300 kilometers away, and eventually, the demand for pottery shifted. This demand was driven by two consumer values. The first consisted of the value of potted vegetation for interior spaces. Once it was discovered that Ticul vessels made desirable receptacles for large plants, consumers wanted these large vessels to display potted vegetation indoors and on patios and porches. The greatest demand for these vessels came from the Cancún hotels, which reportedly changed their pots every one to two years, but such vessels were also used by hotels in the capital city of Merida and by urban dwellers in these cities and elsewhere.

The second consumer value that emerged was the demand for small vessels painted with copies of ancient Maya designs. Such vessels became symbols of a visit to the land of the ancient Maya and were small enough to fit into a suitcase when tourists returned home. The demand for these vessels was facilitated by a government-sponsored workshop that was established in Ticul in the early 1970s to teach potters to make copies of prehispanic vessels with ancient Maya polychrome designs.

The demand created by these values was facilitated by an extensive transportation infrastructure. As recently as 1951, highways were limited and the extensive railroad network was the principal form of transportation throughout much of the northern Yucatán peninsula (Thompson 1958). By 1965, highways had expanded, but many roads to the interior were still unimproved and were nothing more than vehicle tracks that required four-wheel drive or a high wheel base to negotiate them. By the late 1960s, however, the quality of the roads was improving, and by the 1990s, most roads to the interior of the peninsula were asphalt. Meanwhile, work had begun on a limited access toll road eastward from a point sixty-eight kilometers east of Merida during the 1980s, and by 1994, the drive from Merida to Cancún required only a few hours. With the increase in highway infrastructure, access to the tourist markets on the east coast was easier and relatively rapid in comparison to travel there in the 1960s.

As a result of these changes, ceramic production in Ticul also changed. First, raw material procurement intensified and became professionalized with clay and temper mining carried out by full-time specialists (Arnold 2008:153–220). Consequently, the principal clay source that had been used for centuries became exhausted[4] and clay procurement shifted to sources in the State of Campeche (see Arnold 2000, 2008:154–170; Arnold et al. 1999). In the late 1980s, a new source of temper was discovered, and by 1997, temper procurement had largely shifted to the new source (Arnold 2008:193–204).

As already implied, vessel shapes also changed between 1965 and 1997. After the early 1970s, production of traditional shapes used for utilitarian and service purposes were largely (but not completely) abandoned. Ritual vessels, however, such as food bowls, incense burners, candle holders, and whistles, continued to be produced on a seasonal basis for the Day of the Dead ceremonies. Some coin-banks continued to be made for local consumption. Nevertheless, production largely shifted to making plant pots and suitcase vessels. While some of these shapes were miniature copies of traditional[5] vessels, most consisted of totally new shapes that included copies of ancient Maya vessels that were produced in prehispanic times.

Vessel decoration also changed. The traditional decoration, which consisted of red and tan firing slips, continued to be used on plant pots. Using oil-based paint to decorate banks was introduced in the 1940s and this practice continued through 1997. The most dramatic change in decoration, however, was the expansion of oil-based painting to include a variety of vessels and the use of polychrome designs copied from books of Maya art and archaeology.

The pattern of the consumption of Ticul pottery changed as well. Although the local Maya population still purchased pottery for use in Day of the Dead rituals, the consuming population changed from the Yucatec Maya to one that was largely tourist-related. Second, the physical location of the market also changed from the State of Yucatán to the resort of Cancún in the State of Quintana Roo on the east coast of the peninsula. Third, the size of the market and consuming population also changed. In the late 1960s, consumption was generally limited to the Yucatec Maya demand for water-carrying and water-storage jars, coin-banks, and vessels for seasonal rituals. By the 1990s, the demand for plant pots from hotels and urban dwellers and for vessels from tourists seemed insatiable and subject only to the vicissitudes of the ebb and flow of the tourist industry.

Finally, the patterns of distribution have changed. In the late 1960s, potters (or members of their families) sold their pottery directly to consumers. With the development of the tourist market at Cancún, however, most potters could not transport their pottery there using public transportation and were forced to sell their pottery to those who had vehicles. These potters thus lost control of the market and had to sell their wares to middlemen/brokers who transported it to Cancún or other consumer markets.

HISTORY OF RESEARCH

This chapter is a small part of a more comprehensive study of change in contemporary pottery production in Yucatán that occurred over ten visits from 1965 to 1997. These visits have varied in duration from one week to six months (Arnold 1967, 1971, 1987, 1989a, 1989b, 1991, 1997, 1998, 1999, 2000, 2008; Arnold and Bohor 1975, 1976, 1977; Arnold et al. 1999; Arnold, Neff, and Glascock 2000; Arnold and Nieves 1992; Ralph and Arnold 1988). The goals, data, and outcomes of each visit varied, but almost every visit included collecting data about potters, where they lived, where they produced pottery, and the persons who helped them.

One advantage of long-term research in the same location is the high validity that is possible to achieve with such a strategy. Because I have returned to the same community repeatedly over thirty-two years, I have become well-acquainted with potters, their relatives, their residence locations, and their production. Consequently, during each visit, I built upon the rapport and knowledge of previous visits and can assess, even with a brief visit, the veracity of informants' statements and the validity of short-term and long-term changes. The result is that I can easily detect both deliberate and involuntary deception and verify and cross-check data with other informants. I can see changes from previous visits, and because I know most of the potters in the community, I can easily determine who is making pottery and where they are making it, often from observation alone. The following narrative briefly describes the history of this research, but it is abbreviated to focus on the collection of the data relevant for this chapter.

When I first went to Yucatán in 1965, I spent six months in Ticul and carried out a survey of potters. A sketch map was made locating each household, and data collection included the names of the potters present, how long each potter had been making pottery, the type of pottery made, and where it was sold. A return trip to Ticul in 1966 (Arnold 1967, 1971) included a survey of each potter's household with its location on a map. Data from two households were obtained from others since visitation was not possible. A sample of 93 percent of the pottery-making households was obtained at that time.

The research visits of 1967 and 1968 focused on raw materials, but these visits also involved a compilation of a list of active potters. In 1968, the preparation of genealogical diagrams of potters' families was begun. Two brief visits in 1970 involved eliciting a list of active potters. The lists from 1967, 1968, and 1970, however, are biased toward my informants' families, their lineal relatives, and others known by them since they were not based on visits to households other than those of my principal informants.[6] Subsequent visits and narratives of the history of each potter's household have shown these lists to be accurate but incomplete, with approximately 10 to 15 percent of the potters in the community missing from these years' lists.

I returned to Ticul in 1984 for six months and visited almost all potters' households, elicited extensive genealogies of potters' families from a few informants, and filled in the gaps in the diagrams with data from others (see Arnold 1987, 1989a). I returned again in 1988 and 1994. Many potters' households were visited, but visits focused on the extended family with which I had most familiarity, even though a list of all active potters was elicited. In 1988, the location of each potter's household was identified by brief inspection and each was placed on a map of the community produced in 1984. Again, narratives of household histories revealed that these lists included approximately 90 percent of the potters in the community.

In 1997, an attempt was made to systematically visit all of the potters' households. A list of potters and other workers in each household was compiled. Those households that were not visited were identified as making pottery by brief inspection, but most of these had been visited before, and their owners and personnel were personally known to me and verified by my informants. In addition, questions (particularly about kin relationships) from previous visits were answered and verified.

THE ELECTRONIC DATABASES

The data from the ten research visits were assembled into four electronic databases, of which only two are relevant to this chapter.

The Production Unit Database

This database was compiled from data collected during each of my ten trips to Yucatán between 1965 and 1997. Each potter during this period has a record (N = 302) and each record contains a set of fields for each visit that includes the type of potter (whether owner of the production unit, worker, or relative of the owner), the production location, the type of production unit,[7] the address of the unit, the type of pottery produced, and the other potters working in it. Three other fields recorded the presence or absence of a pottery store associated with the unit and, if present, its location and address. After fieldwork in 1997, fields such as "helpers" and "painters" were added for that year because some production units were becoming increasingly specialized with workers who were not potters.[8] Additional summary fields were also added to provide numerical comparison between the different visits. In total, approximately eighty-eight fields exist for each record in the database.[9] The production unit database makes it possible to track individual potters and production units through the thirty-two years of my research. These data, among other aspects of production, show changes in the composition, the number of potters, and the locations of the production units over time.

The Genealogical Database

Genealogies of the entire population of potters in Ticul constitute a second database. The primary purpose in developing this database was to graphically represent the relationships among potters across all of the generations and provide links among the seventy-two kin diagrams elicited in 1984. These links were complex and in some cases were not evident from the paper diagrams. So the data from these diagrams were entered into a commercial genealogy program (Parsons' Family Origins program) and then updated with field notes from subsequent visits and microfilmed marriage records from the Ticul church (see below).

The resulting database consists of 1,024 individuals, 287 nuclear families (e.g., Mo, Fa, and children), and 659 events. The "events" group of fields consists of birth, marriage, and death dates; residence; place of origin; occupation; and other information that does not occur elsewhere in the database. The data for the "events" fields, however, are uneven because some individuals have many data entries in the "events" fields while others (such as those deceased for more than one generation) have no entries in these fields.

The electronic version of the genealogies provided a quick and easy way to answer specific genealogical questions from the production unit database. Each time a question arose about the relationship of one potter to another, this database would be searched for the answer. The electronic version of the genealogical data can thus be accessed and presented in a variety of ways including ancestors, descendants, family groups, and standard family trees.

During more than thirty years of research in Ticul, data gathered from participant-observation seemed to fit with my genealogical data. There were, however, some ambiguities that seemed "to slip through the cracks," and I was

Table 6.1. Basic data on potters and production units from 1965 to 1997

	1965–1966	*1968*	*1970*	*1984*	*1988*	*1994*	*1997*
Total potters	85	29	57	135	75	80	153
Number of female potters	29	7	13	45	23	12	25
Percentage of female potters	34%	24%	23%	33%	31%	15%	16%
Number of production units	30	16	27	50	39	35	48
Mean potters per unit	2.8	1.8	2.1	2.7	1.9	2.3	3.2
Median potters per unit	2.5	1.0	2.0	2.0	1.0	2.0	2.0

Note: Total potters includes all Ticul potters working in Ticul and Ticul potters working in Uxmal from 1965 to 1970 (see Arnold 2008:39).

anxious to resolve them by independent means. This task was accomplished by consulting church records for marriages from Ticul; these records were borrowed from the genealogical library in Salt Lake City and available through the Family History Center in Naperville, Illinois.

Much to my delight, I discovered my genealogical data proved to be amazingly accurate, and the church records succeeded in resolving ambiguities that had puzzled me for almost fifteen years. The data also aided me in completing some missing details about potters, such as their birth and marriage dates.

RESULTS

Several demographic trends are evident among Ticul potters from 1965 to 1997 (Table 6.1). First, the number of potters has grown. Second, although the number of female potters has fluctuated, the percentage of female potters working in the craft in 1997 decreased to 46 percent of the 1965–1966 levels. Third, the number of production units has increased dramatically.

Although the mean number of potters per production unit has fluctuated over the years, this mean increased slightly between 1965–1966 and 1997 (see Table 6.1). When the median size of the production units is considered, the data indicate that the median size has also fluctuated but suggest that most production units are very small. This small size is further demonstrated by the distribution of the number of potters per production unit in 1965–1966, 1984, and 1997 (Figure 6.1). These data reveal that while a few production units have gotten larger since 1965, the size for most units has remained small with most units consisting of one to three potters throughout the period.

Since it was clear from the outset of this study in 1965 that the composition of production units consisted largely of kin who were household members, the first task was to identify the kin relationships of the potters in the production units. Potters in each unit were classified into a kin type according to their relationship to unit's owner (who is usually male) and placed in the database.[10]

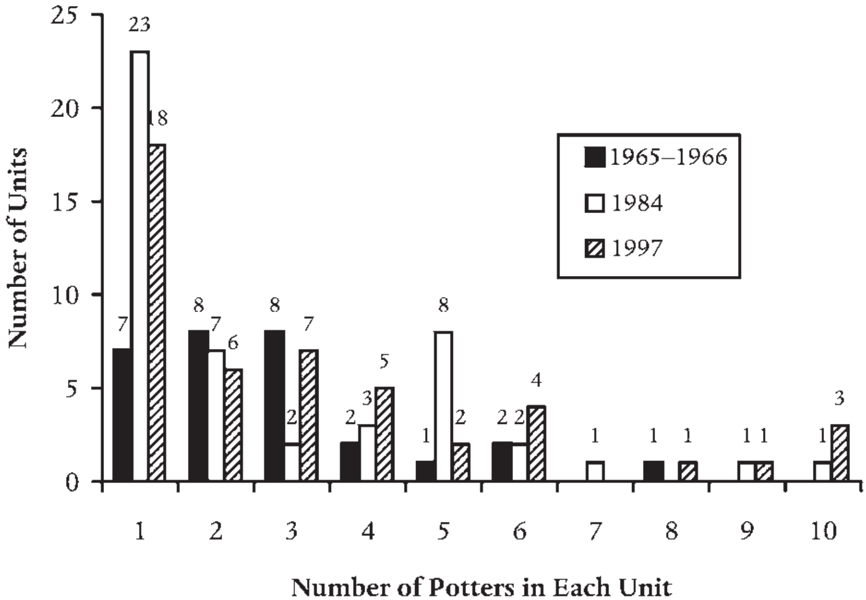

Figure 6.1. Number of potters per production unit in Ticul in 1965–1966, 1984, and 1997; these three periods of observation had the most complete survey data

These types were then grouped into four larger, more encompassing categories commonly used in kinship analysis: affinal, lineal, collateral, and non-kin. "Non-kin" consisted of three types of persons. First, it included potters working at the tourist hotels at the archaeological site of Uxmal in "attached workshops" (see Brumfiel and Earle 1987) or "retainer workshops" (Costin 1991:9).[11] A second category included the wage laborers who worked as potters in production units in Ticul, and a third category consisted of potters that had ritual *compadrazgo* (or fictive kinship) relationships[12] with production-unit owners.

The first way of describing the kin composition of the production units over time was to chart the numbers of kin types grouped by the major categories (lineal, collateral, affinal, and non-kin) according to each observation year (Figure 6.2). In this analysis, the numbers of different kin types were counted by observation year and then plotted. The result reveals some variability in the numbers of types, but over the years there has been an increase in the number of types of collateral kin working in the units.

When the number of potters in each of these categories was expressed as a percent of the total population and then plotted over the entire thirty-two-year period of the study, some dramatic changes were evident (Figure 6.3). Considerable fluctuation occurred in the frequency of all the categories, but there were two clear trends. First, there was an overall decreasing trend in the

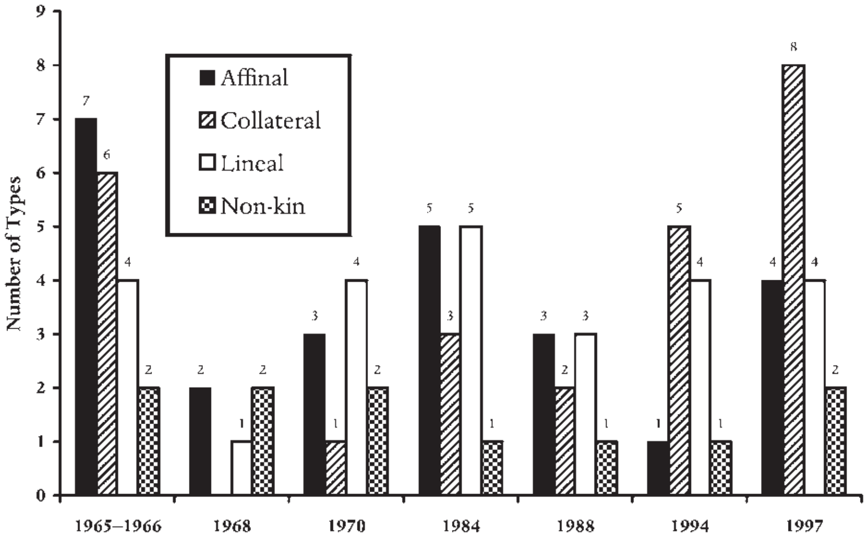

Figure 6.2. Number of different kin categories of potters from 1965 to 1997; types are defined by their relationship to the production-unit owner

percent of affinal relatives in production units, and second, there was an increase in the percent of non-kin in these units.

When the potters attached to the workshops at the tourist hotels at Uxmal (from 1965 to 1970) are removed from the "non-kin" category and the number of wage laborers are expressed as a percent of the total population, the percent of potters who were wage laborers increased dramatically between 1965 and 1997 (Table 6.2). This change was first evident in 1984, when owners of some production units were hiring many non-relatives who were potters or were training non-potters to make pottery as wage laborers. This change corresponds to the increased demand for plant pots for resort hotels and vessels for tourists.

Kin classification can also be described by generation (Figure 6.4). Using the kin relationships that identified potters by their relationship to the owner, these relationships were classified by generation. In these cases, the reference individual ("ego" in kinship reckoning) was the owner of the production unit and is in the "0 generation." A father or mother thus would be in the "+1 generation" while a grandchild would be in the "–2 generation." Similarly, a brother would be in the "0 generation" while a FaBr would be in the "+1 generation." The plots of these classifications revealed no clear trends except perhaps the use of late adolescent and adult grandchildren (the "–2 generation") in the production units since 1988.

Since the owners' kin have constituted the majority of potters in production units since 1965, it is useful to ascertain which kin type has been the most

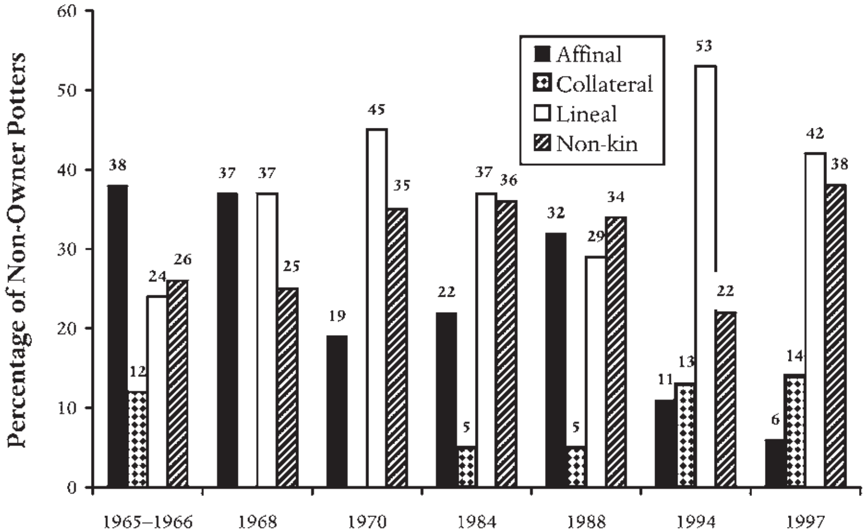

Figure 6.3. Percent of total potters by kin type; kin types are identified by their relationship to the production-unit owner and then grouped into the categories used here

common. When the most frequent types are expressed as a percent of the total population of potters and then graphed by year, the data reveal that son, wife, daughter, and mother (in rank order) have been the predominant types of potters during this thirty-two-year period (Figure 6.5). Again, considerable variation in these percentages has occurred over the years, but the clearest trend has been a decrease in the percentage of wives working as potters.[13]

So far, this discussion provides a measure of the aggregate of changes in production units between 1965 and 1997. It does not, however, provide a picture of continuity (or lack of such continuity) of individual production units through time. To assess this continuity, the evolution of each unit was traced through time and its trajectory was placed into one of four categories (Figure 6.6). The first category ("same") consisted of those units whose production locus did not change at all. The second category ("segmented") included those units that had internally segmented into differentiated nuclear families but who lived in the

Table 6.2. The number and percent of non-relative wage laborers in production units in Ticul, 1965–1997

	1965–1966	*1968*	*1970*	*1984*	*1988*	*1994*	*1997*
Total potters	85	22	56	137	75	80	153
Percentage of laborers	12%	9%	7%	36%	34%	22%	36%
Number of laborers	7	1	2	30	14	10	39

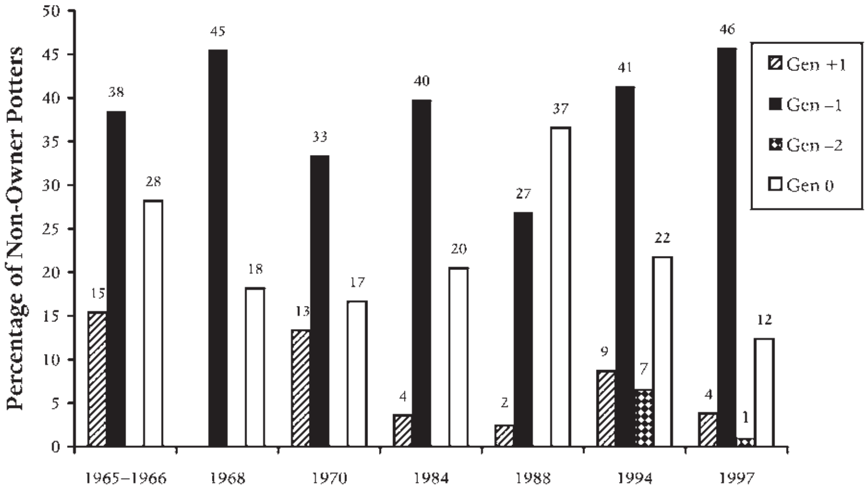

Figure 6.4. Frequency of potters classified by generation of the kin type that defines their relationship to the owners of production units from 1965 to 1997

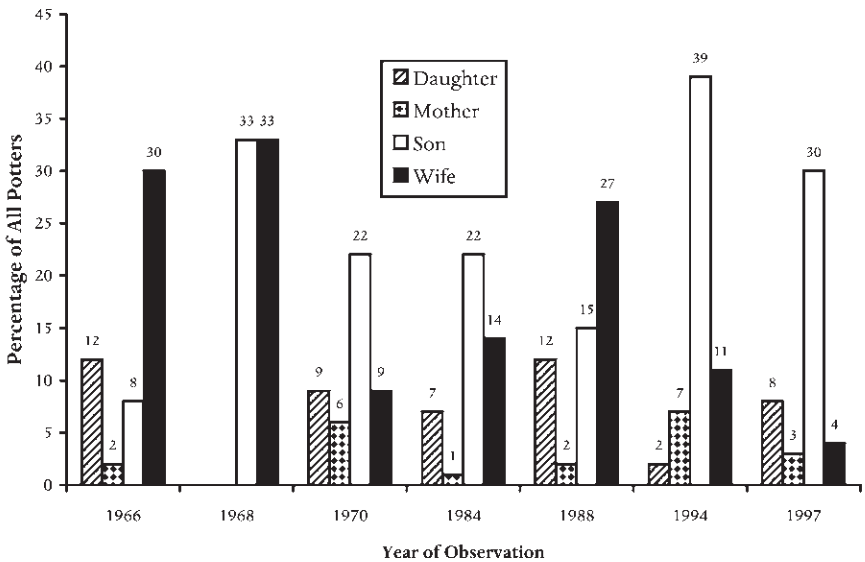

Figure 6.5. Most common kin of potters working in production units from 1965 to 1997; types are defined by their relationship to the production-unit owner

same houselot. All such nuclear families consisted of children of a potter in the previous generation. The third category ("fissioned") were households that had been previously part of another but had fissioned because the parents' unit was

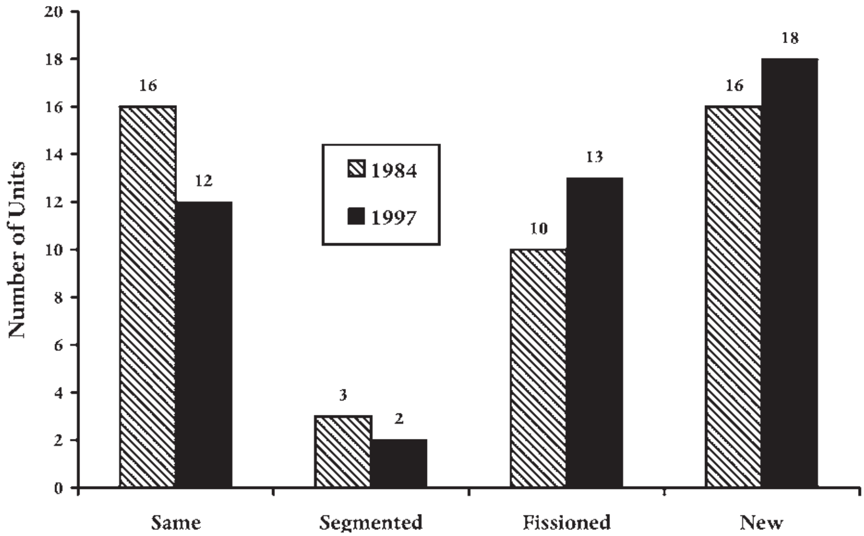

Figure 6.6. Changes in the locations in production units in Ticul from 1965–1966 to 1997

too small to accommodate the space needs for production by an additional family. A fourth category ("continuing") included those units that had been making pottery during at least one previous survey and were missed because of methodological bias or had temporarily stopped making pottery at one time in the past and had begun making pottery again. This category also included individuals who were making pottery during a previous survey but had moved because a financial crisis had caused them to sell their household land.

When all production units were tracked, compared, counted, and graphed, several patterns emerged. First, comparing the 1984 and 1997 surveys with 1965–1966 data, it is clear that great household continuity occurs throughout the thirty-two-year period (see Figure 6.6). In 1984, 35.5 percent of the households were the same as those in 1965–1966, and an additional 29 percent were units derived from existing production units through segmentation and fissioning. Similarly, 26.7 percent of the production units in 1997 were the same as those in 1965, and another 33.3 percent were derived from those units through segmentation and fissioning.

The development of "new" units is also evident (see Figure 6.6). In 1984, 36 percent of the production units were "new" units without any continuity from units in 1965–1966. By 1997, the number of totally new production units had increased in absolute numbers and in the percentage (40 percent) of the total. These "new" units are the result of entrepreneurs who had established production facilities to take advantage of the tourist market. They were usually painters (not potters) and hired potters as wage laborers (see Table 6.1).

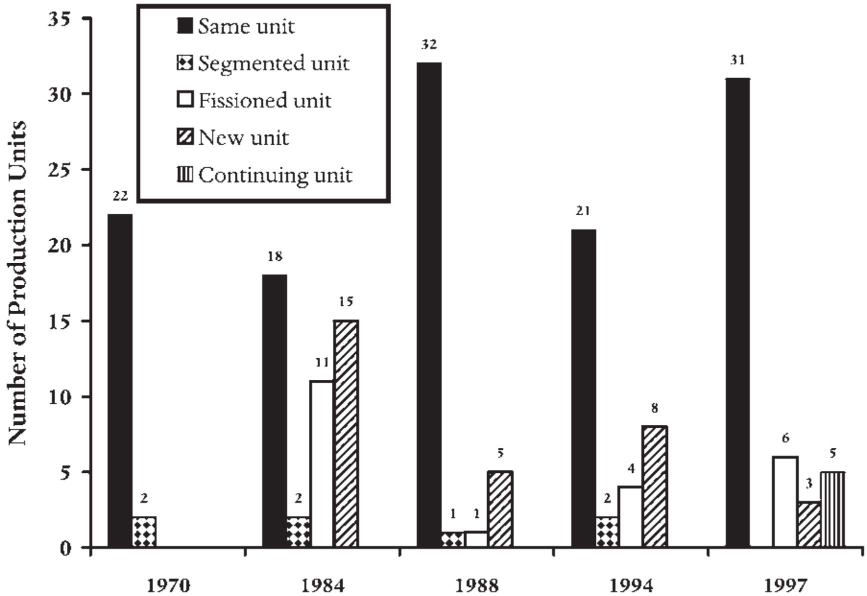

Figure 6.7. Changes in the location of production units from 1970 to 1997 based on movement from their location in the previous survey; the 1970 data are compared with the 1965–1966 data

When one looks at the changes in location relative to each successive period of observation and the graph of each "change" category compared to the previous visit, a slightly different picture emerges (Figure 6.7). There was a dramatic jump in new units in 1984, but there was still a strong continuity of production units from the previous survey and a diminishing number of "new" production units since 1984. This pattern again marks the change in the orientation to the tourist market that began in the late 1970s.

Finally, another way to look at the continuity of the population of potters is to look at the overall kin-relatedness of production units through time (Figure 6.8). "Kin-relatedness" was defined as the kinship relationship of two production-unit owners traceable across no more than one marriage.[14] By "traceable," I mean that the kin relationships had to be traceable in my electronic genealogical database or paper kin diagrams. If the owners of two production units met these criteria, they were considered to be "kin-related." The number of units that met these criteria was then counted, grouped, and graphed by year. For simplicity, only the data from the first two field seasons in 1965–1966 and the last field visit (1997) are presented here (see Figure 6.8) because they show the amount of kin-relatedness among production units at the beginning and end of this study. These data show a very strong kin continuity of the production units in Ticul, both across the entire population of potters and through the entire period of this study.

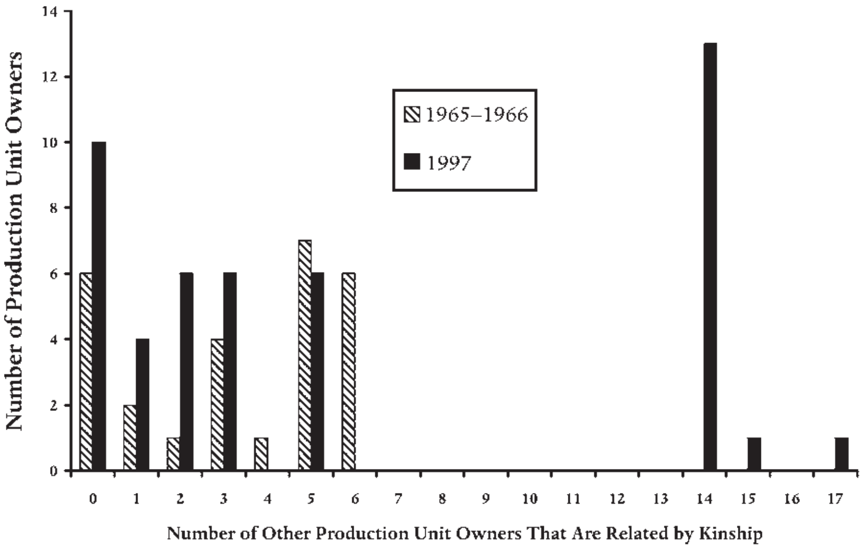

Figure 6.8. The amount of kin relatedness among production units in Ticul in 1965–1966 and 1997, based on traceable kin relationships

SUMMARY AND CONCLUSIONS

In conclusion, what does study of the production units in Ticul across the thirty-two years of research tell us? First, the strong continuity in the location of production units through time is the result of the use of the nuclear family (So, Da, Mo, Wi) as production personnel and indicates the co-occurrence of most (but not all) production units with households. The small size of most units is also consistent with this finding. Second, the stability and change in the location of most units are the results of processes of household continuity resulting from patrilineal inheritance of household land, segmentation, and fissioning. This finding is consistent with a previous study that used data collected in 1984 (Arnold 1989a).

It is now time to revisit the notion of "household" that was temporarily replaced at the beginning of this chapter in favor of a more neutral term "production unit." By examining the results of this study in light of the term "household," it is clear that while some production units are getting larger and adding wage laborers as workers, most, if not all, production units are still household-based, use household personnel, and remain or change locations based on household processes such as inheritance of household land, segmentation, or fissioning. When fissioning occurs, the residence location is still relatively close to the source of the fissioning household as the result of patrilineal inheritance of household land and its subdivision. By 1997, residence was virilocal and was not simply the result of post-nuptial residence "rules" but rather a result of the desire of parents to have their children live relatively near them. To ensure this proximity, a father would buy land nearby for his sons (most frequently) and his daughters (less frequently).

Probably the most remarkable aspect of these data is that in spite of massive social and cultural changes and the changes in raw materials, procurement practices, vessel shapes, decoration, demand, and market that has occurred since the late 1960s, pottery production in Ticul is still household-based and is still largely perpetuated through household processes of procreation, socialization of the young, land inheritance, post-nuptial residence, and other processes that affect household composition. Since the household and its continuity is critical for the perpetuation of the society through procreation and socialization of new members of the society, it is not surprising that given a demand for crafts produced within the household, the technology of their production is perpetuated by the same processes as those that perpetuate the household. The Ticul data collected over the thirty-two-year period of this study suggest that the production population is probably the most conservative aspect of ceramic production in Ticul. This continuity persists precisely because production is household-based and tied into household processes rather than macro-level processes outside of the household.

Household continuity in production thus transcends the life of individuals. By 1997, 32 percent (27 of 85) of the potters living in 1965–1966 had died, and at least 18 percent (16 of 85) more had left the craft for one reason or another. Nevertheless, 60 percent of households in 1997 had continued from 1965–1966 because of the inheritance of household land, internal segmentation of families, and fissioning. The continuity for ceramic production thus appears to be even more conservative than population continuity, even in light of massive social, technological, and cultural changes.

What has occurred in Ticul during this thirty-two-year snapshot is the beginning of the evolution of a more complex organization of ceramic production. In 1965, the craft was tied to generalized household space (Figure 6.9), but by 1997, production space had become more specialized but was still tied to the household (Figure 6.10). More important, the evolution of the changes in personnel from households to larger workshops has seen the increase in the use of wage laborers. During the period of this study, there was much variability in size, composition, and location of production units. Through it all, however, household organization has not disappeared but continues to form the basis of the composition of production units and is responsible for their persistence because households provide the social context in which the craft is learned and perpetuated. Even though the amount of production space has increased and the craft has become increasingly specialized, production units that no longer look like households are still household-based

Figure 6.9. The back of Lorenzo Pech's house and his production unit in 1965, looking south through the house to the street; in this image, his father, Lucas Pech, is making water-storage vessels in a thatched structure at the rear of his house

*Figure 6.10. Lorenzo's house (*in the distance*) and the workshop behind it in 1997, showing the space used for the quantities of drying and fired pottery; this photo was taken in a position identical to that of Figure 6.9 but twenty meters further north toward the rear of the workshop*

because their social organization is still largely based on the kin relationships in the household and change by the same processes that maintain and transform households through time. Household pottery production thus has great potential to permit an increase in the amount of production space and in the amount of task segmentation without fundamental changes to household social organization.

How do these data square with Costin's description of "scale" and its usefulness as a parameter for defining and organizing craft specialization? In a phrase, rather well. Costin argues that the two extremes of production are small, individual or family-based production units, while at the other extreme are "wage labor forces of the industrial west, where employment is contractual in nature and based on skill and variability" (Costin 1991:15). While this dichotomy is a truism in many respects, it is also true that when family-based production units meet the industrialized West, as seen in Ticul, a mix of largely small household-based production units exist alongside much larger highly specialized units. Both are largely household-based. In responding to Torrance (1986), that there is a necessary link between the nature of the demand and the scale of production, Costin argues that both independent and attached facilities can be large or small (Costin 1991). And so it is in Ticul. With the high demand of the tourist-related market, there is a mix of small and large production units with a predominance of small units. What is important about the Ticul data, however, is that large units are still family- and household-based, but these large units also include wage laborers who often are members of the extended family, individuals related to production-unit owners by fictive kin relations, as well as non-relatives. These changes correspond precisely to the observation that Costin made from Kleinberg's (1979) work with village pottery production in Japan: "As production units grow in size, new labor is recruited first among distant, fictive, and adoptive kin. With further growth, nonrelated individuals are added to the workforce" (Costin 1991:15). In Ticul, the composition of production units has reflected most of these categories between 1965 and 1997, but over time, the use of more distant relatives and non-relatives as supplements to the nuclear family has increased. The addition of personnel is much more complex than this, however, because over time, the types of collateral relatives and the percentage of the population of non-relatives used in production units have increased, but the percentages of affinal kin, women, and wives as potters have decreased.

While Costin's notion of "scale" is an important descriptor of the organization of craft production, the Ticul data suggest that its usefulness as an index of the evolution of craft specialization is limited because of the great variability of the size and composition of the production units even within a short span of thirty-two years. Not only is there variability in the type of craft production units in Ticul, but great variability also exists in their scale with the principles of kinship and household recruitment still being the predominant means of labor recruitment. Does this mean that pottery production in Ticul has not evolved and become more specialized? Of course not. Rather, a better indicator of the evolution of Ticul pottery production is the increasing use of specialized household space for production and the resulting increase in the size of its total spatial footprint in each production unit (compare Figures 6.9 and 6.10).

The production of Lorenzo Pech provides a dramatic example of the change in production space. In 1966, his production space consisted of a house and an attached porch (see Figure 6.9). Thirty-one years later, Lorenzo expanded his house, built a large production facility behind it, and established a second production unit along the highway in another part of town (see Figure 6.10). Although his production space increased more than any other production unit in Ticul, such changes were reflected in a lesser degree in all of the other production units in the community. Production space in all units changed from generalized space to specialized space, and the amount of specialized space increased.

The evolution of specialized space from generalized space for ceramic production and the increase in the amount of specialized space are changes most visible to archaeologists. These changes reflect an increased amount of pottery produced and increasing task segmentation. They also co-occur with the development of increased homogeneity of ceramic vessels, but for other reasons (Arnold 2008:265–272). Elaboration of these changes, however, is the subject of a future monograph currently in preparation.

Finally, one of the most interesting concluding observations about these data concerns the adaptive nature of households. The Ticul data show that households are dynamic and changing entities that are elastic in the way in which they can organize production socially and serve as its spatial locus in light of changing social and economic conditions. Households are not just an abstract type of unit on a unilinear scale of modes of production organization but rather are changing, dynamic entities capable of adapting to increased amounts of production with a larger production scale and intensity. In this sense, one can see how the use of Costin's notion of "production scale" for describing production organization is a better tool to describe evolutionary changes in production than the use of abstract types. Her descriptors also provide more insight into the evolution of households that is not possible with the use of finely graded abstract social types.

With Ticul pottery production, as with the households of ancient Ejutla of the Oaxaca Valley (Feinman 1999), production intensity should be decoupled from production scale just as Feinman suggested. The household, as Feinman (1999) has found archaeologically, is capable of far more production intensity than was previously thought possible. Households thus are not just elastic in scale but are also capable of producing a greatly increased amount of pottery without being coerced or organized by social and economic entities outside of the household.

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NOTES

1. This problem is one reason why I tried, as much as possible, to explicitly avoid typologies in *Ceramic Theory and Cultural Process* (Arnold 1985).

2. Some trees that I have observed in potters' households are avocado, orange, perennial chili pepper, and the tree gourd (*Cresentia cajeta*), used for making gourd bowls and scrapers/shaping tools for forming pottery.

3. In one case, production has expanded into a location outside the household, but generally most such activities have remained within houselots, although the households themselves have changed greatly.

4. A visit to the interior of the clay mine at Hacienda Yo' K'at in 1968 revealed that this clay source was used in the Terminal Classic period (Arnold and Bohor 1977). Since cross-cultural models of resource distances indicate that clay sources are seldom more than seven kilometers from production centers (Arnold 1981, 1985), it appears likely that pottery production took place in, or near, Ticul during the Terminal Classic period. The most probable location for this production is the archaeological site of San Francisco just north of Ticul.

5. "Traditional" vessels are those vessels described by Thompson (1958) that were used for cooking, carrying and storing water, soaking maize kernels, and serving water and food.

6. The methodological bias toward lineal relatives in these lists can be seen in Figures 6.2 and 6.3. In light of surveys during other years, it is clear that those potters who are affinal and collateral relatives of production-unit owners did not occur in the lists of those years.

7. This category was initially "household" or "workshop," but this distinction turned out to be useless. See the previous discussion in the text for an explanation.

8. This separation into "potters" and "painters" had already occurred in 1984, but since I was not interested in painting at that time, I did not collect systematic and quantitative data about the painters in the production units.

9. Some fields have few data points (such as those for the 1967 and 1968 visits), whereas other fields (such as those for the 1965, 1966, 1984, 1988, 1994, and 1997 visits) have many data points. Since the 1965 and 1966 visits were only six months apart and the data were complementary, the data from these visits were combined into a new set of fields called the "1965–1966" fields.

10. Up until recently, only males could legally inherit land upon the death of a father, unless the land was legally deeded to a daughter before her father's death.

11. From 1965 to 1968, potters worked at only one Uxmal hotel, but a second hotel added potters in 1970. At both hotels, the shapes, decoration, and the number of vessels produced were controlled by the management of the hotel. Here, "attached workshops" means "attached specialization" (Brumfiel and Earle 1987), in contrast to the "independent specialization" that was characteristic of Ticul production at this time. Although the term "attached specialists" refers to ancient production, the category does fit the production in these hotels, in contrast to "independent specialization" in Ticul itself.

12. Co-parent (*compadres*), godparent, and godchild relationships.

13. While most of the production-unit owners were males, some units were owned and operated by females. In most cases, these women owners were unmarried, widowed, or divorced.

14. This definition does not include relationships acquired through serial marital unions. Rather, it simply indicates that relationships that could be traced through a marriage of affinal relatives were not considered to be related by kinship. So, affinal relatives of a production-unit owner were considered to be kin-related and a potter married to an affinal relative was considered to be kin-related. A traceable relationship through the marriage of an affinal relative other than one's spouse, however, was not considered to be kin-related.

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SEVEN

Pots and Agriculture

Anasazi Rural Household Production, Long House Valley, Northern Arizona

JOHN G. DOUGLASS AND ROBERT A. HECKMAN

INTRODUCTION

Household ceramic production is of keen interest to scholars, both in prehistory and in contemporary contexts (D. Arnold 1985, this volume; P. Arnold 1991; Bernardini 2000; Cordell 1997; González Fernández, this volume; Hagstrum 2001; Hill 1994; Mills and Crown 1995; Roux 2003; Spielmann, Mobley-Tanaka, and Potter 2006; Wiewall, this volume). Key interests in the American Southwest include questions related to the initial use of ceramics, trade and interaction, social identity, and the organization of production. This chapter focuses on the last topic, the organization of production, through the investigation of AZ-J-28-32 (NN), a small, rural Anasazi household group occupied during the Pueblo II period (AD 1000–1150). This site is located in the southern part of Long House Valley, in the heart of the Kayenta region of the modern Navajo Nation, immediately to the north and west of Black Mesa in the American Southwest (Figure 7.1). This chapter examines competing models of household ceramic production in the Pueblo period Black Mesa area—one that households of a variety of sizes produced ceramics, and another that ceramic manufacture was confined to

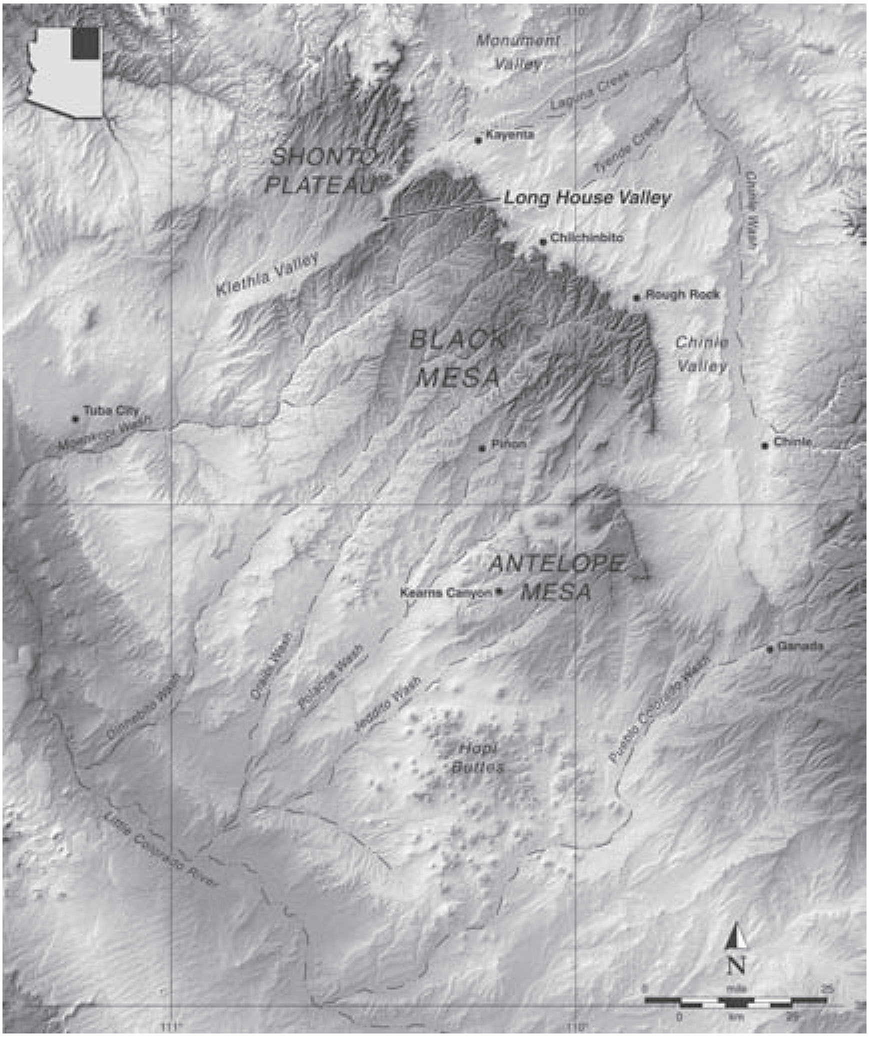

Figure 7.1. Location of Long House Valley, northeastern Arizona; note Black Mesa immediately to the south and east of Long House Valley

larger village sites—to better understand the dynamics of this essential household activity.

HOUSEHOLDS CONCEPTUALIZED

In the introductory chapter of this volume, the fundamental theoretical underpinnings of the study of households were underlined. Here, we focus specifically on the archaeological correlates of households as they are defined by the physical remains they leave behind. Although households and dwellings are not synonymous, across time and space the remains of residences help archaeologists define the household unit. Architecture has long been recognized as playing a key role in reflecting the daily activities and social organization of households and larger social units (Kent 1990; McGuire and Schiffer 1983; Wilcox 1975; see also chapters by Beaule, Ciolek-Torrello, Henderson, González Fernández, and Snow, this volume). There are differences in dwelling use and adaption through time (Wilshusen 1988) in residential architecture that are the reflection of activities, behavior, and development of social systems (see chapters by Ciolek-Torrello and Douglass and Gonlin, this volume). During the time period primarily addressed in this chapter, the Pueblo II period, there was a divergence in residential architectural style in the Kayenta region (Rocek 1995a, 1995b). Whereas permanent hamlets and villages were primarily constructed with aboveground pueblo-style architecture, some households constructed small pit structure groups in rural areas for seasonal use (Gilman 1987, 1997; Lipe and Hegmon 1989). By the Pueblo II period, households were heavily reliant on diversity in agricultural production to maximize their labor investment. As a result, pit structures were generally constructed as residences for use during the growing season. By inhabiting these rural areas for part of the year, household members were able to minimize agricultural risks through multiple fields in varied environments (Whalen 1981).

Defining the number of households within a pit structure group is a critical but challenging task (Wilshusen 1989). If households are defined by the functions and activities members perform, this task becomes slightly more manageable. Two of the central functions of households are coresidence and cooperative production (Netting, Wilk, and Arnould 1984; Wilk and Rathje 1982). The physical location of structures is, as Wilk (1984:224) has pointed out, an "overt symbolic expression of the relationship between inhabitants" (see also Henderson, this volume). The distance between structures symbolically expresses the degree of communication, cooperation, and, more generally, ties between them. Even within a small homestead, there may be more than one household present. Physically, pit structure groups can be divided into household units by the degree of clustering of structures. Loose or tight clustering may be a physical expression of the degree of cooperation among household groups or members.

Defining the number of households within a pueblo-style, aboveground roomblock is an easier task, in part because of ethnographic analogy with contemporary pueblo household groups. Early Pueblo period aboveground structures were constructed in functionally distinct spaces from north to south within units of redundant household suites (Eggan 1950; Lightfoot 1994). One recent Pueblo I household excavation at the Duckfoot site (Lightfoot 1994) illustrates how several cooperative families living together in an architectural suite may form a household. In his analysis, Lightfoot showed that although there was independence among the different families within one site (what he has defined at the Duckfoot site as a single roomblock cluster), there was also a high degree of cooperative behavior, as indicated by the high degree of clustering among roomblocks.

HOUSEHOLD CERAMIC PRODUCTION ORGANIZATION CONSIDERED

Rural households, across time and space, are producers and consumers of culture, whether material (crops, ritual items, craft goods) or non-material (beliefs, values). First and foremost, however, rural households are often focused on self-sufficiency (see Douglass and Gonlin, this volume). In rural areas, where farming may be the primary task of households and other activities may be designed to complement or sustain core tasks during down periods, households need to be efficient economic units. In times where households cannot produce enough food or other goods for self-sufficiency, they will undertake reciprocal exchanges for goods, labor, or food. Household scheduling of activities is another decisive variable, especially in difficult or risky environments (see Henderson, this volume, for discussion of household scheduling). For example, in semiarid environments, rainfall is a limiting factor for dry-farming. Household members will need to schedule tasks so that they may maximize available rainfall for success of their agricultural crops (see Neff, this volume). As a result, supplemental tasks, such as craft production, may be a household task to permit exchange of craft goods for supplemental food or other items (D. Arnold 1985). In the American Southwest, the primary season for agricultural production (during the monsoons, May through September) also coincides with times that may allow manufacture and firing of ceramics. Wood, for example, is driest in May, during the time when planting needed to be done (Hagstrum 2001:51). This time period is also an ideal time to dry pots prior to firing, as the snow is gone and the weather is warm. The majority of traditional pottery-producing cultures manufacture ceramics during warm months (D. Arnold 1985). As a result, scheduling of agricultural and supplemental production tasks may need to be balanced among household members. Hagstrum (2001:51) has argued that in the American Southwest, this balance is done in part along gender lines, with males farming and females producing pottery (see Beaule, Gonlin, Gougeon, Neff, Snow, and Wiewall, this volume, for discussions of gender roles within the household). Beyond household scheduling, access to and the quality of resources related to production (e.g., readily available clay sources), weather, and climate are all factors with which households must deal (D. Arnold 1985).

Within many agrarian societies, household production is classified as ad hoc, part-time, or full-time (Clark and Parry 1990:298–299; Douglass and Gonlin, this volume). The scale of production is significant too and falls along a continuum from small, informal, kin- or household-based production to large, formal, independent workshops or factories (Costin 1991). Although specialization may be defined in a variety of ways, Costin's definition (1986:328, cited in 1991:3)—"the regular, repeated provision of some commodity or service in exchange for some other"—is helpful here. Determining the nature of production, its consistency, degree, scale are all elements to be investigated. The standardization and intensity of production was also quantified by Roux (2003:780) in terms of "low-rate" and "high-rate" ceramic production, based on ethnographic examples. Here, Roux (2003) argued that a low degree of standardization of ceramic production may relate to non-centralized production, based on comparisons with archaeological data. However, Roux (2003:780) went on to argue that the degree of standardization is, in part, an emic concept. Only in "high-rate" (i.e., workshop or factory) production settings does standardization appear to transcend these emic concepts.

Along these lines, Brumfiel and Earle (1987; Earle 1981) have argued that the organization of craft specialization is divided into two categories: independent and attached (see Dean Arnold's chapter in this volume for a detailed discussion of the organization of craft production). Independent specialization is, in essence, a function of economic necessity—that is, independent specialists will produce goods based on the demands of exchange networks or local demands by consumers (Douglass 2002:58). Independent specialists have direct contact with consumers and control the distribution of their goods. Alternatively, attached specialization differs from independent in that elites create a demand for specialized products that is in part politically motivated (see Brumfiel and Earle 1987; Earle 1981). In the case of the Anasazi, the vast majority of specialization will be independent, based on the nature of the social hierarchy. Among many agrarian societies farmers may undertake independent craft production during downtimes each year (see D. Arnold 1985, 1993, this volume; P. Arnold 1991, 2000; Costin 1991:17; Kramer 1985, 1997). If craft production is primarily for household use, production output will likely be low and the array of products created will mimic the household inventory (P. Arnold 1991:104). For example, there will not be unusual vessel forms or ceramic types that were not used by the household itself.

CERAMIC PRODUCTION: HOUSEHOLD FUNCTION AND COMMUNITY SIZE

A central research question in the American Southwest relates to the "push" for ceramic production among agriculturalists. As discussed above, in general rural agriculturalists may produce ceramics or other craft goods as a supplemental function. Often times, these groups are in marginal agricultural environments (e.g., D. Arnold 1985). While agricultural marginality may be seen as a reason for “pushing” agriculturalists to supplement their livelihood with craft manufacture, such as ceramics, Harry (2005) has recently argued that this may not always be the case. Generally, in agricultural societies, there appears to be an inverse relationship between the degree and intensity of craft specialization and the degree of access to sustainable agricultural land (Netting 1990). Harry (2005:296) argues that farming is a less risky endeavor than ceramic manufacture and also has higher returns. Both are risky with regard to the degree of availability of resources, but small-scale farming can directly feed a household and ceramics cannot, as ceramics must be exchanged for food or other goods. Harry (2005:296) cites D. Arnold (1985:193) as arguing that therefore, it is clear that only in specific situations, such as population pressure or lack of sufficient agricultural land, may a farmer undertake ceramic manufacture as a supplemental task. Harry examined data from four areas of the American Southwest to better understand this relationship between agricultural marginality and ceramic production and her general conclusion was that agricultural marginality correlated poorly with community-based ceramic manufacture and by itself did not drive the development of it (Harry 2005:311). Much of the basis for these arguments hails from ethnographic studies, whereas prehispanic societies differed in distribution systems, social networks, population pressure, and land tenure (Harry 2005:313–314).

Across the American Southwest, the first models of ceramic production posited that the manufacture of ceramic containers occurred at nearly every prehispanic settlement (Gladwin 1943), from small, rural households to large villages. Recent research has focused on identifying the locus of ceramic production and has suggested that ceramic vessels were distributed within and among regions on a regular basis (Mills and Crown 1995). To illustrate, a multitude of sites of varying sizes in the Four Corners region during Pueblo III revealed evidence of ceramic manufacture that reflects non-specialized household production (Pierce et al. 1999). Even at the village level, it is generally thought that ceramic manufacture was a household-level activity (Wilson and Blinman 1995). There is good evidence of interhousehold cooperation in the manufacture of ceramics (Bernardini 2000; Blinman and Swink 1997). Evidence of ceramic manufacture may be shown through the recovery of unfired ceramics, raw clay, polishing stones, shaped sherds, and extramural features. Hill (1994) provides an exhaustive list of material correlates of Puebloan ceramic production, which are presented in Table 7.1. No direct evidence of specialized ceramic workshops has been identified in the American Southwest (Mills and Crown 1995:7) and direct evidence of production through firing kilns is rare, although trench kilns are now being recognized (e.g., Bernardini 2000).

David Hill’s (1994) study of ceramic production in the Black Mesa area offers insight into variation in ceramic manufacture in the American Southwest. As discussed above, commonly it is thought that prehispanic households living

Table 7.1. Material correlates of Puebloan ceramic production in the American Southwest

Stage of construction	*Ceramic materials*	*Equipment used*	*State of ceramic material*
Paste preparation	Mixed clay, temper	Flat surface: stone slab,[b] house floor[b]	Tempered paste
Vessel construction	Tempered paste	Shaping tools: recycled from sherds or gourds[a] Basemolds: recycled ceramics, ceramic plates,[b] basketry[a]	Coils, unfired vessels
Decoration	Pigments: organic,[a] mineral, or combination Slip	Scraping tools and/or sandstone abraders,[b] polishing stones, brushes,[a] skin "mops"[a]	Unfired vessels: slipped and/or decorated, plain
Firing	Completed-unfired vessels	Open area,[b] shallow pit,[b] extramural hearth,[b] trench kiln	Completed ceramic vessels

Source: after Hill 1994:table 3.2.

[a] Organic materials that may not be preserved in archaeological contexts.

[b] Multifunctional tools or facilities.

in a wide range of social settings, from small, rural hamlets to large villages, produced ceramics. Hill's study, alternatively, suggests a very different phenomenon for the Black Mesa area through an examination of fifty-three prehispanic sites located on Black Mesa, within the boundaries of what are today the Navajo and Hopi Nations. Artifacts and materials related to ceramic manufacture (shaping and scraping tools, polishing stones, base forms, unfired sherds, clay coils, and tempering paste) were recovered from forty of the fifty-three sites. The few sites lacking such evidence were small in size (< 3 structures) and may represent specialized activity areas or seasonal camps where ceramics were not produced but were imported from larger villages (Hill 1994:45). Hill (1994:45) argues that site manufacturing of two ceramic types, Tusayan White and Gray wares, was common, whereas other types were likely brought in through trade. Hill (1994:51–52) concludes:

> Evidence for the production of pottery at sites within the project area suggests a larger role for onsite manufacture than for exchange of ceramics produced at only a few localities (they are not mutually exclusive alternatives). Larger sites, possibly with longer spans of occupation and greater population, suggest a greater dependence on a small portion of the landscape, possibly through increased dependence on cultigens or locally abundant natural resources. Sites with more intensive production strategies seem to have greater evidence of ceramic production because more vessels for storage and food preparation were needed in a more intensively utilized area. Smaller sites

with evidence of less intensive occupation might have derived their ceramic assemblages from nearby pottery-producing communities.

The contrast of Gladwin's (1943) model with Hill's (1994) model provides competing hypothesizes that will be examined below with data from AZ-J-28-32 (NN).

CONTEXT OF THE STUDY: AZ-J-28-32 (NN) AND LONG HOUSE VALLEY

In this study, we present data from AZ-J-28-32 (NN), a Pueblo II period seasonal farmstead located in Long House Valley, on the northern edge of Black Mesa. Seasonal, temporary, and short-term mobility of small communities represents a pervasive adaptive strategy for groups in the northern Southwest (Varien 1999). As part of this site study, the micro-level of production (Zedeno and Mills 1993:176) was assessed to specifically identify any types of production undertaken at this location. During the Pueblo II period, small, isolated pithouse structures were short-term or seasonal habitation loci for specific activities, such as farming. If this was the case, were the inhabitants producing ceramics or other goods during their short tenure? If so, what evidence related to both the organization and intensity of production? Were these wares consumed locally?

Pit structures as part of larger Puebloan-style architectural complexes have been investigated in detail, but rural sites have not been as intensively studied. The research conducted at this small site offers an opportunity to further test the relationship among household production, agricultural organization, and the function of architecture. Most settlement on Black Mesa that dates to the Pueblo II period were pueblo-style roomblocks, but the semi-subterranean pit structure style continued in certain locations, such as AZ-J-28-32 (NN). Structure function and the use of intramural and extramural space will be examined to answer these research questions.

The particular environment and specific culture history of the region offered resources and constraints that shaped the daily activities performed by the inhabitants of small sites like AZ-J-28-32 (NN). Without this context, it is difficult to fully understand the site's prehispanic lifeways. A regional approach contextualizes the site, which was a systemic part of the interaction and trade networks. Long House Valley is a narrow, Y-shaped valley in the heart of the Kayenta area. This small valley (ca. 75 km^2) is separated by a series of low hills from the Klethla Valley and the Shonto Plateau on its western edge, whereas the northern and eastern sides of the valley are bordered by steep escarpments, Tsegi Canyon and Black Mesa, respectively. Laguna Creek is the most prominent watercourse in the local area. Long House Valley's floor varies between approximately 1,950 and 2,200 meters above mean sea level. According to Dean and colleagues (1978:27), the valley contains little climatic variation because of its small size. As is the case in most parts of the American Southwest, the monsoon season (July through October) produces the bulk of the annual precipitation, which averages approximately 280 millimeters.

Immediately to the east and south of Long House Valley, Black Mesa is a large plateau (75 miles in diameter) composed primarily of Mesa Verde sandstone (Gumerman 1970:5) and other sedimentary material. Compared to Long House Valley, Black Mesa encompasses a variety of topography. Along its border with Long House Valley, Black Mesa would be considered the uplands, in part because it rises approximately 500 meters above the valley floor. Like Long House Valley, sections of Black Mesa can be described as part of the pinyon-juniper woodland association (Powell 1983:41) and, more generally, is part of the Great Basin Conifer Woodland (Brown 1982:52–58). Four primary plant associations have been suggested for the region: (1) juniper and pinyon with sage understory; (2) juniper and pinyon with a cliff-rose understory; (3) sagebrush; and (4) sagebrush with dwarf pinyon (Plog 1978; Powell 1983:41). There is a much larger variety of climatic and environmental variation on Black Mesa, however, than in Long House Valley because of the nearly 700-meter variation in altitude in the former.

The natural environment and subsistence systems are closely related in agrarian societies (D. Arnold 1975; Douglass 2002; Willey 1953), including the Anasazi (Euler et al. 1979; Karlstrom, Gumerman, and Euler 1976; Phillips 1972; Powell 1983). The prehispanic settlement patterns of Long House Valley through time are indicative of household and community economic and subsistence organization across time (Dean, Lindsay, and Robinson 1978). In terms of subsistence, one of the primary differences between the lowlands and uplands relates to farming techniques that began during the Basketmaker periods (Phillips 1972; Powell 1983). It has been hypothesized that lowland farmers (such as those in Long House Valley) may have focused on floodwater agriculture along washes and drainages (sometimes called *barranca*, arroyo, or *ak chin* agriculture), while those cultivating in the uplands may have been primarily dryland farmers. Upland areas of Black Mesa are generally more marginal for farming, in part because of the very nature of dryland agriculture; that is, farmers are dependent on rainfall for the success of their crops. The site discussed in this chapter appears to have been a part of this larger, regional agricultural system, with its inhabitants likely engaged in *ak chin* farming. This site is located at the base of the Black Mesa bench, within a pinyon-juniper habitat. In a review of the Pueblo periods for the Kayenta region, relevant recent detailed studies of the paleoenvironment for the region beginning ca. AD 770 are included (Dean 1969, 1988, 1996a; Deal et al. 1985; Euler 1988; Euler et al. 1979; Smiley 2002).

THE PUEBLO PERIODS IN THE LONG HOUSE VALLEY AREA

Pueblo I (AD 850–1000) and Pueblo II (AD 1000–1150) periods in the Anasazi region were times of initial demographic expansion and later consolidation, both of which had an impact on subsistence and social and political organization (Figure 7.2; Feinman, Lightfoot, and Upham 2000). During Pueblo I, farming was the primary subsistence pattern, a trajectory that began in the earlier Basketmaker III period (Figure 7.2). This priority is reflected in Pueblo I settlement patterns, where lowland sites across the Kayenta region focused on areas within or adjacent to floodplains. By the Pueblo II period, Gumerman and Dean (1989:118) argue, "all upland and lowland localities, except those intrinsically uninhabitable, were occupied . . . as rapid population growth fueled range expansion." This occupation expansion into new areas most likely led to further consolidation of farming, as traditional areas for hunting and gathering filled in. Pueblo I period settlements included large villages, whereas during the Pueblo II period, these villages were usurped by small hamlets dispersed across the landscape to maximize local resources (Dean 1996b:33–34; Gumerman and Dean 1989:118). During both Pueblo I and II, residential loci across the Kayenta region appeared to be fairly independent of one another (Gumerman and Dean 1989:118–119).

During the Pueblo periods, there appeared to be several cycles of aggregation and decentralization of populations within the Kayenta and Mesa Verde regions, what Lipe and Matson (1971) have referred to as "boom and bust." Across the American Southwest, including the Long House Valley area, this might have been related to documented environmental fluctuation (see, e.g., Dean 1969, 1988, 1996a; Dean et al. 1985; Euler 1988; Euler et al. 1979; Smiley 2002). According to relative population estimates produced by Plog (1986), there was a huge surge in population in the Black Mesa region beginning ca. AD 1025 that rose steeply for 100 years, until AD 1125, when population levels plunged rapidly and dramatically (Powell 2002:figure 5.5). By the end of the Pueblo II period, ca. AD 1150, much of Black Mesa was abandoned. Although there was a remnant population left in the area after AD 1150, there was over a sevenfold drop in the number of sites (Powell 2002:figure 5.5).

Ceramics began to be regularly utilized in the Basketmaker period, but by the Pueblo I and II periods, ceramics manufacture was fully incorporated into the economy in the Kayenta region. Gray wares during these periods dominated household assemblages, in many cases accounting for more than 80 percent of the total wares (Plog 1978; Powell 2002:85), with plain and banded Gray wares predominating. There appears to be a break in the popularity of ceramic types around AD 1025 in the northern Black Mesa region, with Tusayan Corrugated replacing Gray ware. Changes in technology of ceramic production between Basketmaker III and Pueblo I in the Dolores area suggest that a greater number of households were producing ceramics than previously, as evidenced by an increase in the proportion of modified sherds (used as ceramic scrapers) during the Pueblo I period at the McPhee community (Blinman and Wilson 1988).

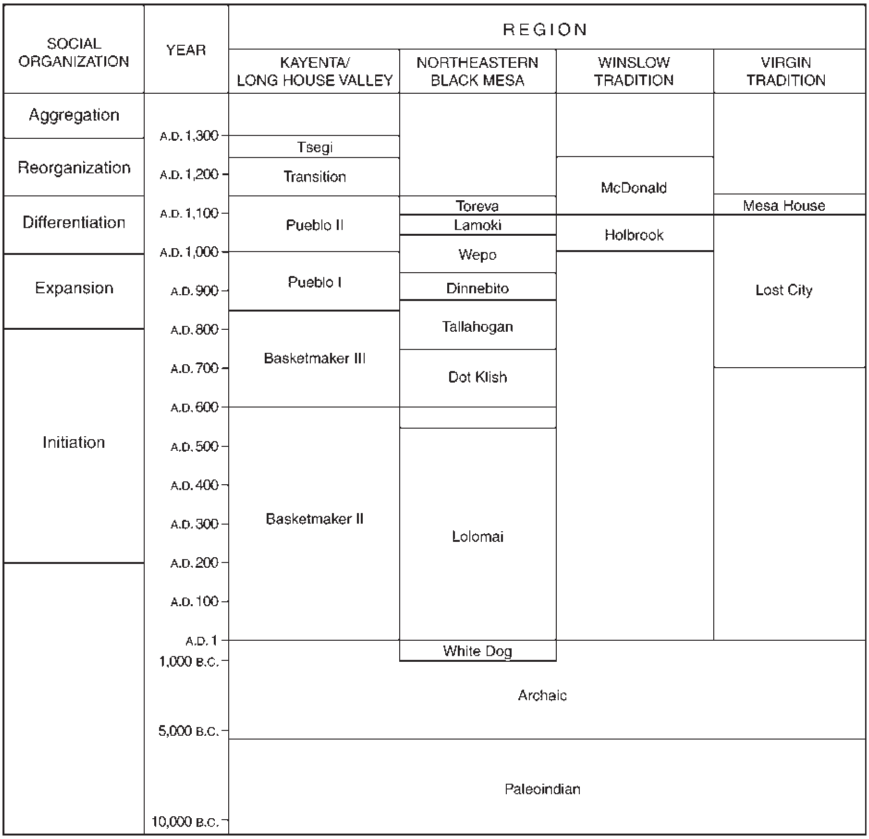

Figure 7.2. Regional chronology for the western Anasazi of the American Southwest (after Gumerman and Dean 1989:fig. 16; Smiley 2002:50)

AZ-J-28-32 (NN) FEATURES

In 2002, Statistical Research Inc. (SRI) first identified the prehispanic site AZ-J-28-32 (NN) during survey as a small scatter of isolated artifacts in preparation work supporting the construction of a gas pipeline for the Questar Corporation. During the monitoring of pipeline construction at this location, more artifacts and several extramural features were identified. As a result, data recovery excavations were conducted in the spring and summer of 2002 and SRI recovered numerous cultural features. A firm occupation date for the site during the Pueblo II period resulted from a combination of radiocarbon assays, tree-ring dates from recovered beams, and relative dating of ceramics.

The primary habitation and storage features identified consisted of two pit structures (Features 95 and 106) and a storage cist (Feature 96). Pithouse Feature 95 likely functioned as a residential structure. With a maximum dimension of approximately 4.7 by 2.2 meters, the prepared, plastered floor of Feature 95 was approximately 0.5 meter below the modern ground surface. This pithouse contained a central hearth, which was constructed of three vertical sandstone slabs sunk into the floor. Macrobotanical remains from the hearth, identified by Karen Adams, included the reproductive parts of cheno-am, bug weed, prickly pear, husk tomato, rice grass, and maize plants, all of which likely represent the remains of cooking accidents. Corncob and shank portions of *Zea mays*, normally considered waste products by aboriginal farmers, were burned as fuel in the hearth. Adams has pointed out that the agricultural fields must have been close enough for the farmers to routinely bring these remains to the pithouse for use as tinder or fuel for the hearth. Two architectural elements, a shallow basin, and three postholes were identified and excavated within pithouse Feature 95. Generally, the pithouse floor did not contain much in the way of intramural features, further suggesting that this was primarily a residential structure. While no architectural evidence of the roof was identified during excavation (beyond architectural elements and postholes), botanical analysis suggests that local juniper and pine may have been used as structural beams for this residence and roof closing materials may have included sagebrush, greasewood, and buffalo berry. The entrance to this pithouse was not identified.

Pithouse Feature 106 was located approximately a meter to the west of pithouse Feature 95 (Figure 7.3). Measuring approximately 3.2 by 3.1 meters, the pithouse interior was constructed with two levels: the main floor measured approximately 0.5 to 0.8 meter below modern ground surface, and a subfloor chamber in the northern portion of the pithouse sat approximately 1.9 meters below current ground surface. Walls of the pithouse were earthen, as was the floor. Unlike Feature 95, the floor was not formally prepared. The presence of six postholes indicates the likely presence of a wooden superstructure that rose above the earthen walls, but no wooden architectural elements were recovered during excavation. The interior space in this pithouse was unlike its adjacent neighbor. In Feature 95, the floor was markedly open with few intramural features. In contrast, the floor of Feature 106 had few open spaces, as basins, postholes, and the large subfloor chamber entrance took up much of the floor space. There was no central hearth in this structure; rather, a buried ceramic vessel containing a mixture of plants and wood charcoal was recovered from the central portion of the floor. The subfloor chamber contained a variety of materials, including ceramics, faunal bone, flaked and ground stone, and wood charcoal. Five large ground or shaped stones were recorded in situ from the floor of this subfloor chamber and may have functioned as elevated surfaces for storage.

Storage cist Feature 96 was located several meters to the northeast of Feature 95 and originated on the same surface as the other features. This bell-shaped cist originated approximately 0.2 centimeters below modern ground surface, measured maximally ca. 1.9 meters deep and 1.8 in diameter and had a volume

Figure 7.3. Pithouse Feature 106, after excavation; Pithouse Feature 95 is located in the upper left corner of the photo; Subfeature 160, a subfloor chamber, is located in the northern portion of this structure (view to the north): note the large number of intramural features in the floor of the pithouse.

of approximately 3.9 cubic meters. The size of the storage cist is large, likely larger than the amount of maize a household could consume in a year (Winter 1976:25). The entrance to this storage cist was to the northwest, away from the pit structures. The walls of the storage cist were dug into native soil and not formally prepared, but the floor was compact and plastered. The fill of Feature 96 included flaked stone, ceramics, mineral, burned corncobs, a large stone slab, and shell. Given its large size, it most likely functioned as a storage cist for maize and other food staples, but its terminal function was as a receptacle for household detritus. Macrobotanical analysis by Adams indicates that the storage cist had the largest diversity of plant remains of any feature investigated on site, including reproductive parts of cheno-am, bug weed, grass, sunflower, juniper, prickly pear cactus, husk tomato, pinyon pine, dropseed grass, rice grass, broad leaf yucca, and maize. The remains collected from the storage cist represented residential refuse, dumped into the cist over time prior to the site's abandonment and after its original use for maize storage.

The area to the south of the pithouses (Features 95 and 106) contained eleven extramural features. Of these, eight were trash-filled pits, one was a slablined pit, and two were small pits of unknown functions. Many of these pits were either burned on the interior or contained charcoal-stained fill, and several contained fire-affected cobbles. Trash deposits in many of these (the final use of these pits) contained ceramic sherds, lithics, and dispersed charcoal. Plant remains from these extramural features, analyzed by Adams, unfortunately were unable to offer much insight into their function; cheno-am, *Physalis*, and *Stipa hymenoides* plant remains were identified in various features. Extramural features that contained heavy evidence of burning may be related to pottery production (see, e.g., Hill 1994). However, the function of many of these pits is enigmatic beyond their terminal use as trash containers.

In sum, it appears that AZ-J-28-32 (NN) was occupied by a single household that occupied and used the two pithouses, storage cist, and extramural features. Based on various dating methods (both absolute and relative), features appear to have been contemporaneous to one another. The closeness of all the features on site suggests cooperation among household members related to everyday tasks. The two pithouses may have functioned differently: Feature 95 appears to have been the primary residence, whereas Feature 106 had an ancillary function related to storage and household crafts. Neither main structure had much in the way of segmented space beyond storage features. The storage cist, given its proximity to pithouse Feature 95, was likely shared by all members of the household for storage of maize and other crops grown in nearby agricultural fields.

HOUSEHOLD PRODUCTION AT AZ-J-28-32 (NN)

Evidence of household production at AZ-J-28-32 (NN) consisted of lithics, architecture, botanical remains, and ceramics. Katherine Pollock analyzed 102 lithic artifacts from across the site, including 10 pieces of ground stone (including 2 polishing stones), 10 non-bifacial tools, 79 pieces of flaked-stone debitage, and 3 shaped slabs. Her interpretation is that a limited amount of lithic production took place at the site, as evidenced by a scant number of cores (3), hammerstones (3), and debitage (79). The complete flakes identified from the site were tertiary, indicating that initial reduction of raw materials took place at the source (i.e., elsewhere than the site). If intensified lithic production had occurred at the site, one would expect a much larger amount of debitage to have been found. The two foci of lithic production were both centered on the two pit structures, which when combined, account for nearly 90 percent of the lithic collection. It is difficult to state the degree or organization of lithic production with a high degree of confidence, but the remains suggest independent, ad hoc production directly related to the needs of household members. With the small collection of lithic artifacts representing a limited variability in behavior, inhabitants of the site did little more than process plant material, perform a limited amount of lithic reduction, and perhaps produce pendants or other personal ornaments.

However, the lack of formal tools in the collection, such as hoes, may suggest that they were removed from the site when the occupants left.

Architecture and botanical remains together suggest that the household that occupied AZ-J-28-32 (NN) was agrarian and members worked nearby fields containing maize and husk tomatoes. From a variety of contexts, including a hearth (where botanical remains were likely related to cooking accidents) and the large storage cist, these two species were identified. The volume of the large storage cist (nearly 4 cubic meters) suggests that several metric tons of corn could have been stored in this bell-shaped pit. Adams identified "waste" parts of corn, which may indicate that agricultural fields for arroyo or dryland agriculture were near the site. It is unclear if the crops stored in the storage cist were for only this particular household's consumption or if some crops were transported to other locations. Features and ecofacts together suggest that the primary production focus on the household at AZ-J-28-32 (NN) was agriculture.

One of the authors (Heckman) analyzed the ceramic collection, which consisted of 1,225 sherds, 3 reconstructable vessels, and 150 fragments of unfired vessels and molded clay objects. All painted ceramics recovered from excavations were from one of two ceramic ware categories—Tusayan White ware or Tsegi Orange ware. There were three categories of unpainted pottery identified at the site—Tusayan Gray Corrugated, Tusayan Gray Plain, and indeterminate Tusayan Gray ware (possibly non-corrugated sections of corrugated vessels). The range of painted and unpainted types of vessels was representative of Pueblo II occupation.

Ceramic manufacture at AZ-J-28-32 (NN) hails from several different lines of evidence. This study uses those variables listed in Table 7.1 (adapted from Hill 1994:table 3.5) as appropriate to evaluate different stages of ceramic production. In the case of recycled ceramic sherds, a qualitative evaluation of the use-altered edges was done using Schiffer and Skibo's (1989) descriptive criteria relating to ceramic abrasion. The recovery of fragments from minimally two (and possibly more) unfired vessels provides one line of evidence of ceramic production at the site (Figure 7.4). The paste characteristics, including the size and composition of the inclusions, most closely resemble the many fired examples of Tusayan White ware recovered from the site. Also supporting the inference that the unfired vessels represent White ware vessels "in the making" was the presence of corrugated bowl fragments. The only finished corrugated bowls identified represented the Tusayan White ware type Shato Black-on-white. Other unfired artifacts did not correspond to any recognizable fired and finished product (see Figure 7.4). These artifacts appear to have been carelessly molded by hand into amorphous patties and squeezed into simple cylinders. The homogeneity of the unfired paste and inclusions suggests that all vessel fragments and molded artifacts came from the same batch of tempered clay and thus represent a single episode of ceramic production.

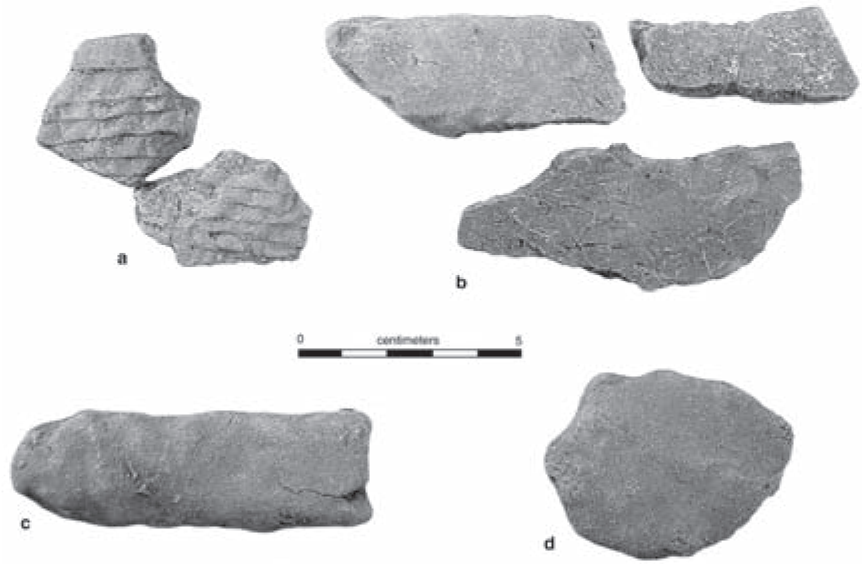

*Figure 7.4. Unfired clay objects from an intramural feature within Pithouse Feature 106: (*a*) rim and body fragments of unfired corrugated bowl; (*b*) body sherds of unfired vessel, possibly a jar; (*c*) unfired ceramic paste shaped into a cylinder; (*d*) unfired clay informally shaped into a disk or patty*

In addition, two polishing stones, the use of which is well documented in ceramic manufacture (Bunzel 1972; Hill 1994; Rice 1987; Shepard 1985), indicate a stage in the manufacturing process. Vessels, once formed and dried to a leather-hard stage, receive slips and paints. Once the slips and paints have dried, polishing stones are used to create a polished and finished exterior, interior, or both just prior to the final drying and firing of the vessel.

Three ceramic plates were also recovered. Ceramic plates, by definition, are shallow bowls with out-curved, or flaring, rims (Braun 1980; Rice 1987; Shepard 1985). Christenson (1994) provides criteria for plates that might have been used in ceramic production as base molds, which mold and support the base of a vessel while it is under construction. Although the rim sherds discussed here are Tusayan Gray Plain ceramics from plates (per Christenson's [1994] definitions), use-wear patterns were unable to be evaluated.

Finally, six recycled sherds were identified in the collection (Figure 7.5). One was representative of a sherd disk, while the others were identified as shaping tools used in ceramic production, based on the morphology and use-wear criteria (Schiffer and Skibo 1989; Hill 1994). These shaping tools were likely used for smoothing and scraping clay during the manufacture of ceramics. Two of the five tools identified as shaping tools were worked (presumably flaked and

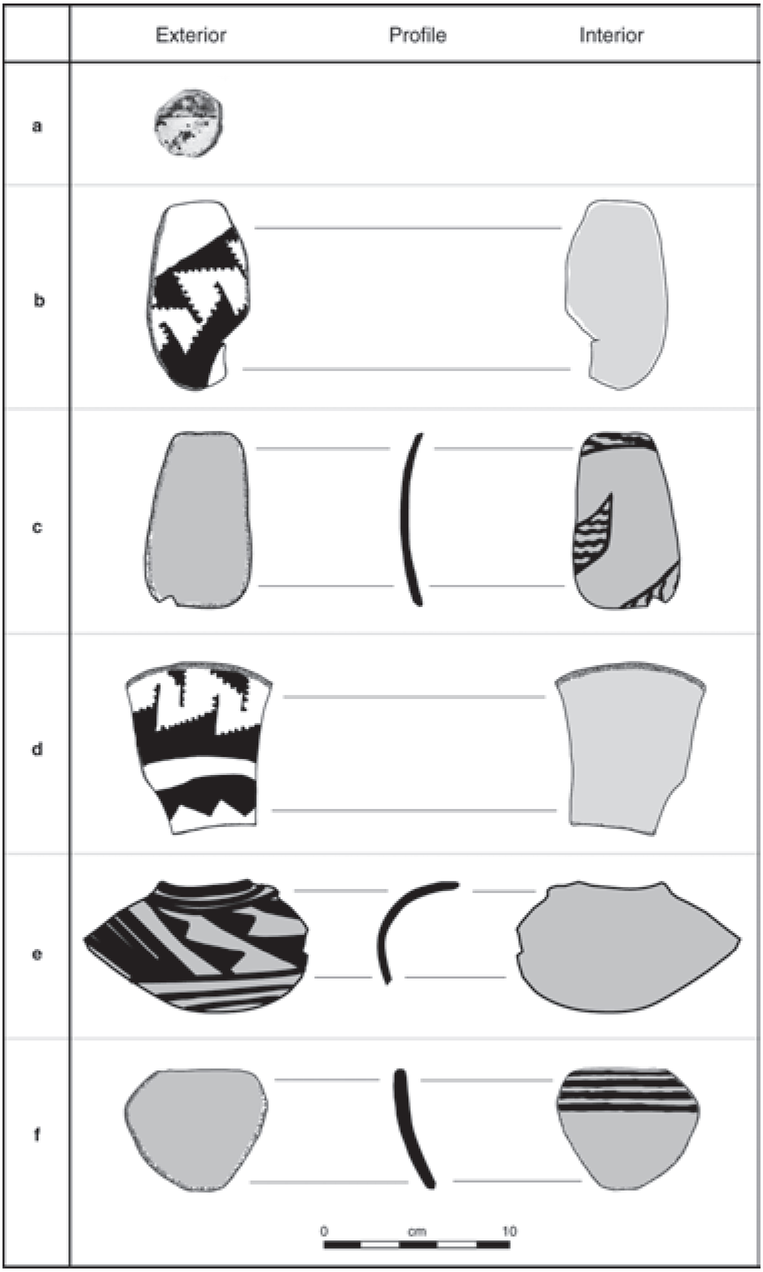

Figure 7.5. Recycled sherds from AZ-J-28-32 (NN): (a) *sherd disk with no feature association;* (b) *shaping tool from fill of extramural feature;* (c) *shaping tool with no feature association;* (d) *shaping tool, from fill of Pithouse Feature 106;* (e) *shaping tool, from the fill of an intramural feature within Pithouse Feature 106;* (f) *shaping tool with no feature association*

ground) into elongated tapering ovals and closely resemble tools illustrated by Hill (1994:figure 3.11). Although not as tapered, the shaping tools identified in this study share general shape and use-wear patterns with the tools identified as smoothing tools. These recycled sherds were likely used to obliterate coil junctures on the interior and exterior of vessels during the forming stage of the construction process (Hill 1994:40). The convex edge of the shaping tool matches the concavity of the interior of the vessel under construction.

DISCUSSION AND CONCLUSIONS

Lithic manufacture, ceramic production, and farming were all undertaken at AZ-J-28-32 (NN), a rural household group that was seasonally occupied and reveals an emphasis on agriculture. Limited lithic production suggests ad hoc, independent manufacture of tools related to mundane activities. Evidence of ceramic production is more compelling, with a collection of unfired vessels and modeled artifacts that appear to derive from the same batch of tempered clay. Viewed in a regional context (Hill 1994), such evidence for rural ceramic production is relatively anomalous.

Hill's (1994:45) study of ceramic production for adjacent Black Mesa suggests that ceramic production primarily occurred at large village sites. In his study of over fifty sites, small specialized activity areas or seasonal occupations showed little or no evidence of ceramic manufacturing. Table 7.2 highlights the differences in the nature of occupation for the Black Mesa sites used in Hill's (1994) study compared to AZ-J-28-32 (NN). Site characteristic data presented in Table 7.2 were gathered from the Black Mesa descriptive publications (Andrews et al. 1982; Christenson and Parry 1985; Nichols and Smiley 1984; Powell, Layhe, and Klesert 1980; Smiley, Nichols, and Andrews 1983). Hill, in his study, classified sites on a ceramic production scale of 1 to 4, with lower scores indicating less evidence of production. In Table 7.2, we present only those sites that, based on Hill's (1994:table 3.3) criteria, exhibited a production score of 3 (good probability of ceramic production) or 4 (excellent probability of ceramic production). From these data, only two of the eighteen Black Mesa area sites that show evidence of ceramic production were small, seasonal habitation sites (see Table 7.2). The remaining sixteen sites were interpreted as habitation sites, some of which were multicomponent and exhibited intensive year-round occupations, as evidenced by numerous structures and copious amounts of material culture.

For purposes of comparison, a ratio using the total number of sherds as a proxy measure for material culture ubiquity was calculated by the authors. Sampling and collection strategies and preservation issues aside, the premise is that the greater number of sherds collected at a site, the more diverse the material culture may be and, therefore, the greater the potential for recovery of the material remains of ceramic production. The total manufacturing evidence val-

Table 7.2. Evidence of ceramic production comparing excavated sites in the Black Mesa area to AZ-J-28-32 (NN)

Site characteristics[a]					*Material correlates of ceramic manufacturing*[b]									
Site number (ASM)	*Site Type*	*Date AD*	*Number of structures*	*Total sherds*	*No. of shaping tools*	*No. of scraping tools*	*No. of unfired sherds*	*No. of ceramic pastes*	*No. of coils*	*No. of plates*	*No. of polishing stones*	*Total manufacturing evidence*	*Manufacturing score* [b]	*Manufacturing ratio* [c]
AZ D:7:216	Habitation	850–975	15	12,736	16	0	0	0	0	2	18	36	3	0.28
AZ D:7:220	Habitation	1050–1150	11	69,978	34	0	1	1	0	2	3	41	4	0.06
AZ D:7:222	Habitation	1100–1150	3	2,531	9	1	1	1	0	2	3	17	4	0.67
AZ D:7:234	Habitation	850–1100	11	33,048	25	1	1	1	0	2	3	33	4	0.10
AZ D:7:262	Habitation	1050–1100	21	64,567	44	1	1	5	0	1	13	65	4	0.10
AZ D:7:719	Habitation	1100–1150	7	10,225	31	0	1	0	0	0	8	40	3	0.39
AZ D:7:2013	Habitation	850–1150	10	1,386	25	1	0	0	0	0	15	41	3	2.96
AZ D:7:2064	Habitation	850–975	6	4,661	8	1	0	0	0	0	2	11	3	0.24
AZ D:7:2085	Habitation	1050–1150	5	9,684	25	1	0	1	1	1	2	31	4	0.32
AZ D:7:2094	Habitation	1050–1150	4	3,858	4	1	0	1	1	2	2	11	4	0.29
AZ D:7:3003	Seasonal	1100–1150	2	5,192	12	1	0	1	1	2	2	19	4	0.37
AZ D:11:2001	Habitation	1100–1150	2	6,781	19	0	0	0	0	0	3	22	3	0.32
AZ D:11:2027	Habitation	800–900	7	6,431	12	0	0	0	0	0	4	16	3	0.25
AZ D:11:2030	Seasonal	800–900	4	4,256	61	0	0	0	0	1	5	67	3	1.57

continued on next page

Table 7.2—*continued*

	Site characteristics[a]				*Material correlates of ceramic manufacturing*[b]									
Site number (ASM)	*Site Type*	*Date AD*	*Number of structures*	*Total sherds*	*No. of shaping tools*	*No. of scraping tools*	*No. of unfired sherds*	*No. of ceramic pastes*	*No. of coils*	*No. of plates*	*No. of polishing stones*	*Total manufacturing evidence*	*Manufacturing score*[b]	*Manufacturing ratio*[e]
AZ D:11:2051	Habitation	1100–1150	7	10,829	13	0	0	0	0	3	0	16	3	0.15
AZ D:11:2062	Habitation	900–975	15	9,612	13	0	0	0	3	5	21	42	4	0.44
AZ D:11:2068	Habitation	850–1150	22	37,760	23	0	0	3	0	3	5	34	4	0.09
AZ D:11:2108	Habitation	1050–1150	10	30,277	62	0	0	3	0	1	4	70	4	0.23
Mean Values[c]	—	—	9	17,989.56	24.22	0.44	0.28	0.94	0.33	1.50	6.28	34	—	0.49
AZ-J-28-32[d]	Seasonal	1000–1150	2	1,225	5	0	2	0	0	3	2	12	4	0.98

[a] Data from Powell, Layhe, and Klesert (1980); Andrews et al. (1982); Smiley, Nichols, and Andrews (1983); Nichols and Smiley (1984); Christenson and Perry (1985).

[b] Data from Hill (1994:Table 3.3); manufacturing score: 3 = good probability of ceramic production; total manufacture >9; 4 = excellent probability; total manufacture >10 including unfired clay

[c] Mean values for the Black Mesa sample calculated by Heckman.

[d] Navajo Nation site number; data from current study.

[e] Manufacturing ratio = total manufacturing evidence / total sherds (multiplied by 100).

ues ranged from 11 to 70, with a mean of 34 and a standard deviation of 18.66 for the Black Mesa area (see Table 7.2). A total manufacturing value of 12 was tallied for AZ-J-28-32 (NN), a number representing low evidence of ceramic production relative to Black Mesa values. One may assume that this low score may result, in part, from a low total number of artifacts at the site, but other sites in the study with approximately the same number of sherds recovered at AZ-J-28-32 (NN) had total manufacturing evidence over three times greater (see, e.g., site AZ-D-7-2013).

When other characteristics of the site are considered, however, a different picture emerges. To highlight any potential differences between sites, Heckman calculated a manufacturing ratio by dividing the value of the total manufacturing evidence by the total number of sherds for that site and multiplying that value by 100 (see Table 7.2). This formula standardizes values to better compare sites with each other. Fifteen of the eighteen Black Mesa sites had manufacturing ratios that fell below the mean value of 0.49. Two of the three values above the mean represent statistical outliers (sites AZ-D-7-2013 and AZ-D-11-2030), based on box and dot plots, and exhibited exceptionally high manufacturing ratios (see Table 7.2). Site AZ-D-7-2013 (ASM) represents a large multicomponent site where postoccupational erosion resulted in low numbers of artifacts recovered (Sink, Davy, and Jones 1982:123). The other outlier, AZ-D-11-2030, represents a seasonal occupation where artifact density and diversity are often lower (Andrews et al. 1982; Christenson and Parry 1985; Nichols and Smiley 1984; Powell, Layhe, and Klesert 1980; Smiley, Nichols, and Andrews 1983). AZ-J-28-32 (NN) yielded a manufacturing ratio of 0.98, well above the mean of 0.49 for the Black Mesa sites. By any means of comparison, AZ-J-28-32 (NN) is a departure from the Black Mesa regional pattern of ceramic production as presented by Hill (1994). Ceramic production in the Black Mesa area during the Pueblo I and II periods predominately took place at large habitation sites, not small, seasonal sites like AZ-J-28-32 (NN). Of the three sites with the highest manufacturing ratio, two were seasonally occupied (the only two seasonally occupied sites in the sample), a point that is discussed further below.

Although the manufacturing ratio is 0.98 for AZ-J-28-32 (NN), it seems unclear if the household produced ceramics for only its own needs or if some ceramics were produced for trade to supplement farming. This site is on the margins of Black Mesa and would have been peripheral to major trade networks, given its location as well as its seasonal use. The overall scale of production is small at AZ-J-28-32 and part-time production likely occurred during downtimes in the agricultural cycle. Some models for the American Southwest suggest that women were the primary producers of ceramics while men were primarily the farmers (Hagstrum 2001:51), activities that were not mutually exclusive. Just as there are multiple tasks involved in agriculture, a number of tasks are associated with ceramic production (e.g., mining and tempering clay, collecting wood for firing, firing ceramics). It is unknown where clay sources may have been in relation to this site. Both farming and ceramic-production activities likely involved other members of the household (Hagstrum 2001:51). No trench kilns (Bernardini 2000) were identified during excavation, but as noted above, extramural features with evidence of intense burning may have been used for firing small numbers of ceramics. It is also possible that trench kilns or other firing features may have been located outside of the project area. Yet, there did not appear to be any specialized or segmented spaces for ceramic manufacture, suggesting that firing was likely a small-scale production. Unfired sherds and shaped sherds were found in several intramural features within pithouse Feature 106. Manufacture and drying of ceramics may have taken place outside of the pithouses in open areas adjacent to extramural features.

In conclusion, although the scale of production at the seasonal site of AZ-J-28-32 (NN) was small and ad hoc, it is clear from the evidence presented in Table 7.2 that household ceramic production in seasonal sites appears to have been relatively intensified compared to larger, more permanent habitation sites. While the site with the highest manufacturing ratio was a habitation site, the next two highest ratios belong to the only two seasonally occupied sites, with all other sites in the sample (all habitation sites) having a much lower manufacturing ratio. This suggests that small households, spending part of the year away from villages and more permanent settlements, intensified their ceramic production while they were also farming. If clay deposits were near these seasonal loci, it would make sense for these farmers to manufacture ceramics there and bring home the finished goods. If these farmers, while away from their villages, were disconnected from the social networks that facilitated the ceramic trade, the idea that the inhabitants of AZ-J-23-32 (NN) were producing ceramics for their own use makes more sense.

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SECTION II

Households as Primary Producers

Implications for Domestic Organization

EIGHT

Hohokam Household Organization, Sedentism, and Irrigation in the Sonoran Desert, Arizona

RICHARD CIOLEK-TORRELLO

INTRODUCTION

Studies of Hohokam households have most often focused on identifying and describing them as elements of the distinctive social structure that emerged in the low desert areas of the Southwest. Such studies have generally taken a static view that emphasizes continuity through time and space. Recent anthropological theories, however, take a more dynamic view of household structure and organization, linking changes to processes such as increased agricultural dependency and sedentism (Flannery 1972; Netting 1990; Wilk and Rathje 1982). According to these theories, agricultural dependence influences the degree of sedentism, the makeup of the units of production, and the systems of land tenure in which households participate (see Neff, this volume). As is envisioned by many of the authors in this volume, the household is the elemental social and economic unit in preindustrial societies. It is isomorphic with the basic unit of consumption and is distinguished from the reproductive unit commonly known as the family (Ciolek-Torrello and Reid 1974; Goody 1972; Wilk and Rathje 1982; also see Douglass and Gonlin, this volume). The family as a set of individuals and the household to which these individuals may belong are not necessarily the same (Buchler and Selby 1968:21–23).

Two basic models describe the transition to a sedentary, agricultural way of life in the prehistoric Southwest (Gilman 1997:4; for discussion of the transition through time of groups in other areas, see chapters by Beaule, González Fernández, Henderson, and McCormack, this volume). One model suggests that agricultural dependence and residential sedentism came quickly following the introduction of agriculture, occurring as early as the last centuries BC in the Late Archaic period. In accordance with this model, a distinctive pattern of domestic organization developed early and persisted essentially unchanged throughout the prehistoric period despite substantial changes in architectural forms and materials. This model has been of great appeal to Hohokam archaeologists, who have noted the abundance of wild resources along the ancient desert rivers, the ubiquity of corn in Late Archaic and Early Formative contexts, and the persistence of settlements over periods spanning hundreds of years (Fish, Fish, and Madsen 1992; Nelson and Schachner 2002:190–191).

By contrast, the second model states that agricultural dependence and residential sedentism came much later, perhaps over 1,000 years later, because people initially used agriculture only to maintain a hunting and gathering subsistence system (Gilman 1987, 1997; Wills 1991). Proponents of the second model have argued that agricultural dependence and sedentism, which are closely linked in the first model, may function independently (Graham 1994; Rocek 1995). They argue that in the Southwest, intensive agricultural production may have preceded sedentism (see Douglass and Gonlin, this volume). The second model emphasizes the differences between early pithouse architecture and later aboveground masonry and adobe architecture, along with substantial changes in material culture, demography, diversification of agriculture, and the development of intensive agricultural technologies that occurred late in prehistory as important indicators of changes in economy and mobility patterns. Gilman (1997), for example, finds it difficult to explain such substantial changes if sedentism and agricultural dependency occurred early in the prehistory of the Southwest (see also Ciolek-Torrello 1995, 1998a; Whittlesey and Ciolek-Torrello 1996). Although the notion of mobile or non-sedentary farmers has been readily accepted by many archaeologists working in the Colorado Plateau and Mogollon regions (Gilman 1997; Nelson and LeBlanc 1986; Powell 1983), it has found few adherents among those studying the Hohokam. This situation is due in great part to widely held views regarding the greater stability and persistence of Hohokam culture in comparison to other Southwestern cultures (Nelson and Schachner 2002:190–191).

In this chapter, I apply these recent anthropological theories and models of agricultural dependency and sedentism to examine changes in household structure in the Sonoran desert region occupied by the Hohokam from the Late Archaic to the Classic period. I infer household organization from architecture and site structure and relate these patterns to the development of canal systems and other indicators of agricultural intensification.

AGRICULTURAL DEPENDENCE AND RESIDENTIAL MOBILITY

Two variants of the second or gradual development model are useful for examining the relationship among household organization, agricultural dependence, and sedentism. In a model originally presented in 1972 (and revisited in 2002), Flannery argues that intensification of agricultural strategies influences the degree of sedentism, the makeup of the units of production, and the systems of land tenure in which households participate. In the archaeological record, intensification is manifested by the construction of agricultural features requiring investment of labor and the development of new technologies. Changes in the degree of sedentism and units of production are reflected in household and settlement structure. Flannery (1972:325) relates mobility patterns, organization of production, and control of key resources to different types of household and settlement structure. Using ethnographic data, he argues that circular houses are found more often in relatively mobile societies that exhibit a low degree of agricultural dependence. By contrast, more modular, rectangular architecture is found among groups that move less frequently and invest greater effort in food production. In a recent revision of this model, Flannery de-emphasizes these architectural differences while placing greater emphasis on changes in resource sharing and the location of storage facilities. More recently, Flannery (2002:421) argues that his main distinction is between settlements where small huts are occupied by individuals and storage is shared, and settlements where larger houses are occupied by whole nuclear families and storage is private (see also Gilman 1987).

According to Flannery's model, settlements formed of small, circular houses reflect a fluid and flexible social structure similar to that of hunter-gatherer bands that aggregate during periods of local resource abundance. The entire group is the unit of production in the settlements formed by these temporary aggregations, and resource sharing is necessary. This informal domestic arrangement is generally associated with low-intensity land-use patterns characterized by low population densities, long-fallow cycles, shifting cultivation, and low labor investment in agricultural production (see also Boserup 1965; Howard 1993; Wills 1991). Systems of land tenure are informal as well, and exercise of ownership rights to residential and agricultural lands is relatively lax. The archaeological correlates of this economic and organizational pattern are the arrangement of dwellings in circles, common ownership of storage facilities and their location in extramural areas, and occupation of houses by individuals, not households (see chapters by Neff and Wiewall, later in this volume, for other discussions of land tenure).

Flannery contrasts this type of settlement with those having larger, rectangular architecture and a modular structure; the members of each household reside together in houses that may be subdivided into rooms, and each has its own private storage facilities. The modular structure of the settlement gives it a planned look and allows for accretionary growth without disrupting the residential unit (Flannery 2002:425). The basic economic unit in these settlements is the nuclear household, which produces for its own use in accordance with its own perceived needs. He relates this type of settlement structure to increased investment of labor in food production, reduction of fallow cycles, increased sedentism, and the development of private landholdings (see also Howard 1993).

Emphasizing risk and privatization of storage space, Flannery (2002:421) maintains that these settlements have a more "closed" site plan to avoid jealousy and conflict that might arise from differences in food and wealth. He adds that such a "closed" site plan might also be reflected in the enclosure of extramural work spaces with mud walls. Under such circumstances, there exists more incentive to intensify production, since any resulting surplus does not have to be shared.

Flannery (2002:423–425) adds a third type of settlement composed of larger social and residential units. He argues that in some regions, villages composed of nuclear households were replaced by larger, multigenerational extended households containing multiple hearths, kitchens, and storage facilities. This third type of settlement structure suggests even greater residential permanence to Flannery, as it resulted from offspring remaining attached to parental households rather than moving away when they reached adulthood and married. Larger households may have been a response to the need to divide labor among various simultaneous tasks because resources or field systems were dispersed or because of the greater demands for pooled labor to construct and maintain intensive irrigation systems (see Netting, Wilk, and Arnould 1984; Pasternak, Ember, and Ember 1976; see also detailed discussions of small and large social and residential units in Henderson, this volume).

The second variant of the gradualist model relating sedentism and agricultural dependence focuses on architecture and de-emphasizes household arrangements. Using ethnographic and archaeological data, several archaeologists have suggested that people living in pithouses did not inhabit them year round but instead were residentially mobile for at least part of the year (Diehl 1992; Gilman 1987, 1997; Rocek 1995; Varien 1999). Rocek (1995:205), however, warns that archaeological examples of pithouse architecture cannot automatically be interpreted as residences of mobile groups. A corollary of this argument is that residents of pithouses were not fully dependent on agriculture (Gilman 1987:560; 1997:2). Ethnographic studies reveal that pithouses are most common in regions with at least one cold season per year; in cultures with at least biseasonal settlement patterns, where food is concentrated during one season; and, most important, where such concentrated food supplies can be stored (Gilman 1987, 1997). If agriculture is part of the subsistence system, much of the stored food may be in the form of agricultural products (Gilman 1987:546). Gilman (1997:6) also suggests that pithouses are not generally occupied during the hotter summer months, because of the higher seasonal temperatures or because of greater residential mobility during this time of the year. Instead, arguing for the greater thermal efficiency of subterranean structures, Gilman (1987:542) maintains that pithouses were usually occupied in winter, when their residents were dependent on stored food supplies. It must be made clear, however, that we are not suggesting that pithouses were occupied by highly mobile groups. Rather, pithouse settlements reflect a shift to a substantially reduced level of seasonal and interannual mobility or a mixture of settlement strategies, in contrast to the ephemeral settlements of more mobile hunter-gatherers (Rocek 1995:210–211; see also Gilman 1997:6).

McGuire and Schiffer (1983), for example, have proposed that the pithouse-to-pueblo transition in the Anasazi region of the Southwest was closely related to the shift to a more sedentary life style. They argue that pithouses are relatively quick and easy to build, especially by people who are residentially mobile, but they are difficult to maintain and have relatively short use-lives. Pithouses have a maximum use-life of about twenty-five to thirty years (Ahlstrom 1985; Cameron 1990; Craig 2000; Diehl 1992). By contrast, McGuire and Schiffer (1983:292–294) maintain that pueblos have longer use-lives and are more versatile to use but are more difficult to build (cf. Wilshusen 1988). They assume that as the Anasazi became more sedentary, they were willing to invest more effort in construction to get houses with a longer use-life and lower maintenance costs. In a similar view, Diehl and Gilman (1996) contend that ephemeral structures are low cost and briefly occupied, pithouses are moderate in cost and are inhabited for intermediate lengths of time, and masonry pueblos are most costly to build but are occupied for the longest periods. From such arguments, Gilman (1997:3) proposes that pit structures are in the middle of a continuum between ephemeral structures and the more substantial stone and adobe pueblo structures that replaced them in the Southwest.

In an argument that closely parallels Flannery's, Gilman (1987:556) suggests that the primary factor in the shift from pithouses to aboveground pueblos was increasing dependence on agriculture, specifically, the storage, preparation, and cooking of food. Increased time devoted to each of these activities and the need for greater storage capacity resulted in the increasing differentiation of household space into discrete rooms or structures devoted to individual activities (Gilman 1987:558). (Byrd [2000:65] interprets similar changes in interior domestic space during the transition to sedentary food production in southwest Asia as a reflection of increasing household autonomy and changes in the way nuclear households interacted with one another.) In Gilman's view, storage space became an increasingly critical factor not only because of greater dependence on agricultural products but also because of the need to store surpluses for more than one year as a hedge against crop failure and to retain sufficient seeds for planting (see Van West and Altschul 1994). Furthermore, a shift from underground and outdoor storage to aboveground, indoor storage resulted from the need to protect vital food supplies from dampness, vermin, and thievery for longer periods of time (Gilman 1987:559). Ethnographic data suggest that underground storage features are indicative of food caching associated with seasonal site abandonment and are most effective when they are sealed for prolonged periods and accessed intermittently (Rocek 1995:207). Storage pits would not be effective if they were accessed continuously by a resident population. Large aboveground ceramic containers were perhaps the least costly and most effective facilities for protecting and accessing stored foods, especially agricultural cereals (Gilman 1997:8; Whittlesey and Ciolek-Torrello 1996). Similarly, the increased time devoted to processing and cooking cereals to make them more digestible also would have required a greater number and variety of containers.

TRANSITION TO SEDENTARY FARMING SETTLEMENTS

Although these models have been used to describe various aspects of the pithouse-to-pueblo transition in the Anasazi and Mogollon regions of the Southwest, they are relevant to interpreting changes in prehistoric household and settlement structure in Sonoran desert areas, such as the Phoenix Basin (Figure 8.1). Here, too, the span of time from the Late Archaic period, around 1500–1000 BC, to the Classic period, between AD 1200 and 1450 (Figure 8.2), witnessed the transition from a residentially mobile, broad-based foraging/

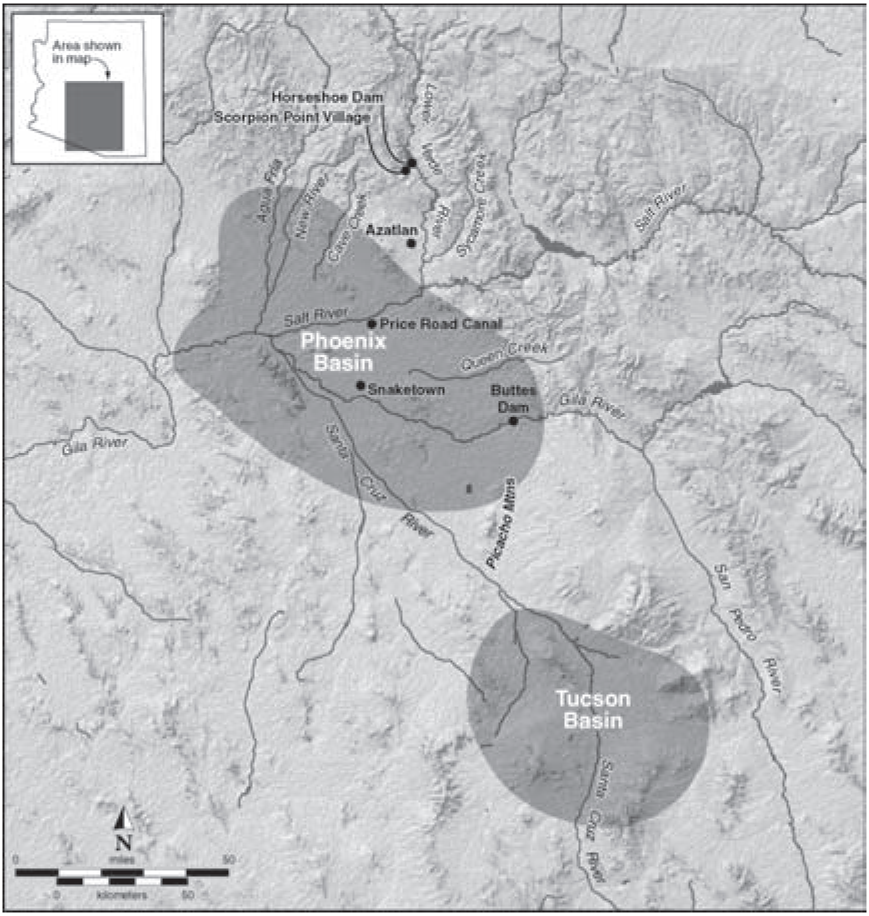


Figure 8.1. Map of south-central Arizona

farming society to one of large sedentary, agriculturally dependent villages in the river valleys of the region.

Late Archaic and Early Formative Period Beginnings

The first farming settlements appeared in the Southwest during the Late Archaic period between 1100 and 600 BC (Mabry 2000:39). These settlements contained small, ephemeral pithouses with intramural and extramural storage pits and thick midden deposits indicating an intensive occupation. Larger settlements with numerous small pithouses occurred in better-watered areas in the Cienega phase (600 BC to AD 100), the terminal phase

	Period		Phoenix Basin	Tucson Basin
AD			(Dean 1991; Deaver 1998b)	(Dean 1991; Deaver and Ciolek-Torrello 1995)
1900	Late Historic		Anglo	Anglo
1800	EarlyHistoric		Pima/Papago	Pima/Papago
1700				
1600	Protohistoric			
1500				
1400	Classic		Civano	Tucson
1300				
1200			Soho	Tanque Verde
1100		Sedentary	Sacaton	Rincon
1000				
900		Colonial	Santa Cruz	Rillito
800			Gila Butte	Canada del Oro
700			Snaketown	Snaketown
600	Preclassic		Sweetwater/ Estrella	
500				Tortolita
400		Pioneer	Vahki	Agua Caliente
300				
200			Red Mountain	
100				
0 BC		Archaic	Late Archaic	Late Archaic

Figure 8.2. Chronology for the Sonoran desert

of the Late Archaic. These larger settlements contained clusters of houses in discrete residential groupings (Figure 8.3). Some of the structures in these house groups reflected specialized storage or integrative functions. Mabry (2000:39) interprets this development as indicative of a trend toward increasing sedentism and the presence of villages composed of multiple extended families.

Architectural changes in the following Agua Caliente–Red Mountain phase (ca. AD 100–500), the initial phase of the Early Formative period,

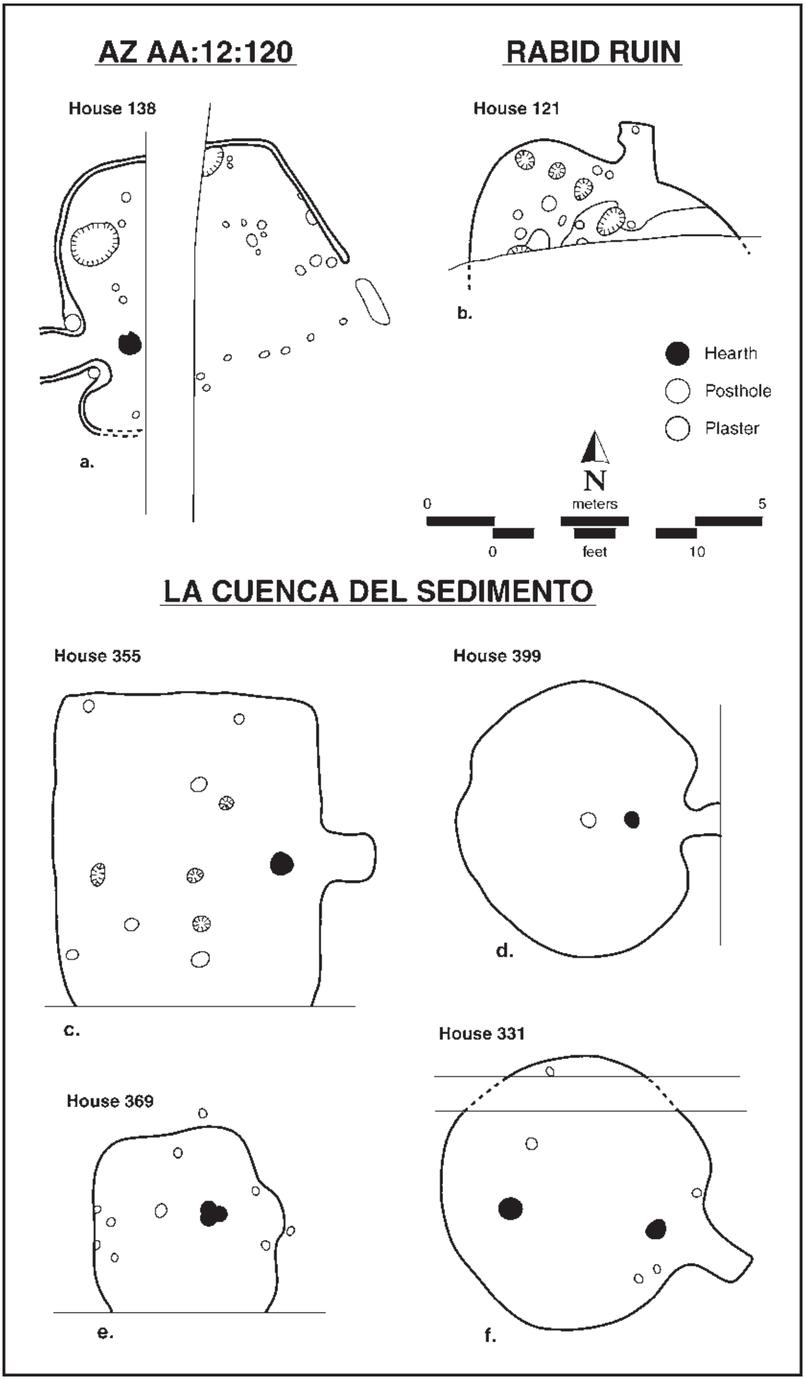


Figure 8.3. Late Archaic period houses

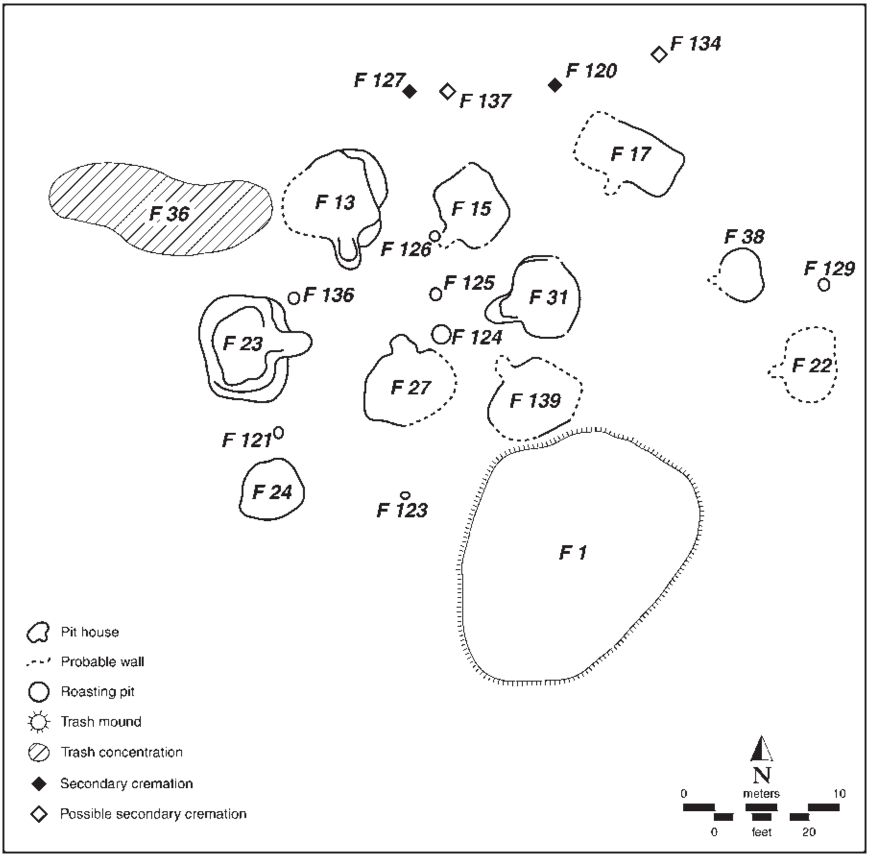


Figure 8.4. Pioneer period house cluster at the Eagle Ridge site (after Elson and Lindeman 1994:fig. 3.25)

include the construction of larger, deeper, and more substantial structures and a shift to bean-shaped and subrectangular house forms, pointing to further increases in sedentism (Ciolek-Torrello 1995; Mabry 2000; Figure 8.4). These changes are associated with the appearance of small ceramic cooking and storage vessels and a shift to an expedient stone tool technology that came to be associated with later desert cultures.

By the first centuries AD, mobility patterns appear to have been reduced to seasonal movements between floodplain settlements and smaller upland campsites. Floodplain settlement was based largely on expedient or casual cultivation of maize using floodwater farming and exploitation of wild riparian resources. In the Phoenix Basin proper, these farming methods may have been aided by small irrigation canals tapping the Salt River near the active floodplain (Ackerly

1989; Howard 1991). A biseasonal settlement pattern may have followed. Villages were distributed along canals and in the floodplain in the fall, winter, and spring seasons and dispersed into summer farmsteads in the floodplain and surrounding upland areas (Cable and Doyel 1987; Howard 1991; Wilcox 1979).

Despite the early occurrence of canals, it remains unclear whether these early settlements were maize dependent and sedentary. With the exception of the canals, food-production and -processing technology and the organization of settlements and domestic life appear to have remained geared to a more mobile lifestyle and generalized mode of subsistence. Whittlesey and Ciolek-Torrello (1996) argue that the use of storage pits, the small number and size of ceramic vessels, and the exploitation of plant and animal resources from a variety of locales during the Early Formative period indicate continued residential mobility and a lack of dependence on agricultural products. The construction of relatively small pithouses with few interior features also fits Gilman's criteria for residential mobility, although at a much more reduced level than in the preceding Late Archaic period.

These early agricultural settlements fit well Flannery's model for the fluid and flexibly structured settlements associated with a low degree of agricultural dependence. Circular and oval house forms predominated. Extramural storage pits were common, suggesting shared storage. Floor area averaged just over eight square meters (Ciolek-Torrello 1995; Ciolek-Torrello, Klucas, and Whittlesey 2000:table 1; Mabry 2000:51), a figure that is generally considered too small to have housed a nuclear household. Although the mean values vary considerably (Byrd 2000:80), a figure of about ten square meters per person, suggested by cross-cultural studies of per capita floor area (Cook and Heizer 1968; Naroll 1962), is the most widely recognized amount of space required for a nuclear household.

By the Vahki phase (AD 500–600), at the end of the Early Formative period, house size increased to about eleven square meters in the Phoenix Basin and doubled to an average of sixteen square meters in the contemporary Tortolita phase in the Tucson Basin. Rectangular houses became the dominant forms, and the presence of formal entryways and extensive use of plaster in wall and floor construction indicates greater investment in house construction. Superpositioning of houses was rare, however, suggesting that domestic space shifted over time and rules of land tenure were not well developed. Houses were often clustered with entryways oriented parallel to one another and had a common easterly orientation, which appears to reflect a culturally prescribed norm (Elson and Lindeman 1994; Gregory 1995; Mabry 2000; see Figure 8.4). The focal points of these early settlements appear to have been large communal houses, up to ninety square meters in area, which may have originated among the smaller, less formal communal houses in Cienega phase settlements. The communal houses of the Phoenix Basin contrasted with the circular and bean-shaped houses from

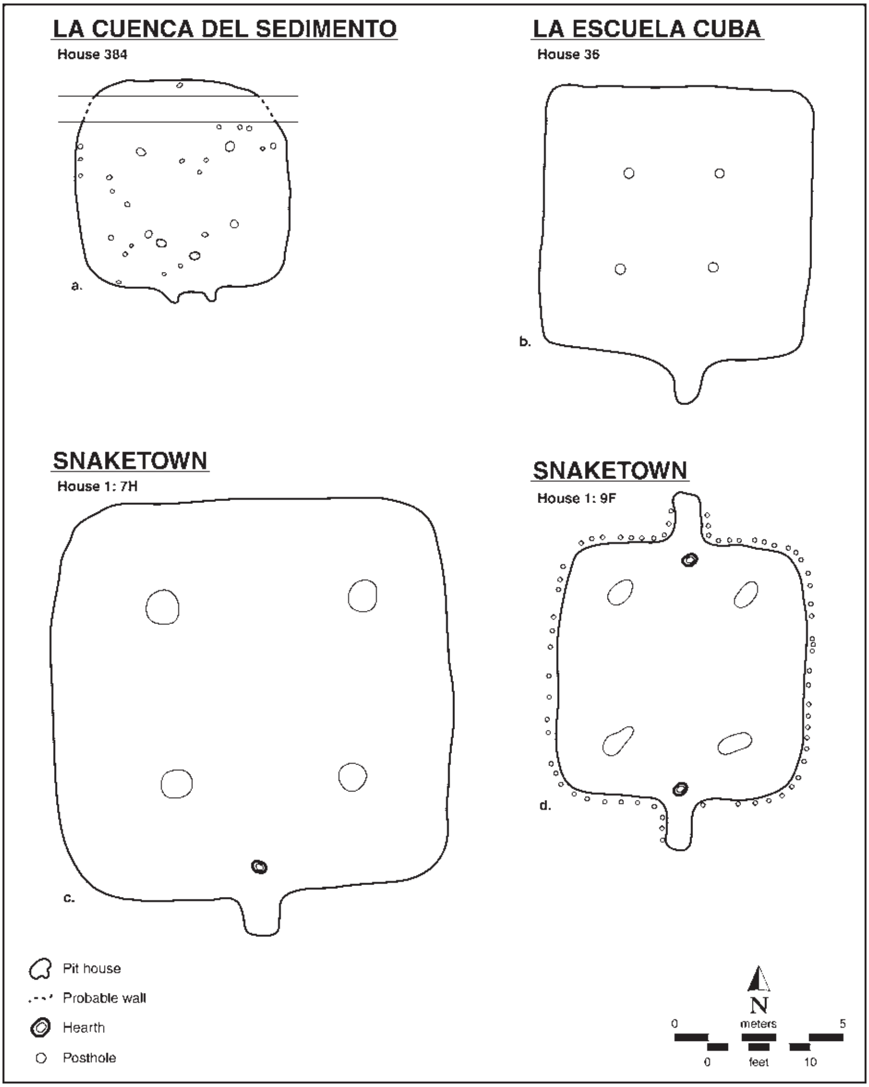


Figure 8.5. Hohokam communal houses from the Pioneer period (from Ciolek-Torrello 1998a:fig. 100)

other periods and regions of the Southwest (Ciolek-Torrello 1998a; Figure 8.5). In the Phoenix Basin, communal houses were represented by the large subrectangular pithouses originally identified at Snaketown (Gladwin et al. 1937). These large houses are common in Flannery's (1972:336) sample for the less structured type of settlement and apparently organized a social unit on the scale of a band (Ciolek-Torrello 1995; Gregory 1995).

Preclassic Period Developments

At the end of the Pioneer period, around AD 750, the Hohokam emerged as a distinctive cultural system. The undisputed high degree of maize use among the Hohokam is reflected in technological developments, although canal construction appears to have started much later than in the neighboring Tucson Basin. For example, the Price Road canal, the oldest known irrigation feature in the Phoenix Basin, was constructed between 130 BC and AD 275 (Henderson 1989:194–196). In a major treatise on irrigation in North America, Doolittle (1990) asserts that this canal represented a monumental engineering enterprise that was more technologically advanced than early Mesoamerican canals. He estimates it irrigated an area of up to 750 hectares. It also drew its water from the Salt River, one of the most flood-prone rivers of the Southwest (Welch 1994), not the smaller streams or upland runoff that fed early canal systems in the Tucson Basin (Doolittle 2002; Ezzo and Deaver 1998; Mabry and Holmlund 1998).

The Pioneer period canals of the Phoenix Basin were elaborated into the largest and most technologically sophisticated irrigation systems known in North America (Doolittle 1990:79–80). In their final form, these systems were a complex web of canals, several over sixteen kilometers in length (Howard and Huckleberry 1991), and covered an area of about 128,000 acres (Figure 8.6). Using Graybill's (1989) paleo-streamflow data for the Salt River, Howard and Huckleberry (1991:table 5.1) estimate that at its peak the largest system could have watered more than 24,000 acres. Using a different method, Schroeder (1943:380–381) estimates that as much as 9,000 hectares could have been irrigated at any one time. Larger and more productive varieties of maize also became available, and cotton, beans, squash, agave, and a variety of other plants constituted a broad and diverse agricultural complex (Gasser and Kwiatkowski 1991).

Early reconstructions of Hohokam agricultural and social developments provide strong support for Flannery's model. Based on surface information from early maps and aerial photography, a number of investigators (Haury 1976; Neitzel 1987; Upham and Rice 1980; Wilcox and Shenk 1977; Woodbury 1960) have argued that Hohokam canal systems were constructed gradually through a process of accretionary growth that culminated in the large, complex systems of the Classic period. The development of runoff-control technology in upland areas is also generally considered to be a late Sedentary or Classic period response to increasing population size or environmental degradation (Doyel and Elson 1985; Wood and McAllister 1984).

COURTYARDS TO COMPOUNDS

Many researchers viewed the transition from courtyard groups to compounds as another developmental process toward greater settlement size and social

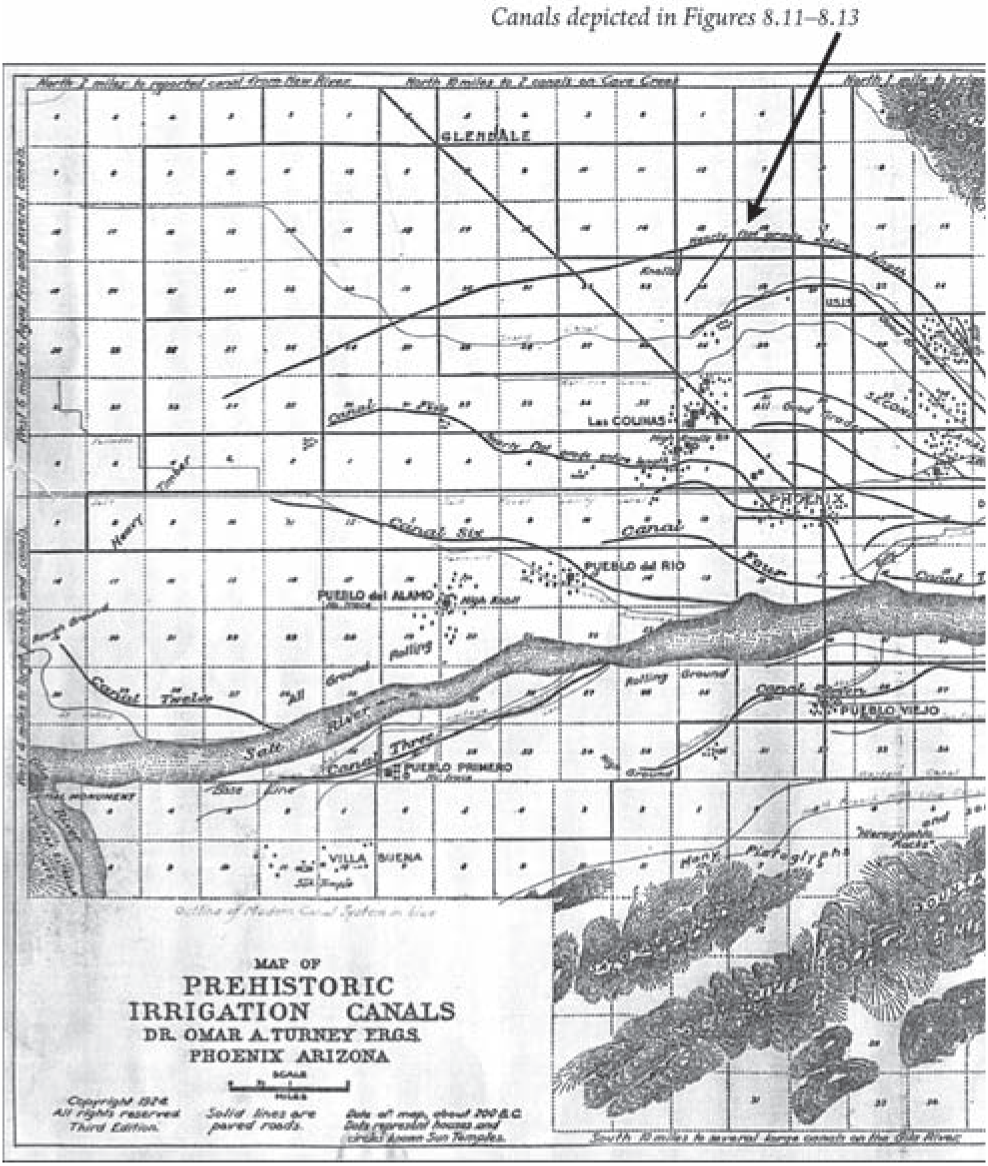
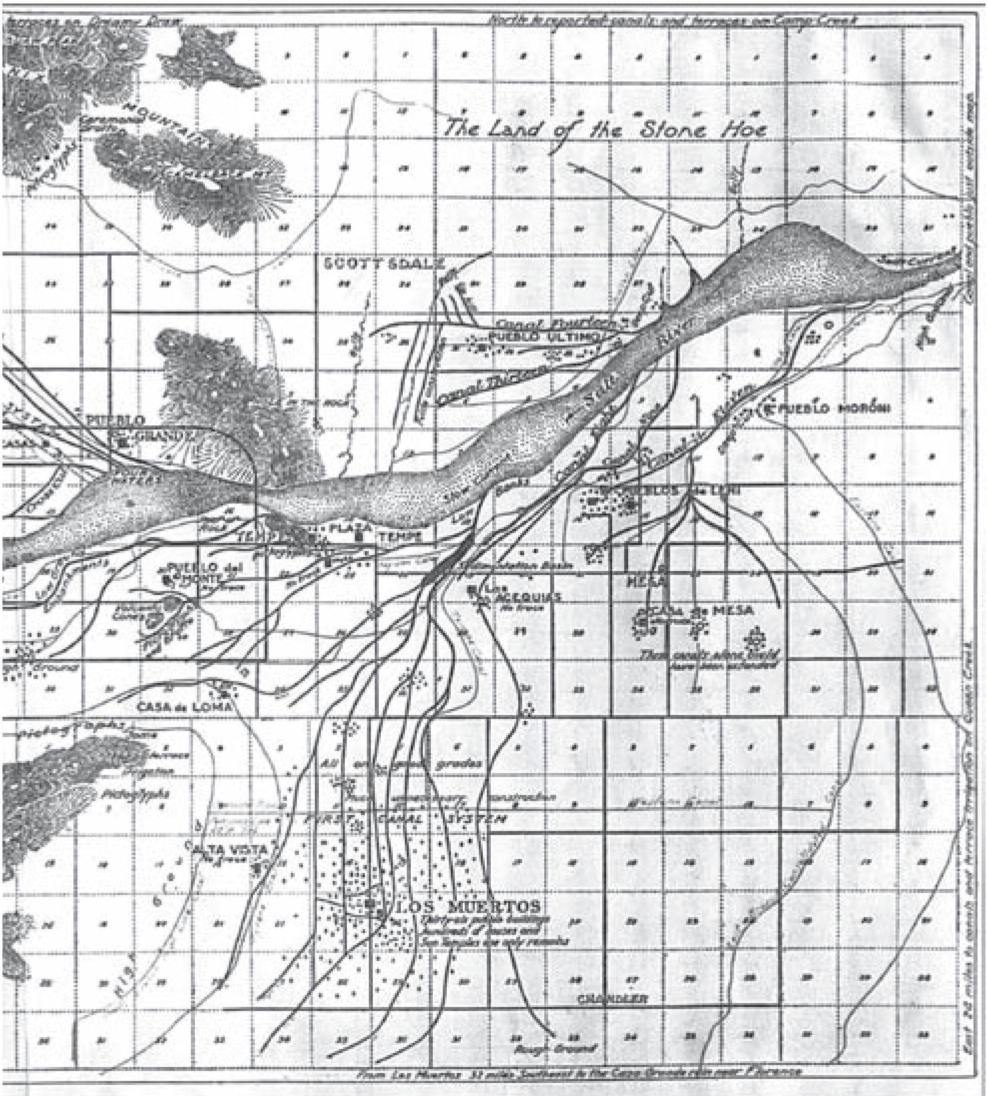


Figure 8.6. Prehistoric canal systems in the Phoenix Basin (from Turney 1929)

complexity (for detailed studies of architectural differences among households in other areas, see chapters in this volume by Beaule, González Fernández, and Snow). Courtyard groups are generally regarded as the basic structural elements of Hohokam settlements from at least the Colonial period until their transfor-



mation into the residential compounds of the Classic period (Sires 1987; see also Ciolek-Torrello 1988; Henderson 1987; Howard 1985; Wilcox, McGuire, and Sternberg 1981). Early Hohokam settlements, however, often lack evidence of courtyard groups (Klucas, Ciolek-Torrello, and Riggs 1998; Wilcox, McGuire, and Sternberg 1981); prior to the appearance of courtyard groups, Hohokam houses were distributed in loosely structured arrangements (Craig 2000:147).

According to Wilcox, McGuire, and Sternberg (1981), the typical Hohokam courtyard group consists of two or more contemporaneous pithouses oriented in a semicircular arrangement with their entryways opening onto a common living and work area. Discrete refuse middens, cemeteries, and food-processing areas are usually on the periphery, leaving the courtyard area itself devoid of features or trash. The courtyard group is generally interpreted as the residence of an extended household or lineage segment (Wilcox, McGuire, and Sternberg 1981). Habitation structures tend to be rectangular or subrectangular forms, whereas circular and oval forms are largely restricted to smaller special-function structures (see the chapter by Beaule, this volume, for a discussion of architectural shape and its correlation with household unit function in the Bolivian Andes).

The development of hereditary land ownership in these settlements is suggested by the persistence of individual courtyard areas over several generations. The sequence of superimposed houses commonly found in Hohokam courtyards is considered to represent several generations of a social unit occupying the same space and replacing houses as they deteriorated or as the needs of the social unit changed (Wilcox, McGuire, and Sternberg 1981). The association of discrete cemetery areas with these courtyards suggests the presence of corporate units larger than households that maintained descent and controlled land (Wilcox, McGuire, and Sternberg 1981; Wills 1992). These cemeteries enhanced the symbolic relationship among these corporate groups, the land upon which their residences were built, and associated fields (Varien 1999:210).

Small courtyard groups comprising two to three contemporary houses are common in smaller Hohokam settlements such as Scorpion Point, a Preclassic period Hohokam village in the Lower Verde Valley at the northeastern edge of the Phoenix Basin. This site may have contained as many as 300 pithouses, of which 60 were investigated. Only a small fraction of these houses, however, were occupied at any one time during the approximately 400-year span of time in which this village existed. The earliest occupation occurred in the late Pioneer–early Colonial period, when a scatter of single houses was built in three of the six residential loci identified at the site (Deaver 1998a). The main occupation occurred in the late Colonial period (Santa Cruz phase), when house density increased dramatically and two small ballcourts (see below) were constructed in the largest residential locus. Trash mounds and two distinct cremation areas were present in this locus, along with a cluster of *hornos* (pit ovens) in a pattern typical of the Hohokam residential units (Howard 2000). Several of the courtyard groups investigated exhibited superpositioning of houses and multiple instances of remodeling, indicative of extended and multigenerational use.

Courtyard groups at Scorpion Point contain three types of pithouses: large (mean ~24 m^2, range 20–37 m^2, n = 24) subrectangular to rectangular habitation

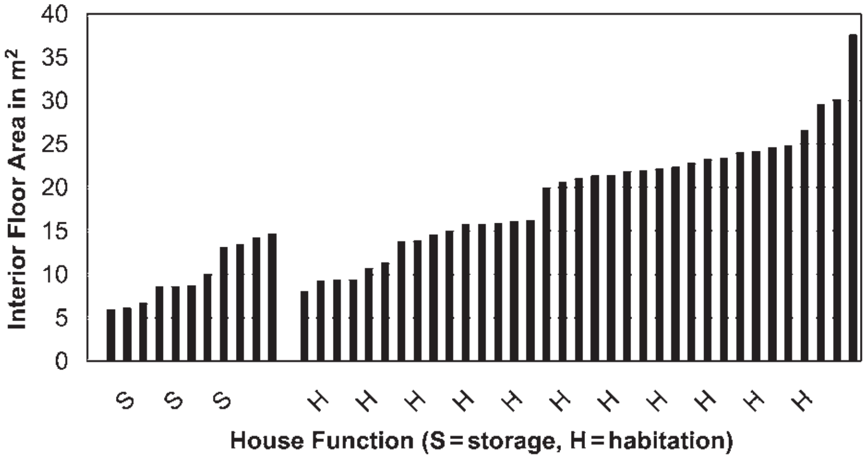


Figure 8.7. Preclassic period house types and sizes from the Lower Verde Valley; N = 46 (from Ciolek-Torrello, Klucas, and Whittlesey 2000:fig. 5)

structures with formal hearths and ramped entryways; smaller (mean ~13 m^2, range 8–16 m^2, n = 20) oval to rectangular habitation structures with formal hearths, usually with entry ramps; and smallest (mean ~10 m^2, range 6–15 m^2, n = 15) oval to rectangular structures lacking hearths and entry ramps but often containing storage pits (Ciolek-Torrello, Klucas, and Whittlesey 2000:83–85; Figures 8.7 and 8.8).

During the Colonial period, house size and function were most diverse, and courtyards groups were composed of roughly equal frequencies of all types of structures. In the Gila Butte phase (early Colonial period), courtyard groups were often not apparent and houses were arranged in an eastward-facing orientation (Figure 8.9). Typical courtyards appeared in the Santa Cruz phase (late Colonial period). By the following Sacaton phase (Sedentary period), however, large habitations were much more frequent, comprising 73 percent of all the houses in courtyard groups, while frequencies of small habitations and storage structures were dramatically reduced (Ciolek-Torrello, Klucas, and Whittlesey 2000:table 2). The reduced variation in house size and function evident in the Sacaton phase indicates subtle changes in the composition of the social groups that inhabited them. The diversity of houses in the Colonial period is consistent with a previously defined extended household pattern in which family members resided in a large habitation and either a smaller habitation or storage structure (Ciolek-Torrello 1996; Huntington 1986). The concentration of domestic activities within large habitations in the Sedentary period may reflect a shift to nuclear household organization or a shift in the permanence or periodicity of settlement. Similar changes have been observed in house size and function between

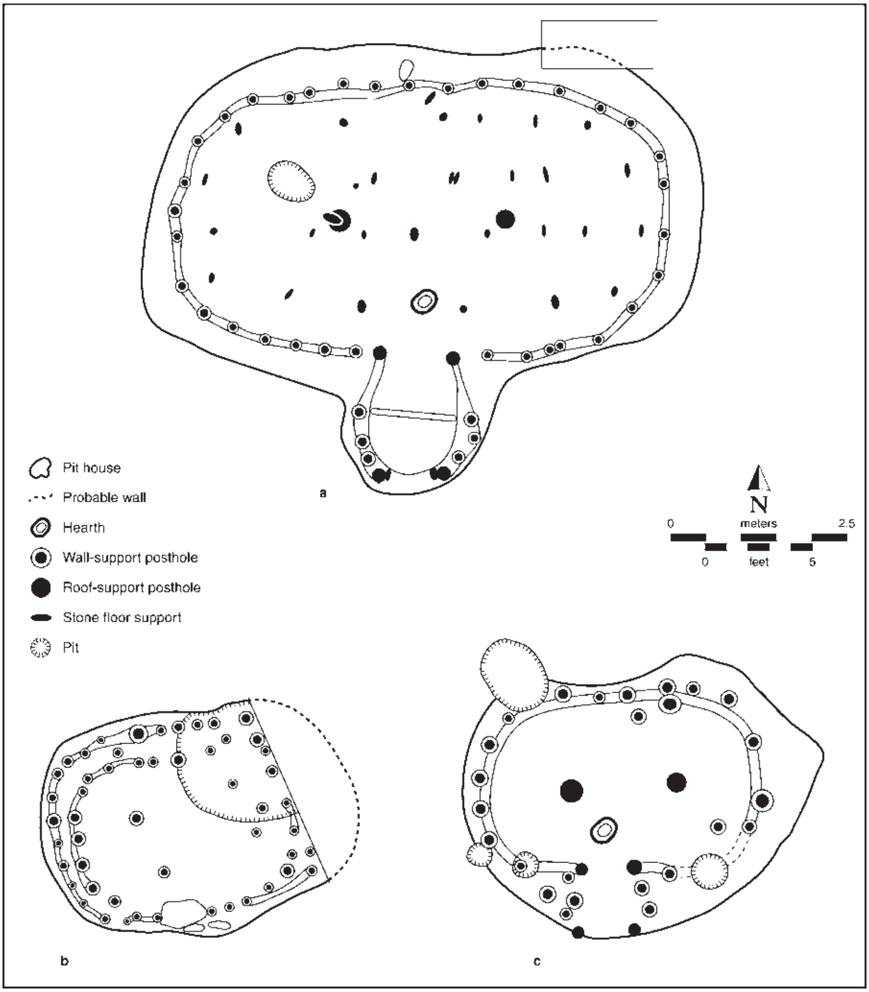


*Figure 8.8. Preclassic period house types at Scorpion Point Village in the Lower Verde Valley: (*a*) large habitation; (*b*) small storage structure; (*c*) small habitation (from Ciolek-Torrello, Klucas, and Whittlesey 2000:fig. 4)*

the Colonial and Early Classic period house clusters in the Picacho Mountain area at the southern edge of the Phoenix Basin but have not been replicated in the heart of the Phoenix Basin (Klucas, Ciolek-Torrello, and Riggs 1998).

Howard (1985), among others (see also Doelle, Huntington, and Wallace 1987; Sires 1987), suggests courtyard groups like those found in small settlements are the elemental, modular residential groups in larger settlements. For example, village segments comprise clusters of discrete courtyard groups placed back to back and side to side (Howard 1985; Wilcox, McGuire, and Sternberg

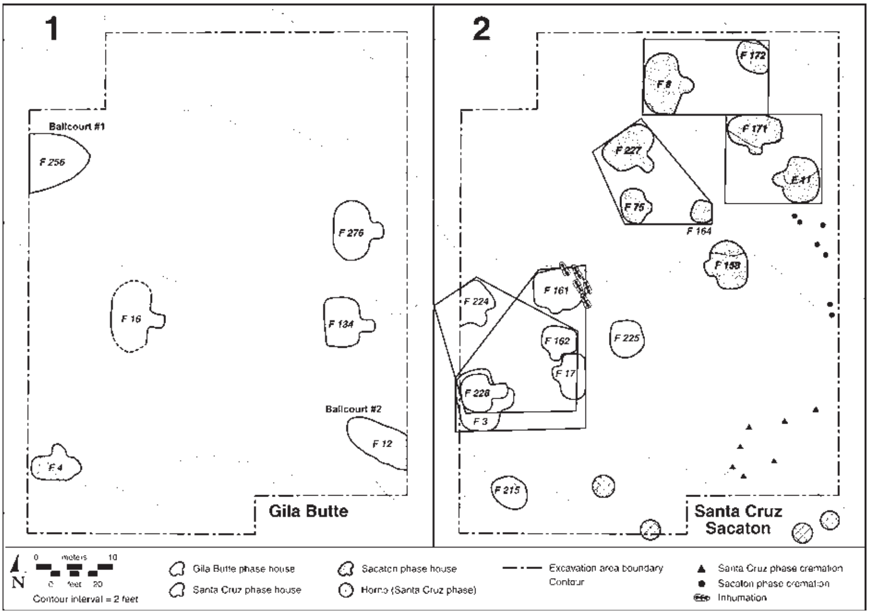


Figure 8.9. Preclassic period house clusters at Locus A, Scorpion Point Village (from Ciolek-Torrello, Klucas, and Whittlesey 2000:fig. 6)

1981:figure 40; see Figure 8.9). More recently, Howard (2000:169) has identified village segments in the Phoenix area as large residential areas centered on large open plazas averaging about 100 meters in diameter. The only features found within these plazas are hornos, which Howard interprets as communal-use facilities. Clustered around the periphery of these plazas were several residential units, each comprising several contemporary courtyard groups. Discrete trash disposal areas also occurred between the residential units along the periphery of the plazas. Howard (2000:187) also notes the presence of discrete cemetery areas east of the residential units.

Sires (1987) argues that the trend toward modular, rectangular house arrangements in some Preclassic period settlements culminates in the Classic period residential compound around AD 1250 (Figure 8.10). In many cases, compounds were built directly upon the remains of older courtyards and appear to represent a continuation of the same social unit (Doyel 1978; Sires 1987). Clark (1995) argues that small compounds are composed of similar sized and structured domestic groups as the earlier courtyards (see also Ciolek-Torrello 1994), whereas large compounds are composed of multiple sets of these domestic groups.

When viewed from the long-term perspective of the more than 3,000 years of agricultural production in the Sonoran desert, it is apparent that changes in

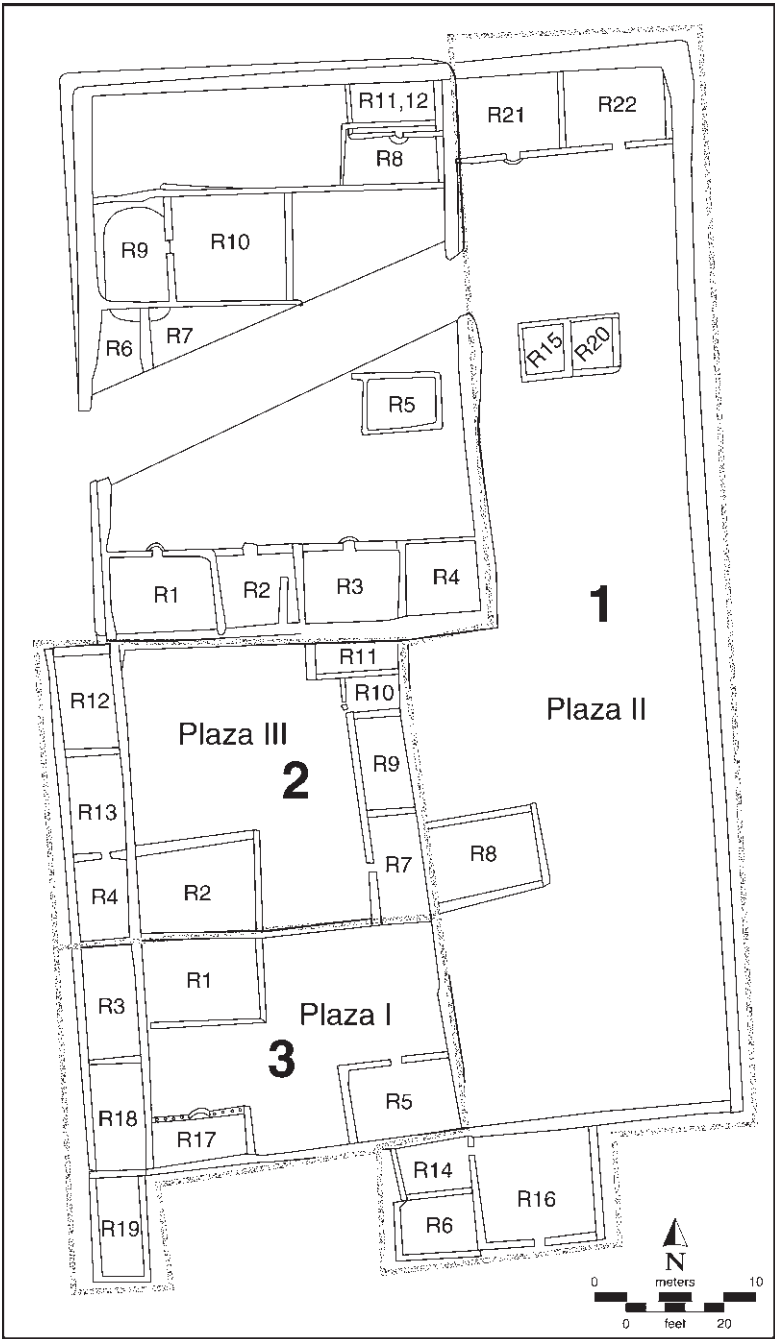


Figure 8.10. Classic period compound and courtyard groups at AZ U:15:3, Escalante Ruins (after Doyel 1981:fig. 4)

the structure of households closely parallel increased sedentism and agricultural dependence. Changes in architecture, domestic arrangements, and settlement structure appear to occur in step with the development of intensive agricultural technologies and associated material culture, supporting the various models that propose a causal relationship among these processes.

Recent research, however, suggests a much more complicated picture. Contrary to the views held by many Hohokam archaeologists, the transition to a sedentary agricultural lifestyle was not a steady progression that inexorably culminated in the large irrigation communities of the Classic period. Rather, as I will document in the remainder of this chapter, the archaeological record reveals considerable instability throughout the lengthy period that agricultural settlements were found in the region. Such instability is reflected in landscape changes, canal construction, and shifting locations of canals and associated settlements.

IRRIGATION SYSTEM DYNAMICS

It has been a long-held view that Hohokam canal systems were constructed gradually through a process of accretionary growth (Haury 1976; Neitzel 1987; Upham and Rice 1980; Wilcox and Shenk 1977; Woodbury 1960). Recent research, however, reveals that individual canal alignments exhibit a high degree of instability with numerous instances of abandonment. Canals had a short use-life and were constantly rebuilt, often in response to catastrophic flooding (Ackerly 1989; Greenwald and Ciolek-Torrello 1988; Howard 1993). Henderson (1989:198–199) estimates that the average use-life of canals in one system was roughly thirty-five years. According to Doolittle (2002:408), "the entire Salt River Valley for the period extending from AD 0 to 1450 was a dynamic landscape of canals of various sizes and locations undergoing constant renovation and relocation. . . . [T]he valley can be best characterized in terms of the irrigated landscape as a constantly changing mosaic."

Howard (1993) has developed a detailed chronological and hydraulic reconstruction of Canal System 2, the largest integrated system in the Phoenix Basin. Between AD 500 and 1450, roughly fifty main canals were constructed, fanning out in a series of parallel channels closely following topographic contours. At any one time, however, only about nine of these canals were active. Perhaps the most interesting aspect of his reconstruction is the intensity of growth exhibited during the Colonial period. Instead of gradual expansion over the Sedentary and Classic periods, the greatest growth of Canal System 2 occurred early in the sequence. Howard (1991; 1993:297) demonstrates Canal System 2 had reached its greatest spatial extent by about AD 1000, the end of the Colonial period, and was capable of irrigating more land than at any subsequent time.

Expansion of Hohokam Farming Systems in the Colonial Period

Between the late Pioneer period and the early Colonial period, Hohokam methods of floodwater farming and irrigation were spread to their geographical limits in the Phoenix Basin and surrounding areas. Small farming communities spread into the smaller tributary valleys along the Agua Fria, New River, Cave Creek, and Lower Verde River along the northern edge of the Phoenix Basin and the Queen Creek and Buttes Dam area along its southeastern edge. These areas lacked the large expanses of arable alluvium present along the Salt and Gila Rivers at the center of the Phoenix Basin, but the lower flows of the smaller drainages in these peripheral valleys may have been more easily managed. Furthermore, these valleys were located in more upland areas that provided a great variety of important wild plants that could be exploited and encouraged. Game was also abundant, and these valleys may have been important sources of protein for the large settlements along the Salt and Gila Rivers (Abbott 2000).

In the Phoenix Basin, many of the Pioneer and Colonial period canals were built near the active floodplain (Figure 8.11), where they could be taken easily out of the Salt River (Ackerly 1989:335; Doyel 1991:247; Greenwald and Ciolek-Torrello 1988; Henderson 1989; Howard 1988). Although these canals exhibited reasonably good engineering principles, their location along relatively steep topographic slopes near the active floodplain caused considerable problems. For example, the Dutch Canal Ruins consist of a series of early canals located in an area of Canal System 2 that witnessed major flooding during the historical period. The gradients of the canals in the Dutch Canal Ruins are estimated at about 2.35 meters per kilometer, more than twice as high as recommended for an earthen ditch (Haury 1976; see also Katzer 1989). The high water velocities resulting from such steep gradients are reflected in the coarse sediments contained within their fill, the high incidence of channel migration within individual canal alignments, and numerous examples of basal channel and bank erosion (Greenwald and Ciolek-Torrello 1988:84). In reference to Canal System 1, Ackerly (1989:342) also points to considerable evidence for flood-caused destruction of head gates, deposition of sediments, breaching of canal berms, and erosion of fields.

Erosion problems were undoubtedly aggravated by the streamflow regime and high-magnitude discharges that characterized the Colonial period. Graybill's (Nials, Gregory, and Graybill 1989) paleoclimatic reconstruction, based on regional tree-ring records, reveals that this was a time of high streamflow variability with periods of extremely high discharge and severe droughts (Graybill 1989). Using Graybill's data, Ackerly (1989) shows that this approximately 200-year time period was characterized by seven intervals of droughts and floods with a mean of only twenty-five years between intervals. By contrast, the following 150 years of the Sedentary period were characterized by only three droughts

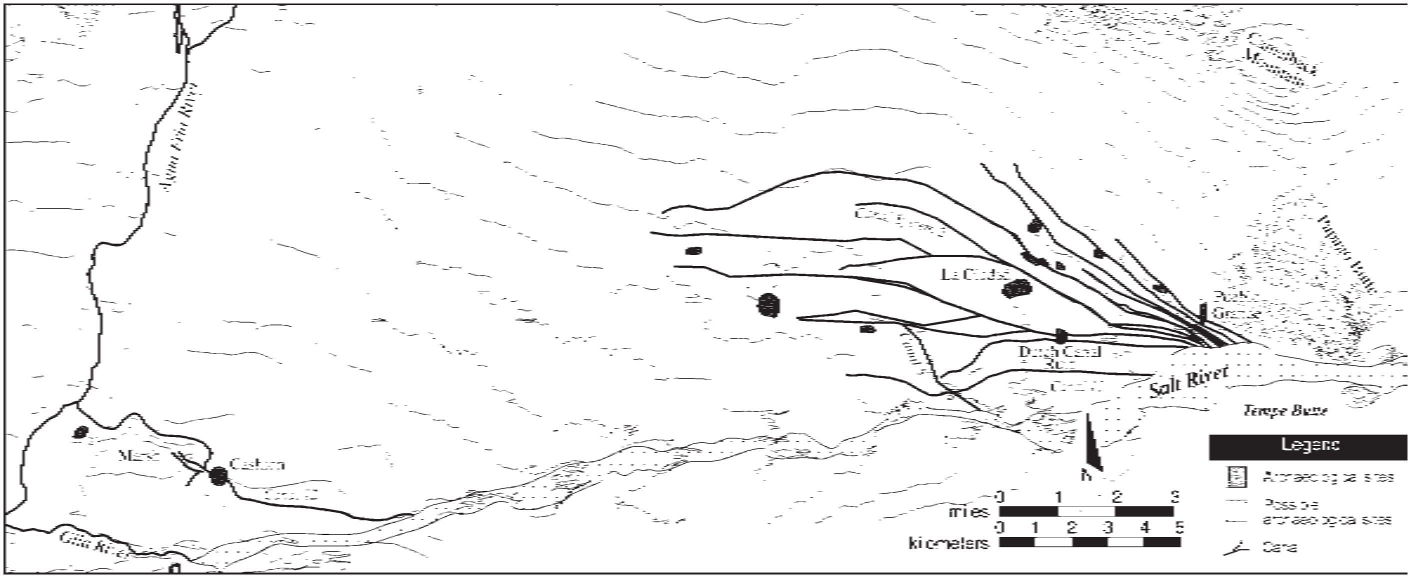


Figure 8.11. Pioneer and Colonial period canals and villages in the lower Salt River (adapted from Howard 1993)

and floods with a mean of forty-one years between intervals. High discharges during the Colonial period were also of much higher magnitude than in the Sedentary period. The southern portion of Canal System 2, which was closest to the river and the most susceptible to damage by even low magnitude floods, was abandoned by the end of the Colonial period, and new canals and settlements were constructed on a higher contour away from the river. Located on the higher Pleistocene terraces overlooking the river, the new canals were not only better protected from flooding, but their new positions led to a reduction in gradient and the resulting erosion damage from high water velocity and discharge and an increase in the acreage that could be irrigated downslope of the canals (Howard 1991:4.16).

Landscape Changes and Hohokam Retrenchment in the Sedentary Period

Waters and Ravesloot (2001) suggest a different cause for the changes that occurred in the Sedentary period based on a geomorphic reconstruction of the Gila River and its floodplain. They (2001:290) note that during the early part of the Preclassic period, the Gila River was characterized by a narrow channel with a broad floodplain. Flow was perennial and confined to the channel except during floods when the water would overtop its banks and inundate the adjacent lowlands, resulting in overbank deposition and vertical aggrading of the floodplain. Although early canal systems may have been damaged by flooding, these floods would also have renewed nutrients to the fields. This stable and productive landscape changed radically between AD 1020 and 1160 (Waters and Ravesloot 2001:291). The channel of the Gila River downcut and widened significantly, eroding the banks, destroying riparian forests, and generally disrupting nearly a millennium of floodplain stability. This wider channel had a braided streambed and the main flow channel shifted over the streambed with each large flow, forcing Hohokam farmers to rebuild diversion dams and to move their head gates repeatedly. Although this reconstruction was developed along the Gila River, Waters and Ravesloot (2001:294) believe similar events occurred along the Salt River because, as a major tributary of the Gila River, the channel of the Salt River would have responded to changes in the larger river.

The Cashion site, one of the largest Preclassic period settlements along the Salt River, appears to have been one of the casualties of these changes. Located at the downstream end of the Salt River near its confluence with the Gila River, the farmers at Cashion drew their water from Canal 12, a small canal downstream of Canal System 2. Antieau (1981) suggests that Cashion was abandoned at some time during the Sedentary period, when changes in upstream use left insufficient water to supply Canal 12. The population of Cashion apparently shifted a short distance downstream, establishing several smaller settlements and building new canals tapping the flow of the Agua Fria River, which empties into the Gila River a few miles downstream of the Salt River confluence.

The landscape changes proposed by Waters and Ravesloot (2001) provide an explanation for the abandonment of Cashion. The heads of most Sedentary period canals were concentrated at Pueblo Grande, a point immediately downstream of where the Salt River flows between two large bedrock outcrops, Papago and Tempe Buttes (Figure 8.12). The presence of these bedrock outcrops would have reduced channel downcutting and bank erosion in this location, providing greater stability for the canals that had their source close to these outcrops. Canals and associated fields were also shifted from the floodplain to the higher Pleistocene terraces during the Sedentary period. The locations of settlements followed suit. During the Colonial period, canals and settlements were scattered throughout the basin. By contrast, during the Sedentary period, most canals and settlements were located above 1,110 feet (ASML; see Figure 8.12). Canal systems, such as Canal 10 and the Cashion canal (Canal 12), which headed further downstream and irrigated low-lying floodplain areas, were abandoned by the end of the Sedentary period.

The displacement of canals and population to higher ground combined with less variability in streamflow to create optimal conditions for irrigation in the Phoenix Basin during the Sedentary period. According to Howard (1993:300–301), the Sedentary period is distinguished by much less rebuilding. He (Howard 1993:table 5) estimates that only about half as much earth (400,000 m^3) was moved to build canals compared to the Colonial period (800,000 m^3). Despite half the construction effort, irrigated acreage was only about 20 percent lower than the Colonial period. Although Ackerly (1989:340) sees little improvement in canal engineering over time, improved location of canals and head gates and more stable climatic conditions made Canal System 2 much less prone to failure during the Sedentary period.

Renewed Expansion of Irrigation Systems in the Classic Period

The Classic period is characterized by a new wave of canal abandonments, more major settlement shifts, and the construction of new canals on still higher ground in the northern portion of Canal System 2. At the same time, canals and settlements in the central and distal portions of the system were abandoned (Figure 8.13). The amount of canal construction in Canal System 2 increased dramatically, (850,000 m^3 of earth moved; Howard 1993), exceeding slightly the Colonial period levels, but irrigated acreage at any one time was 10 percent lower. Canals were extended to the northernmost limit of the system and some of the farmlands that had fallen into disuse in the floodplain were reclaimed (Greenwald and Zyniecki 1996; Howard 1993). Canal System 1, upstream of

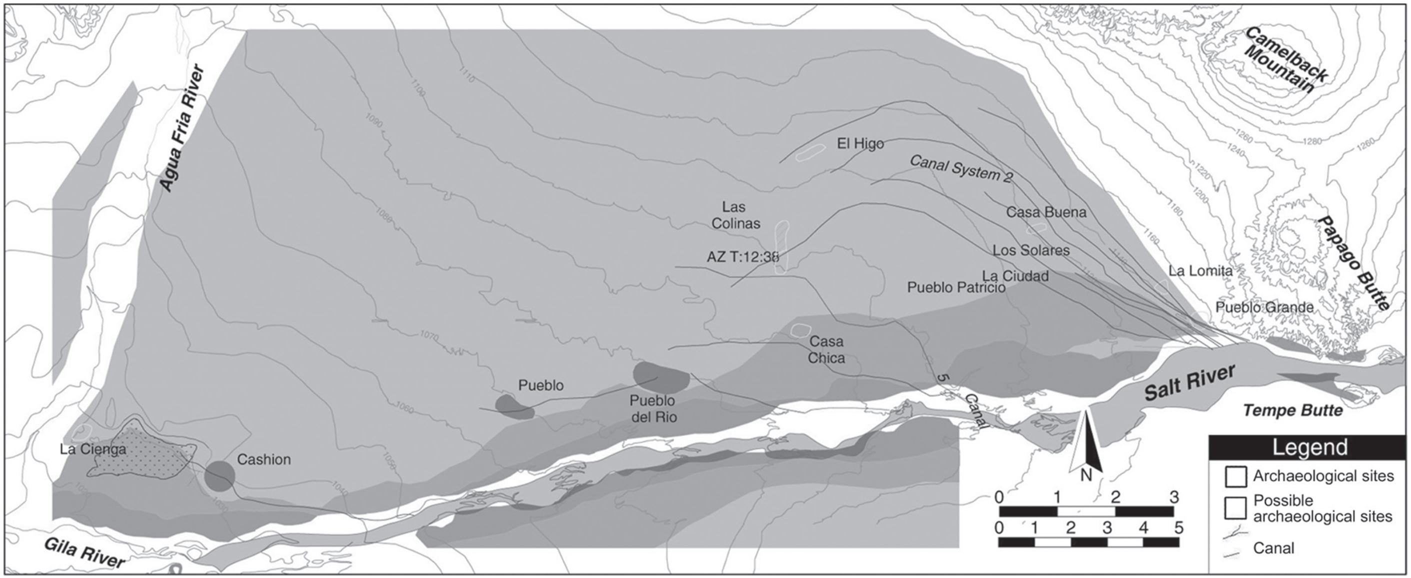


Figure 8.12. Sedentary period canals and villages in the lower Salt River (adapted from Howard 1993)

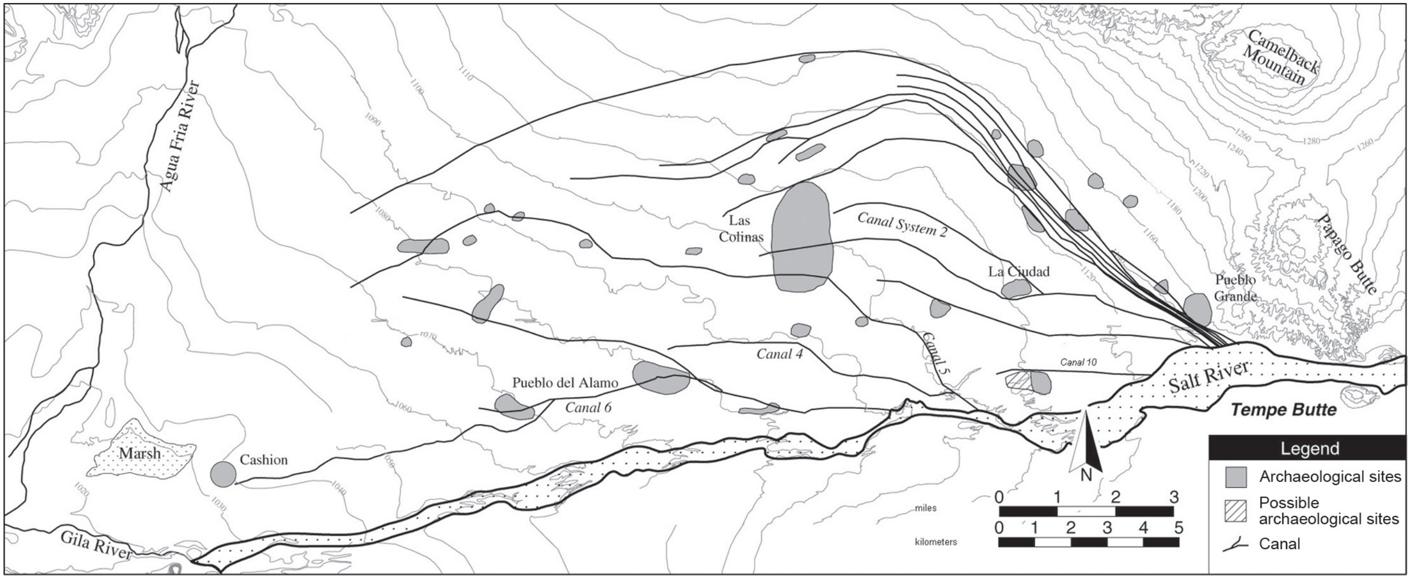


Figure 8.13. Classic period canals and villages in the lower Salt River (adapted from Howard 1993)

Papago Buttes and south of the Salt River, was also greatly expanded and an entirely new system, the Lehi Canal System (Canal 11), was constructed further upstream on the south side of the Salt River in the area of the modern city of Mesa (Abbott 2000:33; see Figure 8.6). Canal Systems 13 and 14 were also greatly expanded in the vicinity of modern Scottsdale well upstream of Canal Systems 1 and 2. The expansion of these systems was monumental in scale and required considerable effort and coordination (Abbott 2000:28).

While irrigation networks were greatly expanded or newly created in the center of the Phoenix Basin, the small river valleys along the northern edge of the basin and the upper Queen Creek and Buttes Dam areas southeast of the basin were abandoned by the beginning of the Classic period (Wilcox, Robertson, and Wood 2001). New Hohokam canals were constructed along the Verde River a short distance above its confluence with the Salt River later in the Classic period. The upper reaches of the Lower Verde Valley, however, from Sycamore Creek to Horseshoe Dam remained abandoned by the Hohokam. From as early as the late Pioneer period, this area had sustained numerous large Hohokam settlements, including Azatlan, considered by some to be the largest known Preclassic period Hohokam town (Ciolek-Torrello 1998b).

Along the Salt River, streamflow variability and high flows increased during the Classic period, although they were not nearly as high as during the Colonial period. Unreliable water flows and shortages plagued Hohokam farmers throughout the region during many years (Ackerly 1982; Howard 1991). The residents of Canal System 2, the largest canal system and the farthest downstream, were particularly hard hit by these problems (Abbott 2000:207). Dietary problems developed as a result of an overdependence on cultigens and a lack of wild plant foods and animal protein (Abbott 2000:197).

Despite these problems, conditions may have improved along the major desert waterways to facilitate the tremendous growth that characterized the Classic period. Waters and Ravesloot (2001:292) observe further landscape changes along the Gila River during the Classic period. The river channel narrowed again, the riparian zone was likely restored, and the floodplain stabilized. If such conditions can be extrapolated to the Salt River, then floodplain canals and head gates downstream of Papago Buttes were probably viable once again. The concentration of Classic period canals on higher ground and the proximity of head gates to Papago Buttes, however, made them less vulnerable to flooding and low water flows and probably resulted in more dependable crop yields than during the Colonial period.

Implications of Irrigation System Changes

Recent research counters the widely accepted notion that the Hohokam quickly mastered the rivers of the low deserts, gradually expanding their canals into one of the largest systems known in prehistory. Instead, the archaeological, paleoclimatic, and geomorphic records reveal that the Hohokam were often at the mercy of highly variable streamflow conditions and changing landscapes and were forced to continuously rebuild and move their canal systems to adjust to these changing conditions. Canal System 2 reached its greatest capacity during the Colonial period, but erosional problems led to a pattern of repeated rebuilding and abandonment because of the location of many canals in flood prone areas, their steep gradients, and high streamflow variability at this time. Much of the floodplain zone was abandoned during the Sedentary period, as canals and settlements were shifted to higher ground. During the Classic period, existing canals were expanded, while new ones were once again constructed in the floodplain. Canal systems were also greatly expanded and new ones constructed upstream of Papago Buttes, perhaps leading to water shortages along Canal System 2, especially at the "tail ends" of the canals, during low river flows (Abbott 2000:33, 46, 198, 207; Ackerly 1982). At the same time, large tracts of land that had been farmed for hundreds of years in the smaller valleys on the northern and southeastern edges of the Phoenix Basin were abandoned (Ciolek-Torrello 1998b).

This evidence has at least two important implications: first, agricultural intensification did not occur through the gradual expansion of individual canal systems; and second, the constant rebuilding and relocation of canals resulted in a pattern of shifting land use during the Colonial period followed by major settlement reorganization during the Classic period. The reorganization involved the expansion of canal systems and associated settlements in the central Phoenix Basin and abandonment of outlying areas. Although Canal System 2 was at its greatest capacity during the Colonial period, destruction of canals and fields undoubtedly resulted in repeated crop failure. Expansion of farming and settlement into the smaller outlying valleys during this time may represent an attempt toward diversification of the greater Hohokam agricultural system as a hedge against failure of one or more of its parts. Such diversification was apparently less necessary during the Sedentary period, when canals were concentrated in optimal locations and climatic conditions were generally more stable. At this later time, however, flood-prone areas of Canal System 2 were abandoned along with many of the smaller systems in outlying valleys. During the Classic period, Canal System 2 was rebuilt once again and expanded greatly along with the other major canal systems along the Salt River and the Gila River. By contrast, the northern edge of the basin became a no-man's-land between the Hohokam and new immigrants into the uplands surrounding the basin (Ciolek-Torrello 1998b; Doyel and Crary 1995).

Clearly, the early development of large canal systems did not provide the rich and stable resource base that prehistorians have traditionally believed sustained the Hohokam culture. Rather, Hohokam farmers continually faced numerous challenges from flooding, changing landscapes, and unreliable water flows. They were forced to build and repair their canals constantly and to shift their locations along with their settlements to entirely new areas.

RESPONSES TO CHANGING SYSTEMS OF PRODUCTION

The changes in Hohokam domestic organization and settlement structure, discussed above, must be viewed from the perspective of changing landscapes, fluctuations in the productivity, and shifting locations of irrigation systems rather than an inexorable evolutionary process toward greater sedentism and complexity. Hohokam settlement reached its greatest spatial extent during the Colonial period, expanding into the smaller river valleys surrounding the Phoenix Basin, north to the Colorado Plateau, east to the mountains of central Arizona, south into the Tucson Basin and southeastern Arizona, and west to the Gila Bend area. During this time, villages and hamlets composed of courtyard groups identical to those in Phoenix Basin settlements appeared in many of these areas along with small-scale irrigation systems (Ciolek-Torrello 1998b; Doyel and Elson 1985; Gregory 1995). These settlements also shared a similar cultural pattern evidenced by common use of Hohokam Buff ware ceramics and their local varieties, similar architectural styles, and similar ritual paraphernalia and mortuary patterns (Wilcox 1979).

Public Architecture and Regional Integration

Ballcourts, platform mounds, and the activities associated with these structures were key elements of Hohokam settlements and communities. Ballcourts, low earthen embankments surrounding an oval depression, were centrally located within many of the larger Preclassic period settlements of central and southern Arizona and are believed to have been used for playing a game similar to the Mesoamerican ballgame (Wilcox 1991). Unrestricted access to these ballcourts indicates that the games held within them were viewed by the members of the surrounding community. A continuous spatial distribution of ballcourts linked Hohokam settlements together into a regional system (Wilcox and Sternberg 1983). Archaeologists generally infer that this was a network of geographically separate and, most likely, unrelated populations dependent on one another through their shared participation in ritual and social events, as well as the exchange of a great variety of goods and services (Abbott 2000:28, 31).

At some time during the Sedentary period, a series of events began that transformed Hohokam society and the manner in which it was integrated. According to Abbott (2000:192), the distribution and composition of settlements were completely rearranged across the landscape by the end of the period. The social, ritual, and economic ties that integrated much of central Arizona for centuries had fallen into disarray as the vast network of ballcourts was abandoned. By the Soho phase, the early part of the Classic period, a much smaller and more nucleated Hohokam regional system appeared with an entirely different look. Further dramatic changes occurred to the Hohokam system during the Civano phase, the latter part of the Classic period, before Hohokam society ceased to exist as a recognizable entity at the end of the fourteenth century.

By AD 1200, use of ballcourts had virtually ceased. In their place appeared large earthen and rock mounds that initially served as platforms for public ceremonies and eventually became residences of presumably elite households. Abbott (2000:32) uses the distributions of ballcourts and platform mounds to document the extent of regional interaction during the Preclassic and Classic periods. In contrast to ballcourts, platform mounds were restricted to the center of the Phoenix Basin and a few of the larger irrigated valleys to the south and east. Notably, the lower Verde Valley and upper Queen Creek areas at the northeastern and southeastern edges of the Phoenix Basin had contained a concentration of ballcourts in the Preclassic period, but no platform mounds in the Classic period. Nor were any found in the Agua Fria, New River, and Cave Creek valleys along the northern edge of the basin, reflecting a substantial reduction in the Hohokam interaction sphere.

Furthermore, ballcourts and platform mounds functioned in very different ways. Ballcourts are believed to have integrated diverse populations from distant locations, facilitating the exchange of commodities from different environments. By contrast, platform mounds were symbolic edifices of inward-focused, boundary-maintaining communities. They were part of a highly structured settlement system closely linked to the Classic period canal networks. Spaced at regular intervals along canals, they were ideally positioned to facilitate communication and decision making with respect to hydraulic management (Gregory 1987). Platform mounds also may have been the focus of elaborate ritual systems that served as a spiritual means of coping with environmental and economic uncertainty (Bostwick 1992) or as communal storage facilities (Lindauer 1992) that could have been used to ameliorate spatial and temporal variability in food production (Altschul and Van West 1992). Another theory suggests that platform mounds were prominent symbols reflecting the establishment of a new system of land tenure in which canal systems or segments of the larger systems became closely associated with individual descent groups. Abbott (2000:204–205) proposes that platform mounds were constructed by a descent group for the worship of its ancestors, who had constructed the fields and the canals that supplied water to them (see also Ciolek-Torrello and Whittlesey 1996). Each platform mound symbolized the link between the canals and cultivated fields within its view and a closed group of direct descendants who controlled access to these canals and fields.

Reorganization of Hohokam Society in the Classic Period

As the Preclassic period Hohokam interaction sphere collapsed and ballcourts were replaced by platform mounds, population swelled along the Salt and Gila Rivers and the residents of small sites aggregated into larger villages. At Pueblo Grande, one of the largest Classic period settlements in the Phoenix Basin, residence group size increased dramatically, and several new residence groups were established, which together nearly doubled the size of the population (Abbott 2000:32). A significant immigration of population is suggested by the rapid scale of growth. Abbott (2000:195) suggests that the massive growth of Los Muertos in Canal System 1 may have been related to the immigration of Hohokam settlers, who had abandoned large Preclassic period communities such as Snaketown along the Gila River. He also suggests that the establishment of the Lehi Canal System (Canal System 11) may have been the product of a wholesale resettlement of groups from other areas of the Phoenix Basin. Emigrants from the smaller valleys along the northern edge of the Phoenix Basin may have been the primary source of these settlers (Ciolek-Torrello 1998b). Many large new Hohokam settlements also were built along the Gila River and in the Picacho Mountains along the southern edge of the Phoenix Basin in the Classic period (Ciolek-Torrello 1988; Doyel 1981). It is more likely that the many Hohokam settlements that were abandoned in the Lower Verde and other smaller valleys along the northern edge of the Phoenix Basin were the primary source of population swelling the villages along the Salt River.

Changing Household Structure and Residential Patterns

The reorganization of Hohokam society during the Classic period as evidenced by population resettlement, aggregation, changing public architecture, and possibly changing systems of land tenure is reflected in changing domestic structure. Preclassic period courtyard groups composed of clusters of pithouses were gradually transformed into groups of adobe-walled surface structures contained within rectangular compounds partitioned from other residential groups by walls that may have stood two or more meters high. Most prehistorians infer that these walled compounds represent an unaltered social pattern from Preclassic period courtyards (Clark 1995; Doyel 1991). In a view clearly reminiscent of Flannery, Abbott (2000:175), however, suggests that compounds represent a "departure from an open pattern of social intercourse unencumbered by stringent social distinctions to one where such differences were clearly apparent." He links this change to the increased importance of agricultural land and its produce, emphasizing that the "loosely aligned and less-organized families" of Preclassic period settlements "coalesced into socially exclusive and closely cooperating units that effectively protected their agricultural yields and water rights."

Thus, when viewed from the perspective of concurrent changes in irrigation systems and the reorganization of Hohokam society, the shift from courtyards to compounds probably reflects a fundamental change in lifeways rather than merely a modification of preexisting residential patterns. The residents of Preclassic Hohokam courtyard groups exploited an ever-changing landscape with shifting irrigations systems and residential locations. These courtyard groups represented much more loosely structured and more mobile residential groups than previously believed. Although the courtyard group, with its evidence for multigenerational use, has usually been regarded as the hallmark of deep sedentism in the Southwest (B. Nelson 1990), better chronological controls of the occupational histories of individual courtyards reveal much greater instability and a high degree of mobility (Ciolek-Torrello, Klucas, and Whittlesey 2000; Deaver 1998b; Vanderpot, Klucas, and Ciolek-Torrello 1999). Rather than continued growth and expansion over long periods of time, Hohokam courtyards often exhibit patterns of intermittent occupation, unexpected decline, and shifting location. McGuire and Schiffer (1983:286) characterize the early Hohokam residential pattern as one of mobile households occupying permanent settlements. According to this pattern, settlements may have been permanently occupied, but households moved frequently within and between them (see Wilk and Rathje 1982:633–637).

For example, Henderson and Rice (1987:61) describe changing residential patterns in one residential unit at La Ciudad, one of the largest Preclassic period settlements in Canal System 2. Between AD 750 and 875 only one or two houses were occupied at a time, with a new house built only after the previous one had been abandoned. This was followed by a thirty-year period in which five houses were occupied simultaneously. The area was then abandoned for the next thirty years, but reoccupied by groups of four to eight houses until AD 1000. The occupation then reverted to a solitary house.

This pattern of shifting occupation is better illustrated at Scorpion Point Village. Between 28 and 50 percent of the dated houses at the site were occupied during the approximately 100-year span of the Santa Cruz phase (depending upon how many of the general Colonial period houses can be attributed to the Santa Cruz phase) (Ciolek-Torrello, Klucas, and Whittlesey 2000:table 2). Craig's (2000) method for estimating the periodic occupation—average use-life of 25 years per pithouse, a 100-year span for the phase, and total of 84 to 150 houses (28–50 percent of 300)—provides a rough estimate of between twenty-one and thirty-eight houses that may have been occupied at any one time during Santa Cruz phase. Analysis of domestic structures at the site (Ciolek-Torrello, Klucas, and Whittlesey 2000; Klucas, Ciolek-Torrello, and Riggs 1998) indicates that the Colonial period population was distributed among extended households occupying at least two houses—a large habitation and either a small habitation or storage structure (see also Ciolek-Torrello and Greenwald 1988; Huntington

1986:44; Sires 1984). Applying this figure to our calculations suggests that between ten and nineteen extended households resided at Scorpion Point at any one time during the Santa Cruz phase.

Both ballcourts were abandoned sometime during the Santa Cruz phase, as indicated by the intrusion of Santa Cruz phase cremations. By the end of the phase, the entire site appears to have been abandoned. The settlement was reoccupied following a fifty-year hiatus between the Santa Cruz and Sacaton phases (Sedentary period) (Deaver 1998b). Sacaton phase settlement, however, was structured in an entirely different manner. Approximately 25 percent of the houses at Scorpion Point date to the Sacaton phase occupation, which probably lasted only fifty to seventy-five years. Using the same calculations as for the Santa Cruz phase, approximately twelve houses (300 houses × 0.25; 75-year span of occupation; 25-year house use-life) were occupied at any one point of time during the Sacaton phase. In contrast to the Santa Cruz phase, the Sacaton phase population was distributed in nuclear households residing primarily in large habitation structures, which comprised almost 75 percent of the houses during this phase (Ciolek-Torrello, Klucas, and Whittlesey 2000:table 2). Thus, roughly nine households were occupied at any one point in time during the Sacaton phase. These data indicate that the number of households at the site was either halved or approximately equal, again depending on whether we can use the larger part of the range for the Santa Cruz phase occupation. Considering the much smaller size of Sacaton phase households, however, the population size was reduced dramatically.

Despite the difference in size of households, houses continued to be arranged in courtyard groups at Scorpion Point during the Sacaton phase. In fact, courtyard groups with at least three houses are slightly more common and these groups are more tightly clustered than their Santa Cruz phase counterparts (Klucas et al. 1998:513). Chronological data, however, indicate that the houses in individual Sacaton phase courtyards at Scorpion Point were not used at the same time. The contrast between Santa Cruz and Sacaton phase courtyard groups at Scorpion Point is striking. The earlier houses exhibit considerable superpositioning and remodeling, indicating multigenerational use of the same domestic area. By contrast, Sacaton phase houses lack evidence of superpositioning and remodeling (see Figure 8.9). If the Sacaton phase houses were occupied contemporaneously, it would suggest the presence of a more aggregated and structured village, albeit short-lived. The evidence for noncontemporaneity of Sacaton phase courtyards at Scorpion Point, however, suggests a short-term and more intermittent occupation (Deaver 1998b).

DISCUSSION

Howard and Wilcox (1988) have argued that abandonment or changes in settlement locations were closely related to shifts in the location of canals in the

Phoenix Basin. As canals within Canal System 2 shifted northward onto the higher terraces during the Colonial and Classic periods, a progression of site types was constructed. Temporary field houses were initially constructed while Hohokam farmers tended their new fields. These were replaced by small settlements occupied by families that budded from the original villages. As the network continued to expand northward, a large village was eventually constructed in the new location.

This type of progression, however, does not account for the type of fluctuations evident at La Ciudad and Scorpion Point. It is more likely that the changing residential patterns evident at these sites reflect the relocation of individual households in response to economic fluctuations. Floods that damaged fields and irrigation systems or droughts that reduced water flows are the most likely culprits for these fluctuations. Households may have moved to other portions of a canal system, to a different canal system, or even to different river valleys that were not affected in the same way, only to return when conditions improved.

The construction of pithouses by the Hohokam must also be viewed from the perspective of a mobile residence pattern. Although Hohokam pithouses were not constructed in pits as deep as their Anasazi and Mogollon counterparts, materials and construction techniques were similar. Use-lives of Hohokam pithouses are also believed to be of a similar span as Anasazi and Mogollon pithouses. Thus, like most cultural groups known in the ethnographic and archaeological record, the Hohokam built pithouses during the Preclassic period because they probably remained relatively mobile agriculturalists.

This relationship between architecture and mobility has not gone unrecognized by Hohokam archaeologists. Most prehistorians regard the Polvoron phase as a terminal portion of the Classic period, when Hohokam society collapsed in the late 1300s with the destruction of the irrigation systems that sustained it. The Hohokam reverted to an earlier, less structured society that occupied pithouses once again (Crown and Sires 1984).

Henderson and Hackbarth (2000) present an alternative view of the Polvoron phase. They argue that the Civano and Polvoron phase manifestations are contemporary and represent the normal range of variability expected in complex late Classic period communities. Civano phase manifestations are represented by compounds in large, permanent, aggregated riverine villages, whereas Polvoron phase manifestations occur in small, seasonal farmsteads in outlying areas. Using the ethnographic analogy of Tohono O'odham people, who seasonally or temporarily resided in the riverine villages of their Akimel O'odham neighbors, Henderson and Hackbarth (2000) suggest that the occurrence of Polvoron manifestations in the large riverine villages represents the presence of transient populations that moved between the outlying farmsteads and riverine villages. The less permanent status of these transient populations is reflected in the construction of less substantial jacal pithouses on the periphery of the large villages as well as in outlying areas. Henderson and Hackbarth (2000) explicitly state that in constructing pithouses labor investment was minimized in the face of an uncertain residential status. It is highly likely that this type of residential pattern had a long history that may have extended as far back as the beginnings of Hohokam culture.

The Preclassic period ballcourt system also should be viewed from the perspective of a more mobile Hohokam society during the Preclassic period. The network of Preclassic period ballcourts was associated with the movement of people and goods between riverine villages and outlying regions. Ballcourts were the focal points of communities where people from different settlements and regions probably came together to conduct games or rituals; to exchange news, goods, and services within a reciprocal framework; and even, perhaps, to arrange marriages. It would not be a significant stretch of the imagination to propose that the relationships established at the events conducted at ballcourts facilitated residential shifts among settlements within the same canal network, among different networks, and even among different river valleys. People did not shift residence at random or into unknown areas. Rather, they undoubtedly moved to areas where they had established relationships with existing residents. Interestingly, the bulk of the immigrants to Pueblo Grande during the Classic period joined existing residence groups rather than establishing new ones (Abbott 2000:198), suggesting that they knew and were welcomed by the existing residents.

The replacement of the widespread ballcourt network by the smaller network of more inwardly focused platform mounds during the Classic period marks a radical departure from the more open, wide-reaching, and fluid Preclassic period system. That this change was associated with the expansion and improvement of irrigation systems within the Phoenix Basin, abandonment of outlying regions, and the replacement of pithouses by aboveground, adobe-walled houses enclosed by compound walls tends to support the models proposed by Flannery and Gilman regarding the relationship among agricultural intensification, more rigid systems of land tenure, increased sedentism, and architectural change.

Expected changes in domestic structure, however, are not as readily apparent. Domestic organization clearly responded to increasing agricultural dependency and sedentism between the late Archaic and Preclassic periods. Larger, more substantial houses arranged into courtyard groups replaced loose clusters of smaller, ephemeral pit structures. Hohokam courtyard groups and larger residential units, however, exhibit much greater organizational structure and residential stability than contemporary Anasazi and Mogollon settlements, despite similarities in architectural forms. I argue, however, that the continued use of pithouse architecture combined with the evidence for shifting settlement and irrigation systems during the Preclassic period indicates greater residential mobility, less agricultural dependency, and the existence of a system of land tenure based more on usufruct than during the Classic period. It was only during the Classic period that the Hohokam could be considered fully sedentary and agriculturally dependent. Whether they were hemmed in by enemies or tethered to an immense and highly productive irrigation system cannot be determined as yet, but their degree of dependence on agricultural products may have reached the point of dietary stress and disease as suggested by the data from Pueblo Grande (Abbott 2000).

SUMMARY AND CONCLUSIONS

In this chapter I have attempted to evaluate the relationship among domestic organization, sedentism, and agricultural dependency in the Phoenix Basin using models developed through cross-cultural studies by Flannery, Gilman, and others. My focus has been on how changes in household architecture and organization were related to changes in settlement and farming systems. Specifically, I have tried to demonstrate that a shift occurred from extended households in less structured and more mobile communities in the Late Archaic and early Preclassic periods to nuclear families in more structured and sedentary communities in the later Preclassic and Classic periods. These changes, in turn, were related to the development of more structured rules of land tenure associated with agricultural intensification involving increasing dependence of large-scale irrigation systems. Close parallels among changes in irrigation systems, settlement, and domestic organization tend to support Flannery's model overall. A true test of this model would seek evidence for greater dependability in food production during the Sedentary and Classic periods. For example, maize frequencies or ubiquity values should be much higher or more consistent. Sedentary and Classic period courtyard groups and compounds also should exhibit greater residential stability; they should display extended occupations with gradual and continued growth rather than the intermittent occupations evident in many Colonial period settlements.

The simple evolutionary schemes for increasing sedentism, changes in domestic organization, and development of irrigation systems used by many Hohokam archaeologists, however, are not supported by the evidence presented here. I have tried to demonstrate that Preclassic period Hohokam culture was not the icon of "deep sedentism" that most Southwestern archaeologists have considered. While many of the large Preclassic period villages and towns were occupied over several centuries of time, individual households most likely shifted their residences on a regular, if not seasonal, basis, and entire settlements or loci may have been abandoned periodically. This pattern of shifting residence was a response to environmental fluctuations, unreliability of floodplain farming, and a broad landscape that offered a variety of other farming opportunities.

The larger and more complexly organized villages and communities of the Classic period were not merely the product of steady and inexorable growth and development from Preclassic period roots, but rather a response to a changing physical and social landscape, as well as the movement of canals to locations that provided more stable and reliable agricultural production.

Although the focus of this chapter has been on the relationship among environment, farming technologies, and domestic organization in the Sonoran desert, it should be clear that Hohokam prehistory provides a rich source of data to evaluate theoretical models concerning these relationships. This chapter is intended as a case study but has important implications for cross-cultural studies.

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NINE

Understanding Households on Their Own Terms

Investigations on Household Sizes, Production, and Longevity at K'axob, Belize

H. HOPE HENDERSON

INTRODUCTION

This chapter applies the ethnographic model by Wilk and Netting (1984) of household economic organization, which predicts how households will internally organize production given differences in household sizes, to an archaeological study of household variability at K'axob, Belize. In presenting this study, I will discuss some of the strengths and weaknesses of defining prehistoric households in terms of what their members do, that is, as the union of the overlapping activity spheres of production, distribution, transmission, reproduction and coresidence (Wilk and Netting 1984). I argue that before archaeologists reconstruct these activity spheres, they should first question how households coordinated basic domestic activities. This more explicit perspective strengthens archaeological reconstructions of household phenomena by directly questioning the relationships among household structures, activities, and adaptability. I expand on these ideas by examining the possible relationships among internal household composition, domestic activities, and household longevity. Finally, this chapter argues that Wilk and Netting's (1984) household model is similar to current studies of agency and structure (Brumfiel 1992; Dobres and Robb 2000) because it overtly questions the relationship between behavior and structure.

There are three parts to this chapter. First, I discuss some of the challenges of conceptualizing and applying Wilk and Netting's ethnographic households to archaeological contexts. We need to think more carefully and discuss more explicitly how we reconstruct households with archaeological data. I also discuss the relationship between Wilk and Netting's ethnographic household and current studies of agency and structure that consider the relationship between choice and behavior at the group level. Second, I summarize the results of an investigation of internal household organization by analyzing variation in household sizes, staple crop production, and wealth differentiation in a sample of ancient lowland Maya households from K'axob, Belize (Henderson 1998, 2003). This study shows that all households in this farming community followed a diverse productive pattern focused on a variety of staple foods but that there were meaningful differences between larger and smaller farming households. Larger households were better able to pool labor and resources to produce an even more diverse array of staple foods. Smaller households, by comparison, focused more of their labor and resources on maize agriculture. Interestingly, the broader economic approach of larger households was more successful. Larger households were wealthier, with more elaborate architecture, and featured more sequential occupations, more than double the number of smaller households. Third, I question why larger households were more prosperous and longer-lived than smaller households. Based on the results of this study, I consider how internal hierarchies and household leadership could have consistently facilitated a diverse pattern of staple crop production and strengthened household longevity at K'axob.

THINKING ABOUT THE ARCHAEOLOGICAL HOUSEHOLD

In their seminal chapter on households, Wilk and Netting encouraged anthropologists to understand households in terms of what they do (see Douglass and Gonlin, this volume). Instead of relying on functional typologies, they argued that anthropologists needed to directly observe the activities that are most commonly carried out and shared by household members (Wilk and Netting 1984:2–6). Investigators should observe and map individual activities to understand how human groups come together to carry out mundane tasks. In an approach taken by many authors in this volume, the product of household analysis, then, is the definition of activity spheres that show where and how individual and group activities coincide. This behavioral focus is amenable to archaeological analysis and is well oriented to archaeological data. However, it is difficult for archaeologists, far removed from observing how people cooperated in the past, to document the relationships among individual activity spheres. Archeologists cannot directly observe the cooperative efforts of people who coordinated different activities, and the lack of this information creates an analytic dilemma for archaeologists who want to reconstruct and analyze households in the past. Unless archeologists begin household studies by questioning how households internally managed life-supporting activities, it is unlikely that we can deduce household boundaries and think about how shared activities would have brought together household members, created friction, or even pulled them apart. As a result, archaeologists run the risk of assuming that the household was an adaptable social unit characterized primarily by unity and shared activities. We assume functionality instead of analyzing it. It is in keeping with Wilk and Netting's original ethnographic model, which clearly distinguishes between structure and behavior (Wilk and Netting 1984:2), to question the potential relationships among different kinds of internal household organization and household activities (Wilk and Netting 1984:6). What Wilk and Netting originally proposed is that researchers treat household activities and morphological classifications with the same "explicitness" (Wilk and Netting 1984:4). By considering how households coordinated tasks before reconstructing activity spheres, archaeologists are in a better position to achieve a critical evaluation of household structures and activities. In fact, Wilk and Netting recognize the need for historians and archaeologists to start their studies based on their knowledge of the morphological characteristics of households (Wilk and Netting 1984:6).

This means we need to think more carefully about the many possible relationships among different household forms and the long-term success of these small social formations. We should not treat household organization in a deterministic manner or assume household functionality or unity. We need to start our work by explicitly asking about those possible relationships. Fortunately, archaeologists have an analytical advantage in documenting and observing human behavior over long periods of times. By comparing the histories of numerous households, archaeologists are in a stronger position to empirically evaluate household adaptability or functionality by considering whether household organization was related to household longevity. Comparing the lifespans of prehistoric households strengthens this internal focus. By focusing directly and separately on internal household organization, individual histories of residential groups (Hirth 1993), and domestic activities, archaeologists can offer a long-term perspective on household longevity that questions whether group cooperation in carrying out shared tasks was adaptive to the household group or individual household members. This overall evaluation of household longevity would constitute an interesting contribution to anthropological studies of households. Even so, considering these internal relationships does not mean that external factors are secondary, for the long-term success of households is also contingent upon larger social, economic, and political processes.

One example of an archeological study that considers how internal organization influences household activities over time is Widmer and Storey's analysis of a Teotihuacan apartment compound (Storey and Widmer 1999; Widmer and Storey 1993). They identified a compound-wide cognatic kin group as having been responsible for coordinating and maintaining religious and administrative activities while smaller, extended family groups cooperated in craft production at Tlajinga 33 (Widmer and Storey 1993:103). They also found that shifts in production, from lapidary to pottery, were related to changes in household wealth and mortuary rituals, for through time the number of adult burials with offerings decreased in this household compound. Their reconstruction of household phenomena, which demonstrates the differences between larger and smaller groups within the same residential compound, shows how changes in what households produced was related to household prosperity. In a similar approach, Hendon (1996) argues that archaeologists need to visualize domestic relationships, such as women's roles in craft production and food preparation, to understand specifically the value of labor and, more generally, household phenomena.

Furthermore, by considering internal household relationships and productive activities, these perspectives question household unity and functional adaptability and enable us to examine households both in terms of structure and agency (Brumfiel 1992:558–559). Studies of agency and structure, though varied (see Brumfiel 2000), are within the spirit of Wilk and Netting's (1984) original ethnographic model, which explicitly questioned the relationship between structure and behavior and recognized internal variation in the ways household groups come together to coordinate the activities of production, distribution, transmission, reproduction, and coresidence. The approaches of Storey and Widmer (1999) and Hendon (1996) coincide with studies of structure and agency by showing how choice and strategic action, analyzed in these studies as productive activities, can vary depending on gender and economic differences. Moreover, Brumfiel's call for subject-centered analyses that identify social and economic variables and evaluate them in relation to specific behavioral strategies (Brumfiel 1992:559) is complementary to household analyses. In this case, the internal composition of the household group, rather than the individual, is the "subject" of study. Dobres and Robb (2000:11) suggest a similar approach to Brumfiel (1992) by identifying group agency as the study of the cultural processes by which groups are constructed, negotiated, and transformed. I think there is much similarity between Wilk and Netting's discussion of households and a more general theoretical search for less mechanistic models of human behavior on the part of archaeologists. All these anthropological approaches question deterministic models of social organization and change.

These interests grow out of a study of prehistoric households in the Maya Lowlands that examined variability in a sample of seventy-two household occupations that dated to between the ninth century BC and the 9th-ninth century AD in the small settlement of K'axob, Belize (Henderson 1998, 2003). The principle objective of this work was to determine whether differences in household size were related to the ways households internally managed labor and organized staple crop production. To do this, I elaborated on Wilk and Netting's ideas of simple and diverse production to see whether the formation of larger corporate households at K'axob coincided with a more diverse pattern of production consisting of more activities focused around more kinds of resources (Figure 9.1). I also wanted to see whether smaller households followed a simpler form of production, which consisted of a few productive activities focused on a few kinds of resources such as *Zea mays* (see Figure 9.1). For Wilk and Netting (1984), the ways households schedule major productive activities distinguish simple production from diverse production. Unable to document how households annually ordered specific tasks, I conceptualized household production as the cumulative results of how farmers coped with an array of potential productive alternatives and limitations. Following Wilk and Netting (1984:6), I reasoned that annual productive strategies could vary for any number of reasons and that any decision could also bring about unintended organizational consequences (Henderson 1998). Instead of assuming that a single rationality motivated household production, I broadly questioned whether households internally managed resources and labor in organizationally different ways because of their overall size differences. If this was the case, then over long periods of time the cumulative results of a wide variety of decisions related to staple crop production could result in qualitatively different productive strategies for larger and smaller households. I was more interested in finding average and long-term differences among many households as evidence of multiple household production strategies than in looking for annual or individual differences in production among a few households. In this respect, this study began as an investigation into variation in group-level agency (Dobres and Robb 2000) and a subject-centered analysis (Brumfiel 1992:559) that assumed farming households creatively managed production based on their own internal criteria. Did smaller households tend to focus more on maize agriculture? Did larger households tend to produce a wider array of staple foods?

Differences in household size were reconstructed by comparing the spatial layouts of sixty-two household occupations. In this analysis I differentiated between two size categories: larger, patio-focused corporate households and all other smaller households (Henderson 1998, 2003; see also discussion by Ciolek-Torrello, this volume). Long-term patterns in staple crop consumption and production were reconstructed by comparing the stable bone isotopes (i.e., λ^{13}C

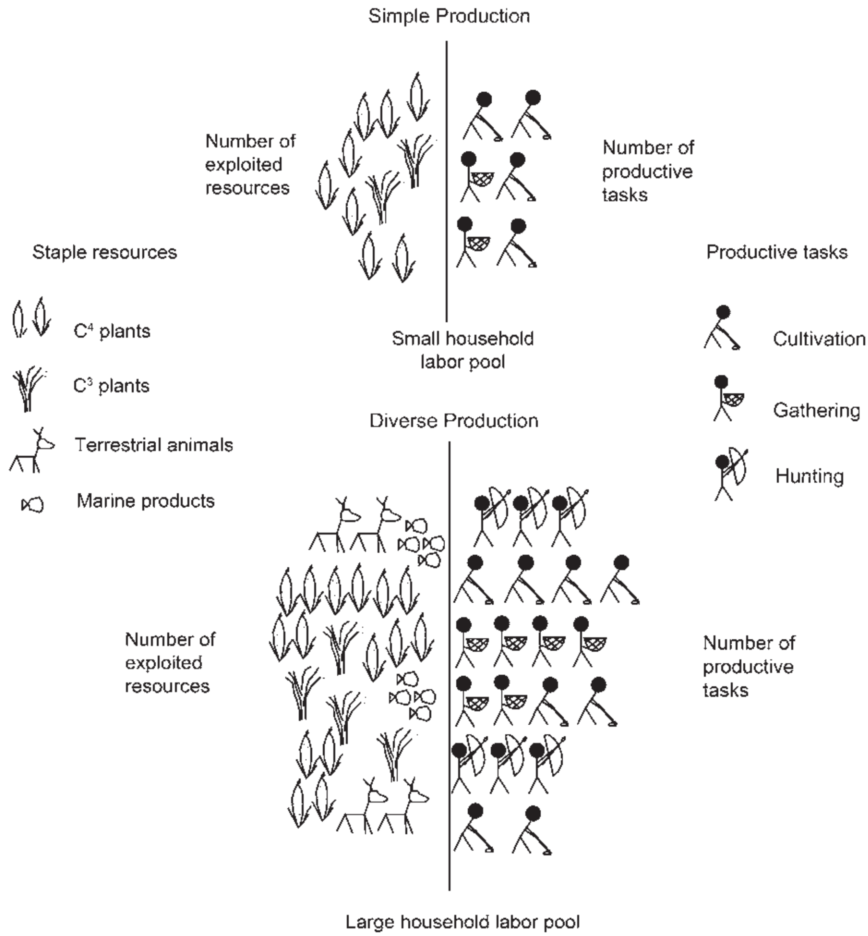

Figure 9.1. Model of household organization and staple crop production

collagen, λ^{13}C apatite, λ^{15}N collagen) of twenty-five adults from twenty-one different household occupations (Henderson 1998, 2003). Here I summarize the results of that research rather than presenting detailed research methodologies and analyses. I also present in more detail the stratigraphic histories of specific households.

To conceptually link household consumption to household production, I drew on ethnographic research indicating that households produced the staple foods they consumed on daily basis (Netting 1993:18; see also chapters by Gonlin, Neff, and Wiewall, this volume). Thus, I assumed that this was the case for households at K'axob. I realize that not all scholars will agree that that the consumption of staple foods accurately reflects all staples that households habitually produced. Stable bone isotope data, which measure the consumption of carbohydrates and proteins (Ambrose 1993), may not reflect the staple foods that households produced for exchange or tribute (Hastorf 1990). To measure diversity in productive patterns, however, it is not necessary to document all of the staples that households produced. Farming households may or may not produce staples for exchange or tribute, but they have to produce crops to meet their own subsistence needs. Therefore, subsistence crops provide a baseline for measuring diversity in production, and stable bone isotope data directly measure average and composite dietary patterns. For the purpose of this study then, human remains provide the best kind of data to consistently reconstruct and compare dietary patterns between large and small households over three different time periods. A diverse diet in this population is represented by low $\lambda^{13}C$ apatite values, indicating that adults consumed high proportions of plants with a C_3 pathway. In northern Belize a wide variety of staple foods have a C_3 pathway, and presumably, a diet rich in plants with a C_3 pathway contains numerous kinds of staple foods (Bronson 1966; Hammond and Miksicek 1981; Hather and Hammond 1994; Hellmuth 1977; Miksicek 1983, 1991; Wiseman 1983a, 1983b). Most researchers agree, on the other hand, that *Zea mays* was the principal C_4 crop consumed by Maya populations (Gerry 1993; Gerry and Krueger 1997; Reed 1994; Tykot, van der Merwe, and Hammond 1996; White 1997; White, Wright, and Pendergast 1994). Thus, a diet that included many kinds of plant species would register low $\delta^{13}C$ apatite values, indicating a high percentage of plants with a C_3 pathway and a low percentage of plants, most likely *Zea mays*, with a C_4 pathway. Furthermore, the presence or absence of terrestrial, freshwater, or marine resources in the diet, as reflected in $\delta^{15}N$ collagen values, also indicates diversity in consumption and productive activities (Wright and White 1996). This study reconstructs average and long-term consumption of staple foods to generally infer which categories of plants or animal foods (i.e., C_3 plants, C_4 plants, types of protein) were more or less important in household productive strategies.

I envisioned a simple productive pattern as one in which households regularly relied on small work groups that pooled their labor to carry out a few productive tasks focused on a few key resources (see Figure 9.1). Thus, I expected that households would have selectively relied on the cultivation of seasonal crops such as *Zea mays* and minimized the diversity in the number of staple resources that they habitually exploited. If so, then relatively high $\delta^{13}C$ apatite values would indicate that individuals consumed a high percentage of *Zea mays*. Meat may have been an irregular source of protein in adult diets if smaller households dedicated less time and labor to hunting activities. I also would not expect for marine foods to be a staple resource for households following a simple productive strategy. Moreover, I envisioned households practicing simple production as a small and homogeneous social group with little internal differentiation. To the extent that age, gender, or other distinctions were present in these households, I did not expect to find evidence that these divisions significantly changed the ways people pooled labor or staple foods. Thus, at both the household and individual levels, I expected to find little internal variation in stable bone isotope values. Finally, I expected to find evidence of simple production in the many small household remains that were located beneath single mounds (Figure 9.2).[1]

Diverse production, unlike simple production, favored an expansion and reorganization of the household labor pool. In diverse production, households organized and participated in more types of productive activities and expanded their staple resource base (see Figure 9.1) (see Douglass and Gonlin, this volume). This economic pattern relied on larger labor pools capable of exploiting a wider variety of raw resources and coordinating more kinds of productive activities. Given the larger labor pool, households following a diverse form of production would have had greater flexibility within the annual agricultural cycle of clearing fields, planting, weeding, and harvesting. The larger corporate households at K'axob could represent such an expansion of the household labor pool. They may have also participated more regularly in hunting terrestrial animals or gathering marine or freshwater resources. I also expected that corporate households, composed of several families, may have developed internal hierarchies that changed the ways that these households allocated and pooled resources as they exploited more staple resources and carried out more kinds of productive activities. As a result, some individuals within these households may have consumed differing proportion of staple foods, either carbohydrates or proteins. If so, then at the individual and household level, stable bone isotope values should be more varied. I expected to find a diverse productive pattern in the larger corporate household remains present beneath basal platform mounds (see Figure 9.2).

Archaeologists document the material remains of residential areas as a basis for defining household phenomena. At K'axob, each household is represented by an occupation, which consists of a single stratigraphic layer, usually the portion of an interior and exterior surface associated with a single residential structure (Henderson 1998, 2003). Residential space at K'axob consisted of structural foundations, such as low plaster floors, that were joined to earthen or plaster exterior surfaces. Excavations habitually uncovered remains of domestic pits, postholes, burials, and cache deposits intruding into structural foundations and exterior surfaces (Henderson 1998, 2003). The seventy-two household occupations identified by this study had these recurrent features, which suggest that these stratigraphic layers were the material remains of habitation spaces (Henderson 1998:73–129). There were three nonresidential occupations documented in this sample, which were special purpose work areas, and these occupations did not have the recurrent features associated with residential spaces (Henderson 1998:42–51). To facilitate household studies at K'axob, I first classified the com-

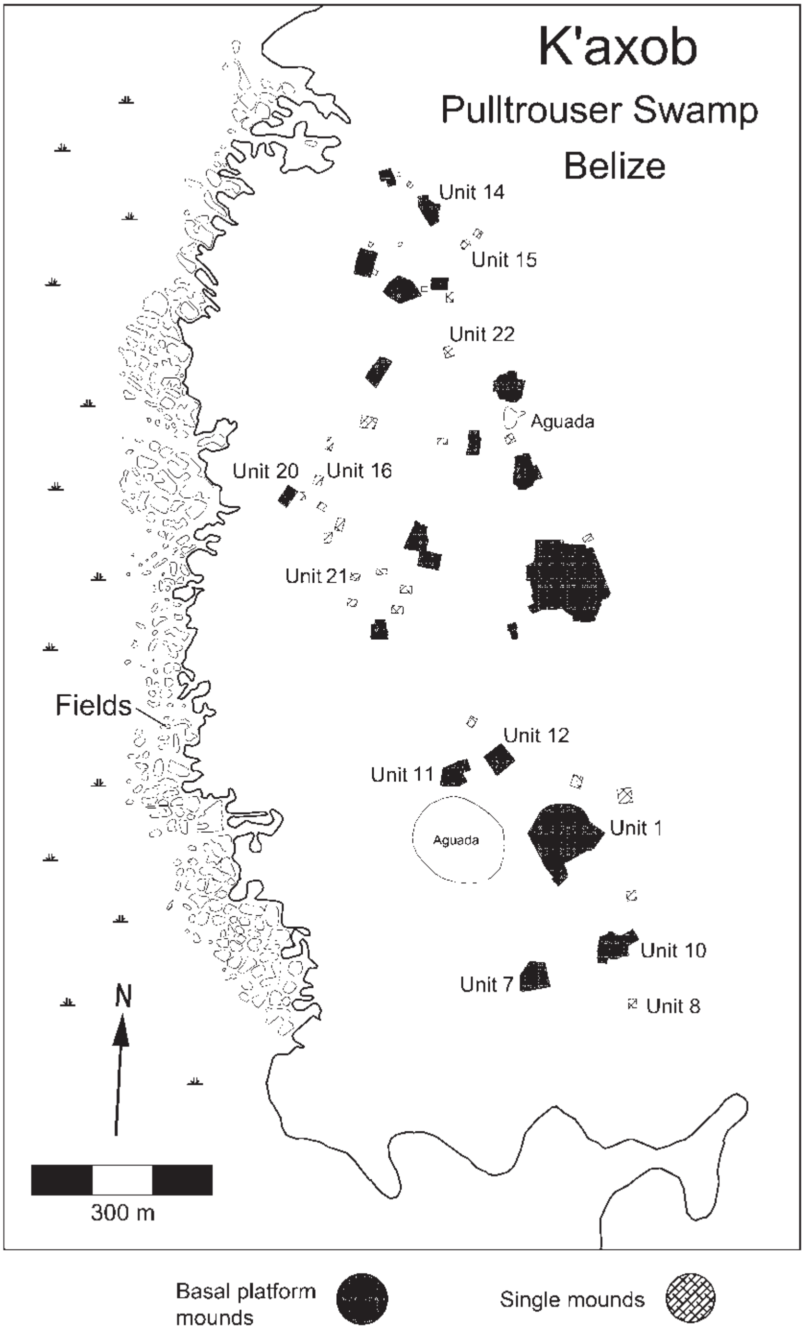

Figure 9.2. Location of excavation units in basal platform mounds and single mounds at K'axob, Belize

plex stratigraphic sequences of superimposed residential structures and ambient exterior spaces from twelve excavations into separate household occupations. In this region, the Maya renovated and rebuilt domestic architecture in the same location so that residences were sequentially built on top of one another (Ettlinger 1983; Hammond 1991; Harrison 1990; Levi 1993; McAnany and López 1999; Pyburn 1987; Sullivan 1991). The presence of superimposed residential structures spanning multiple time periods provided the opportunity to sample and identify households as separate stratigraphic layers. Each excavation unit thus identified from three to eleven superimposed residential occupations, making it feasible to document and compare diachronic changes in households at K'axob. This analysis is inspired by the Harris matrix system that groups temporally related features into an analytic unit called "phases" (Hammond 1993:table 9.1; Harris 1989). The seventy-two household occupations that I defined based on separate stratigraphic layers of residential structures and ambient spaces are the equivalent of a "phase" in the Harris matrix system. This method of analysis is also comparative to the concept of "household series" proposed by Hirth (1993).

Since this study was focused on long-term patterns, I compared households from three broad time periods: the Middle Formative (800–400 BC), the Late Formative (400 BC–AD 250), and the Classic (AD 250–900). A more precise dating of household occupations, such as the average length of each occupation, was beyond the scope of this study. Instead, the household occupations presented here represent periods when the entire residential area was rebuilt.

VARIATION IN HOUSEHOLD SIZES, STAPLE CROP PRODUCTION, AND WEALTH DIFFERENTIATION

This study documented variation in household sizes, staple crop consumption, and wealth differentiation at K'axob (Table 9.1). Based on these findings, I inferred that household production strategies differed between larger and smaller households. Since these subtle differences in staple crop consumption and household size were also related to wealth differences and longer and shorter household occupations, I also inferred that the ability of some households to expand in size, diversify their resource base, coordinate larger labor pools, and produce a wider variety of staple foods was related to household longevity (see Douglass and Gonlin, and González Fernández, this volume). In earlier works, I have argued that households at K'axob, from the ninth century BC to the ninth century AD, were largely independent and that regional elites had only an indirect effect on the production strategies of farming households (Henderson 1998, 2003).

Investigators working in Mesoamerica have drawn on archaeological, ethnological, and ethnohistorical data to distinguish between the spatial arrange-

Table 9.1. Variability in household occupations at K'axob, Belize

Household size	*Mound type*	*Residential spatial pattern*	*Average % of Zea mays in diet*	*Protein consumption*	*Intergroup wealth differentiation*	*Average number of occupations*
Large corporate households	Basal platform mounds	Structures joined to a central plaster patio	24–35%	Adult diets more dissimilar	Elaborate residential architecture	5.3–6.2 occupations
Smaller households	Basal platform mounds and single mounds	Individual structures or several informally arranged structures	34–37%	Adult diets more similar	Simple ground-level residential architecture	2.5–3.0 occupations

Note: Figures are based on mean values at one standard error.

ment of larger corporate households and smaller households (Carrasco 1976a, 1976b; Flannery 1976; Flannery and Marcus 1983; Hayden and Cannon 1982; Ringle 1985; Ringle and Andrews 1988; Wilk 1988, 1991; Winter 1974, 1976). These sources provided a basis for this research because they show that corporate households conformed to a specific patio-focused spatial layout and that corporate households were larger than other types of households (Henderson 1998:130–136). For example, Carrasco documents compound households, or *cemithualtin*, which featured two to four houses around a central patio, in a 1540 colonial census from Molotla, located in Yautepec, a political territory of the Valley of Morelos, which had on average 5.2 married couples and 23.2 people (Carrasco 1976b). The total population range for these corporate households was twelve to thirty-five people.[2] Similarly, Farriss estimates that prior to the Spanish conquest, larger households in the Maya Lowlands contained twenty to thirty adults and children (Farriss 1984:134). Drawing generally on these ethnohistoric sources, I estimate that larger households at K'axob had twelve to thirty-five people (Carrasco 1976b; Farriss 1984). At K'axob, the clearest category of larger households was the large corporate residence, which included two to six structures joined around a paved plaster patio. These were the largest households at K'axob and they were only present in basal platform mounds. I was able to identify the formation of these larger households in excavation units by the presence of a central plaster patio surface that was joined to residential structures, changes in structure orientation that indicated that several structures were reoriented and built around a central patio, and the repetition of this spatial layout in subsequent household occupations within each residential mound

(Henderson 1998, 2003). These three attributes consistently indicated a change in the composite spatial layout and an expansion in the aggregate size of residential areas. Once built, this spatial arrangement was replicated with all subsequent occupations, and I inferred that the formation of these larger households group was lasting.[3] In all, I found that 61 percent of all household occupations from excavations in a total of seven basal platform mounds corresponded to the spatial layout of larger corporate households (Henderson 1998, 2003).

Smaller households at K'axob had a wide range of variation in overall size. For example, I found cases of single residential structures. These simpler and smaller residential areas were common in single mounds and basal platform mounds. I also found cases of intermediate-sized residential areas, which included several informally arranged residential structures. These households differed from the largest households at K'axob because their total area was smaller and because individual structures were not architecturally joined together by a central plaster patio. Even so, in differentiating larger corporate households from all other-sized households at K'axob, I came to realize that large coresidential groups of seven to twelve people, a size range documented for households in the Colonial period for Yucatán (Kurjack 1974:16), were probably common at K'axob. Similarly, based on a 1583 colonial census from Tizimin, Farriss found an average of 9.4 persons per household (Farriss 1984:134). Farming households at K'axob were similar to households in colonial Maya communities that seemed to value large coresidential groups (Wilk 1988; Kurjack 1974:16).

The stratigraphic sequence from excavation Unit 10 is an example of a smaller residence that expanded into a larger household associated with a corporate residence (Figure 9.3).[4] All five occupations correspond to the Late Formative period (400 BC–AD 250). While the first occupation was a nonresidential work area (Henderson and McAnany 1996), the second occupation represents a smaller household that featured a single apsidal-shaped structure built over an earthen ground surface (see Figure 9.3). The third occupation featured a continuous exterior plaster surface, which I interpreted as evidence of the central patio of a larger corporate residence. The fourth occupation had a variety of domestic features intruding into the central patio of the residence: a portion of a structure, a lip-to-lip dedicatory cache, two adult burials, and a domestic pit filled with fire-cracked rocks. The final, fifth occupation featured a central plaster patio surface and a single adult burial. Thus, after one occupation by a small household, residents here built a larger corporate household that persisted for three more sequential occupations. One adult individual, buried in the central patio of this household's last occupation (i.e., Zone 23), was included in the random sample of adults for bone isotope analysis. An analysis of stable bone isotopes from this individual registered a λ^{13}C apatite value of –10.600 percent, which suggests that *Zea mays* accounted for approximately 26 percent of his/her carbohydrate diet.

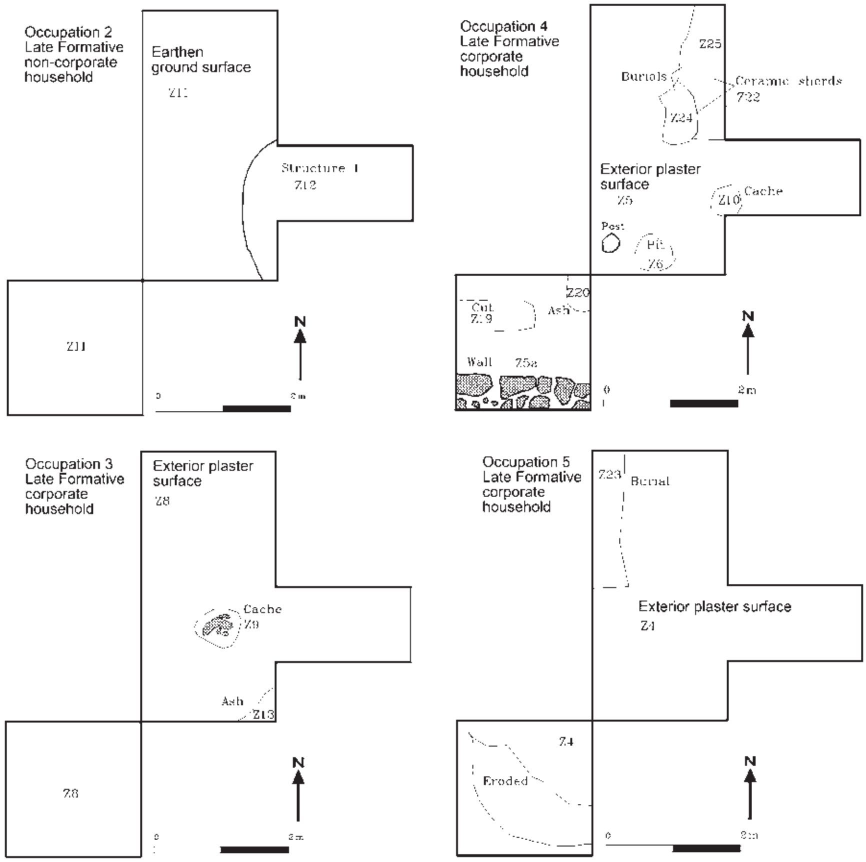

Figure 9.3. Plan view drawings of occupations 2, 3, 4, and 5 from Unit 10, K'axob, Belize

Another example of the transition to a larger corporate household was found in excavation Unit 14, where a series of five smaller households were followed by three occupations of larger corporate households (Figures 9.4 and 9.5). The first four occupations date to the Late Formative period (400 BC–AD 250) and the last three occupations date to the Classic period (AD 250–900). Here, the first occupation consisted of a single posthole and two domestic pits excavated into bedrock. If occupation 1 represents the remains of a residential area, then it was a relatively small household. The next three occupations all consisted of ground-level structures built over earthen surfaces. In particular, Occupation 3 had an unusual number of primary features present in the excavation unit. Four child burials were placed around two small ground-level structures. A multiple burial of a six-year-old and two-year-old was placed in the corner of Structure 2,

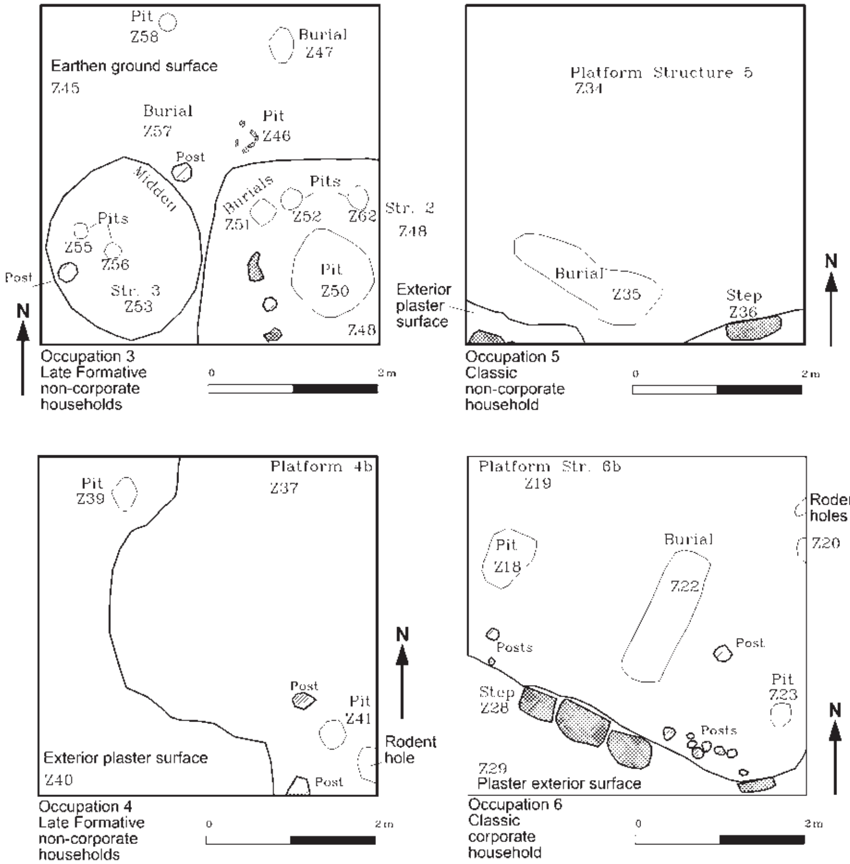

Figure 9.4. Plan view drawings of occupations 3, 4, 5, and 6 from Unit 14: two burials from this sequence might reflect the position of a household head; the first example is the burial of a single adult individual in Z35, which is covered by the steps (i.e., Z28) to Structure 6b; second is the example of the burial of a single adult individual on the central axis of Structure 6b, K'axob, Belize

and a nine-month-old and a one-year-old were interred in the adjoining earthen ground surface. The presence of a midden with animal bones, large sherds of utilitarian pottery, and numerous small sherds was interpreted as a kitchen or food-preparation area of the residence.

The construction of residential space expanded outward with Occupation 5. Excavations documented a rounded platform structure built over a plaster exterior surface. Unlike previous occupations, there were no domestic pits or middens associated with Occupation 5. Despite the presence of a plaster exterior surface, I did not classify this occupation as a larger corporate household because structure orientation did not change with this occupation. Only with

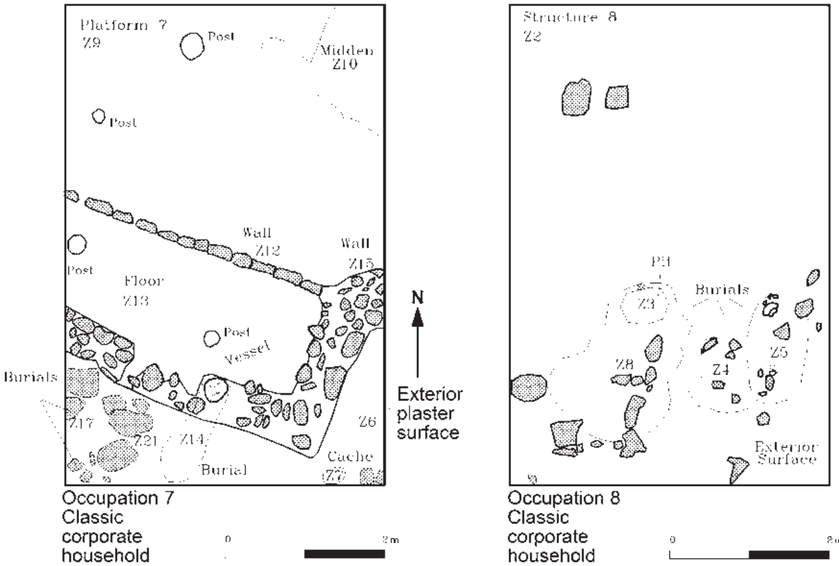

Figure 9.5. Plan view drawings of occupations 7 and 8 from Unit 14, K'axob, Belize

Occupations 6, 7, and 8 was it clear that residential architecture was reoriented to face a central patio area. Residential architecture in these larger corporate households was more elaborate: structure shape was rectangular or square; structural foundations were built as low platforms; and internal divisions within structures indicate a general trend toward more segmented domestic space. Work areas, represented by domestic pits and middens, were not as commonly located inside or next to residential structures. This pattern is common and distinctive in large corporate households, especially those from the Classic period at K'axob (Henderson 1998).

Three adult individuals from Occupations 6, 7, and 8 were randomly selected for stable bone isotope analysis (i.e., Zones 4, 14, and 22). Bone isotope analysis of $\lambda^{13}C$ apatite from the adult interred during Occupation 6 registered a value of –9.200 percent, which suggests that his/her average *Zea mays* intake was approximately 35 percent. The individual from Occupation 7 had a $\lambda^{13}C$ apatite value of –9.600 percent, suggesting that *Zea mays* consumption was around 33 percent. Finally, the individual buried during the final occupation had a $\lambda^{13}C$ apatite value of –10.100 percent, which averages to around 29 percent *Zea mays* consumption.

Stable bone isotope analysis of twenty-five adults from twenty-one different household occupations and dating to the entire occupational sequence of K'axob indicated that all households followed a diverse pattern of production (Henderson 1998, 2003). The mean $\lambda^{13}C$ apatite value of -9.430 ± 0.186 percent at one standard error ($n = 23$) suggests that on average the adult carbohydrate diet featured 34 percent *Zea mays*. Root crops (Bronson 1966; Hammond and Miksicek 1981; Hather and Hammond 1994; Hellmuth 1977; Wiseman 1983a), beans, squash, and a wide variety of tropical fruits (Miksicek 1983, 1991; Wiseman 1983a, 1983b) are staple foods with a C_3 pathway documented for this region that probably rounded out the average adult diet. The average λ^{15}N value for the adult population at K'axob was 9.145 ± 0.144 percent at one standard error (n = 11). The average λ^{13}C collagen value was –14.750 ± 0.242 percent at one standard error (n = 10). Taken together, average λ^{13}C collagen and λ^{15}N collagen values suggest that dog, deer, peccary, and turtles were likely sources of protein for farming households at K'axob (Henderson 1998, 2003; Wing 1981; Wing and Scudder 1991; Wright and White 1996). These findings are similar to dietary reconstructions for adult populations from the nearby sites of Cuello and Laminai (Tykot, van der Merwe, and Hammond 1996; White and Schwarcz 1989). These results are also similar to other studies of Maya populations with δ^{13}C apatite data, which suggests that *Zea mays* formed only about 30 to 55 percent of the average carbohydrate diet (Gerry and Krueger 1997:202; Tykot, van der Merwe, and Hammond 1996:359). Finally, temporal analysis of adult diets from the Middle Formative, Late Formative, and Classic periods indicates that production and consumption of staple foods varied little through time. I did not find significant differences in λ^{13}C apatite, λ^{13}C collagen, or λ^{15}N collagen values in average adult diets by time period (Henderson 1998, 2003). These results suggested that on average all-sized households followed a relatively diverse pattern of production from the ninth century BC through the ninth century AD. Household decision making and long-term production strategies were not as varied as I had originally imagined.

Even so, I did find evidence of subtle economic differences between larger and smaller households at K'axob, which suggests that household decision-making strategies differed slightly in terms of the number of resources exploited and labor organization. Larger corporate households followed a more diverse pattern of staple crop production than all other-sized households (Figure 9.6). The mean λ^{13}C apatite value of –10.050 ± 0.849 percent at one standard error (n = 8) for corporate households suggests that, on average, adults from these households consumed 30 percent *Zea mays*. The mean λ^{13}C apatite value of adults from all other-sized households of –9.100 ± 0.193 percent at one standard error (n = 15) means that, on average, adults from these households consumed 36 percent *Zea mays*. The 0.950 percent difference between larger and smaller households is significant ($t = -2.733$, $df = 21$, $p = 0.011$). Moreover, the 6 percent average difference in *Zea mays* consumption is meaningful because it is nearly one-fourth of the average variation documented for the entire Maya region using δ^{13}C apatite values (Gerry and Krueger 1997:202; Tykot, van der Merwe, and Hammond 1996:359). This is the first archaeological study to show that individual dietary differences can be explained by examining variation in household labor organi-

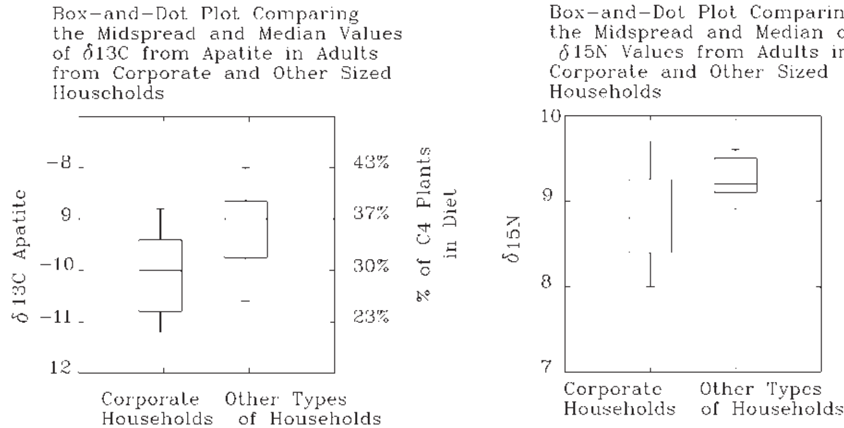

Figure 9.6. Comparison of box-and-dot plots for λ^{13}C apatite and δ^{15}N values from adults associated with corporate and smaller households, K'axob, Belize

zation and household size. In this case, a household-level analysis that considers how households internally managed labor and resources helped to understand variation in adult diets and subtle economic differences in the ways larger and smaller households managed resources and labor. Moreover, these findings suggest that the model of the household as a cooperative task group is appropriate for describing past households from K'axob.

Were these larger corporate households more internally stratified? I found evidence that suggests differences among individual household members in larger corporate households, for the standard errors of λ^{13}C apatite, λ^{13}C collagen, and λ^{15}N collagen values were larger in corporate households than in all other households. For example, the mid-spread of adult λ^{15}N values in corporate households is more than twice as wide as that for adults from smaller households (see Figure 9.6). This difference means that adult diets in corporate households were more heterogeneous than those in other-sized households. Adults from corporate households were less likely to consume the same proportions of C_3 plants and the same amount or quality of proteins. This study falls short of showing how food was unequally distributed within larger households. Indeed, more research is needed to show how food preparation and redistribution within households may have changed with the formation of larger corporate households. Future investigations could expand on these finding by systematically examining dietary variation in adults from the same household. Ethnohistorical sources from Mesoamerica explain various arrangements that resulted in intrahousehold differentiation (Carrasco 1976b; Evans 1993; Farriss 1984:132–239; Lockhart 1992: 59–93; McAnany 1995; Williams and Harvey 1997:42–48). By combining more detailed dietary analysis with specific models on internal household organization, future research could explain the extent to which internal stratification influenced individual dietary patterns.

An additional source of variation between larger and smaller households was related to length of occupation. Some of the smallest households at K'axob, those found in single-mound locations, followed a less diverse production pattern with each household occupation. There is a moderately strong correlation between length of occupation (*X*) and $\lambda^{13}C$ apatite values (*Y*) ($r = 0.690$, $p = 0.021$, $y = 0.896x—10.950$). Length of occupation helped to explain 69 percent of the variation in $\lambda^{13}C$ apatite values in households located beneath single mounds. These findings suggest that some of the smallest households at K'axob had a more restricted productive capacity that made a diverse pattern of staple crop production more difficult to maintain with each sequential occupation. The long-term differences in the production of small households indicate different household productive strategies within the general context of diverse production at K'axob. While larger households were able to further diversify production, smaller households were unable to maintain a diverse productive pattern. McAnany has suggested that these smaller households had less access to agrarian resources during the Classic period (McAnany 1995).

Surprisingly, I also found that subtle differences in staple crop production and household size were related to long-term patterns in wealth differences between larger and smaller households at K'axob. These results suggest that the ways households internally managed labor and resources were related to wealth inequality. For example, larger corporate households on average built low platforms and used *sascab* construction fill, quarried from bedrock, to construct more elaborate residences. On average, 70 percent of corporate households in this sample used *sascab* construction fill compared to the 17 percent of other households that had *sascab* construction fill ($X^2 = 21.20$, $p = 0.0005$, $v = 0.63$). Similarly 63 percent of corporate households in this sample had platform structures and only 16 percent of other households had platform structures ($X^2 = 12.12$, $p = 0.0005$, $v = 0.49$). These labor-intensive construction techniques first occurred during the Late Formative period and coincided with the formation of corporate households. Additionally, corporate households featured a longer sequence of occupations. On average, larger corporate households ($n = 25$) had 5.84 occupations and other-sized households ($n = 34$) had 2.5 occupations ($t = 5.926$, $df = 57$, $p = 0.0005$). Larger residential groups were better able to socially and economically reproduce themselves through time and to continue constructing their houses over those of their ancestors (McAnany 1995). Smaller households, on the other hand, were less likely to rebuild their residences in the same location. Slight differences in household productive strategies had different long-term consequences for larger and smaller households.

THINKING ABOUT HOUSEHOLD LONGEVITY

What I find interesting about these results is the idea that the ways household members pooled labor and resources to maintain a diverse pattern of staple crop production did not necessarily result in household longevity or prosperity. To understand why larger households at K'axob had more long-term success than smaller households we need to ask what made these groups more resilient and prosperous. Why did larger households have on average double the number of occupations of smaller households? We also need to ask why a more diverse pattern of production was not as tenable for smaller households. These issues are explored and questions raised for future research about household leadership.

As a general observation, larger labor pools gave larger corporate households more economic flexibility. Beginning in the fourth century BC, these larger households were able to participate in a wider range of productive activities. While some scholars have noted that prehistoric farming households were limited by a narrow range of economic opportunities or were inherently conservative regarding production strategies (Hirth 1993; Sahlins 1972), the results of this study suggest that farming households were able to diversify staple crop production. It is important to note, however, that changes in household production were subtle. The production of staple foods was stable in this community from the ninth century BC through the ninth century AD. The formation of larger households beginning in the fourth century BC meant that some households were able to expand an already diverse productive pattern. Other households had more difficulty producing a diverse array of staple plant foods. In this regard, control over larger labor pools gave larger households at K'axob an advantageous flexibility that contributed to their general prosperity and longevity.

The slow formation of larger households at K'axob also lends support to the argument that larger households were able to expand production for their own prosperity. While some larger households began forming during the Late Formative period, they did not become common until the Classic period at K'axob (Henderson 1998, 2003). This gradual pattern differs from that at other lowland Maya Late Formative communities such as Cuello and Komchen (Hammond 1991; Ringle and Andrews 1988), where larger corporate households formed more rapidly. At K'axob, changes in household composition, production, and wealth inequality coincided with the emergence of regional elites at the nearby communities of Nohmul and San Estevan, but the slight nature of these changes suggests that the staple foods that households produced and how they managed production were local affairs and not the prerogative of regional elites. If regional elites had directly controlled staple crop production, I would expect to see more corporate households forming during the Late Formative period and greater changes in the production of staple foods, especially the increased production of staple crops such as maize.

I also suspect that the formation of these larger households involved a social change in the formal composition of the household that contributed to the resiliency of larger households. The architectural pattern of two to six structures physically joined around a central patio area meant that the way households expanded or rebuilt was more structured and restricted. In other households, individual residences were not connected to one another and new residences could always be built closer or farther from existing residential structures. I think that this architectural difference is indicative of differences in the internal leadership and the cohesiveness of larger households. Leadership and authority may have differed from other households in two ways. First, I suspect that household leaders were more successful in coordinating how household members pooled labor, diversified their resource base, and redistributed resources within the group. Second, household leaders probably managed inheritance in such a way that permitted larger coresidential groups to more easily reproduce themselves through time. Household leadership in corporate households was potentially more multifaceted than leadership in smaller households. Future research could expand upon ethnohistorical sources that describe intrahousehold inequality and differentiation to better understand leadership within larger households (Carrasco 1976b; Evans 1993; Farriss 1984:132–239; Lockhart 1992:59–93; McAnany 1995; Williams and Harvey 1997:32–48; see Wiewall's discussion of ethnohistoric source descriptions of household organization later in this volume).

The formation of larger corporate households also seems to have coincided with a more hierarchal internal structure. Why would a more hierarchal social structure facilitate household prosperity and longevity (Wilk 1989)? This organization, while not equally favoring all household members, may have contributed to household longevity if leaders were successful in generating consensus within the household and in defending the household's rights and obligations within the community or larger region. For example, household leaders may have wielded more influence within lineages eager to maintain resource rights (McAnany 1995) or in community decisions, such as when to plant crops (Wilk 1991), beginning in the fourth century BC. If this was the case, then a household leader or group of leaders of corporate households may have had privileged positions in mediating rights and obligations within their communities that better responded to the needs and interests of larger households. Farriss (1984:139) has noted that there is no contradiction between a corporate group that shares a set of reciprocal rights and obligations and a hierarchically ordered group that recognizes a central authority that mediates these rights. If this kind of internal differentiation can be demonstrated for larger households at K'axob, then future investigations have the potential to show whether leadership strategies and economic flexibility gave the largest households at K'axob an advantageous position within their communities that smaller households were unable to achieve or perpetuate from one household occupation to the next.

The spatial location of several tombs in larger corporate residences seems to support the idea of internal hierarchies, a household head, or a single high-status individual. These adults are buried beneath the entrance to residences or along the central axis of residences. In the stratigraphic sequence from Unit 14, a tomb of a single adult was capped by three large stones, which served as the steps or entryway into Structure 6 (see Figure 9.4). Here the construction of residential architecture and the tomb of one high-status individual are conjoined. Following this construction episode, another high-status adult individual was buried along the central axis of Structure 6. Both of these burials were incorporated as central elements in residential architecture and featured elaborate burial treatment, which included stone-lined crypts and several ceramic vessels. In Occupation 8, the final residence documented by Unit 14, three burials were placed on the front of a residential structure, but only one of these (Zone 8) featured a partial stone crypt (see Figure 9.5). Moreover, this tomb was later entered and the cranium of the adult individual was removed (Zone 3), a practice associated with ancestor veneration among the lowland Maya (McAnany 1995). These three different burial contexts are what I would expect to find if internal hierarchies were important to larger corporate households at K'axob.

If the ways those larger households managed resources and labor was related to the elaboration of household leadership positions, future research would need to demonstrate the presence or absence of similar internal hierarchies in smaller households. If the shorter occupational histories and reduced capacity of single-mound households to diversify production with each occupation was related to relatively weak internal leadership and a less-unified social group, the tombs of adults should show different spatial patterning and should be less elaborate than those from larger corporate households. Larger horizontal excavations are needed to better understand the spatial location and differentiation of burials in these smaller households.

The results of this research are not conclusive but they suggest that archaeological studies of households can benefit from an internal focus that considers the multiple ways in which households may make decisions. Subtle and gradual changes in household size and production were related at K'axob, even though long-term patterns in household size and staple crop production were stable from the ninth century BC through the ninth century AD. The prosperity of larger households, beginning in the fourth century BC can be understood, in part, as a function of their ability to manage larger labor pools and coordinate a wider variety of productive activities and resources. Future research should build on these results by asking whether these larger corporate households were internally more hierarchal and whether a household head or a privileged group of individuals managed economic and political relationships in a way that enhanced household productivity and longevity. Complementary lines of data on household production, especially the role of craft production (see Henderson 2003), would greatly enhance the information and analysis presented here.

SUMMARY AND CONCLUSIONS

I have argued that Wilk and Netting's original emphasis on the manifold relationships between household structures and activities is in the spirit of current studies into group-level agency (Dobres and Robb 2000) or subject-centered analyses (Brumfiel 1992); in Wilk and Netting's work, households are creative and dynamic social formations. I have also argued that meaningful archaeological applications of this model require archaeologists to consider more critically how households coordinated basic tasks before they embark on reconstructing activity spheres. The research agenda on household phenomena should include a direct questioning of the relationships among household structures, activities, and longevity. This perspective enabled me to identify two general household productive strategies with different long-term consequences for larger and smaller farming households at K'axob, Belize.

I realize that some scholars may argue that the long-term patterns and the group-level agency presented here ultimately tell us little about specific practices or household decision makers. Some will not be satisfied with the idea that larger households prospered by producing more staple foods with a C_3 pathway from the fourth century BC onward. For those interested in recovering a sense of individual narratives and action in past societies (i.e., Hodder 2000), productive strategies that are the cumulative result of habitual practices and many annual agricultural cycles may be too far removed from what farmers and households at K'axob actually did at different historical moments to be of much relevance. Nonetheless, questions of agency and practice, recognized by many as a "good thing" for current theory, stem from different theoretical approaches (Brumfiel 2000; Dobres and Robb 2000), and the long-term perspective is justified for several reasons. First, our own assumptions about agency and structure, and individuals and social groups, may delimit to some degree our own ability to recognize unique social arrangements, behaviors, and consequences. I found, for example, that in an economic sense, households at K'axob were less "creative" than I had originally assumed when I proposed simple and diverse production. The small differences found in household size and staple crop production were something of a surprise since I did not expect to find such a conservative pattern of household organization or production. However, once I identified these historical patterns, I was better able to appreciate the subtle variations between smaller and larger households. I could understand both smaller and larger households in terms of the ability of some groups to elaborate on existing cultural practices and the inability of other groups to maintain these cultural practices. This awareness enriched my perspective on household prosperity. Here the concept of prosperity encompasses the ability of some households to further elaborate on traditional agricultural practices and knowledge oriented to a wide variety of plant and animal foods and to pass on the ability to carry out such practices to subsequent household generations. Only the largest households at K'axob attained this level of prosperity. One conclusion is that household studies and theories of agency in general are more fully realized through the reconstruction of long-term patterns.

Second, as Wilk and Netting note, household structures are often "compromises" among different and sometimes "contradictory imperatives" (Wilk and Netting 1984: 20). This observation means that the identification of specific practices, individual intentions, or a group's rationality may singly never fully explain household phenomena, which is characterized by uncertainty as well as purposeful actions. Thus, if we are to understand households in terms of what they do, we must also consider how household members coped with opposing intentions and needs. This consideration means we will need a robust sense of agency when examining households. More explicit questions concerning the internal composition of households are needed in archaeological reconstructions to better understand the degree to which mutual cooperation and the negotiation of different interests were characteristic of household phenomena. Furthermore, the research presented here, while not conclusive, provides contextual information that could inspire smaller-scale analyses of individual or group practices. A long-term theoretical approach informs rather than excludes smaller scales of analyses.

Finally, I conclude by saying that Wilk and Netting's notions about studying households in terms of what they do is a forceful proposition that should continue inspiring and challenging archaeologists to investigate household phenomena. Wilk and Netting challenge us to understand households on their own terms. The proposition that households and their members act not only in reference to larger macro-processes and institutions but according to their own particular histories, conflicts, concerns, and aspirations is a generous theoretical proposal for all scholars interested in understanding past households.

NOTES

1. The fields represented in Figure 8.2 are raised fields located in Pulltrouser Swamp that bordered the settlement. Excavation units, which generally measured from sixteen to forty-eight square meters, were positioned within the residential mounds that are depicted here (see Henderson 1998:table 2.1). Thus, this figure indicates the basal platform mounds and single mounds that were selected for excavations.

2. Carrasco labels five households labeled as *cemithualtin* and eleven households that shared kinship and economic relationships as "compound households." I suspect that the *cemithualtin*, which literally translates as "those of one patio," referred to the specific spatial layout of corporate households identified by this study. These five households

had populations of 35, 17, 30, 17, and 39, thus averaging 27.6 individuals per corporate household (Henderson 1998:135).

3. Household sizes may change because of family growth cycles, postmarital residential obligations, differential demographic rates within populations, and even random factors (Hammel 1984). These fluctuations in household sizes and the reasons that larger households formed are not the subject of this study.

4. To conform to the Harris matrix system, each feature at K'axob was given a zone number. Thus, the earthen ground surface from excavation Unit 10 and Occupation II is numbered Zone 11 and is depicted in Figure 8.3 as Z11. Moreover, while occupation numbers are represented in these figures as I, II, and III to conform to the Harris matrix system, in the text they are written as one, two, and three.

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TEN

Late Classic Period Terrace Agriculture in the Lowland Maya Area

Modeling the Organization of Terrace Agricultural Activity

L. THEODORE NEFF

INTRODUCTION

The subject of this chapter is the organization of Late Classic period (ca. AD 550–800) ancient lowland Maya terrace agricultural activity. Agricultural terraces are embankments, typically constructed of stone but at times made of wood or augmented by living plants, placed perpendicular to hill slopes or drainages for the purpose of conserving or catching soil and catching or channeling runoff. Terraces are beneficial to agriculture because they create areas of wetter and deeper soils that are more conducive to plant growth (Beach et al. 2002:379; Donkin 1979:2; Kunen 2001:326; Treacy and Denevan 1994:95; Turner 1983). Terraces also allow greater cropping frequency than would otherwise be possible in hilly terrain and are thus typically associated with the process of agricultural intensification (Chase and Chase 1998; Dunning and Beach 1994; Healy et al. 1983; Johnston 2003; Kunen 2001; Murtha 2002; Neff 2008; Turner 1983). The ancient Maya civilization was located in what today is eastern and southeastern Mexico, Guatemala, Belize, and western Honduras (Figure 10.1). The Maya area is typically divided into highland and lowland zones with the highlands

Figure 10.1. Eastern Mesoamerica showing the study area location

consisting of the mountainous areas of Mexico, Guatemala, El Salvador, and Honduras to the south and the rest of the terrain forming the lowlands to the north. Maya civilization began with the occurrence of early agricultural villages around 1500 BC and was decimated with the Spanish conquest in the early part of the sixteenth century. During the period running from ca. AD 550 to 800, known as the Classic period, Maya civilization was at its height in terms of population, sociopolitical complexity, and agricultural intensification.

Relic terraces are common features in the lowland Maya area (Dunning and Beach 1994; Kunen 2001; Turner 1974, 1983), as well as the rest of the Americas (Donkin 1979), and have been recognized as such since the first half of the twentieth century. Indeed, as early as 1936, as part of the Michigan-Carnegie Botanical Expedition to British Honduras (Belize), Cyrus Lundell observed numerous agricultural terraces on the Vaca Plateau in the far west-central part of the country. "On one hillside I counted no less than 51 terraces, and this was not an exceptional condition" (Lundell 1940:9). Lundell's observations confirmed those of Ower (1927) and Thompson (1931), who had visited the same area a decade or so earlier, and all three concluded that the terraces were remains of the ancient lowland Maya civilization. Lundell (1940:11) made the following remarks about what these features indicated about the agricultural system employed by the ancient Maya:

> That a shifting type of agriculture, such as the milpa system, would be employed in a terraced area is unbelievable. The building of stone retaining walls and the filling-in with soil call for an investment in labor which would not be expended for a form of agriculture where the land would be abandoned for eight to twelve years after one or two crops. Terracing indicates continued occupation of land and at least a form of semipermanent agriculture.

In the five-plus decades since the publication of Lundell's remarks, ongoing settlement-pattern research has confirmed his observation regarding the Vaca Plateau area of Belize, as well as for numerous other parts of the lowland Maya area. Numerous agricultural terraces have been documented as dispersed among Late Classic period (ca. AD 550–800) structures (Chase and Chase 1998; Dunning and Beach 1994; Fedick 1994; Healy et al. 1983; Kunen 2001; Murtha 2002; Neff 2008; Turner 1974, 1979, 1983). Agricultural terraces make up roughly half or more of the surface-visible settlement traces in many areas (see Ashmore et al. 1994; Neff 2008; Neff et al. 1995) and constitute a substantial component of the built environment, along with residential and civic-ceremonial architecture.

Because of the large number of agricultural terraces associated with households in many parts of the lowland Maya area, agricultural activity associated with them must be an important component of household production. Beginning with the pioneering work of von Thünen in 1826 and continuing to the present, research on preindustrial, small-scale agrarian landscapes indicates that distance to fields is a primary variable regarding land use. Working with this premise, researchers in Mesoamerica have proposed models that characterize agrarian land use from an all-encompassing, top-down landscape perspective, as well as from a more focused, bottom-up household viewpoint. These perspectives tend to characterize agricultural areas adjacent to and interspersed among households, areas that often contain agricultural terraces (Chase and Chase 1998; Fedick 1994; Healy et al. 1983; Kunen 2001; Murtha 2002; Turner 1983; Wyatt 2005), as either zones of permanent or semi-permanent cultivation from the perspective of the larger landscape or as garden areas beyond the core area of the household. This chapter focuses specifically on these permanently cultivated areas. Little research, in particular archaeological excavation, has focused on the agricultural terraces that make up large portions of these zones in many parts of the lowland Maya area. In an effort to address this lack of research attention, a model positing a spatial continuum of terrace agricultural activities outside of the core area of the household is presented. Points along this continuum are defined as "adjacent agricultural space," "transitional agricultural space," and "outlying agricultural space." The model is evaluated using terrace excavation data from areas near Dos Chombitos, a lowland Maya minor center located in far west–central Belize, Central America (see Figures 10.1, 10.2, and 10.3). The result is a successful preliminary test of the model and illustration of its usefulness. The overarching goal of this study is to lay the groundwork for further research on the organization of terraced agricultural activity.

BACKGROUND

Two extant models provide points of departure in formulating the model of terrace agricultural activities in relation to the household. Patricia McAnany's (1995:69–78) biotic continuum model provides perspective from the larger landscape viewpoint. She defined points along a continuum running from the household out into the surrounding landscape. At one end, the continuum is anchored by pristine rain forest. This term is meant to designate forest areas that have not been affected by human activity. McAnany (1995:69) notes, however, that it is unclear what constituted "pristine" rain forest during the Maya Classic period (ca. AD 250–900) because macrobotanical and pollen evidence indicate a high rate of deforestation during this time. The next point on the continuum consists of lands that are part of a fixed-plot farming system with varying rates of fallow. McAnany (1995:69–70) describes this zone as an "ecotonal band along the continuum from forest to field." Even though such lands may have been left fallow for a considerable period—long enough to look like true forest or pristine forest—their composition is such that they reflect the impacts of human use, such as the increased presence of economically valuable species. Fields that are currently in cultivation but are prone to intermittent fallow constitute the next point along the continuum. With regard to proximity to residences (household core areas), these areas are not infields (Turner and Sanders 1992:266–267) but are located

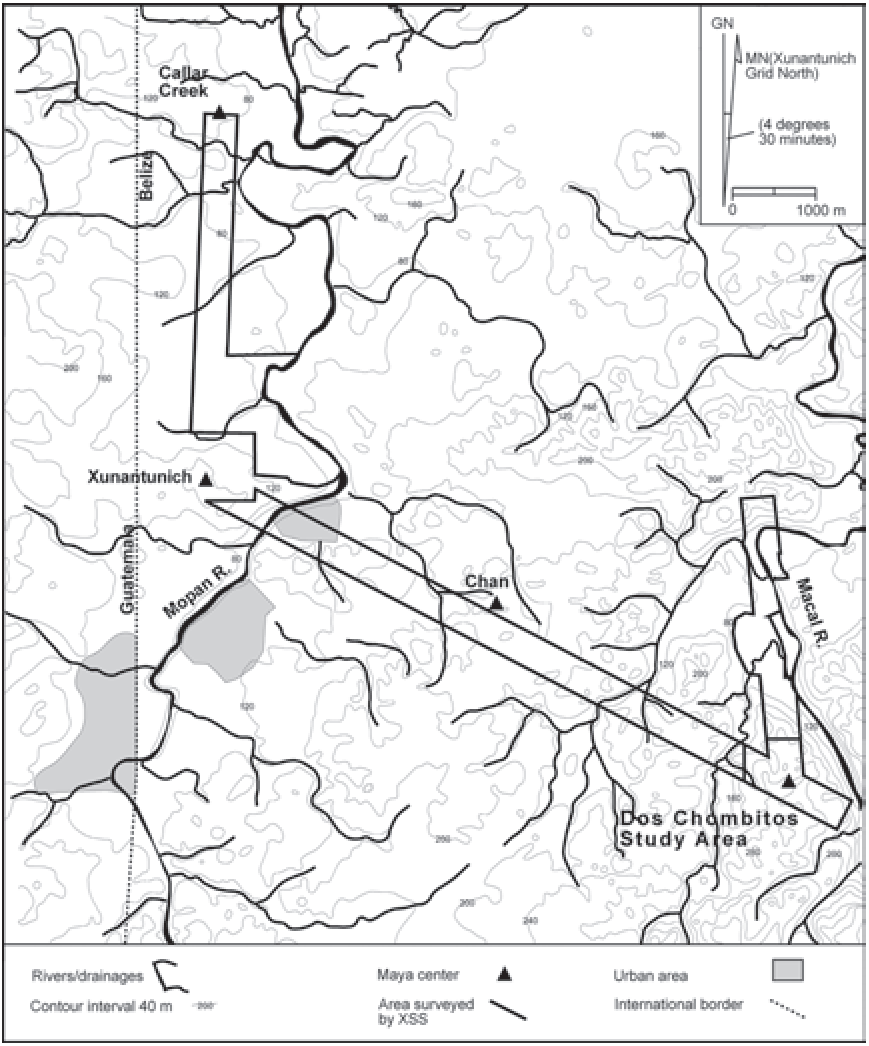

Figure 10.2. Area surveyed by the Xunantunich Settlement Survey (XSS) in the upper Belize River valley area (the Dos Chombitos study area is marked)

at distances of an hour or more away without the aid of modern transportation (McAnany 1995:72). The other end of the continuum is composed of permanently cultivated fields, gardens, and orchards (McAnany 1995:74). These areas "envelop the house and are so thoroughly managed and continuously cropped that the term 'field' seems to be a misnomer" (McAnany 1995:77). Included in this category are features used to reclaim marginal lands, such as the use of agricultural terraces on steeper slopes.

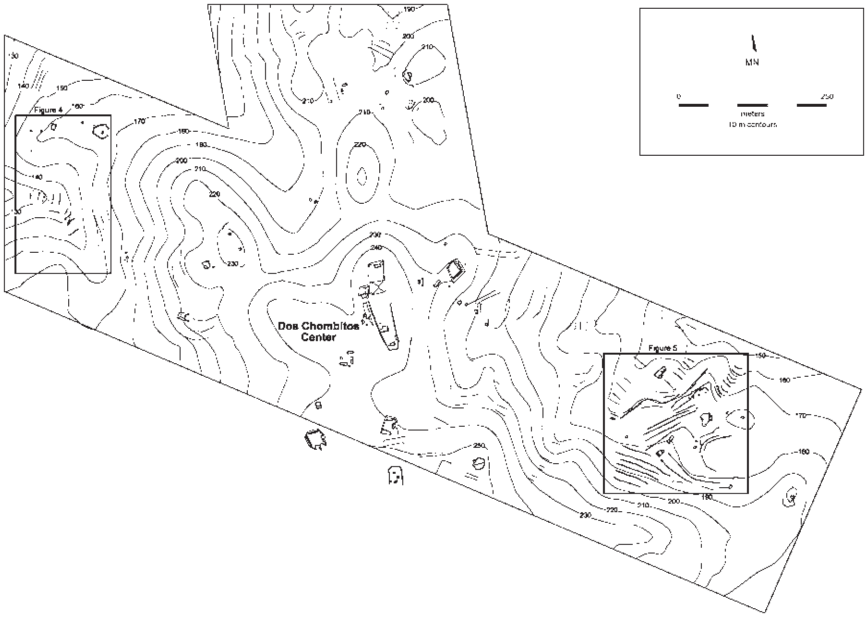

Figure 10.3. Area surveyed by XSS near the minor center of Dos Chombitos (intensive mapping and excavation areas are marked)

Perspective from the household scale of analysis is provided by Thomas Killion's (1992b:124) houselot model. According to this model the ideal configuration of a Mesoamerican houselot consists of "the structural core, a clear area of debris-free space surrounding the core, an intermediate area of fairly concentrated refuse enclosing the clear area, and a peripheral garden of mixed vegetation and debris" (Killion 1992b:124). The model specifies that clear spatial and material patterns are present around household structures, resulting from the maintenance of clear and trash-filled areas. Additionally, Killion made several important general points regarding the spatial and material properties of small-scale agricultural systems. First, Killion (1992a:4) noted that a lot of cultivated space is also heavily used residential space, and therefore it reflects material traces of both cultivation and habitation. Second, he stated that "as population reached progressively higher levels within circumscribed territories . . . more uniformly intensive systems of production would have replaced the infield-outfield structure" (Killion 1992a:6). Research in the lowland Maya area suggests that this process occurred during the Late Classic (ca. AD 550–800) period (Drennan 1988; Dunning and Beach 1994; Johnston 2003; Neff 2008; Sanders 1981; Turner 1983). Third, Killion (1992a:7) observed, following von Thünen (1966 [1842]), that a basic characteristic of an agricultural system is distance between residence and field. Farmers locate the most labor-intensive farming practices as close to residences as possible to reduce labor costs. Therefore, "the differential use of nearby or more remote locations requires different groups of people provisioned and organized for a different set of tasks" (Killion 1992a:7).

How can the biotic continuum and houselot models, coupled with Killion's observations about the spatial and material properties of small-scale agricultural systems, aid in conceptualizing the organization of terrace agricultural activity in the Maya Lowlands? Beginning with the houselot model, Cynthia Robin (1997:4; 1999; 2006) conducted research on the specific layout of houselots in the vicinity of the Chan center located ca. four kilometers to the east-northeast of the Dos Chombitos area (see Figure 10.2). Her research provides information on the actual layouts of houselots near the Dos Chombitos study area and how they relate to the ideal constructs of the houselot model. Her research documented these distinct areas: (1) a mostly artifact-free area (except immediately adjacent to structures) in the form of a fifteen- to twenty-meter radius around structures (the cleared area around each house structure or the structural core); (2) an area of increased artifact density along the edge of this radius (the intermediate area of fairly concentrated refuse enclosing the clear area); and (3) a generally artifact-free area beyond this (the garden area). Robin also noted that low densities of artifacts were found adjacent to agricultural terraces and *chultunob* (subterranean storage pits). In the specific instances that Robin studied, agricultural terracing occurred beyond the fifteen- to twenty-meter-wide ring around house structures. Robin's work demonstrates the usefulness of the houselot model for conceptualizing activity in the vicinity of household core areas. With respect to the houselot model and agricultural terracing, the following question may be asked, within houselot garden areas, which include terracing, is artifact patterning indicative of different kinds of agricultural activities? The answer is that it is not immediately apparent how the specifics of Killion's houselot model—the density of artifact assemblages indicating areas of specific activity like trash disposal or maintaining cleared spaces—apply to terraced space in the vicinity of household core areas.

The definitions of two terms, "household core" and "residential agricultural space," are important in modeling the organization of terrace agriculture activity. These terms make a distinction between space where exclusively agricultural activities likely occurred and where they likely did not. By making this distinction, analytically meaningful space is defined, from the perspective of agricultural terracing, at the intersection of Killion's houselot and McAnany's biotic continuum models. The household core consists of both the houselot structures and the fifteen to twenty meters of cleared space that surrounds them. Thus, the term combines two of Killion's houselot model terms, the structural core and the surrounding area of cleared space, and designates a specific-sized area based on Cynthia Robin's research. The terrain outside of the household core, together with the area that contains the majority of the agricultural terraces, is called residential agricultural space. Put another way, residential agricultural space is the "sea" that contains numerous household core "islands." Residential agricultural space is a combination of Killion's ring of refuse and peripheral garden area of mixed vegetation and refuse, as well as McAnany's permanently cultivated fields, gardens, and orchards. I utilize the terms "residential" and "agricultural" to describe the space instead of "houselot" or "domestic" because I want to emphasize that primarily agricultural activities were taking place here within a larger spatial context composed of both agricultural and domestic space.

The concept of the household core embodies an important distinction with respect to the similar-sounding and previously discussed "structural core" of Killion's houselot model. The latter term has a structural, in the built-environment sense, connotation. This follows from the standard definition of the ancient Maya household, which is a single structure or a group of several structures in which the structures composing the group are closer to one another than they are to adjacent isolated structures or groups (Ashmore 1981:47–49). However, it is assumed, and has been demonstrated archaeologically (Johnston 2002; Killion 1992b; Robin 1999), that the spatial footprint of the ancient Maya household is larger than its surface-visible structures. Killion's houselot model defines the household as consisting of a number of different parts, one of which is the structural core, which consists of the structure or structures of the household. According to this conceptualization, the structural core, as well as the surrounding cleared area and ring of trash, are not areas where agriculture occurred or agricultural activities took place. Rather, agricultural activities occurred in the garden areas beyond the ring of trash.

The houselot model, however, while critically valuable from the heuristic standpoint, is conceptually problematic with regard to households that are associated with agricultural terraces. The conceptual problems have to do with the specific spatial components of the houselot in relation to the terracing that surrounds and intermingles with many ancient Maya households and also the underlying premise of von Thünen that agricultural activities are governed by the law of diminishing returns with distance (Butzer 1982:216). In the households considered for this study, terraces are present not only in the garden area where agriculture and agricultural activities took place but also in the ring-of-trash area where refuse disposal occurred and even occasionally in the cleared area where non-agricultural activities are assumed to have taken place. As per the houselot model, the basic assumption is that agricultural activities took place in the garden area but not in the ring-of-trash and cleared areas. The presence of agricultural terraces, on which agriculture and agricultural activities took place, in parts of the household where the houselot model generally infers they did not occur is problematic. A way through this conceptual logjam is to define areas of the household where agriculture and agricultural activities were likely to have taken place, including agricultural terracing (residential agricultural space), versus areas where they were unlikely to have occurred (household core).

THE MODEL

Figures 10.4 and 10.5 illustrate the delineation of household core space (not shaded) from surrounding areas (shaded) in two areas near the Dos Chombitos center that contain domestic and terrace architecture (see Figure 10.3 for the location of these areas). The surrounding space contains the vast majority of the agricultural terraces and is the area where agricultural activities took place. Importantly, this is the area where von Thünen's premise, that agricultural activities are influenced by distance from the edge of the household core, is operative. This space needs some kind of a label, but what should it be? Killion's houselot model conceptualizes the extra-household core space as areas of refuse and peripheral gardens of mixed vegetation, and McAnany's biotic continuum model conceptualizes it as part of a larger area of permanent cultivation. Neither of these conceptualizations is appropriate for the task at hand, which is defining the types of activities that took place. They were not, with respect to Killion's houselot model, phrased with terracing in mind or specifically phrased to delineate space where agricultural activities took place from space where they did not. Further, the scalar perspective of McAnany's biotic continuum model is too coarse-grained. Despite these specific shortcomings, aspects of these models are quite important to the initial model-building process that is the subject of this chapter (see below).

The term "residential agricultural space" is chosen as the label for the extra-household core space. "Residential" is used as opposed to terms like "houselot" or "domestic" because it is unclear which portions of residential agricultural space is actually part of the houselot. In fact, just as the distinction between infield and outfield is neither appropriate nor useful in the lowland Maya area (Drennan 1988; Sanders 1981), the distinction between household agricultural space (areas outside of the household core) from non-household agricultural space is not useful either. The critical variable is distance from household core areas out into terraced residential agricultural space. "Agricultural" is preferred over terms such as "garden," "orchard," or "field" because these terms have spatial implications with respect to domestic areas or connote the kinds of plants grown. The model needs to be flexible enough to account for agricultural activities and specific modes of plant husbandry that do not fit into preconceived notions about household agricultural production.

The next step in the model-building process is to conceptualize residential agricultural space in such a way that von Thünen's premise may be applied. Two points are important with respect to this conceptualization. First, residential agricultural space is conceived as representing a continuum, not an area divided

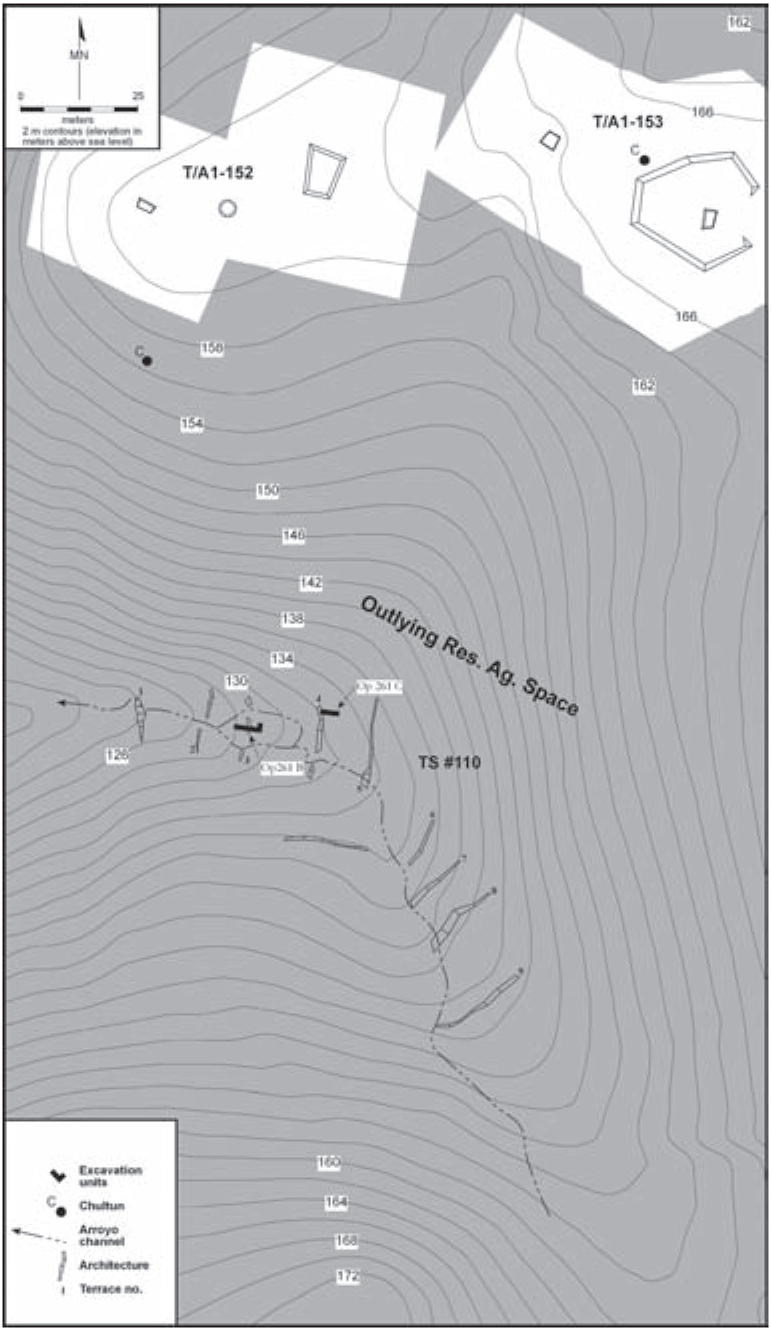

Figure 10.4. The Terrace Set #110 area showing the delineation of residential agricultural space

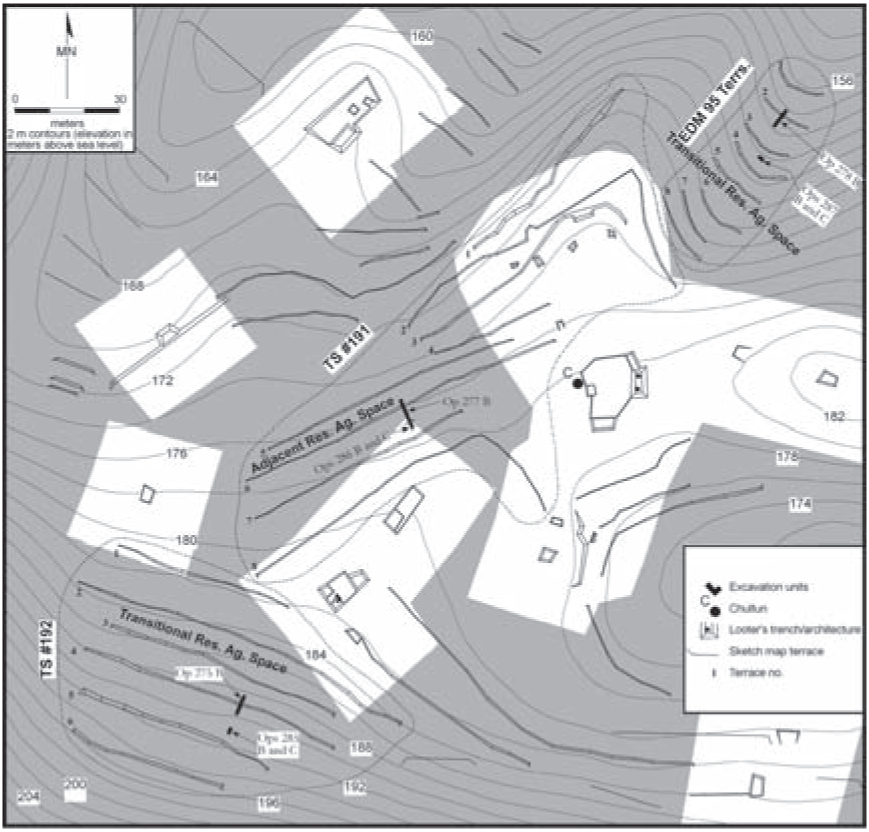

Figure 10.5. The Terrace Set #191 area showing the delineation of residential agricultural space

into discrete blocks of space with rigid boundaries. McAnany chose the term "continuum" for her biotic continuum model because she wanted to imply a sense of vegetation succession. Although her model does have labels for certain parts of the overall biome, the emphasis is on the continuous nature of the biome. Residential agricultural space is conceptualized as a continuum in the same sense. Second, Killion describes his houselot model as an "ideal" construct. By ideal, Killion means that actual households will vary with respect to specific spatial patterning but they will generally conform to the tenants of the model. The following conceptualization of residential agricultural space is an ideal one in the same sense.

The continuum of residential agricultural space is anchored on one end by terraced areas directly adjacent to the household core. These areas are called "adjacent residential agricultural space." Excavations placed along the edge of the household core of T/A1-183 within Terrace Set #191 sample this space (see Figure 10.5). Terraced areas located well beyond the structural core of the household anchor the other end of the continuum and are termed "outlying residential agricultural space." This endpoint includes terracing located well beyond an isolated household core area and terracing equidistant from two or more household core areas. All of the excavations within Terrace Set #110 are within this space with respect to T/A1-152 and 153 (see Figure 10.4). Terraced areas that are transitional in terms of position between these poles are referred to as "transitional residential agricultural space." Excavations placed within Terrace Set #192 and EDM 95 Terrs. are located within this space. The terms "adjacent," "intermediate," and "outlying" were chosen because they convey clear spatial differences while at the same time are not so specific as to imply a non-continuum-like and spuriously rigid delineation of terraced space.

The following are expectations regarding the material remains recovered and the activity inferred from them, depending on location within residential agricultural space. These expectations are derived from Killion's (1992b) houselot model and from research by Patricia McAnany (1992) at Pulltrouser Swamp, Belize. First, in terraced space adjacent to household structural core areas, greater densities of artifacts are expected, as well as a mix of artifacts representing residential and cultivation activities (Killion 1992a:4). Also, the proximal and medial fragments of broken agricultural tools would be brought back to the house for recycling (McAnany 1992:205–206) and thus would be expected in this context. Second, in space further away from household structural core areas—that is, outlying residential agricultural space—lesser densities of artifacts are expected, as well as artifacts representing specific agricultural activities (Killion 1992a:7). Specifically, the distal fragments of broken agricultural tools, which would not be brought back to domestic contexts, should be found in outlying residential agricultural areas (McAnany 1992:205–206). Third, material-culture characteristics from areas situated between these endpoints on the continuum—intermediate residential agricultural space—should be characteristic of their transitional position. Artifact densities should be higher than outlying residential agricultural space but not as high as adjacent residential agricultural space.

METHODS

The following methods were used during excavation and subsequent laboratory analysis to test the model. Important considerations were the placement of test excavations, definition of excavation provenience, assignment of contextual designations to excavation proveniences, and the application of a technique that results in the expression of the number of artifacts per provenience as a density value per a standard volume of space. Subsets of artifacts from spatially and stratigraphically informative contexts are distinguished by the application of these methods and allow an assessment of the model. The expression of artifact numbers as densities per a standard volume of space allows comparison across groups despite factors such as differences in the aggregate volume of proveniences from different spatial contexts.

A primary goal of the excavations was to obtain artifacts from different residential agricultural spatial contexts. Outlying residential agricultural space, transitional residential agricultural space, and adjacent residential agricultural space have been defined to characterize the continuum of residential agricultural space (see above). Excavations were undertaken in two areas adjacent to Dos Chombitos center (see Figure 10.3). West-northwest of Dos Chombitos two test excavations, Operations 261B and 261C, were placed within a set of cross-channel terraces (see Figure 10.4). These terraces are located in an arroyo approximately 100 meters downslope to the south from domestic architecture. Thus, these excavations produced the sample of artifacts from outlying residential agricultural space. East-southeast of Dos Chombitos five test excavations were placed at varying distances from household core areas. One excavation, Operations 277B and 286B (a continuous excavation), was placed near a household core area and yielded the sample of artifacts from adjacent residential agricultural space (see Figure 10.5). Four excavations—Operations 275B, 285B, 278B, and 287B—were placed in areas intermediate in terms of distance from either household core areas or the furthest outlying terraces in the group and therefore yield the artifact sample from transitional residential agricultural space.

A provenience is defined as a three-dimensional unit of space for the purpose of this study. During excavation, proveniences were defined by stratigraphy. In strata thicker than 0.20 meter, proveniences were changed every 0.20 meter. Excavation in the seven locations described above resulted in the definition of 124 proveniences. Each provenience was assigned a contextual designation. Table 10.1 presents the contextual designations used in this study and their numerical codes. Contextual designations were defined to partition variability in both natural and cultural deposition and formation processes (Schiffer 1987). An important goal in the process of assigning contextual designations was to isolate proveniences inferred to be the result of agricultural activity. Contexts 261, 262, and 263 are reasoned to be the result of agricultural activity. Of the 124 defined proveniences, though, only 38 were assigned contexts 261, 262, or 263. These 38 proveniences could be further grouped depending on their spatial origin, adjacent ($n = 8$), transitional ($n = 9$), or outlying ($n = 21$) residential agricultural space.

While the number of proveniences from adjacent and transitional space is approximately the same—eight and nine, respectively—the number of proveniences from outlying space is significantly larger ($n = 21$). This disparity presents an obvious difficulty with respect to making comparisons among the three spatial groups. Artifacts from the outlying residential agricultural spatial

Table 10.1. Contextual descriptors for terrace excavation proveniences used in the analysis

Contextual descriptors for terrace excavation proveniences	*Code*
Top 0.20 m (surface down to 0.20 m below that surface) of a terrace stratigraphic unit	261
Second 0.20 m (0.20 to 0.40 m) of a terrace stratigraphic unit; this context likely reflects activities and processes that went on at this locus, both cultural and natural, that contributed to the deposition of the terrace bed matrix	262
General terrace bed fill (below 0.40 m)	263
Fill of terrace walls	267
Colluvial deposits	265
Alluvial deposits	266
Mixed	264
Indeterminate	260

context will skew the comparison because there are more artifacts in this group compared to the other two spatial contexts, and, importantly, they come from a larger aggregate total of volumetric space. Each provenience has a volume that is calculated by multiplying the length times the width times the depth of the provenience. One way to engage in a comparison among the three spatial groups, despite the disparities in aggregate volumes, is to represent the number of artifacts from a particular provenience or group of proveniences as a density figure using a standard unit of volume. The density of artifacts within a standard unit of space, calculated in the same way for all the three groups, is comparable even if the group volumetric space totals are different. The standard unit of space chosen for this study is 0.40 cubic meters, which is equal to 1 m × 2 m × 0.2 m.[1]

RESULTS AND DISCUSSION

The spatial relationship of ceramic artifacts, lithic tools, and associated debitage aided a model-building process for the reconstruction of terrace agricultural activity. The artifact analysis revealed several robust lithic and ceramic patterns and supported the expectations presented above.

Lithic tool diversity is the first pattern examined (Figure 10.6). A technological perspective was employed to examine the morphology, function, and production stages of the lithic tool assemblage (Neff 2008). Adjacent to the household, we had evidence of expedient tools, cores, polishing stones, miscellaneous digging tools, general-utility bifaces, and small tabular-shaped, broad-based distal tools (called trowels). The presence of polishing stones, presumably used during pottery manufacture (Rice 1987:138–139, 150; Hayden 1987:212), and the occurrence of other tool types represent the diversity of activities, agricultural and otherwise, taking place near the household structural core. This finding is in

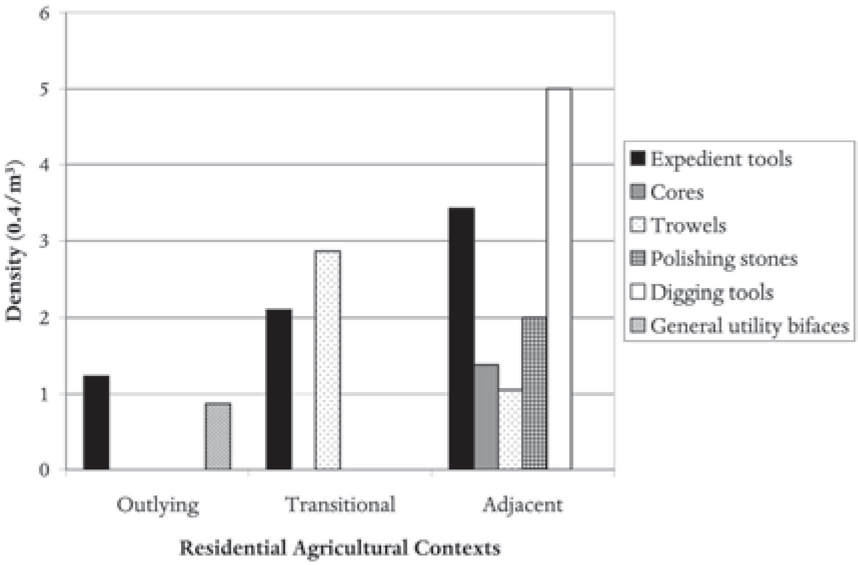

Figure 10.6. Lithic diversity by residential terrace agricultural context

line with the expectation of greater diversity and density in artifact assemblages closer to the household structural core.

The outlying context contained only expedient tools and general-utility bifaces. Using ethnographic information, archaeological evidence from Pulltrouser Swamp, and edge-wear analysis, McAnany (1992) posited that oval bifaces were used as weeding and tilling implements. One complete general-utility biface was found on the surface in the outlying agricultural context. Another distal general-utility biface fragment from the outlying context exhibited wear similar to sickle gloss, which was readily apparent to the unaided eye. The highly polished edge and dorsal face were smoothed and rounded, perhaps the result of the abrasion of the tool surface with phytoliths from grassy plants (Clark 1995:128). These artifact characteristics are in line with the expectation that tools found in the outlying context represent more specialized agricultural activities, including weeding and forest clearing. However, general-utility bifaces were probably used for a variety of purposes, ranging from forest clearing (which includes the cutting of grass and wood) to weeding, tilling, and wood carving (Clark 1995). The macrowear observations made for this study can suggest only one functional interpretation and it is likely that these tools were used for a variety of tasks.

The transitional context contained only expedient tools and small trowel-like tools. This result is in line with the expectation that transitional areas would exhibit assemblage type and density characteristics between those of adjacent and outlying contexts. "Trowels" and other digging tools represented a new tool

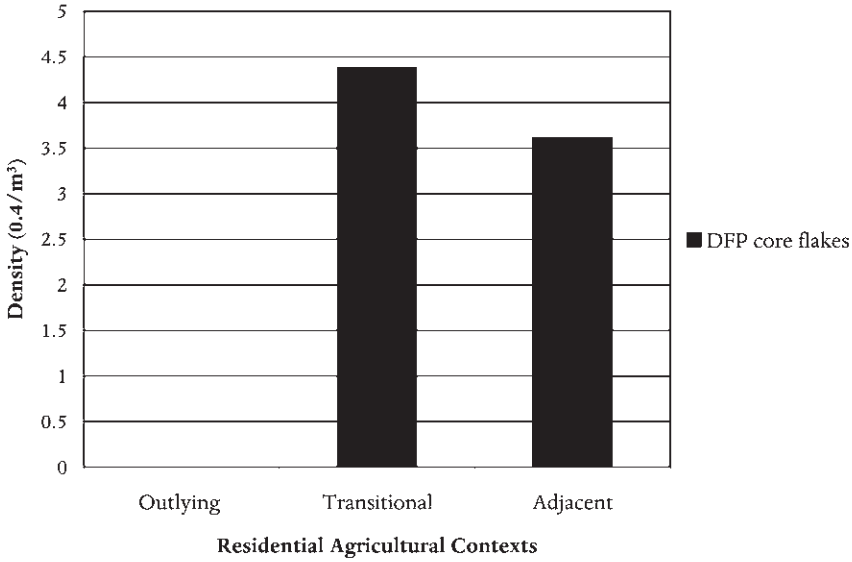

Figure 10.7. Direct freehand-percussion core-flake distribution by residential terrace agricultural context

type. These tools were made out of locally available slate—a prominent geological feature located in the nearby Macal River Valley (see Figure 10.2). Use-wear observed on these tools consisted of edge damage with extensive crushing and some rounding and polishing. Irregular microflaking was present and occurred on both faces of the tools. The polish had a dull texture. Aoyama (1995) performed an extensive experimental microwear analysis using a variety of lithic material types on a number of different working materials. His examination of tools at Late Classic Copán, Honduras, revealed that dull polish with a matte texture resulted from soil abrasion. The trowels and other digging tools are analogous to the modern hoe. They are amenable to a transverse haft like a modern hoe, but could have also been mounted using a simple socket haft at a right angle to the blade. Their similar shape and occurrence in agricultural contexts, in conjunction with use-wear patterning, suggests their use was similar to present-day hoes. The trowel-like tool may have been better suited for transitional and adjacent residential garden contexts because continual intensive gardening would have made other tools unnecessary.

Figure 10.7 illustrates the distribution of direct freehand-percussion core flakes across the residential agricultural continuum. These artifacts are present in only adjacent and transitional contexts. This pattern is in line with the expectation that the initial stages of formal and informal tool production took place closer to the household structural core.

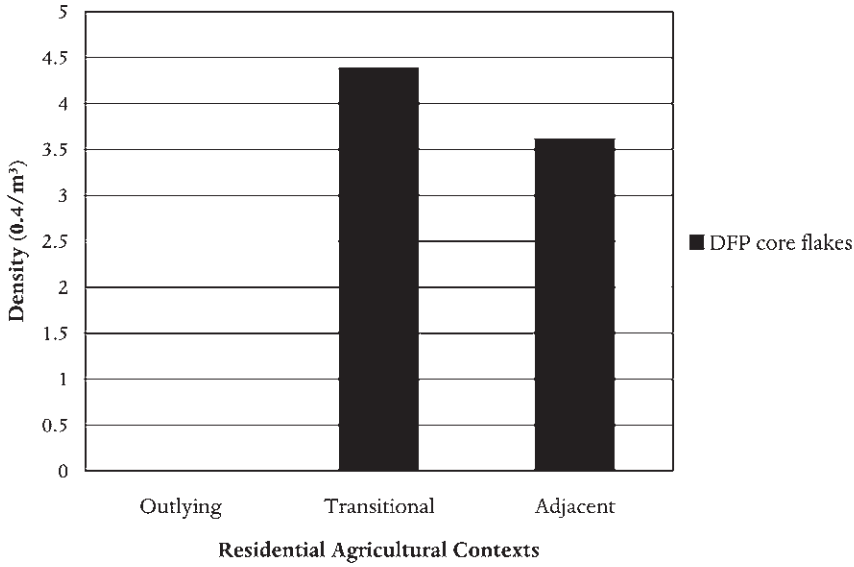

Figure 10.8. General utility biface resharpening flakes by residential terrace agricultural context

Figure 10.8 illustrates the distribution of general-utility biface reduction flakes by residential agricultural context. A 3 to 1 distribution ratio between adjacent and outlying contexts suggests farmers performed most of the tool refurbishing closer to the household structural core. This result is consistent with the argument that the proximal and medial fragments of broken agricultural tools were brought back to the house for recycling (McAnany 1992:205–206).

Figure 10.9 illustrates ceramic form diversity across the residential agricultural continuum. Closed and open ceramic forms occurred in all the residential agricultural contexts, although higher relative densities occurred in adjacent contexts. It is significant that jars with restricted openings had a distinctive presence in the outlying agricultural area. These jars were probably used as watering jars because this form would have minimized spillage and evaporation. Possibly, specialized watering activities were taking place in outlying residential agricultural contexts. Similarly, the minimal amount of open forms present in outlying contexts, in contrast to higher densities in adjacent space, supports the idea of a more specialized agricultural activity in the outlying region. In sum, ceramic form diversity patterns are compatible with the expectation that artifacts representing specific agricultural activities should be found in space further away from household structural core areas (Killion 1992a:7).

In the paragraphs above, I defined key terms, delineated points along the continuum of residential agricultural space, and identified expectations regarding

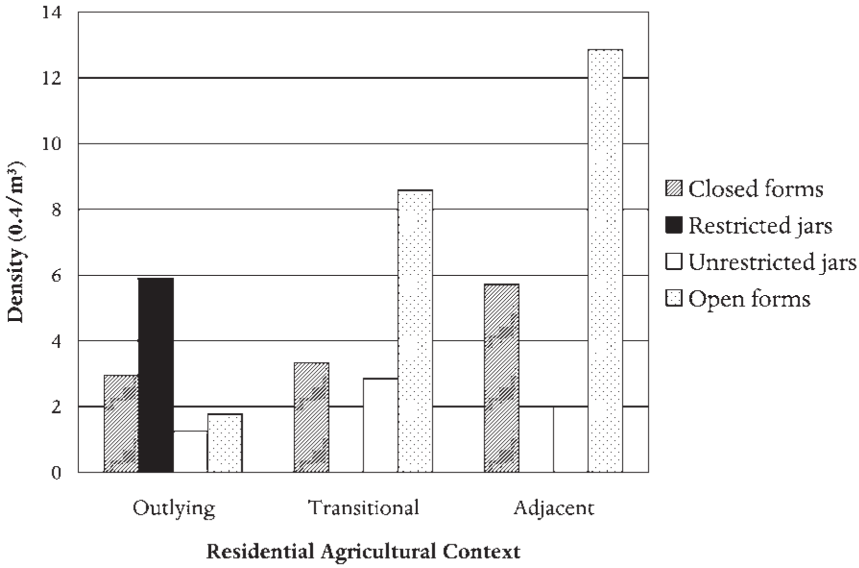

Figure 10.9. Ceramic form diversity by residential terrace agricultural context

artifact patterning based on previous research. I then tested the model using data from terrace excavations in the vicinity of the Dos Chombitos site. Patterns in lithic tool diversity and density, DFP (direct freehand percussion) core flake density, general-utility biface resharpening flake density, and ceramic form diversity data conform to the model's expectations. This exercise resulted in a successful but preliminary first test of the model. To thoroughly evaluate the model more excavation and artifact analyses are required.

SUMMARY AND CONCLUSIONS

Activity associated with agricultural terracing is a significant component of household production in many areas of the Maya Lowlands. An understanding of influential factors in, and the spatial organization of, terracing agricultural activity is an important companion to descriptions, explanations, and understandings of how and why terracing agricultural activity is significant to household production. This chapter proposed a model to explore and define factors influential in, and the spatial organization of, terracing agricultural activity. The model posits a spatial continuum of terrace agricultural activities outside the core area of the household. Points along this continuum are defined as "adjacent agricultural space," "transitional agricultural space," and "outlying agricultural space." The model was evaluated using terrace excavation data and the result was a successful preliminary test.

The usefulness of the model is apparent in two ways. First, in archaeological investigations it is essential to understand the interrelationships of scale, pattern, and process and how they have profound effects on data interpretation. Second, it is necessary to define the appropriate scale of analysis for the research question to be addressed. Beginning with the latter point, within the domain of ancient lowland Maya household economy, I argue that investigation of agricultural terraces is not only an interesting question but also a critical one. The upper Belize River Valley study area for this chapter is just one of many areas in the Maya Lowlands where agricultural terrace features outnumber all other types of residential architecture. More research on agricultural terracing is critical to gain a better understanding of household economic behavior in many areas of the lowlands. The terrace-oriented residential agricultural continuum model and its initial test with excavation data represent an important avenue of household research. Indeed, using the same spatial model and artifactual data set, Linda Neff (2002) explored gender divisions of labor in lowland Maya terrace agriculture. Using multiple lines of evidence, she concluded that a gender ideology associating men with agricultural work occurring away from the household and women with multitasking activity, including agriculture, closer to the household was operative in the Dos Chombitos area during the Late Classic period (ca. AD 550–800). The terrace-oriented residential agricultural continuum model was important to Neff's study because it provided a spatial structure that facilitated questions of who was doing what where and implications for household economy in an era of agricultural intensification.

The second point made above about the necessity of defining scale, pattern, and process in the interpretation of archaeological data is germane to the subject of this chapter. The terrace-oriented residential agricultural continuum model was formulated to organize the study of household production from an analytical perspective not specifically treated by extant models of the spatial order of prehispanic agriculture. The result is a more nuanced analytical perspective that has aided, and should continue to do so, in further exploration of terrace agricultural activity.

The spatial patterning inferences presented in this chapter, while thought provoking and initially successful, should be viewed as only the beginning of a program of research focused specifically on terrace agricultural activity. More terrace research in conjunction with household excavations is necessary to evaluate whether we are on the right track with our hypotheses.

NOTE

1. The following example demonstrates how using artifact density per a standard unit of volumetric space can allow comparisons among proveniences or groups of proveniences with significantly different aggregate volumes. Suppose provenience *A* yielded

twenty artifacts from a volume of space equaling 0.8 cubic meters and provenience *B* yielded sixty artifacts from a volume of space equaling 7.5 cubic meters. The following calculations are performed to determine what the artifact density is per 0.40 cubic meters (the standard unit of volumetric space) for each hypothetical provenience. The twenty artifacts in provenience *A* are divided by the volume of the provenience (0.80 m^3) to derive the provenience artifact density, which is equal to 25. The provenience density (25) is then multiplied by 0.40 cubic meters, resulting in 10, which is the artifact density of provenience *A*. The same calculations performed on hypothetical provenience *B* yield a density of 3.2 artifacts per 0.40 cubic meters of space. Having engaged in these calculations we know that provenience *A* has a higher artifact density than provenience *B*, despite the fact that it has fewer artifacts than the latter. Therefore, the figures presented in this chapter illustrate differences among outlying, transitional, and adjacent agricultural space via artifact densities per 0.40 cubic meter.

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SECTION III

Inter- and Intrahousehold Organization of Production

Households and Communities

ELEVEN

Fluctuating Community Organization

Formation and Dissolution of Multifamily Corporate Groups at La Joya, Veracruz, Mexico

VALERIE J. McCORMACK

INTRODUCTION

In many Formative Mesoamerican communities multifamily corporate groups emerged following the transition to sedentism (Flannery 2002). When surface remains of artifacts and architecture are detectable, aspects of social organization can be inferred. However, in some regions, recovering evidence of household and community organization is difficult because of the perishable nature of houses and the fact that archaeological deposits are deeply buried. For this reason we know little about household or community organization of Formative southern Gulf Coast societies. This chapter investigates community organization at the Formative village of La Joya, Veracruz, Mexico, by determining the conditions that produced nuclear family households and those that produced multifamily corporate groups. Several changes in household organization are detected for La Joya and these changes are placed within the regional environmental and social landscape. While this community-level focus is unable to reveal fine-scaled analysis at the level of individual households, the community approach reveals significant changes in village organization over time. The intrasite spatial patterns at La Joya illustrate that community organization fluctuated between independent nuclear family households and multifamily corporate groups. Comparisons of the activities based in the multifamily corporate groups reveal that organization differs through time, but the presence of multifamily corporate groups is strongly correlated with periods of land scarcity.

La Joya is a twenty-five-hectare village situated along the Río Catemaco, a major drainage and transportation route of the Sierra de los Tuxtlas (Figure 11.1), which is a 4,500-square-kilometer active volcanic mountain range located along Mexico's southern Gulf Coast. While the southern Gulf Coast is best known for the emergence of Olmec societies by 1200 BC (uncalibrated), social organization varies widely throughout the region during the Formative period (Stark and Arnold 1997). For example, societies in the Tuxtlas engaged in similar ideological and ceremonial traditions, shared ceramic technologies, and participated in similar long-distance exchange routes as the San Lorenzo Olmec, but a chiefly society did not emerge until 400 BC in the Río Catemaco drainage.

Over the past decade, research of Formative societies in the Tuxtlas has helped establish broad cultural patterns and chronological sequence for the region (Table 11.1). The earliest evidence for human occupation derives from pollen data, which indicate that around 2250 BC, populations were clearing forests and growing corn in the Tuxtlas (Goman 1992). However, no sites have been identified for this time, suggesting populations moved frequently and did not occupy any single location for an extended length of time. By 1300 BC, hamlets and villages occupied the best agricultural lands within the Tuxtlas, a pattern that continues throughout prehispanic times (Santley and Arnold 1996; Santley, Arnold, and Barrett 1997). La Joya was first settled around 1300 BC and occupation continued through AD 100, when Cerro Puntiagudo erupted and blanketed the region with a layer of thick volcanic ash (Arnold et al. 1996; Arnold and McCormack 2002; Reinhardt 1991). This 1,400-year occupation from the Early Formative through the Terminal Formative makes La Joya an ideal location for studying changes in community organization as social complexity increases.

HOUSEHOLD ORGANIZATION AND THE MULTIFAMILY CORPORATE GROUP

The internal organization of communities reflects the social, economic, and political relationships and boundaries defined and maintained by individuals and households. Household organization varies along a continuum from independent nuclear family households to multifamily corporate groups. Corporate groups consist of several families that are linked together through lineage, kin, or clan affiliation, and members share residence or live in close proximity to one another (Hayden and Cannon 1982). Anthropologists have linked corporate group organization to scheduling conflicts, resource control, inheritance,

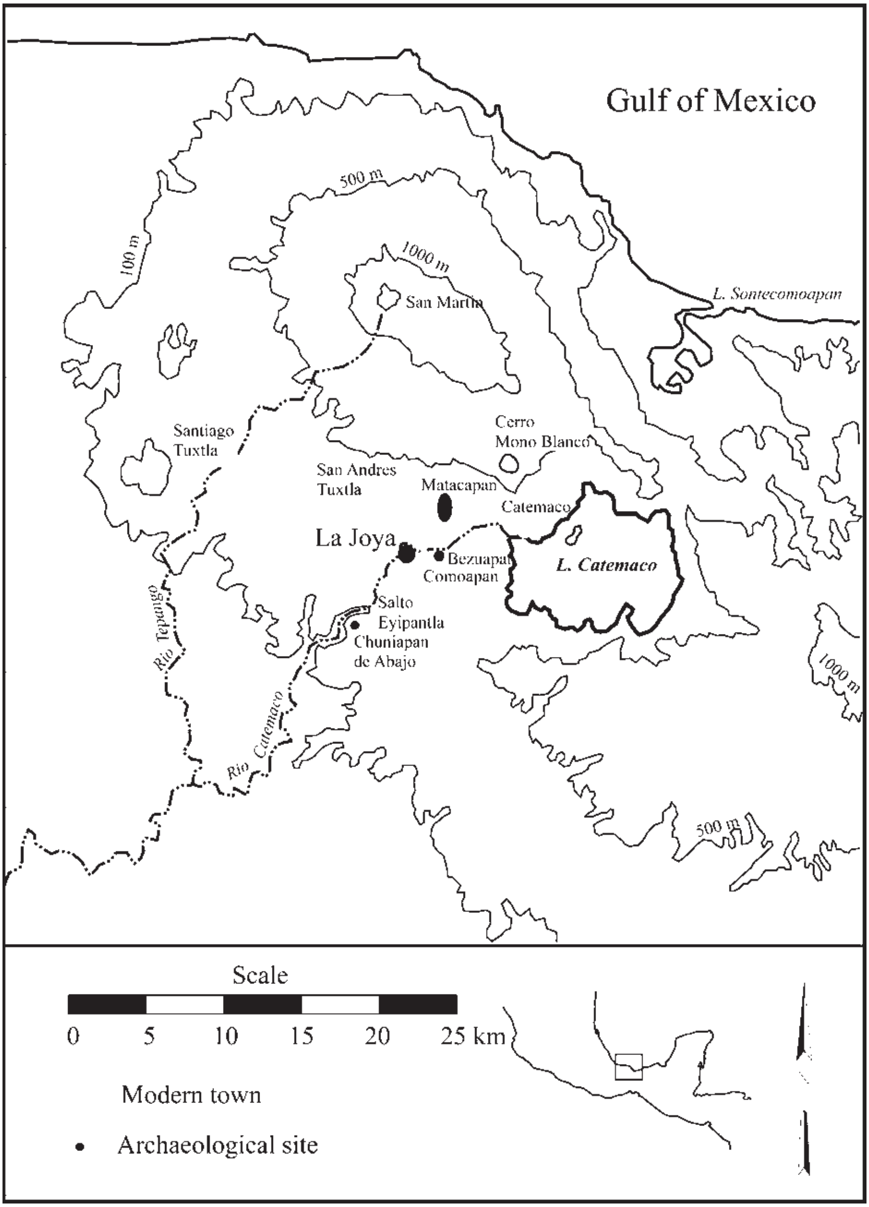

Figure 11.1. Location of La Joya within Sierra de las Tuxtlas, Veracruz, Mexico

and the size of the labor group necessary to extract key subsistence resources (Hayden and Cannon 1982; Nimkoff and Middleton 1960; Pasternak, Ember, and Ember 1976). Cross-cultural studies of household composition and size

Table 11.1. Chronological phases of La Joya

La Joya phase	*Time range*	*Mesoamerican period*
Tulipan	1300–1150 BC	Early Formative
Coyame	1150–850 BC	
Gordita	850–400 BC	Middle Formative
Bezuapan	400 BC–AD 100	Late / Terminal Formative

suggest that the natural tendency is for households to resemble nuclear family units. When independent families are able to carry out subsistence activities on their own, household organization tends to favor nuclear families (Hayden 1995; Pasternak, Ember, and Ember 1976; Wolf 1966).

In reality, this continuum is more complex than it first appears, because independent nuclear family households can be nested within corporate groups (Gillespie 2000; Santley 1993; Smith 1993). Households may form the basic unit of production, but political, social, and religious roles within a community may be coordinated by larger entities. Cross-cultural comparisons suggest that as the number of activities shared by members of a corporate group increases, so does the closeness of the group's organization (Hayden and Cannon 1982).

In other regions of Mesoamerica, multifamily corporate groups formed shortly after the transition to sedentism and during periods of emerging hereditary social inequality. This type of group ranged from nucleated apartment compounds of La Coyotera in the Cuitcatlan Cañada (Spencer 1982) to the residential wards marked by iconographic motifs at San José Mogote, Oaxaca (Flannery and Marcus 1994; Parry 1987; Pyne 1976) and the loosely knit neighborhoods composed of the economically independent but politically linked households of Cerros, Belize (Cliff 1988).

One strategy for creating hereditary status differences lies in the formation of multifamily corporate groups. Hayden (1995) proposes that aggrandizers—individuals who seek wealth, power, and prestige—attempt to form these types of groups to increase a wealth-producing base. This process involves aggrandizers who draw on existing kinship ties and obligations and convince their kin to increase production and ultimately the group's wealth. An aggrandizer's kinspeople also seek to cement their relationships with this individual to elevate their own status positions through association and to ensure recompense. As wealth, power, and prestige become entrenched in the corporate group, the ability to transfer status from one generation to the next becomes permissible. In many Formative Mesoamerican communities, the timing of corporate group emergence may indicate that similar processes played a role in the emergence of complex societies (Blanton et al. 1999:36–42).

While the formation of some corporate groups correlates with critical transitions in social evolution, the range of household organization may also vary within a single community. When household organization varies from nuclear family households to corporate groups within communities, the corporate groups are strongly correlated with wealthy families (Netting 1979, 1982). From the Late Formative period on, households with the largest architecture, elaborate burials, and the most specialized craft items are organized along corporate descent lines in many Mesoamerican communities (see, e.g., Collier 1975; McAnany 1994). The curvilinear model of household organization suggests that the amount of land available for newly married couples to establish an independent household is a particularly influential factor of household composition (Collier 1975). When land is highly available, newly wedded couples will move to unoccupied land to establish a new household. In contrast, when land is scarce, young couples will remain part of the parental unit, which forms a multifamily corporate group. In this case, the personal interests of the household head and the subordinate generation act in a complementary manner to keep the corporate group perpetuating as a unit. The younger generation desires to retain membership to access corporate resources and the corporate group headman delays inheritance to retain labor in the household, thereby increasing production and minimizing corporate group fissioning (Collier 1975; McAnany 1994). When land becomes too scarce to support a large group, however, the trend reverses. Consequently, when land is extremely scarce, the progenous generation will leave the household to establish its own household. In this situation, agriculture is no longer a viable option, and the new household will likely shift to craft production (Collier 1975). This relationship between household organization and land availability provides an interpretive framework for the fluctuating community organization documented at La Joya.

DOCUMENTING COMMUNITY ORGANIZATION AT LA JOYA

Natural and cultural depositional processes have buried Formative cultural deposits up to four meters below today's ground surface at La Joya and within the Tuxtlas. Furthermore, there is little correlation between surface and subsurface artifact densities (Arnold et al. 1996; Arnold and McCormack 2002), limiting the ability to target subsurface deposits through excavation within the twenty-five-hectare settlement. Therefore, unlike many regions of Mesoamerica where community organization can be investigated through collecting surface material, mapping house-mound locations, or exposing architectural remains that are buried near the surface, the study of community organization at La Joya requires alternative methods.

To model community organization along the lines of independent household groups to multifamily corporate groups and to trace changes through time, an extensive subsurface sample was collected with a bucket auger from La Joya.

Data from the auger test probes were used to create density maps in much the same way surface collection data are used. The auger test probes were spaced 10 to 12.5 meters apart on a staggered grid. Diagnostic cultural material and stratigraphic information were used to assign the temporal period to each ten-centimeter arbitrary level for each auger test probe. Finally, the cultural material within each period was plotted to form distribution maps, which define areas of high and low densities. Research in the Tuxtlas suggests that the remains of prehispanic houselots encompass areas of about 0.5 hectare (approximately 70×70 meters) and include a number of common elements such as structures, clear areas, intermediate areas, garden orchards, and middens (Arnold and McCormack 2002; Killion 1987; Pool 1997). In this case, the houselot is taken to represent an archaeological signature of past households (Wilk and Ashmore 1988). In this study, I use the high-density areas as a proxy measure of houselot locations.

While artifact distributions were examined using density maps created through a variety of methods (McCormack 2002), the maps presented in this chapter are based on the mean and standard deviation of log (weight/m^3). These statistics define contour intervals illustrating high-density areas unique to each phase. I prefer to use weight per volume, rather than counts, because it is less influenced by differential depositional and postdepositional processes than the number of sherds. For example, sherds dropped in open areas may become fragmented through trampling, whereas material immediately deposited into a midden is less likely to fragment. The overall weight of sherds per volume of soil will be greater in a midden than for open areas. Since the goal of the density maps is to identify the approximate locations of houselots and general areal extent, weight/volume is the best measurement to use. In addition, this approach defines the high- and low-density areas based on the characteristics of deposits unique to each phase.

The comparisons are akin to statistical probability tests such as the t-test or analysis of variance, which require single peaked and symmetrical batches (Drennan 1996). Archaeological samples are commonly upwardly skewed and require a transformation prior to performing probability tests. The samples of sherd weight/m^3 are no exception. Therefore, the batches were logarithmically transformed; which produced single peaked and symmetrical batches (McCormack 2002). Finally, the mean and standard deviations of the transformed batches were used to create the contour maps and to identify the approximate locations of past houselots for each phase. The artifacts from auger probes within each high-density area are grouped, allowing comparisons of occupational zones within the settlement. The contour maps suggest that community organization fluctuates between independent nuclear family households and corporate groups.

COMMUNITY ORGANIZATION AT LA JOYA

Below, I discuss the nature of community organization at La Joya by time period.

Tulipan Phase (1300–1150 BC)

The initial occupation of La Joya dates to the Tulipan phase, when small villages and hamlets were dispersed throughout the Río Catemaco drainage. Early Formative occupants of La Joya were farming maize and probably practiced an extensive slash-and burn-farming strategy. In addition, they also relied on hunting and fishing to supplement the staple crop (VanDerwarker 2003). In the Tuxtlas, the locations with the best agricultural land typically do not adjoin the ecozones rich with aquatic resources. Therefore, a degree of mobility was likely required to grow corn and extract wild resources (McCormack 2002).

Figure 11.2, the distribution map based on the log (weight/m^3), illustrates numerous high-density areas, more or less evenly distributed throughout La Joya. If we use the high-density areas as a proxy measure of houselot location, it appears that many nuclear family households occupy the site. The archaeological deposits (Arnold 2000), tool design (Arnold 1999; McCormack 2002), and nature of site structure (McCormack 2002) suggest that the initial Tulipan phase settlement of La Joya was occupied by groups who regularly visited the site, moved their houses frequently, or did both (ibid.). Given the mobility associated with the Tulipan phase, these high-density areas more likely reflect incidental reoccupation of the same locations rather than permanent houselot locations (ibid.), making it difficult to ascertain Tulipan phase household composition. Population estimates are difficult to calculate for this phase because of the mobile nature of the residence patterns but have been tenuously estimated between fifty-five and ninety-one persons (ibid.). In other areas of Mesoamerica, households tend to be organized in independent nuclear family groups during periods of residential mobility and early stages of village organization (Flannery 2002), and the same is likely true for the Tulipan phase occupation at La Joya.

Coyame Phase (1150–850 BC)

Around 1150 BC, Cerro Mono Blanco erupted and blanketed the upper Río Catemaco drainage with a layer of tephra. Fires, floods, and mudslides likely followed the eruption, causing long-term, wide-scale environmental degradation for two centuries or more (Chase 1981; Reinhardt 1991). Settlement-pattern research documents large-scale abandonment of the upper Río Catemaco drainage in the Middle Formative (850–400 BC; see Santley and Arnold 1996; Santley, Arnold, and Barrett 1997), and this abandonment likely reflects a long-term response to the Cerro Mono Blanco eruption. Occupation at La Joya, located beyond the perimeter of the major impact zone, continued into the Coyame

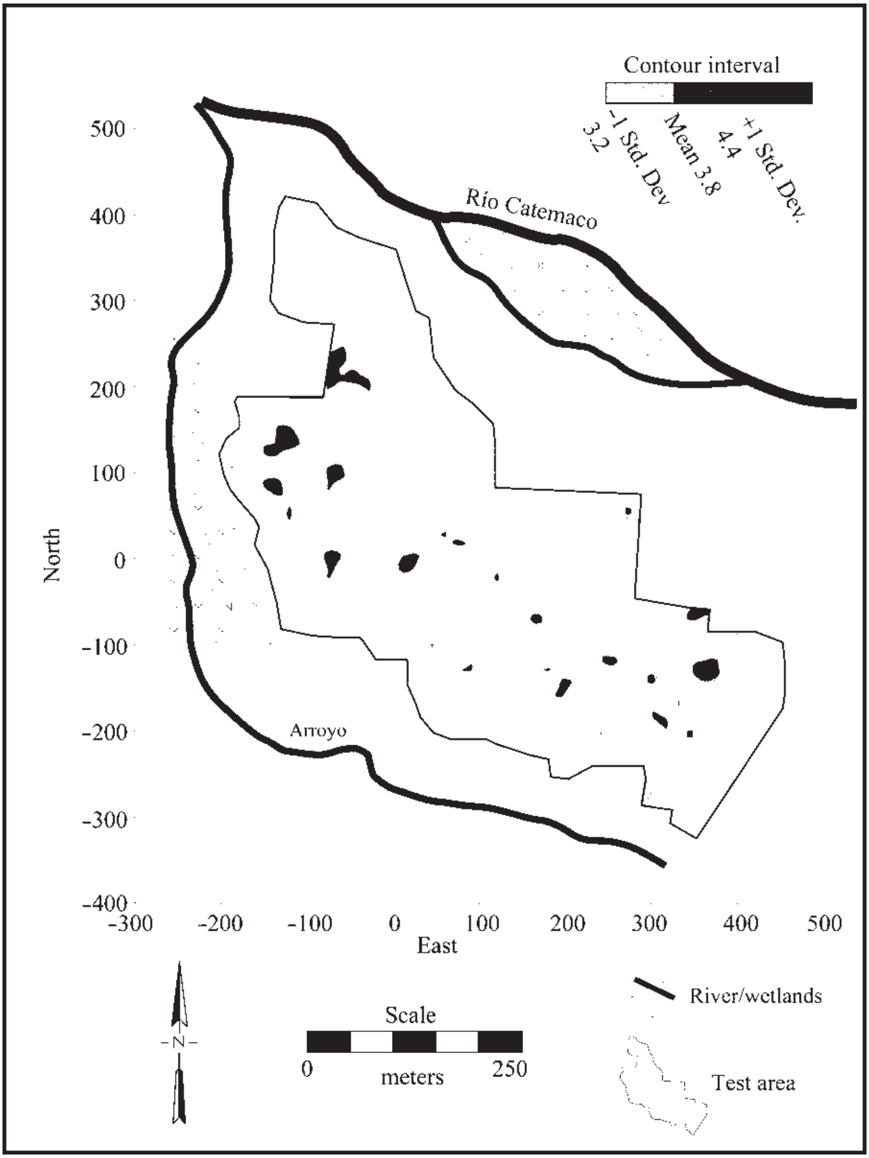

Figure 11.2. Distribution of ceramics based on log (weight/m³) for the Tulipan phase of La Joya

phase. While the amount of cultivable land was severely reduced in the upper Río Catemaco drainage by this eruption, the population at La Joya increased from an estimated 55–91 persons to 168–272 persons during the Coyame phase (McCormack 2002). In addition, an increase in the productivity of maize around

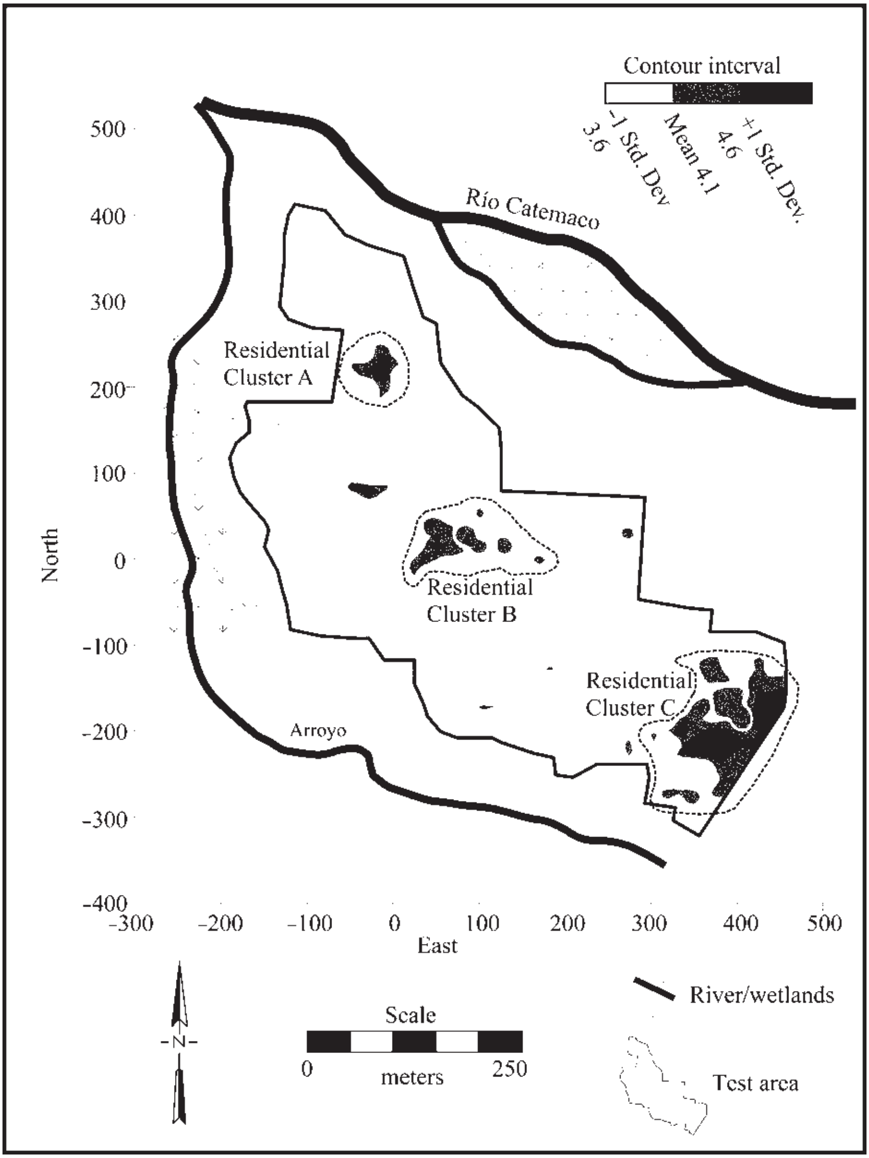

Figure 11.3. Distribution of ceramics based on log (weight/m³) for the Coyame phase of La Joya

1000 BC (Borstein 2001) may have allowed a larger population to support itself on the land available near La Joya. An intensified emphasis on maize in the diet and fewer options to move swidden fields appear to have encouraged sedentism in the Coyame phase (McCormack 2002).

Table 11.2. Population estimates for Coyame phase residential clusters for La Joya

Residential cluster	*Population estimate*	*Occupied area (ha)*
La Joya	163–272	25.0
Residential cluster A	16–24	0.5
Residential cluster B	44–65	1.5
Residential cluster C	65–98	2.0

The increased occupation at La Joya is visible in Figure 11.3, the ceramic distribution map of log (weight/m^3), which illustrates the presence of three large nucleated artifact clusters within La Joya. Given the areal extent, between 0.5 hectare and 2 hectare, and the associated population estimates (Table 11.2), these clusters suggest the presence of multifamily corporate groups, similar in size to residential wards or neighborhoods identified for other Mesoamerican Formative villages. Analysis of ceramic production techniques also suggests that these Coyame households were a continuation of the Tulipan phase populations (Arnold 2003). Settlement in the Coyame phase is not uniform, and Figure 11.3 also illustrates a number of small high-density clusters dispersed among the large clusters. Artifact densities and the structure of space in these clusters are similar to the Tulipan phase deposits (ibid). Therefore, I interpret these clusters as the result of short-term occupation. The transition to settled life is often discussed at the scale of the society; however, it is more likely that the decision to become sedentary was based within the household. Appropriately, a variety of residential strategies should be expected during the transition to sedentism.

Regional settlement patterns in the Río Catemaco drainage suggest that social organization in the Tuxtlas remained undifferentiated and unstratified at this time (Santley and Arnold 1996). Comparison of intrasite residential groups reveals some ranking differences among the residential clusters and suggests distinct differences between mobile and sedentary populations.

During the Early Formative period, individual households and corporate groups obtained obsidian through independent long-distance trade connections (Clark and Lee 1984; Pires-Ferreira 1975; Santley et al. 2001). The comparisons of surface collections from La Joya and other contemporary sites indicate that La Joya has a significantly higher obsidian to rim-sherd ratio (Santley, Arnold, and Barrett 1997), suggesting that the occupants of La Joya were consuming obsidian at a higher rate than the residents of other sites within the region. Santley, Arnold, and Barrett (1997) also propose that the occupants of La Joya were specializing in an economic activity requiring obsidian at this time. The focus on intrasite residential group differences suggests that groups acquired obsidian at different rates, which also influenced how obsidian was used and reduced within each residential group.

Table 11.3. Coyame phase obsidian-to-sherd ratios for La Joya

Residential cluster	*Obsidian*	*Sherds*	*Obsidian:sherd*
A	9	825	0.0109
B	23	1,163	0.0198
C	52	1,258	0.0413
Small clusters	36	1,052	0.0342

Table 11.3 presents the ratio of obsidian to sherds for the Coyame phase and illustrates that corporate groups consumed different amounts of obsidian. This ratio is the highest for residential group C, suggesting that the obsidian consumption rate is two to four times the consumption rate of residential clusters A and B. Also, the small clusters have an obsidian-to-sherd ratio greater than residential clusters A and B but less than residential cluster C. In addition to the relative amount of obsidian acquired in each group, how it was reduced differs. Technologically, reducing the small imported spalls and nodules of obsidian to usable flakes is not a difficult or a skilled process (Clark and Lee 1984; McCormack 1996). Flakes are first removed through percussion, and when the nodules become too small to effectively remove more flakes, the expended cores and flakes are reduced though bipolar reduction. This process creates small flakes and shatter. Given the Early Formative reduction technology, attempts to maximize obsidian might involve a greater effort to reduce every last piece of obsidian, resulting in small fragments produced through bipolar reduction. Most of the obsidian chips recovered from La Joya are extremely small and were probably mounted onto a wooden or bone handle and used as a knife (see Andrefsky 1998), inserted into grater boards (see Lewenstein and Walker 1984), or used with some other type of composite tool.

Table 11.4 presents the categories of obsidian flakes and shatter size and the reduction technology that likely produced the pieces (Boksenbaum 1980; Boksenbaum et al. 1987; Jeske and Lurie 1993). The difference in the obsidian chip sizes among two residential clusters, B and C, and the small clusters is not very significant ($X^2 = 5.85$; $0.50 > p > 0.20$, $V = 0.16$). The sample of obsidian from residential cluster A was not included in the X^2 statistic because of the small sample size.

Although we can not have a great deal of confidence that there are differences in the proportions of chip sizes among the entire sample, comparisons of the proportions and error ranges of the fifteen-millimeter subset indicate that there is greater than 95 percent confidence that the proportion of fifteen-millimeter obsidian chips is greater in residential cluster C and the small clusters than in residential cluster B (McCormack 2002). This statistic suggests that there are some differences in how obsidian was reduced within the different residential groups.

Table 11.4. Coyame phase obsidian flake sizes at La Joya

	Size category (mm)			
Residential cluster	*5*	*10*	*15*	*Total*
A % =	0.0	66.7	33.3	100.0
n =	(0)	(6)	(3)	(9)
B % =	26.1	52.2	21.7	100.0
n =	(7)	(13)	(6)	(26)
C % =	11.5	42.3	46.2	100.0
n =	(6)	(22)	(24)	(52)
small % =	22.2	36.1	41.7	100.0
n =	(8)	(13)	(15)	(36)

The proportions of flakes produced through bipolar smashing also support these differences. Table 11.5 presents the proportions of obsidian produced through core-flake and bipolar production associated with each residential cluster. Overall, the difference in the technology that produced the flakes among the residential clusters is not significant ($X^2 = 2.25$; $p < 0.50$, $V = 0.15$). However, when focus is shifted to the subset of residential clusters B and C, there is a greater than 80 percent chance ($X^2 = 1.76$; $0.20 < p < 0.10$, $V = 0.15$) that the differences observed between these two samples actually do reflect differences in core-flake and bipolar technology. Taken together, with the information on the ultimate size of obsidian chips, these patterns suggest that residential cluster B was obtaining less obsidian and maximizing the obsidian more so than residential cluster C.

In contrast to obsidian acquisition and reduction strategies, the comparison of ceramic assemblages reveals more similarities than differences among the Coyame phase residential clusters. While a substantial number of sherds have been recovered from each residential group, vessel type is identifiable for only a small percentage of the sherds. To document domestic activities the proportions of vessel types are compared. Analysis focuses on two major categories, serving vessels (bowls and plates) and food-preparation vessels (*tecomates* and jars) (after Santley 1992).

Table 11.6 presents the proportions of vessel forms associated with each residential cluster. Comparison of the vessel forms indicates that there is no statistical difference ($X^2 = 1.25$; $p < 0.50$, $V = 0.11$) in proportions of vessel forms among the four residential groups, which suggests that all residential groups were engaging in similar food-consumption and preparation activities. This pattern conforms to observations at the regional level where "Formative sites in the Tuxtlas exhibit little intra-assemblage variability in types present within sites" (Santley, Arnold, and Barrett 1997:193), implying that the occupants of sites performed similar food-preparation and serving activities in similar amounts.

Table 11.5. Coyame phase stone-tool reduction technology at La Joya

Residential cluster	*Bipolar*	*Core-flake*	*Total*
A % =	77.8	22.2	100.0
n =	(7)	(2)	(9)
B % =	76.9	23.1	100.0
n =	(20)	(6)	(26)
C % =	62.3	37.7	100.0
n =	(33)	(20)	(53)
small % =	64.9	35.1	100.0
n =	(24)	(13)	(37)

Table 11.6. Coyame phase vessel types at La Joya

Residential cluster	*Plates and bowls*	*Jars and tecomates*	*Total*
A % =	42.1	57.9	100.0
n =	(8)	(11)	(19)
B % =	32.3	67.7	100.0
n =	(11)	(23)	(34)

In addition to serving and cooking, households and corporate groups sometimes contain different amounts of fancy service wares, which are frequently used as an indicator of high status (Pool and Britt 2000; Smith 1987). While there are no ceramic wares that are distinctly obvious indicators of status at La Joya during the Coyame phase, the proportions of decorated and undecorated ceramics reflect differences in the labor and craftsmanship invested in the production of ceramics (Table 11.7). Decorated sherds include all sherds with evidence of surface modification such as incisions, punctation, and slips, while undecorated ceramics exhibit no surface treatment. The difference in the proportions of decorated and undecorated sherds is significant ($X^2 = 17.5$; $p > 0.001$, $V = 0.06$) among the four residential clusters. Examination of the proportions associated with each residential cluster illustrates that the small clusters have the lowest proportion of decorated sherds. However, it is important to note that the significance associated with this X^2 statistic is influenced by the large sample size. In addition, Cramer's V indicates only a 6 percent difference in the overall proportions of decorated and undecorated sherds, which is an overall weak finding despite the significant results of the X^2. Given the general patterns of ceramics, it appears that all residential clusters were engaging in similar amounts of cooking and serving activities, but the tendency is for the residentially mobile subpopulation to have fewer decorated vessels than the sedentary folks.

Table 11.7. Coyame phase decorated sherds at La Joya

Residential cluster	*Undecorated*	*Decorated*	*Total*
A % =	44.8	55.2	100.0
n =	(364)	(449)	(813)
B % =	44.2	55.8	100.0
n =	(501)	(663)	(1,164)
C % =	45.4	54.6	100.0
n =	(556)	(668)	(1,224)
Small clusters % =	48.4	51.6	100.0
n =	(530)	(498)	(1,028)

Table 11.8. Coyame phase figurine-to-ceramic ratios at La Joya

Residential cluster	*Figurines*	*Sherds*	*Figurines:sherds*
A	3	825	0.0036
B	5	1,163	0.0043
C	8	1,258	0.0064
Small clusters	2	1,052	0.0019

Figurines are generally considered as objects that all Formative Mesoamerican households used in rituals (Follensbee 2000; Marcus 1996) and were material points of reference used in the negotiation and reproduction of social relations (Joyce 1993). However, figurines are sometimes more commonly found associated with large structures than small structures (Lesure 1999), suggesting that large households used figurines in public rituals, and small households did not.

Table 11.8 presents the ratios of figurine fragments to sherds in each group. As with the comparison of obsidian above, these ratios show that residential cluster C is associated with the greatest number of figurines. While figurines were used for household-level rituals, they may also have been used in community-level rituals. The greater number of figurines recovered from residential cluster C may indicate that this residential cluster performed rituals more frequently than the other residential clusters. If figurines were used in ancestor rituals, as proposed by Marcus (1996), perhaps ancestors and the link to the past were of greater importance to this group than the other residential clusters. These comparisons of figurine-to-sherd ratios also indicate that the small clusters, the residentially mobile subpopulations, have the fewest figurines. Overall, this distribution may hint at subtle activity ranking among the residential groups. Also, the limited number of figurines associated with the residentially mobile subpopulation suggests that they were not participating in rituals involving figurines as frequently as the sedentary residential groups.

Table 11.9. Summary of Coyame phase residential clusters La Joya

	Residential cluster A	*Residential cluster B*	*Residential cluster C*	*Small clusters*
Population Estimate	16–24	44–65	65–98	—
Amount of obsidian	Less?	Less	More	More
Obsidian maximization	More?	More	Less	Less
Quantity of figurines	Some	Some	More	Few
Serving vs. cooking vessels	Similar	Similar	Similar	Similar
Decorated sherds	Similar	Similar	Similar	Less

The comparison of artifact assemblages associated with the residential clusters illustrates minor differences among the Coyame phase corporate groups. Table 11.9 presents the generalized pattern, and when there are differences among the groups, residential cluster C stands apart from the others. To recapitulate, residential cluster C acquired relatively more obsidian, possibly reducing the need to conserve the resource in the manner necessary for the occupants of residential clusters A and B. Residential cluster C also contains the greatest number of figurines, suggesting that it performed rituals more frequently than the others. These patterns suggest that residential cluster C had independent contacts beyond the village and that they may have held a higher social position above the other residential groups.

The small clusters differ from the large artifact clusters in that they have fewer figurines, fewer decorated sherds, and an intermediate amount of obsidian. The relative lack of figurines and decorated sherds suggests that it was less important to express membership or individuality in a permanent medium for the members of the small clusters than for the members of La Joya corporate groups. Ritual uses of figurines, whether they occurred in the household or at the community level, may serve the function of bonding individuals within a group. It may have been less important for the part-time residents to participate in, host, or display materials within their houses during rituals and feasts.

Gordita Phase (850–400 BC)

During the Gordita phase, settlement patterns in the Río Catemaco were concentrated in the lower reaches of the drainage, which may have been a continued response to the 1150 BC eruption of Cerro Mono Blanco and the associated environmental degradation. Similar to the Coyame phase, La Joya is one of the few sites in the upper Río Catemaco drainage that was occupied during the Gordita phase. However, Figure 11.4, the distribution map of log (weight/m^3), indicates some significant shifts in community organization. Instead of the relatively nucleated areas, a number of relatively small clusters are distributed throughout the

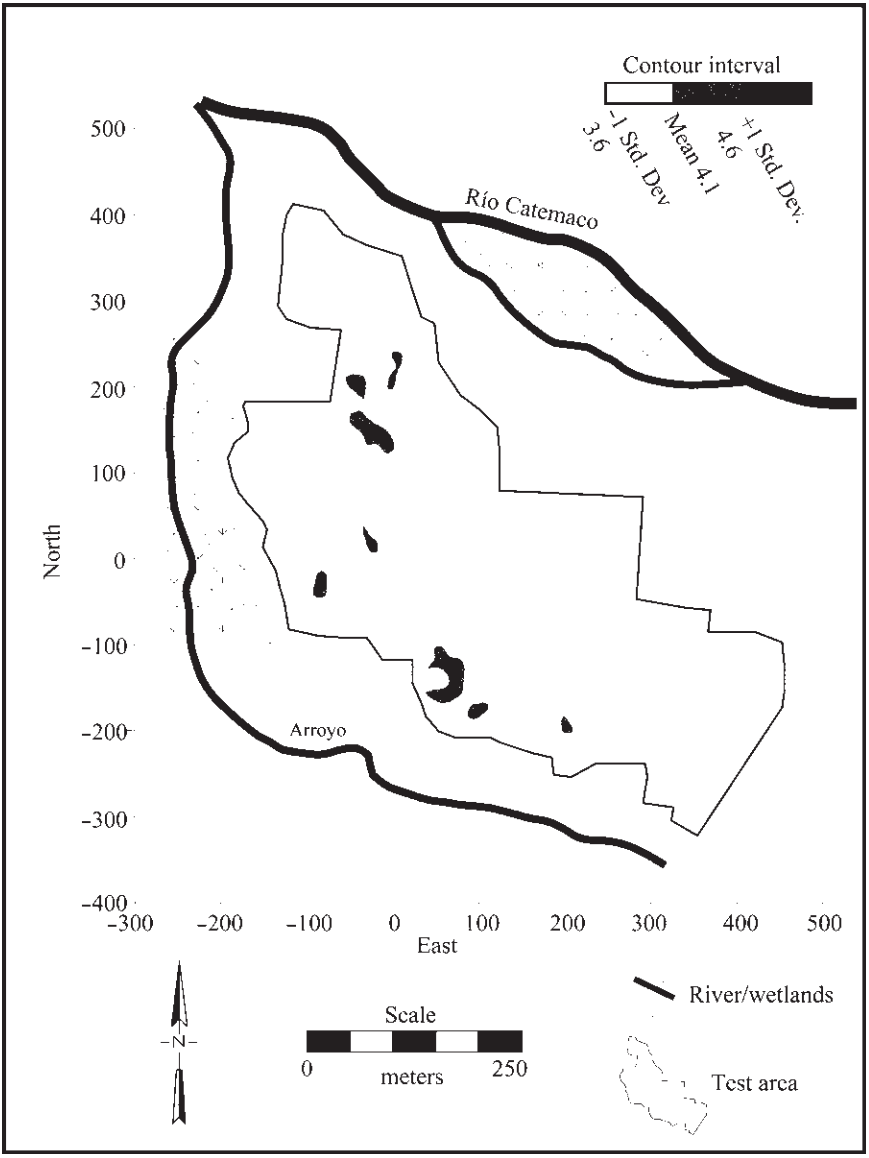

Figure 11.4. Distribution of ceramics based on log (weight/m³) for the Gordita phase of La Joya

site of La Joya. Population estimates for La Joya also suggest an overall population decrease from 163–272 persons to 61–102 persons (McCormack 2002). The shift toward dispersed settlement suggests a breakdown of multifamily corporate groups. While no major settlements are located between La Joya and Cerro Mono Blanco, a few hamlets are present (Santley and Arnold 1996:fig. 3). In addi-

Table 11.10. Population estimates for Bezuapan phase residential clusters at La Joya

Residential cluster	*Population estimate*	*Occupied area (ha)*
La Joya	280–468	25.0
Residential cluster A	92–139	5.0–6.0
Residential cluster B	125–188	5.0–6.0
Residential cluster C	27–41	2.0+

tion, excavations at Bezuapan, an 8.5-hectare Late Formative settlement located five kilometers east of La Joya, reveal that this location was first occupied at the end of the Middle Formative period (Pool and Britt 2000). While data from the regional settlement-pattern study suggest continued abandonment of the area most adversely affected by Mono Blanco's eruption, it is likely that some of the land had recovered to support vegetation and agricultural crops. Consequently, small groups could begin reoccupying this area, a point I return to below.

Bezuapan Phase (400 BC–AD 100)

Around 400 BC, Chuniapan de Abajo emerged as a center of a four-tiered settlement hierarchy in the Río Catemaco drainage, marking the emergence of chiefly society in the Tuxtlas. La Joya is one of the largest villages and may have served as a secondary center. In addition, numerous settlements were established in the upper Río Catemaco drainage in locations of good agricultural land (Santley and Arnold 1996). Figure 11.5, the distribution map of log (weight/m^3), illustrates a significant increase in the intrasite occupation from the previous period. Settlement is distributed throughout the site, including the presence of three high-density areas. While the boundaries of these clusters are not as distinct as the Coyame phase clusters, low-density areas within the site do separate the nucleated residential clusters. The population sizes associated with these clusters also suggest corporate group organization (Table 11.10).

Table 11.11, which presents the ratios of obsidian to sherds for each residential cluster of the Bezuapan phase, illustrates that no one residential cluster obtained markedly more obsidian than the other residential clusters. With the emergence of a chiefly center, all trade into the upper Río Catemaco drainage may have been filtered through Chuniapan de Abajo, rather than directly to the consumer, a change that may have altered and limited the amount of obsidian available to all residents at La Joya.

In addition, Table 11.12 presents the proportions of obsidian flake sizes for each residential cluster. Comparison of the sizes ($X^2 = 0.06$, $p < 0.50$, $V = 0.01$) show that residential groups were reducing obsidian in a similar manner, which further supports the notion that each residential group acquired obsidian in similar amounts. Furthermore, comparison of reduction technology presented in

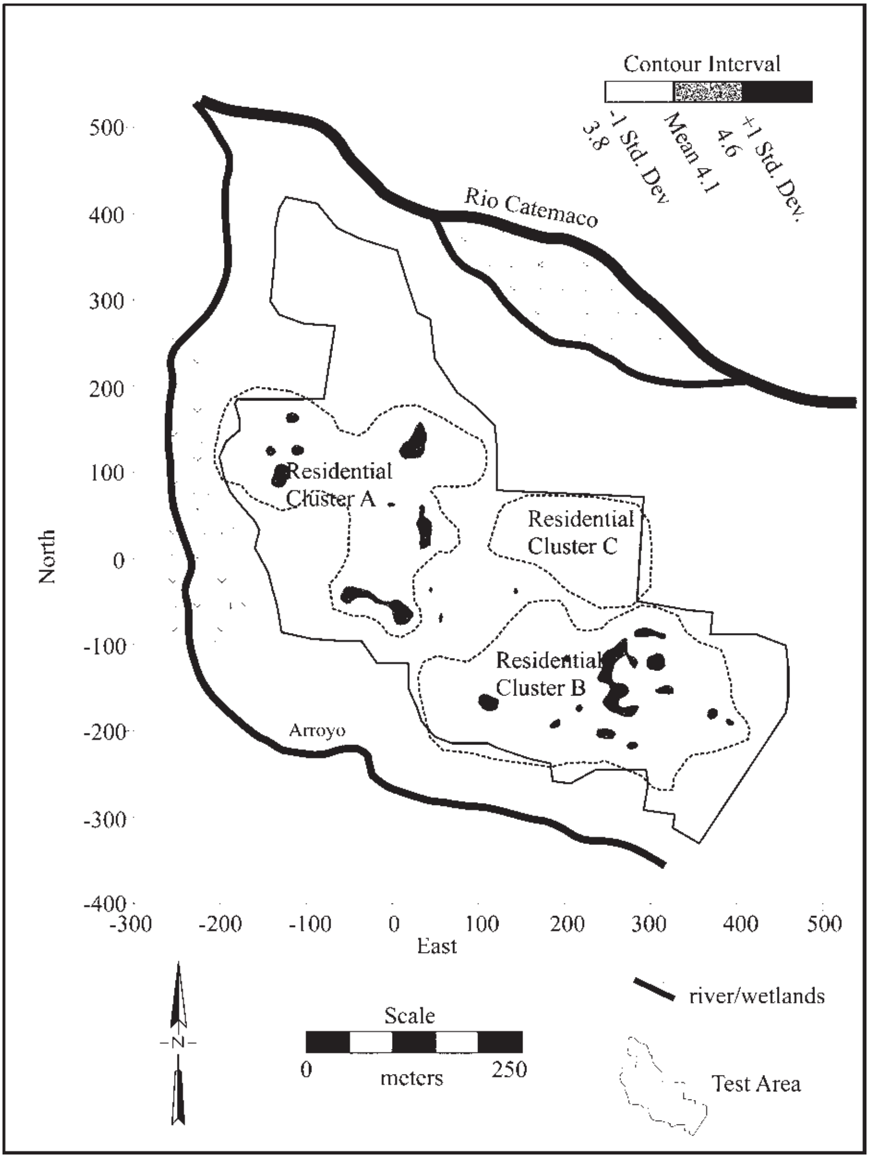

Figure 11.5. Distribution of ceramics based on log (weight/m³) for the Bezuapan phase of La Joya

Table 11.13 reveals no significant difference ($X^2 = 3.17$, $0.50 > p < 0.20$, $V = 0.12$) among residential clusters A and B. Area C was excluded from these calculations because the sample is small.

The one exception to this pattern is the proportions of obsidian blades in the assemblage of each residential cluster. Blade technology increased during

Table 11.11. Bezuapan phase obsidian-to-sherd ratios at La Joya

Residential cluster	*Obsidian*	*Sherds*	*Obsidian:sherd*
A	91	4,859	0.0187
B	121	7,429	0.0163
C	14	943	0.0148

Table 11.12. Bezuapan phase obsidian flake size at La Joya

	Size category			
Residential cluster	*5*	*10*	*15*	*Total*
A %	18.1	44.4	37.5	100.0
n =	(16)	(39)	(33)	(88)
B %	17.4	45.5	37.2	100.1
n =	(20)	(54)	(44)	(118)
C %	14.3	64.3	21.4	100.0
n =	(2)	(9)	(3)	(14)

Table 11.13. Bezuapan phase reduction technology at La Joya

	Reduction technology			
Residential cluster	*Bipolar*	*Core-flake*	*Blade*	*TTotal*
A %	54.5	36.4	9.1	100
n =	(48)	(32)	(8)	(88)
B %	61.0	35.6	3.4	100
n =	(72)	(42)	(4)	(118)
C %	42.9	50	7.1	100
n =	(6)	(7)	(1)	(14)

the Late Formative period, eventually becoming the major technological reduction strategy throughout Mesoamerica. Blades are rare at La Joya, and they may have served as a prestige item. While there is little confidence that the overall technological reduction strategies differed among the groups, we can have greater confidence (X^2 = 2.973; 0.1 > p < 0.05, V = 0.12) that the difference between the proportions of blades associated with residential clusters A and B reflects that residential cluster A obtained greater numbers of blades. Because of the single blade and overall small sample of obsidian from residential cluster C, it was not factored into this analysis.

The comparison of the ceramic assemblages presented in Table 11.14 reveals similar proportions of cooking and serving vessels (X^2 = 1.6, 0.5 > p < 0.2, V =

Table 11.14. Bezuapan phase vessel types at La Joya

Residential cluster	*Plates and bowls*	*Jars and tecomates*	*Total*
A % =	38.2	61.8	100
n =	(34)	(55)	(89)
B % =	42.0	58.0	100
n =	(58)	(80)	(138)
C %=	56.2	43.8	100
n =	(9)	(7)	(16)

Table 11.15. Bezuapan phase decorated sherds at La Joya

Residential cluster	*Undecorated*	*Decorated*	*Total*
A % =	62.7	37.3	100.0
n =	(3,035)	(1,808)	(4,843)
B % =	61.3	38.7	100.0
n =	(4,472)	(2,823)	(7,295)
C % =	66.6	33.4	100.0
n =	(614)	(308)	(922)

0.08). Therefore, we can conclude that each residential group engaged in similar food-consumption and preparation activities, and no particular group appears to have been serving food more frequently, an activity associated with hosting feasts. However, the comparison of the proportions of decorated versus undecorated sherds reveals a significant difference among these groups. The inspection of the proportions in Table 11.15 ($X^2 = 10.522$; $0.01 > p < 0.001$, $V = 0.03$) indicates that residential cluster C contains the fewest decorated sherds, pointing to a lower social position than the other residential clusters.

Specialized serving vessels appear during the Bezuapan phase with the emergence of a chiefly society in the Río Catemaco drainage. Fine-paste vessels are made without temper and are on average thinner than vessels of the same size with temper, attributes that would convey group affiliation and social status (Pool and Britt 2000:154). As reflected in Table 11.16, no fine pastes were recovered from residential cluster C, a detail further suggesting that residential cluster C held a lower position among the residential clusters at La Joya. But the lack of fine-paste sherds also prevents including it in the X^2 analysis. The X^2 reveals that the higher proportion of fine-paste sherds in residential cluster A is statistically significant ($X^2 = 200.82$; $p > 0.001$, $V = 0.13$), suggesting that residential cluster A has a higher status than B.

To summarize, the Bezuapan phase residential clusters still appear to be engaging in similar domestic activities. However, as Table 11.17 illustrates, the

Table 11.16. Bezuapan phase fine-paste proportions at La Joya

Residential cluster	*Tempered sherds*	*Fine paste*	*Total*
A % =	96.1	3.9	100.0
n =	(4,655)	(189)	(4,844)
B % =	99.6	0.4	100.0
n =	(7,282)	(30)	(7,312)
C % =	100.0	0.0	100.0
n =	(922)	(0)	(922)

Table 11.17. Summary of Bezuapan phase La Joya residential clusters

	Residential cluster A	*Residential cluster B*	*Residential cluster C*
Population estimate	125–165	44–65	169–303
Obsidian maximization	Similar	Similar	Similar
Obsidian blades	More	Less	Less
Serving vs. cooking vessels	Similar	Similar	Similar
Decorated sherds	More	More	Less
Fine paste wares	More	Less	None

differences observed for artifacts associated with status (e.g., blades and fine-paste ceramics) are consistently greater for residential cluster A. This pattern suggests that at this time, when regional hereditary social differences emerge, status differences are also endemic at La Joya. While these differences are not great, their presence suggests graded social differences within the region.

SUMMARY AND CONCLUSIONS

The review of intrasite artifact distributions suggests that community organization at La Joya fluctuated between independent, nuclear family–sized households and multifamily corporate groups. The emergence of corporate groups at La Joya is neither static nor a unidirectional development. This fluctuating pattern therefore raises the question, why did corporate groups emerge when they did at La Joya? The examination of available land resources reveals a correlation between land scarcity and multifamily corporate group organization. To quantify land scarcity, detailed information regarding regional and local populations, diet, subsistence, agricultural techniques, land under cultivation, agricultural yields, storage technology, and a host of other factors is necessary. Formative period research in the Tuxtlas is a relatively recent endeavor, with most studies dating to the last couple of decades. Therefore, much of the data needed to quantify land scarcity is not yet available. A number of changes in the regional social and environmental landscape do suggest, on a broad scale, that the relative availability of land fluctuated through time.

During the Tulipan phase, the combination of low population levels and mobile residence patterns suggests that land was highly available, allowing residential groups to shift houselot and, presumably, milpa locations fairly frequently. The direct and consequential effects of the eruption of Cerro Mono Blanco would have dramatically changed that relationship. The blanket of tephra near Mono Blanco rendered soil infertile, probably for centuries. When ash deposits are thin, however, they act as mulch, increasing soil fertility (Reinhardt 1991). The thin ash deposit at La Joya and continued occupation suggest that agriculture was possible in this location, but the ability to move about the landscape and relocate milpas would have been greatly reduced.

Moreover, La Joya may also have served as a refugee zone, absorbing some of the populations displaced by Cerro Mono Blanco's eruption. The increased locational stability and reduced agricultural land might influence the young generations to remain within the parental households as no other land suitable for agriculture was available. While there are some minor wealth differences, these Coyame phase corporate groups were not vehicles enabling the emergence of hereditary social inequality. Therefore, it appears that corporate groups of the Coyame phase were adaptive responses to a decrease in the available agricultural land.

By 800 BC, approximately 300 years following the eruption of Mono Blanco, the tephra deposits likely degraded to a point where they would have formed highly productive agricultural soils. The inheriting generation would therefore have an option to establish a new household on unoccupied land. This option could very well lead to the dissolution of multifamily corporate groups.

Finally, following a period of nuclear family–sized household organization, multifamily corporate groups formed again in the Bezuapan phase at La Joya. While the natural landscape was not dramatically altered as it was in the Coyame phase, the social landscape changed between the Gordita and Bezuapan phases. Populations infilled the locations with the best agricultural soil, and the presence of a chiefly center may have further restricted a household's ability to settle in an unoccupied location with good agricultural land. Therefore, when households were presented with the option to fission and move to locations without land or remain part of the parental household and become a multifamily corporate group, the option to remain part of the original household may have been the more attractive choice. Comparison of La Joya and Bezuapan subsistence strategies suggests that the residents of La Joya incorporated a combination of farming, hunting, and fishing, while farming was dominant at Bezuapan (VanDerwarker 2003). This strategy may be a result of differences in household organization and the ability of larger corporate households to diversify production (see Henderson 1998, this volume).

This longitudinal study of community organization with a focus on corporate-group presence within the social and environmental landscape reveals a relationship between nuclear family households and land abundance, and corporate group formation and land scarcity. While the broad nature of these data prevents a detailed discussion of the specific household activities and composition, it does reveal dynamic changes within one community over time as individual households adjusted to alterations in the natural and social landscape.

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TWELVE

Relationships among Households in the Prehispanic Community of Mesitas in San Agustín, Colombia

VÍCTOR GONZÁLEZ FERNÁNDEZ

INTRODUCTION

In the Alto Magdalena region, in southwestern Colombia, the development of communities at the core of small polities back to around 1000 BC have been traced in regional settlement-pattern surveys. Since that time, groups of households began to cluster together around places that were to become the central mounded funerary sites of the San Agustín chiefdoms during the regional Classic period (AD 1–900). What were the interrelationships among households within such central communities? What kinds of forces shaped and held together these communities while they became the central places of Classic period chiefdoms?

This chapter describes the reconstruction of the development of Mesitas, one of the biggest mounded prehispanic communities in the region. Various probable factors in the shaping of the community are evaluated. Resource control, population growth, and craft specialization do not seem to have been important for bringing about change in the sequence at Mesitas. However, the evaluation of these aspects suggests that the development of social differences among households is related to the very early clustering of some households around agricultural activities during a period when these activities were not crucial for subsistence. A traditional ritual role that some households held in the community since early times seems to explain in part the shape of the community and the greater differences among households later in the sequence. The term "household" is used in this chapter to denote remains of households as evidenced by clusters of artifacts, features, and architecture.

THE ARCHAEOLOGICAL STUDY OF THE MESITAS COMMUNITY

This chapter discusses internal dynamics in the long-term development of the prehispanic community of Mesitas from around 1000 BC to AD 900. During this long period the community—located in what is today the rural county of San Agustín, Department of Huila, in the Alto Magdalena region (Figure 12.1) of southwest Colombia—suffered transformations in size and shape but also in the importance of monumental burial mounds and the ritual activities they reflect. Regional settlement-pattern surveys, carried out since 1984 and totaling about 900 square kilometers, have documented the development of a number of similar communities in the Valle de la Plata and in the Isnos and San Agustín areas (Drennan et al. 2000) starting in the Formative 1 period (1000–600 BC).

These communities are the first societies to appear in the archaeological record of the Alto Magdalena region and are characterized by the widespread use of ceramic and lithic artifacts, the cultivation of a variety of plants, and a disperse settlement-pattern system featuring small residential households that reflect nuclear families (Blick 1993; Drennan et al. 2000; Jaramillo 1996; Llanos 1988; Quattrin 2001; Sánchez 1991, 2000). A chronology based on numerous radiocarbon dates for a number of ceramic types (Drennan 1993) permits us to divide the prehispanic sequence into five periods of different durations (Figure 12.2).

During the regional Classic period, beginning around 1 AD, the communities appear in the survey maps as concentrations of households that cluster together around groups of monumental burial mounds of the San Agustín culture (Drennan 1985; Drennan and Quattrin 1995). The analysis of settlement survey and excavation data from a large number of sites strongly suggests that during Formative times (1000 BC–AD 1) and the regional Classic period (AD 1–900), such communities emerged as the central places of individual chiefdoms or small polities (Drennan and Quattrin 1995), and that the more likely basis of political power of such chiefdoms, at least during the Classic period, was a religious ideology that linked the deceased leaders to supernatural beings in the funerary rituals (Drennan 1995). For understanding various important aspects of the long-term sequence in the region, the reconstruction of the chiefdoms' development needed to be expanded to cover the social interaction at other levels, including the household and the community.

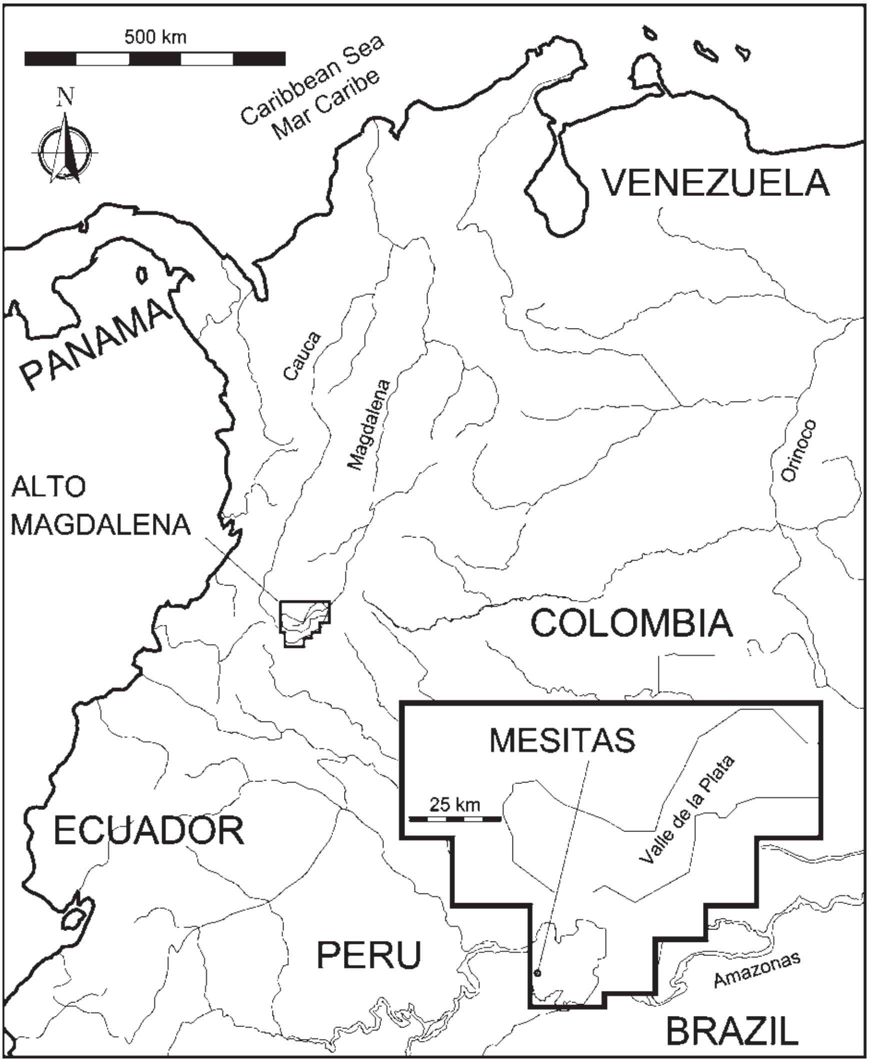

Figure 12.1. Map of Colombia, showing the Alto Magdalena region and the location of Mesitas in the region of San Agustín-Isnos (Reproduced, with changes, from Drennan 1995)

As a way to produce information at the community level and to complement the existing regional- and household-level information on the prehispanic trajectory of the Alto Magdalena, a number of studies[1] since 1997 were focused on the Mesitas community, a settlement concentration around the Mesita A, Mesita B, and Mesita C monumental funerary sites (Drennan et al. 2000:93–117; González 2007). The studies included intensive surveys and programs of numer-

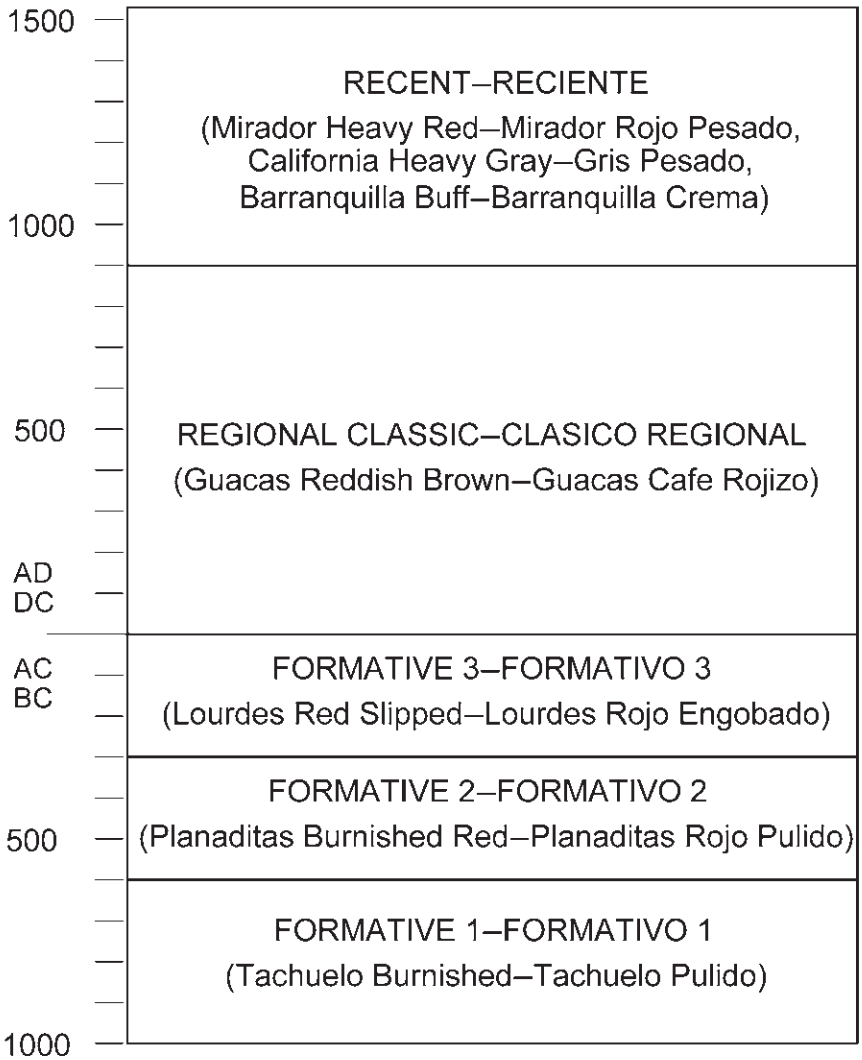

Figure 12.2. Ceramic chronology for the Alto Magdalena Region (Drennan 1993) of Colombia

ous small shovel probes designed to recover detailed information on household spatial distribution as well as samples of artifacts from each household located in an area of roughly three square kilometers.

In this chapter, I discuss the relative importance that resource control, population growth, and craft specialization had in the development of chiefdom's central places in the region, based on information recovered from the increasing number of households that made up the Mesitas community. These aspects had received some attention in earlier studies on chiefdom organization in the Alto Magdalena, but this work is the first attempt to study them at the level of the interrelationships among households within a central community. Using this perspective, I consider the Formative 1, Formative 2, Formative 3, and regional Classic periods at Mesitas, focusing on the relationships among households within this central community and on the forces that may have shaped and held it together while it became the central place of a regional Classic chiefdom.

Previous studies did not find strong evidence for the importance of economic and demographic factors. However, the importance of these factors at a more local level for shaping the development of chiefdoms has not been ruled out. Thus, the case of Mesitas provides a community-level perspective for evaluating the importance of possible factors in the development of chiefdoms in the Alto Magdalena. This perspective should help us understand better what households did inside developing chiefdoms and how important their activities were for the regional long-term trajectories.

CHIEFDOMS AND THE SAN AGUSTÍN CULTURE

The name "San Agustín" has been used by archaeologists working since 1914 to refer to a style of statues sculpted from igneous rock and placed inside burial mounds in dozens of sites in the Alto Magdalena region as well to a group of people who supposedly shared the use of this sculpting style and other cultural traits (Duque 1964; Duque and Cubillos 1988; Llanos 1988; Preuss 1931). A total of about 300 San Agustín statues, varying in height from 0.5 to 4.0 meters, have been found in some sixty elaborated tombs with stone-slab structures inside earthen mounds of around thirty meters in diameter (Sotomayor and Uribe 1987). Some of the statues still have the original, colorful painted surfaces (Cubillos 1980) that suggest the performance of elaborate funerary rituals during the construction of mounded tombs. The geographical distribution of the mounds with statues spans a vast region of about 100 kilometers in diameter (Sotomayor and Uribe 1987), but the megalithic tombs are much more common in a smaller, 300-square-kilometer area near the San Agustín and Isnos municipalities, where a few funerary complexes feature groups of several mounds per site (Duque 1964; Duque and Cubillos 1979). The largest funerary site is Mesitas, featuring a tight cluster of four groups of burial mounds where many of the known San Agustín stone statues are located.

Each San Agustín burial mound covers or is associated with a number of burials, but the mound itself is focused clearly on a particular individual who was buried in a stone corridor at its center, often inside a monolithic sarcophagus (Duque and Cubillos 1983). The statues, representing supernatural beings mixing human and animal features, were buried in front or on either side of the rectangular stone-slab corridor that contained the tomb. The layout of this kind of monumental tomb, associated with regional Classic ceramics (AD 1–900), seems to express a relationship between the person buried in the grave and the religious or mythical beings depicted in the sculptures, suggesting an individually oriented political organization based on a strongly religious ideology (Drennan 1995).

No monumental burial mounds from Formative times have been systematically excavated yet, but a wooden sarcophagus found in a looted tomb of the Alto Lavapatas in the 1930s was dated to around 500 BC* (Duque and Cubillos 1988:107). Continuity in the general patterns of settlement distribution through time (Drennan and Quattrin 1995) suggests that the specific places with megalithic ceremonial complexes built during the regional Classic period were already centers of activities attracting population well before 1 AD.

What were the bases of power during Formative times, how the political organization of regional Classic chiefdoms came about, and how the ceremonial activities in the central communities were related to the development of complex societies are questions that still remain to be fully addressed. Such questions will need new kinds of archaeological studies, focused on analytical levels where the information is still scant, such as the community level.

Some studies of chiefdom development (Blake 1991; Rogers 1995) previously linked community-level processes around civil and ceremonial centers with the regional development of chiefdoms. This level of analysis allows investigating internal dynamics of chiefly developments (Drennan et al. 2000; Price and Feinman 1995) and offers the possibility of linking household-level dynamics with region-wide processes (Bermann 1994:10–18; Henderson and Ostler 2005; Peterson 2006).

FACTORS OF CHANGE: THE CONTROL OF CRITICAL RESOURCES

The literature on the development of chiefdoms places much emphasis on the role of resource control (Earle 1987a; Gilman 1981), contradicting a more traditional view that sees chiefdoms as characterized by authority without real power and lacking the legitimized force that lies at the base of the economic integration in states (Fried 1967; Service 1962; Steponaitis 1978:420). Thus, special attention has been given to the idea that chiefdom development rests on economic control of basic resources by an elite group (Earle 1991a; Johnson and Earle 2000:253). Direct control of access to productive land, for example, has been proposed as a basic factor for chiefdom development (Earle 1991b:71–72; see Douglass and Gonlin, this volume). However, in the Alto Magdalena chiefdoms,

* All dates for the region are uncalibrated ^{14}C.

at the regional level, population seems rather low and dispersed, even if some settlement concentrations do exist. Spatial analysis of such concentrations has shown no correlation with agricultural land or natural resources. This suggests that social and political reasons prevailed over economic factors in determining the location of small polities during Formative and regional Classic periods (Drennan and Quattrin 1995). Although burial architecture and variation show clear social differentiation by the regional Classic period, the number of offerings does not reflect clear wealth differences (Drennan 1995). The horizontal excavation of domestic deposits has shown only minimal economic differentiation (Blick 1993; Jaramillo 1996).

Control of resources in the region, then, was probably not strong. However, small differences in the access to basic resources at the interior of individual communities could have been important in shaping the development of social hierarchy in the Alto Magdalena, and this information likely would not come from more horizontal household excavations but from the systematic study of the artifact variation across whole communities.

FACTORS OF CHANGE: POPULATION GROWTH

Another common factor considered to be important in chiefdom development is population growth, along with the pressure it can create on resources. Demographic indicators do correlate with some of the variables that are often used to identify social complexity (Feinman and Neitzel 1984:75–78). Circumscription and warfare (Carneiro 1981) and agricultural intensification (Boserup 1965) have been proposed as ways in which population pressure triggers sociopolitical transformations. In some areas, chiefdoms seem to have developed in a context of population growth and circumscription to harsh environments (Kirch 1984:216–23; Sanders, Parsons, and Santley 1979:369–85). In the Alto Magdalena, regional population did grow through the sequence, especially from the Formative 3 to regional Classic periods (Drennan et al. 1989:151), providing some correlation of population growth with changes in social and political organization, but the relations still remain unclear. Even at demographic peaks not all potential agricultural land appears to have been utilized (Drennan and Quattrin 1995; Drennan et al 2000).

An aspect of demographic dynamics that may be important at the community level is household size. Elite households might have been structured differently from non-elite households. Larger group sizes have been related to resource mobilization by emerging chiefs (Muse 1991) since larger households seem to have economic advantages that come from having larger labor pools (Henderson 1998; Webster 1990). Household size might also be related to part-time specialization since it would require specific kinds of labor organization. A deeper study of local patterns at the interior of evolving chiefdoms in the

Alto Magdalena is then an adequate base for evaluating the importance of demographic change in the development of social differentiation and political centrality.

FACTORS OF CHANGE: SPECIALIZATION OF CRAFT PRODUCTION

The idea that resource diversity can result in some kind of specialization that creates new managerial requirements has been proposed to explain how chiefdoms evolved (Service 1962). Specialization of production could also create new opportunities for the accumulation of wealth and redistributive economies (see Douglass and Gonlin, this volume). No evidence of specialized agricultural production has been found yet in the Alto Magdalena at the regional level (Drennan and Quattrin 1995; Drennan et al. 2000; see also chapters by Neff and Ciolek-Torrello, this volume) or at the level of the household during Early Formative times (Quattrin 2001). The subsistence base was broad in both cultivars and wild species, and a wide array of plants, including maize, were produced and consumed at all elevations (Quattrin 2001:81).

Craft specialization and the involvement of local leaders in prestige-goods exchange networks have been proposed as ways in which political and economic control developed in chiefdoms (D'Altroy and Earle 1985; Earle 1987b:67–69; Helms 1987; Spencer 1993; Steponaitis 1991). Craft production is a clear possibility for specialization in the Alto Magdalena. Specialization in the production of statues, gold objects, and lithic and ceramic artifacts could have been one factor for shaping these societies, as some relationship of San Agustín elites to production of esoteric knowledge has been linked to the homogeneous character of styles of elite goods in southwestern Colombia (Gnecco 1996).

However, regional analysis in the Alto Magdalena region indicates that ceramic production was not subject to regional control in any prehispanic period (Taft 1993:165–171) and household archaeology in the Valle de la Plata (Blick 1993; Jaramillo 1996) did not produce direct evidence of craft specialization during Formative period times. Data on community organization then can provide a better basis to evaluate how significant craft specialization was for the internal organization of societies in the Alto Magdalena.

THE RECONSTRUCTION OF THE MESITAS COMMUNITY

The reconstruction of the archaeological community of Mesitas took advantage of different kinds of information and various levels of analysis. The monumental burial mounds of Mesitas and some surrounding areas have been horizontally excavated for several decades, producing detailed information mainly on funerary architecture—but also on artifact diversity, stylistic change, and preservation of materials—and numerous radiocarbon dates and some information on residential architecture (Chávez and Puerta 1988; Duque 1964; Duque and Cubillos 1981, 1983, 1988; Llanos 1988; Llanos and Durán 1983).

Archaeological communities appear in the survey maps of the Valle de la Plata region as defined clusters of remains of households spaced at distances of approximately ten kilometers from each other. Since those clusters do not correspond to environmental characteristics, they have been interpreted as the relatively dense communities that were centers of small polities (chiefdoms) whose territories spanned some 100 square kilometers (Drennan and Quattrin 1995) and had populations of 4,000 to 8,000 (Drennan et al. 2000). Each of the central communities in the Valle de la Plata region was located during the regional Classic period around a complex of monumental burial mounds with stone statues of the San Agustín style, suggesting a strong relationship between religious ritual and regional political organization.

Located directly to the south of the Valle de la Plata region are the Isnos and San Agustín municipalities, where a 300-square-kilometer region including most San Agustín burial complexes was surveyed from 1993 to 2007 by the Programa de Arqueología Regional en el Alto Magdalena (PARAM),[3] completing settlement-pattern studies for a total surveyed area of approximately 900 square kilometers as a base for reconstructing demographic dynamics, settlement distribution, and regional political and economic organization (Drennan et al. 2000:41–92). An intensive survey of the Mesitas area was conducted in 1997 as part of the PARAM program. In this survey, 300 1 by 1 meter stratigraphic excavations delineated the general shape of the household clustering around the monumental burial complex and also produced basic chronological information (Drennan et al. 2000:98–99).

Reconstructing the community itself required us to identify and study all the individual household remains that formed the community at the center of the cluster identified in the regional survey (González 2007). The fieldwork methodology for such a reconstruction took advantage of earlier projects in the region in which systematically placed excavations of 40 by 40 centimeters had proven successful in reflecting the actual subsurface distributions of archaeological remains (Blick 1993; Drennan 1985:137–143; Jaramillo 1996; Quattrin 2001). An area of 275 hectares (Figure 12.3) was selected following the settlement concentration discovered in regional surveys around the concentration of mounded funerary sites and also adjusting the boundaries to the specific shape of the local terrain. Inside the selected area, linear transects spaced thirty meters apart and with one shovel probe each five meters were systematically placed so as to cover all relatively flat terrain of the study area. Each of the artifact samples obtained in 2,000 probes was analyzed to produce maps with the distribution of sherds of ceramic types for each specific period (Figure 12.4). For each period, the specific clusters of sherds and other artifact classes that were at least twenty-five meters wide and were located on and around relatively

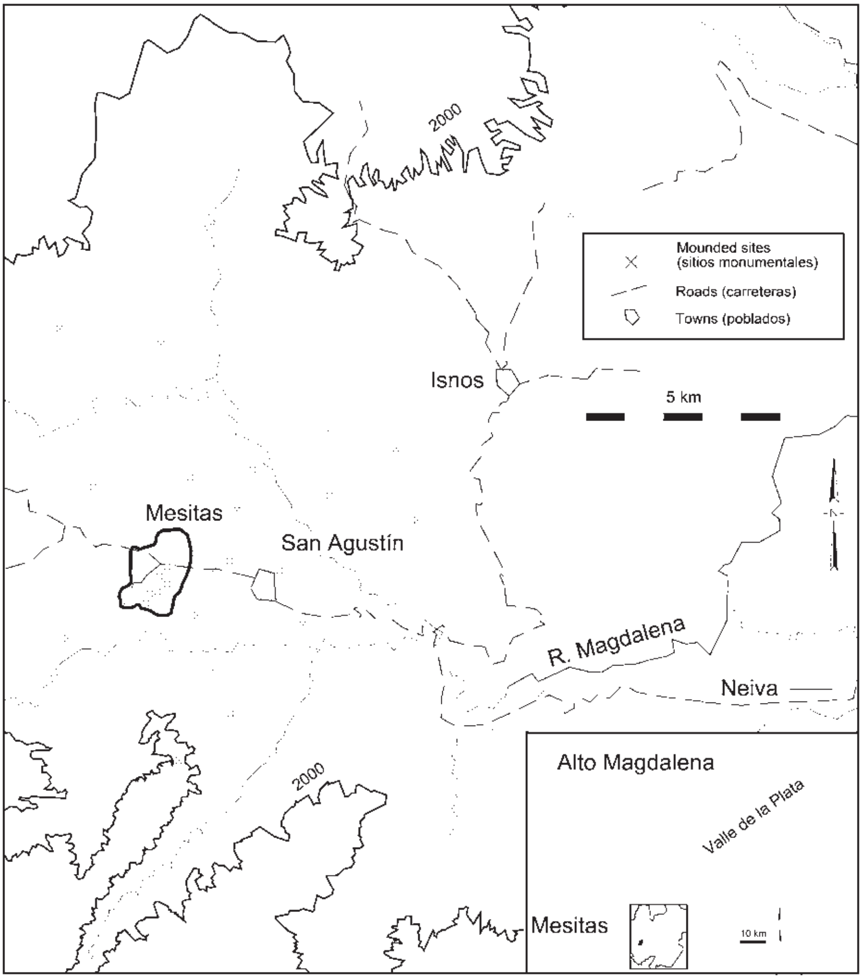

Figure 12.3. Map of the Alto Magdalena region showing mounded sites and the Mesitas area

flat areas were considered to be household locations. These transects permitted the identification of seventy-six specific household locations with 150 separate occupations (González 2007).

Grids of probes formed by placing twenty-five to thirty additional shovel probes on and around each household location were used to obtain larger samples of each household's artifact assemblage and also to get information on the approximate sizes of each household cluster. Every artifact collection obtained in the shovel-probe program at the selected areas represented, in this way, a separate household. Data analysis focused then on the differences and similarities among contemporaneous households.

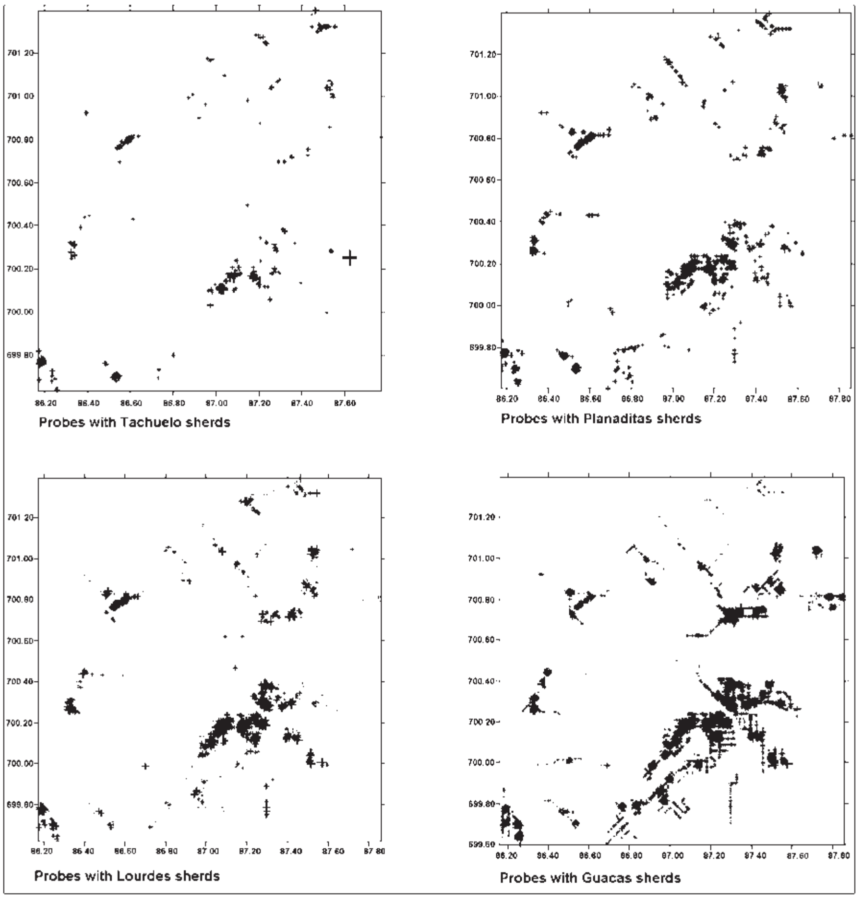

Figure 12.4. Four maps of the Mesitas area showing the location of all the probes with each type of ceramic sherds; symbol size represents sherd frequency

The relative status of a household was indicated, in part, by spatial location within the community. A denser core directly associated to the concentration of mounds contrasted with the less dense periphery (Figure 12.5). In general, some households clustered near the Mesita B mounded site seem to have had a special status in the community. Indication of status for some households in the denser core during the regional Classic period includes the spatial association with the most impressive burial mounds in Mesita B and Mesita A sites and the almost exclusive use of certain types of ceramic decoration. Additional indications of higher status for the core came from finding evidence of more serving than cooking vessels and concentrations of ornaments such as hexagonal stone beads. In Formative times, before the burial mounds were built, status differences can be

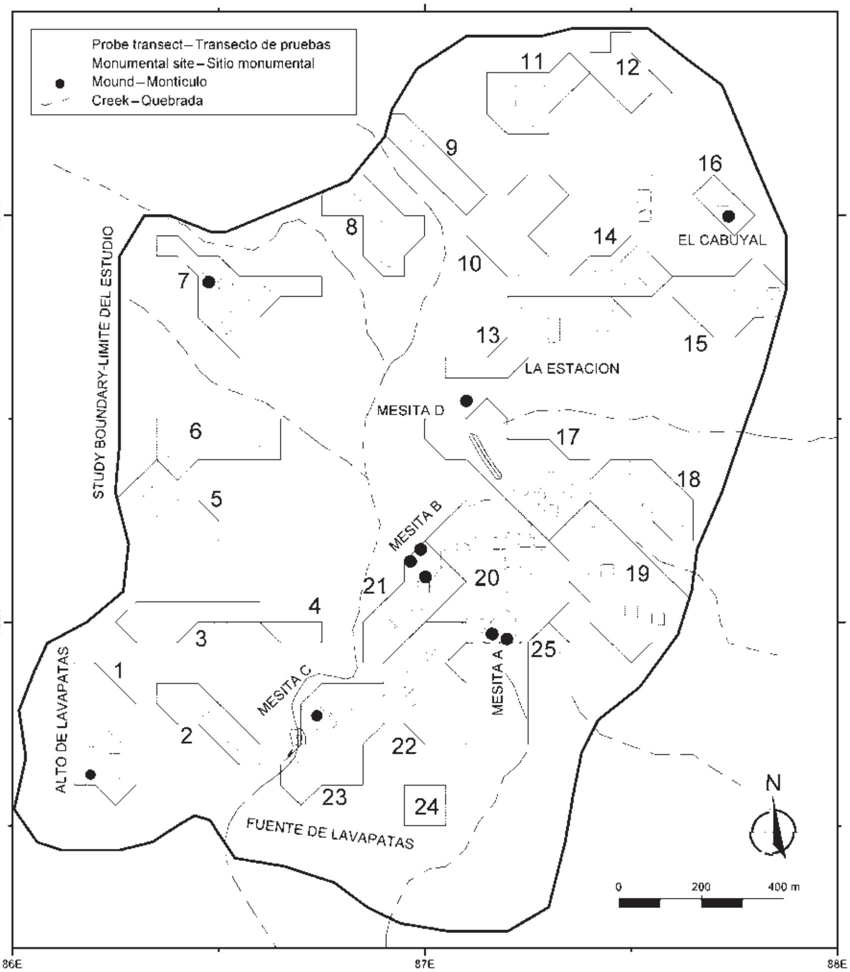

Figure 12.5. Map of the Mesitas area showing the location of the 76 specific household locations, the core of the community and the location of mounded funerary sites

seen in some aspects of the ceramic assemblages. During Formative 1, for example, Household 68, near what later became the mounds of the Mesita B site, had more serving vessels than cooking vessels. Some indication of household wealth was seen in higher proportions of sherds that featured relatively costly decorations and in the greater proportions of fine materials that seem harder to obtain, such as obsidian, which probably reached the region by way of an exchange network (Jaramillo 1996:125–126) and from separate sources (Hurliman 1993). Households in the core also had, in general, more ornaments and a higher frequency of some rare types of decoration on ceramic vessels (González 2007).

Figure 12.6. Four maps of the Mesitas area showing the location of households for each period

Thus, when comparing household characteristics, special attention was given to their location within the community in terms of an apparently high-status core and a lower-status periphery.

The number of households in the community, as reconstructed in the systematic probe program, grew from six in the Formative 1 to thirty-one in the Formative 2, thirty-eight in the Formative 3, and finally seventy-five in the regional Classic period (Figure 12.6). The obvious demographic growth of the community and the association of the Mesita B site with a relatively wide area of flat, arable land suggested at first that demographic dynamics or the control of land could have been important in the development of the regional Classic central community. Alternatively, such a center could have grown around the centralized production of certain crafts. The spatial distribution of households and the specific artifact assemblages of each household were then used to evaluate these possible factors in the consolidation of Mesitas as a chiefdom's central community.

EVALUATING THE CONTROL OF LAND

The importance of the first factor, control of critical resources, was evaluated by looking at the relationship of household locations to land for each of four periods. Investigating the distribution of land among households consisted of a GIS-based catchment analysis that measured and compared associated amounts of productive land. Catchment-area analysis has proven useful in assessing productivity differentials in non-market societies (Brumfiel 1976; Steponaitis 1981; Vita-Finzi and Higgs 1970). In this study, information on local soil productivity (Neira 1996) was combined with precise household location to estimate the area of prime agricultural land that could be reached within catchment circles of a 0.3-kilometer radius around each household. Assuming an association of households to the very close agricultural plots around them is supported by the reconstructed general regional settlement pattern that shows dispersed and continuous occupation of the landscape with no areas devoted exclusively to agriculture (Drennan et al. 2000). During Formative 1, the community was formed by only six households. Three households grouped together on the best piece of available land, while the other three households were isolated. One of the households at the core had direct access to 40 percent of the agricultural land in the study area inside catchment areas (González 2007). It is unlikely, however, that control of this fertile land gave households a critical advantage because the community was so small and the agricultural resources readily available and probably abundant in the local vicinity.

During the Formative 2 period, the community had thirty-one households, and the core was much denser than before. However, there were still a number of locations that offered abundant productive land and remained unoccupied. Some households did have more productive land than the average within their catchment areas, but land was so abundant inside the core that the nucleation there did not result in measurable productivity differentials between zones. This suggests that each household—whether on the periphery or in the denser core—had a sufficient land to fulfill its needs.

The Formative 3 community, with thirty-eight households, was not much larger than the previous period's community, but nucleation increased at the core, resulting for the first time in significant—but not very big—differences between the core and the periphery in terms of household agricultural productivity. At this time, households at the core might have wanted some of the surplus that

Table 12.1. Comparison of agricultural land inside household catchment areas between the core and the periphery of Mesitas for four periods

	Core			Periphery		
Period	*N*	*Mean (ha)*	*Std. Error*	*N*	*Mean (ha)*	*Std. Error*
Formative 1	3	4.00	1.79	3	2.15	0.73
Formative 2	18	1.34	0.30	13	1.41	0.32
Formative 3	27	1.09	0.22	11	1.54	0.25
Regional Classic	41	0.80	0.12	34	0.95	0.13

Source: González 1998.

households at the periphery could more easily produce. The clustering of households in these conditions suggests that high-status households were successful in attracting followers and perhaps also surplus in the form of tribute from the periphery and beyond. Households in the periphery are associated with greater agricultural productivity and might have been "wealthier" than households at the core (González 2007). However, the amounts of unoccupied productive land that still existed during the Formative 3 period outside the core suggest that land was not a critical resource.

During the regional Classic period, the Mesitas community had seventy-five households. Several areas at the periphery were occupied for the first time and the core became somewhat denser, but the differences in agricultural productivity between the core and the periphery were less contrasting than they were during the Formative 3 (Table 12.1). This pattern suggests that during the regional Classic period all households had more equal access to agricultural land. In terms of direct access to land, it can be shown that throughout the sequence that one-sixth of the Mesitas households had easier access to almost 40 percent of the land inside catchments of 0.4 kilometer in diameter. However, the unevenness of this distribution did not change from Formative 1 to regional Classic, so any attempt on the part of elites to restrict access to land seems unlikely.

Interestingly, the average amount of land per household did decline during the regional Classic period for the whole community to about one hectare of productive land inside each household's catchment area. Productive land might have become by the regional Classic a much more critical resource than it was before. Agricultural activities could have been more important during the regional Classic period, especially for households in the denser core. During this period, households of apparently high status were concentrated in the core near the monumental tombs of obviously important individuals. These households were apparently larger than households on the periphery. Thus, land during the regional Classic period was more limited than before and agriculture might have become a much more critical activity, especially for households in the core. But up to this time, no evidence of restricted access to land was seen in the land distribution and the productivity differentials did not intensify over time.

The data on land distribution suggest that direct control of land is not likely to have been a foundation for elite authority at Mesitas. These data do not support the idea that emergent elites directly controlled subsistence resources. The findings are consistent with the results of regional surveys in the Valle de la Plata that found no relationship between site distribution and the distribution of productive soils (Drennan and Quattrin 1995:219–220; see also Douglass and Gonlin, this volume). What is interesting about the data is that households at the core seem to have attracted households to nucleate near them to share some specific tracts of agricultural land despite the opportunity for any household to locate its residence on isolated but also productive lands.

The distribution of Mesitas households suggests that other, untested aspects of agricultural production may have had a greater significance in the trajectory of change than control of land. These aspects include the formation of a cooperating group. Beginning in the Formative 1, denser settlement at the core may reflect the practice of intensive agricultural practices by elite groups (González 2007). Communal activities are suggested by the presence of unusual sherd concentrations in some specific areas in the core that are different from the refuse produced by normal household activities in Mesitas (see Figure 12.4). The identification of such groups in Mesitas in a context of low population levels supports the idea that in chiefdoms labor, not land, was a main factor limiting production (Earle 1987a:293; Friedman and Rowlands 1977; Webster 1990). Any agricultural intensification present during the regional Classic period or earlier was probably not needed for subsistence but may have been instrumental in expressing differences in rank or prestige.

EVALUATING DEMOGRAPHIC CHANGES

The impact of a second factor, population growth, was evaluated by analyzing the timing and extent of demographic changes in the community. To do this, the number of households and their relative sizes from the Formative 1 period to the regional Classic period were reconstructed. The increase in number of households shows a general relationship between local population growth and the consolidation of chiefly authority. Moreover, the tremendous surge in sherd densities for the regional Classic and the greater nucleation at the core opened the possibility that the number of identified households underrepresented the total number of people living in the community and that population growth could then be a considerable force in shaping the community (González 2007).

To reach better estimates than those based on only the number of identified households, the demographic structure of the community was reconstructed for each of the four periods using not only this number but also two different

Table 12.2. Mean household deposition rates by period at San Agustín

Period name	*Period length (years)*	*Number of sherds*	*Number of households*	*Mean deposition rate*[a]
Formative 1	400	814	6	0.339
Formative 2	300	3,593	31	0.386
Formative 3	300	3,348	38	0.295
Regional Classic	900	32,838	75	0.487

Note: Data obtained from a total of 5,057 shovel probes in the Mesitas area (González 1998).
[a]Number of sherds per household per year.

indices reflecting group size: the size of the sherd concentration representing each household and the density of sherds in each group of probes representing each household. The estimates were then adjusted to the different lengths of each period.

The analyses of household size reflected clear but small changes in the size of the households in the core during the Formative and regional Classic periods, suggesting that elite households had only slightly larger labor pools in the former period and that these households were located exclusively inside the community's core. Household size did not show any significant change at the periphery. Incorporating the small changes in household sizes for the regional Classic period reflected by sherd densities and the sizes of artifact distributions, our estimates for the size of the community are 30–36 members for the Formative 1, 200–230 persons for both the Formative 2 and Formative 3 periods, and a final surge in size to 700–900 people in the regional Classic period. This growth, however, happened over a very long period and could have been the result of extremely low annual rates. The recovery of a higher number of sherds for the regional Classic period does not need to reflect a rapid surge in population. The comparison of mean household deposition rates by period (Table 12.2), adjusted for the length of each period, shows similar growth rates throughout the sequence. The regional Classic period does show, however, a higher sherd-deposition rate than for earlier periods. This slightly higher mean deposition rate supports the idea that some households in this period were larger, but the increase in this rate does not reflect drastic demographic changes.

There is at least a correlation between the clearer indications of social hierarchy of the regional Classic and population growth. A good part of this growth at the community level however, has to do with an increasing tendency for nucleation near the core of the community and that tendency was present from before, even between Formative 2 and Formative 3, when there was no observable population growth for the whole study area.

Given these varying rates of growth, any apparent population pressure appearing in the regional Classic at Mesitas should be seen as a result, rather than a cause, of the developing social hierarchy. Moreover, the moderate population densities found in what was probably one of the densest settlements in the region and in the southwest of Colombia give strong support for the conclusion of regional-level studies that carrying capacities were far from being reached (Drennan and Quattrin 1995). Thus, the information on the demographic changes at Mesitas does not support the idea that population pressure (Boserup 1965; Carneiro 1970; Cohen 1977) was the central force shaping chiefdom development in Mesitas.

The information from the Mesitas area, one of the most densely populated areas in the region, even when it shows some increase in household size at the core of the community, is entirely consistent with the results of earlier regional studies that show demographic growth in the Valle de la Plata during the regional Classic period but without any clear evidence of population pressure creating subsistence problems (Drennan et al. 2000), supporting the general idea that demographic shifts should be seen more a consequence than a factor in the development of complex societies (Cowgill 1975). Regional studies in other areas of northern South America have also reported chiefdom development in a context of population growth with very low population densities (Langebaek 1995; Spencer 1990).

Instead of creating subsistence problems, it is possible that greater nucleation at the Mesitas regional Classic center was a result of a successful system of tribute relationships that could have served in Mesitas to balance any pressure on the local resources at the core. Given that the average amount of land per household, even during the regional Classic period, was not terribly low, any tribute flowing from the periphery to support activities at the core did not need to be especially high (González 2007) to support the chiefly activities at the center.

EVALUATING CRAFT SPECIALIZATION

The significance of our third factor, craft specialization, for the changes in Mesitas was evaluated by analyzing changes through time in the ranges of activities performed by different households in the community. For each period, the distribution of different categories of lithic and ceramic assemblages was analyzed and comparisons of the household assemblages were made across the community. The spatial concentration of small numbers of households with particularly high densities of specific and rare tools or materials was considered an indication of household craft specialization. If the basis of elite distinction at Mesitas was the effective control over the production and acquisition of social valuables, we would have expected a direct association of centralized craft production in the households of greatest status in Mesitas.

Analyses of the Mesitas data did show that evidence for craft production is more common at the core than at the periphery (González 2007). The analyses, however, also show that they are not absent from the periphery, and in some cases, they are related to households of apparently lower status. This pattern suggests that elites did not have exclusive control over craft production.

Some kind of concentration of craft production, for example, is reflected in the lithic assemblages for the southwest corner of the study area. Households in this sector have the greatest concentrations of lithic artifacts made of slate. During the Formative 1, these households also show proportions of decorated vessels that might indicate wealth, but they did not show clear indications of high status in the assemblage of vessel forms. The existence of some polishing-stone and lithic artifacts in the assemblages also shows evidence for craft specialization in the core. Greater densities and greater proportions of some types of polished lithic artifacts suggest that the grouping of households near Household 68 was involved in a specific kind of craft production, perhaps the elaboration of gold ornaments, as suggested by the discovery, in this same location, of gold-plate fragments and gold drops in the second level (40 cm) of an excavation by Luis Duque in 1960 (Duque 1964:242).

During the Formative 1, Formative 2, and Formative 3 periods, artifact assemblages indicate one single special location also near the Mesita B with high sherd densities (González 2007). These deposits were interpreted as evidence for supra-household activity, perhaps communal parties or ceremonies. But there are also two other distinct groupings of households within the core, not associated directly with a monumental mound, that had the greatest concentrations of chert, obsidian, polishing stones, axes, and other tools or materials. This suggests that some craft activities were undertaken by other households and not only by the ones near the Mesita B or by any other specific group of households. In fact, a northeast/southwest distinction seemed to separate the core into two areas with different sets of craft activities. In each of these groupings, some households show some signs of different kinds of craft specialization.

The pattern in the core suggests that specialization could have been centralized in Mesitas along kinship lines. Three lineages represented by three separate groupings of several households might have associated themselves with different aspects of craft production. Household 68, near the Mesita B site, always shows some sign of high status in the community and seems related to some kind of supra-household activities. This particular household also shows evidence of craft production in the form of stone cylinders and other types of polished stone that were found only there and that could be used for a specific kind of craft production. Household 68, however, did not exclusively control craft production since other households also participated in other types of craft production. For example, Household 37 may have more intensively manufactured pottery since many more polishing stones were found there than in any other location. Households 37, 39, and 60 had many more chert and obsidian tools than any other household and were probably involved in craft production. Households 60 and 66 had higher numbers of manos and metates than expected, also suggestive of specialized activities. Thus, no elite group at Mesitas seems to have had an exclusive control over the production or acquisition of crafts or valued objects, which does not support the idea of craft production as a basis for chiefdom organization (Schortman et al. 1992:4). Other activities, such as the involvement of Household 68 in communal agriculture and redistribution, seem to have been more central to the organization at Mesitas than craft production.

To conclude, none of the factors selected for the study of the community of Mesitas (control of land, population growth, and craft specialization) seems to have been instrumental in bringing about long-term changes. Alternative factors yet to be evaluated but suggested by the information collected in Mesitas thus far include the formation of early cooperative groups during the Formative 1 period (1000–600 BC), which might have given households near Mesita B a preeminence that made them central to the community. Their traditional role as coordinators of agricultural and ceremonial activities, for example, might have made them increasingly prestigious. During Formative 2 (600–300 BC) and Formative 3 (300 BC–AD 1) times, when the community numbered approximately 250 persons, the increased importance of agriculture and the coordination of supra-household activities might have given the traditional leaders increased authority but not much economic power. The first clear indications of economic differences appear during the regional Classic period, when households in the core are larger than on the periphery, and when the size of the community would have necessitated intensifying some aspects of agriculture. Some households in the core seem to have involved themselves in craft production and obsidian exchange. The centrality of the households of greatest status during the regional Classic, however, does not seem to have come from those activities. Instead, it might be that whatever importance they had came from the traditional and ritual roles that some households played in the community as early as the Formative 1. Perhaps these roles were first related to the organization of cooperative groups and other communal activities, and later to the religious ideology reflected in the regional Classic monumental tombs.

SUMMARY AND CONCLUSIONS

Based on the studies of the Mesitas community, it is concluded that none of the three selected factors seems to have been important for bringing about change in the sequence. Agricultural land slowly became important for the community but was always abundant and never associated exclusively with elite households. During the trajectory, the community clearly grew in size, but such growth could not put any serious pressure on basic resources. Some households seem to have been involved in intensive craft production, but this production was not exclusively associated with clear markers of social status. Elite and non-elite households alike were involved in craft production that does not seem to have been centralized.

What then were the forces or the factors involved in the development of the small Formative community of Mesitas as a regional Classic chiefdom center and monumental burial site? An alternative force yet to be evaluated in Mesitas is the control of ideology and religion. This force does appear to have been prominent during the regional Classic and is clearly expressed in the single-burial monumental tombs featuring stone statues of fantastic beings. The lack of evidence for economic differentiation, specialization in production, or demographic problems in conjunction with the association of clusters of households to monumental sites of high-status individuals points to a centralized political system with a clear social hierarchy based on a belief system that associated individual leaders with supernatural beings (Drennan 1995).

The evaluation of the construction or consolidation of such a belief system might be approached in several different ways. I propose to approach it from the point of view of the individual households in a community and their interrelationships. Reconstructing what the individual households did in the community during the Formative and Classic times will help us to understand how such a social hierarchy developed or became consolidated. In the process, this reconstruction will give us more examples of the activities the households perform as social units and the utility of this concept for the archaeological research of social interaction.

The archaeological study of Mesitas has not yet found specific activities explaining the separation of elite households from the rest. However, the studies have located and characterized all households in the community for the Formative and regional Classic periods and have detected status differences. More intensive study through horizontal excavation of a sample of these households in the future could show in more detail any contrasts between them in terms of activities that may have permitted elites to gain influence and authority.

The study of the community of Mesitas has reconstructed thus far the distribution of domestic refuse in relationship to topographical features and the spatial distribution of monumental tombs. However, this information has not revealed direct evidence of the relations between specific households and the activities, including ceremonial ones, proposed to be the focus of chiefly organization at the core of the community. Obtaining such information for a settlement that spans close to three square kilometers cannot depend on only future stratigraphic excavations. Current research in Mesitas is applying remote sensing (magnetometry and GPR) to map the shape of the household structures located earlier by reconstructing refuse distributions around them and also buried features that may link specific households to their roles in the community, such as roads, burial concentrations, and floors and structures without the domestic refuse that would represent ceremonial houses. By analyzing this additional information about Mesitas and comparing the sequence to the development of similar chiefly centers in other regions, we expect to understand better how elite households constructed and institutionalized social hierarchy in developing chiefdoms.

NOTES

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2. Scientific exploration began in 1857 when geographer Agustín Codazzi described some of the mounded sites but the earliest archaeological excavations were carried out by Konrad T. Preuss in 1914. The most impressive burial sites were excavated from 1940 to 1977 by Luis Duque Gómez and Julio Cesar Cubillos.

3. The Programa de Arqueología Regional en el Alto Magdalena is a collaborative research program of the University of Pittsburgh, the Universidad de Los Andes, and the Instituto Colombiano de Antropología e Historia in Colombia, financed in part by the National Science Foundation.

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THIRTEEN

Interhousehold versus Intracommunity Comparisons

Incipient Socioeconomic Complexity at Jachakala, Bolivia

CHRISTINE BEAULE

INTRODUCTION

Most prehistoric agro-pastoral households farmed, herded domesticated animals, witnessed or perhaps hosted rituals, produced and consumed trade goods, and made a variety of utilitarian implements. This range of activities made up the domestic economy, which can be divided into production (control of food and craft goods, subsuming farming, herding, storage, processing, and manufacturing), service (payments rendered to elites for their support or for community-level functions within the context of a fully developed political economy), and distribution activities (control of resources circulating through interhousehold, intersite, or interregional exchange networks) (Hirth 1996:209).

Access to a range of resources, such as land, kin-based or communal labor, raw materials, and individual talents and personalities, in addition to factors of a particular ecological setting, shape to greater or lesser degrees optimal strategic options for fulfilling each household's demands. However, the domestic unit's primary goal in non-complex societies is the basic accumulation of sufficient provisions to at least minimally support its residents, although subsistence needs are variably defined cross-culturally (Hirth 1993a:22). The archaeological record presents scholars of ancient household studies with abundant opportunities to reconstruct the organization of domestic life, changes in its organization, and the diverse ways in which households go about fulfilling their needs. How we achieve these goals depends on our conceptualization of the domestic economy as well as methodological approaches suitable for our particular research objectives.

Artifact assemblages recovered from domestic structures, features, and deep stratigraphic excavations at the Bolivian highland site of Jachakala (ca. AD 170–1100) document the gradual development of interhousehold wealth differentiation. Jachakala is a small site (6.72 ha) in the La Joya region of the Department of Oruro in the central *altiplano* (the high, cold, flat plain between the two chains of the southern Andean mountains). Deep stratigraphic excavations there in 1997–1998 provided abundant household architectural remains and artifacts employed in the reconstruction of the long-term local history of the community. The three-period chronology employed throughout the project relied on local economic changes through time rather than on ceramic evidence dating the community's first contact with the Tiwanaku state. Specifically, site-wide changes in the relative proportions of camelid faunal packets and basalt hoe debitage were used to define the transitions between the Niñalupita (ca. AD 170–500), Isahuara (ca. AD 500–800), and Jachakala (ca. AD 800–1100) periods. In this way, changes in the production portion of the domestic economy were used to chronologically define those artifact assemblages used to test project objectives. Jachakala's chronology corresponds roughly with the Late Formative and Middle Horizon periods in the south-central Andes.

The model employed in this project attempts to articulate the origins of complexity with shifts in the domestic economy of these prehispanic Andean households. Artifact patterns related to these changes are explored in this chapter in two ways. A comparison of those two methods of exploring changes at Jachakala, rather than the details of the model itself, are the focus of my argument.

CONSTRAINTS ON ECONOMIC DIVERSIFICATION

Household composition directly reflects subsistence practices and the range of available economic opportunities. Variation among contemporaneous households will be predictably small, according to Kenneth Hirth (1993a:23), where few opportunities for economic expansion exist, "except under circumstances of dramatic sociopolitical reorganization or environmental change (draught, famine, plague, etc.), resulting in long-term stability in form and composition." Incorporation into a larger political system would also provide opportunities for economic reorganization on the household and/or community level.

In the absence of such circumstances, the stability of the domestic economy stems from households' inability to procure sufficient resources to create or take advantage of opportunities to fundamentally change their economic organization. While elite households in well-established political economies could generally finance alternative adaptations, subsistence-oriented households typically cannot (Hirth 1993a:23; Douglass and Gonlin, this volume). A few of many possible factors responsible for the long-term stability of non-elite households include their preference for traditional production strategies, deep-seated beliefs about the social composition of households and the various roles of their members, and the limited range of economic opportunities in a given environmental setting.

Constraints on economic growth at the level of the household, however, do not preclude a degree of interhousehold variation. In this sense, Chayanov's picture of peasant farmers who require external stimuli to intensify their subsistence production is far from the rule (cf. Netting 1993). Intensified domestic production in non-complex societies may include increased agricultural production, part-time craft specialization, and increased participation in or reliance on interregional exchange systems. Furthermore, many archaeological and ethnographic case studies have documented such domestic intensification in the *absence* of external stimuli such as environmental or population pressure (Brumfiel 1994; Clark and Blake 1994; Hayden 1990).

This is not to say, of course, that agro-pastoral households are incapable of economic diversification. Except under conditions of extreme population pressure or environmental stress, agrarian households have the ability to produce a bit more (and consume a bit less) food than they need. Similarly, the ability to store extra subsistence products long enough to accumulate a fund that can be spent in support of non-domestic pursuits (potential wealth-building activities such as cash crops, craft production, strengthened trade ties, etc.) is not necessarily a hindrance. In the Andean highlands, for instance, tubers are freeze-dried to make *chuño*, and meat may be stored long-term as *charqui* (jerky). Although preservation of stored subsistence goods elsewhere might be a bigger challenge than in the arid *altiplano* environment, nothing much more than time is needed to accumulate extra food to allow for experimentation with non-domestic activities, at least in theory. However, the unpredictable nature of agro-pastoral resource bases, particularly in such marginally productive environments as the *altiplano* (because of the high risks associated with overnight frosts and highly variable precipitation levels), is well known to anthropologists and modern Bolivian Aymara and Quechua peasants alike. This factor alone could make agrarian households unwilling to count on stores of extra food while they devote more time to non-domestic pursuits.

Given their subsistence orientation, the size and internal organization of households will vary mostly with the amount of land, animals, and labor available to each. One can frame the issue in terms of cultural conservatism, labor productivity, and time allocations (Netting 1993:105–109) or domestic (subsistence-oriented) economy. Regardless, agro-pastoral households are generally unlikely to expand or radically restructure their domestic economy to the extent that archaeologically recognizable wealth differences emerge in the process without some compelling reason to do so. Of course they do so in many cases, and these are some of the archaeological moments of interest to us. Investigating how and why this process of economic differentiation occurs presents a number of methodological opportunities to household archaeologists in particular.

THE HIRTH MODEL OF THE ORIGINS OF COMPLEXITY

The model of the emergence of socioeconomic complexity from changes in a domestic economy that was tested against the La Joya region's archaeological record is adapted from Hirth's (1993a, 1993b, 1996) work in the central Mexican highlands. Briefly, the "Hirth model" of political economy states that differential participation in activities such as trade and craft production can lead to increased variation in the domestic economy, organization, and size of households. This interhousehold variability forms the economic underpinnings of the political economy. The consequent development of rank or status differences among households follows from differential access to key resources such as raw materials and long-distance trade goods.

The potential for interhousehold differentiation rises then with the introduction of economic opportunities outside the traditional agricultural sector, such as an increasing focus on craft production for exchange and wage labor pursuits. This approach, also advocated by numerous other researchers (Blanton et al. 1982; Flannery and Winter 1976; Sanders, Parsons, Santley 1979; Wilk 1984, 1990), complements models equating political development and elite means of controlling certain facets of the production process. Although many have drawn strong connections on a household level between household composition and subsistence strategies (see Netting, Wilk, and Arnould 1984), Hirth's model suggests that variability on this level is more likely because of changes in non-subsistence pursuits. These changes are in turn reflective of changes in intra-community or intercommunity relationships, such as differential involvement in craft production and exchange.

The manner in which socioeconomic complexity emerges and the relative merits of these models of the domestic economy and incipient wealth differentiation are not the subject of this chapter. However, research on changes in the domestic economy related to incipient stratification in societies ranging in size from villages, such as Jachakala, to large urban populations presents opportunities to employ a wide range of methodological approaches. This chapter explores the relative merits of two of these analytical approaches to household

Figure 13.1. Map of the south central Andes showing the location of the La Joya research area of Bolivia (Bermann and Castillo 1993:312)

data, namely comparisons of areas of a community (an interzonal analysis) and direct comparisons of household units. As the analytical summaries aim to demonstrate, patterns of differentiation among zones can reveal a level of socioeconomic organization between the household and community.

INTRODUCTION TO THE JACHAKALA PROJECT

Fieldwork conducted at the site of Jachakala documented domestic economy patterns at a community in the canton of La Joya, Department of Oruro, of the Bolivian altiplano (Figure 13.1). Changes through time in patterns of staple and craft production, wealth inequalities, supra-regional exchange, and material styles were explored extensively at this multicomponent site (Beaule 2002). In sum, the Jachakala project aimed to test whether variability in the economic organization of households underwrote the emergence of social, political, and wealth differences within the village.

The "household unit" (definition below) was the primary unit of excavation in the field, so direct interhousehold comparisons were made possible by combining artifacts from each domestic structure and its associated features. Nine household units were exposed in large, contiguous horizontal excavations averaging 24 square meters; a total of 340 square meters of surface area was opened up in this manner. Deep excavations of seventeen 2-by-2-meter units were taken down to sterile soil within each of those horizontal exposures and in a few randomly chosen locations.

The theoretical aim of the project was to test Hirth's predictions that differential diversification of the domestic economy of some households (specifically to incorporate or focus more on craft production and exchange activities) would lead to early socioeconomic differentiation. Given that goal, comparisons of zones (areas of the site from which excavations to sterile soil extracted samples of domestic refuse that could be grouped in turn) provided a broader picture of the community's long-term local history. These interzonal comparisons had the analytical advantage of negating the skewing of broader socioeconomic patterns provided by outlier households. Since Jachakala was physically divided into three zones of activity during the final period, these zones were simple to define and utilize. As shown on the site map (Figure 13.2), two large east-west-oriented adobe mudbrick walls physically (and emically) divide the community into three clusters. These physical boundaries were used to divide the site into three groups of units or areas of occupation: the southern, central, and northern zones. The results of my interhousehold and interzonal comparisons provide different views of the historical processes documented in the project. Each of these methodological approaches is described in turn, and their relative value in evaluating the Hirth model is discussed in the final section.

During the Niñalupita period (ca. AD 170–500), the site covered three to four hectares. A single calibrated radiocarbon date from a well-preserved hearth in the deepest cultural level dates the site's initial occupation to 1720±60 years BP, or between AD 170 and 290. Patterns of artifacts recovered from the deepest strata (120 to 200 cm below the surface) of pits taken down to sterile soil reveal continuity in distributions of ceramic wares, black basalt lithic debitage, and camelid faunal remains, with very small quantities of semiprecious stones or other non-utilitarian imports. While no complete residential stone foundations were identified deeper than a meter below the surface, typical domestic features such as small unlined hearths, ash-filled pits, storage pits, and a small number of possible activity areas are scattered throughout the compact, silty clay matrix. This combination of artifacts and small features extends from the southernmost border of the site to the middle of the central zone.

The lack of Niñalupita phase house foundations poses little problem for this study of the domestic economy if one employs Kent Flannery's (1976) theoretical approach to the "household unit." This concept incorporates features such

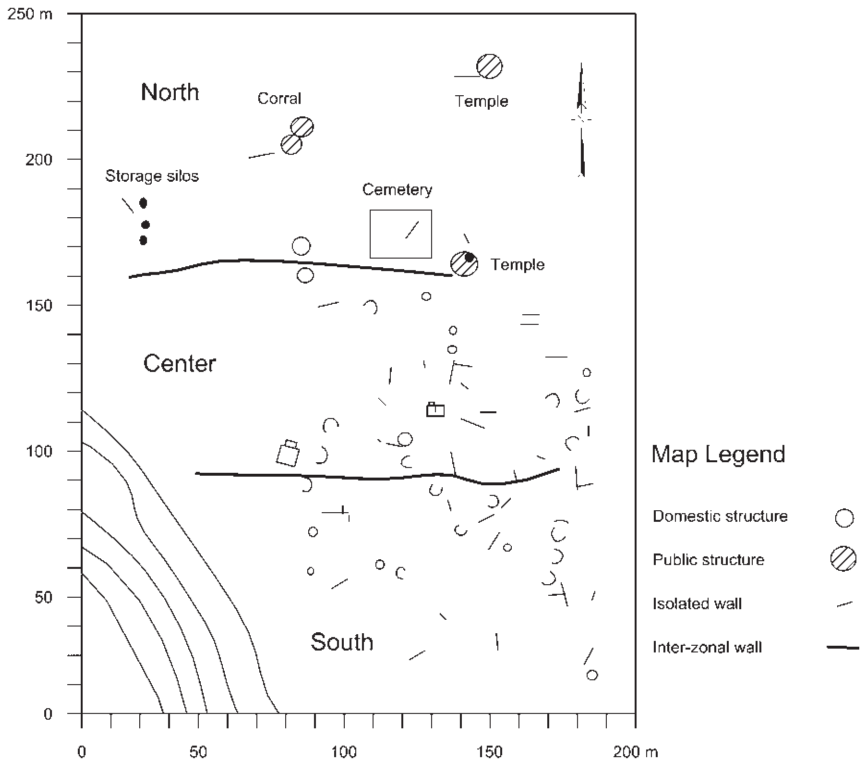

Figure 13.2. Map of the site of Jachakala, showing foundations of domestic and public structures and dividing walls; contour lines in the southwest corner mark ten-meter intervals in altitude

as middens, storage pits, and activity areas as well as residential structures associated with households (Bermann 1994:29). Material residues from the household unit's range of domestic activities will be physically spread over a larger area than that enclosed by a foundation (see chapters by Ciolek-Torrello and Neff, this volume). This is a methodological dilemma acknowledged by archaeologists studying household processes and patterns, but one that is notoriously difficult, if not impossible, to address. In comparing remains from house floors and features immediately around the foundations, activity areas used by those residents are certainly missed. As Bermann (1994:30) argues for his Lukurmata household excavations, only part of each household unit is typically exposed (see also Bermann and Estevez Castillo 1993). The area actively used by modern Aymara peasants, he writes, covers more than 500 square meters on average when one includes outbuildings and associates activity areas along with the residential compound. Therefore, household excavations such as mine, which focus largely on the central domestic structure(s) and activity areas immediately adjacent to them, inevitably miss some proportion of the space actually employed from day to day by its residents. However, household units from Jachakala's two later periods included large, spatially contiguous middens next to each structure. Within this and other related household features such as storage pits and hearths, we have a reasonable picture of the range of activities practiced by their residents, even if the activities, such as agriculture, associated with artifacts took place at some distance from the house itself. And those smaller domestic features—storage pits, hearths, fire pits, offering caches, and others—are well represented in the Niñalupita period excavations.

For the Niñalupita phase in particular, groups of domestic features associated, presumably, with the residents of various areas of the site (rather than particular domestic structures) must serve to represent household units in general. However, the majority of the artifacts analyzed to reconstruct the domestic economy from the Isahuara and Jachakala periods, Jachakala's other two periods, came from the middens next to each house's foundation. Middens are ideal contexts for reconstructing domestic processes because refuse from a range of domestic activities is more likely to be deposited there than on house floors.

Although, as mentioned above, no distinguishable household units could be identified, Niñalupita period artifact-distribution patterns, together with the small sample of recovered burials, indicate that the site was founded as a small, egalitarian village of some three to four hectares. These patterns reveal relatively little variation in the quantity or quality of materials to which groups of households in the southern and central zones had access, including both utilitarian as well as imported goods. However, early evidence for interzonal wealth differentiation dates to the Niñalupita occupation.

It is primarily in the centrally located strata (30 to 120 cm below the surface) of pits to sterile soil that the initial differences among households in different areas of the site are evident. The community began to slowly expand to the north, growing in size to cover approximately four to five hectares during this transitional period. The southern area of the site's Isahuara period yielded the same approximate proportions of ceramic, lithic, and faunal remains, while domestic refuse from the central zone yielded slightly higher quantities of some categories of goods.

These interzonal differences (i.e., between samples of domestic refuse grouped into two areas of the site) during the Isahuara period (ca. AD 500–800) mark the expansion of wealth differentiation between areas of Jachakala. Only two identifiable household foundations were ever uncovered during this phase; site-size estimates are strictly based on the depth at which randomly placed pits throughout the site reached sterile soil. Evidence suggests the gradual development of differential access to both utilitarian (basalt bifacial hoes, camelid faunal remains) and luxury goods (imported semiprecious stones, marine shell fragments, some classes of ceramic wares) among residents of the southern and central areas of the site.

Structures from the Jachakala period date to approximately AD 800–1100, based on the recovery of Tiwanaku IV and V phase ceramic wares from within and around their foundations. By the end of this period, the site had grown to its final size of 6.72 hectares, again expanding primarily to the north. The dense scatter of remains visible on the surface of the site also dates to this occupation. These include the stone foundations of numerous architectural units, which are spatially grouped into three zones or sectors of the site. The two large dividing walls were probably constructed during this period. Many smaller, straight walls also appear within each of the zones, perhaps once serving as windbreaks, for privacy, or as spatial segregation of outdoor activities.

The southern and central zones both contain the remains of numerous household units that were the focus of extensive horizontal and deep stratigraphic excavations. Jachakala's northern zone, on the other hand, yields evidence for numerous non-domestic functions introduced during the Jachakala period. As the smallest of the three zones, it covers less than two hectares, physically separated from the residential areas of the site by a large, double-rowed wall broken by two narrow doorways. Three small extramural depositories, both of very large circular temples, and a sizeable structure composed of two conjoined circular foundations (possibly a double llama corral) are located in this area of the community. Limited excavations in the cemetery located here revealed five male individuals; two female-infant pairs were buried elsewhere. No grave goods were found with any of the buried individuals. Also, a single circular household foundation was identified and excavated next to the large dividing wall but still within the northern zone.

This brief summary of Jachakala's local history is intended to serve as a backdrop for the discussion of methodological approaches I used to explore interhousehold and interzonal patterns in greater depth. What is most important here is their relative utility with reference to how patterns of incipient wealth differentiation are reflected in comparisons of domestic architecture and artifact inventories.

ARCHITECTURAL DIMENSIONS OF RANKING

According to Richard Wilk, the house should be viewed not as an architectural expression of the classically cited public/private boundary but rather as an important means of manipulating boundaries between the domestic sphere and larger social groupings such as the clan or community (Wilk 1990:40). Thus, certain aspects of a society's social and economic organization can be discerned from the intrasite spatial patterning of architectural remains (see Ciolek-Torrello, this volume). Uniformity of housing is enforced in ethnographic cases like the Kekchi Maya, especially within the context of differential participation in external economic pursuits such as cash crops. Such opportunities tend to lead to more open or accessible means of expressing newfound wealth in a public (i.e., architectural) fashion (Wilk 1990:38; see also Gonlin, this volume). Among comparable villages located in more remote settings where wage-earning opportunities fail to penetrate, egalitarian interhousehold relations are reinforced by communal landholding systems, rotating leadership, obligatory generosity, and various methods of social control such as envy and witchcraft accusations (Wilk 1990:38). Wilk also notes that housing tends to be dispersed and, for the most part, evenly spaced in agrarian subsistence economies (this distribution is also the case at Jachakala, where household units are fairly evenly spaced in the southern and central zones). Competition for the choicest land parcels and for access to pooled labor among extended families increases with the introduction of extraneous economic opportunities (1990:39). Wilk's observations provide an architectural dimension to changes associated with incipient complexity and also a measure of resistance to economic differentiation in the form of housing homogeneity.

In addition to exploring architectural differentiation as a response to changing sociopolitical circumstances, domestic architecture can also be used to measure a community's or region's internal social organization. House size, location relative to some desirable point on the environmental or social landscape, and quality of construction are just three features of household architecture frequently cited as reflective of residents' socioeconomic status. Among many others (Blanton 1994; Smith 1987), Robert Santley (1993:80) has argued that house size is a typical indicator of status differences, with elites in larger and better-made dwellings (see Douglass and Gonlin, this volume). Such architectural differentiation among residents of different sociopolitical statuses should, he writes, be more pronounced as "articulations between households become increasingly vertical" (Santley 1993:80).

These observations fit well with Hirth's model in providing additional architectural correlates for both domestic and political economies. If houses differ in terms of size, quality of construction, associated features, and so forth, one can infer by analogy similar changes in the community's social organization related to the composition of cooperative economic units. Since some degree of economic differentiation among households (or sampled areas of the site, in the Jachakala case) is apparent in all three chronological phases, models of changes in household organization can be tested for correlation between activity diversification and architectural differentiation.

HOUSEHOLD REMAINS AT JACHAKALA

"Household units" are defined as the typical architecture and features associated with individual coresidential groups. Coresidential groups include the group of

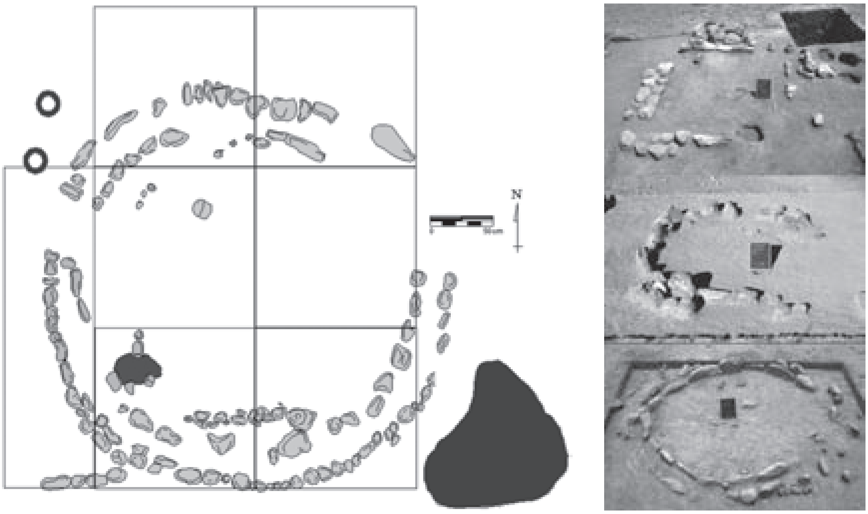

Figure 13.3. Illustration of House 4 (N511 E509), a fairly typical example of domestic architecture from Jachakala; the midden (N511 E509) lies to the southeast of the foundation

individuals, not necessarily composing a nuclear or extended family, who resided together in a single structure or associated group of structures and who presumably made or used the features and artifacts associated with that residential structure(s). Each excavated household unit at Jachakala was uncovered with a set of 1-by-4-meter trenches judgmentally placed to expose full foundations as well as the features immediately surrounding them. After the first three houses were uncovered in this fashion, it became apparent that large middens were usually located immediately adjacent to the southwestern or southeastern portions of the house foundations. Consequently, trenches were placed to overlap larger exterior areas in these directions. When time permitted, the adjacent middens were sampled with single 2-by-2-meter units placed more or less in the center of these features, and taken down in ten-centimeter levels to sterile soil. All artifacts and small features recovered from this set of excavation units inside and next to the house foundations are grouped together as the remains of that household unit. A sample of nine household units (numbered sequentially by zone in Table 13.1) is included in this interhousehold analysis.

Variability in the size and general construction of domestic structures at Jachakala is fairly limited. Single or, occasionally, double rows of small fieldstones were placed in a roughly circular shape and topped by adobe walls. Sometimes the two courses of fieldstones were separated, as is visible in the southwestern corner of House 4 (illustrated in Figure 13.3) to form what may have been some sort of storage alcove. A few of the house foundations in the central zone of Jachakala also included a short, straight extension off of the southwest corner.

Table 13.1. Categories of artifacts from craft production and interregional exchange activities for households 1 to 9, index of assemblage diversity analysis, and scores

	South		*Center*						*North*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
Obsidian and ópalo	3	1	2	3	14	14	3	16	2
Projectile points	0	0	2	3	2	7	1	0	0
Ground stone	0	0	4	2	0	0	0	0	0
Eggshell	0	0	0	0	0	0	0	7	0
Marine shell	0	0	0	0	1	1	0	0	1
Weaving and spinning	2	1	6	6	0	4	0	8	1
Bone scoops	0	1	1	0	1	0	0	0	0
Antler diggers	0	2	0	0	0	0	0	1	0
Mandible tools	0	0	0	6	0	1	0	3	0
Decorated bone fragments	0	1	0	3	0	0	0	0	0
Decorated sherds	17	6	71	28	2	30	7	13	13
Ceramic figurines	0	0	0	5	0	0	0	0	0
Total (N)	22	12	88	56	22	61	11	49	18
Interior area	—	8.8 m^2?	6.3 m^2	10.9 m^2	7.9 m^2	9.0 m^2	9.4 m^2	4.0 m^2	8.3 m^2
Shape	Circular	Rectangular	Circular	Circular	Circular	Circular	Circular	Square	Circular
IAD scores	0.3939	0.7576	0.3446	0.7221	0.5931	0.6945	0.5636	0.7874	0.4837

This may indicate architectural mimicry of the northern dividing wall, which runs into one of the temple's foundations.

As I briefly mentioned earlier, two of the household foundations uncovered during fieldwork are rectangular. One is located in the southern zone and the other one, which is technically square in shape, is in the central zone. Their interior areas (8.8 m^2 and 10.0 m^2) are well within the range of those of the circular foundations (4.0 to 10.9 m^2). There was no indication in the rectangular or square households' artifact assemblages or activity areas as to why they were not constructed in the more common circular shape.

Interior features of households were usually limited to a small, unlined hearth excavated into the floor surface. This was sometimes accompanied by one or more small storage or refuse pits around the interior edge of the foundation. Exterior features included a large midden directly adjacent to the southwestern or southeastern corner of the house, as mentioned above. Also, a number of storage pits, with or without large jars embedded in them, might be dug into the ground surface surrounding a residence. Caches or household ritual features were usually made of some combination of the following: basalt tools, Tiwanaku-style vessel sherds, burned faunal and ceramic vessel fragments, and ash and carbon deposits. These offerings were often placed in small, undecorated bowls and placed in the bottom of a midden, the interior fire pit, or another conspicuous location next to the foundation.

Beyond this basic configuration of features, domestic architecture at Jachakala varies somewhat in terms of size, shape, and the presence or absence of specific features. For example, some but not all included storage pits adjacent to the foundation. Overall, house foundations uncovered at Jachakala include a somewhat wide range of estimated interior floor areas (from 4.0 to 10.9 m^2), morphological characteristics such as single- and double-rowed circular foundations, rectangular and circular structures, interior and exterior features, and associated midden contents. Implications for the architectural expressions of rank differences, both within and between zones, can be briefly explored using these dimensions of variability. This is accomplished through comparing the individual household index of assemblage diversity scores, described in the last section of this chapter.

With only two exceptions, all excavated household remains date to the Jachakala period, based strictly on the depth of identified floors at ten to thirty centimeters below the surface. The two partial foundations excavated in Isahuara period levels in the southern zone lay almost on top of one another. Yet one of these two is clearly rectangular in shape, demonstrating that architectural variability in shape dates back at least that far. Though the majority of the nine illustrated house foundations were small and circular, they differed in terms of their interior floor area, number of rows of foundation stones, and location of features.

Two domestic structures from the southern zone of the site include the southern half of a single-row rectangular foundation (House 2). Since the northern half of the stones were removed or mixed in the fill of a large household midden that postdates this structure, the original interior square area is estimated at approximately twice the preserved length (2.2 m) and width (2.0 m). Underneath and slightly to the north of the midden overlapping the preserved half of this Isahuara period rectangular structure is another partial circular foundation of a single row of small stones (House 1).

House foundations uncovered in the central zone include one square and five circular structures. All of the houses at the site are freestanding structures, with several meters of space separating each house-midden combination from its neighbors. The single domestic structure identified in the northern zone is against the wall dividing the center from the north. This household's lack of extraordinary features, interior area, or concentration of prestige goods makes it essentially indistinguishable from its central zone counterparts in all but location, just like the rectangular and square structures differ from the circular ones in little but shape.

We see then that variability in house foundation shape characterizes both of the site's residential zones. The single domestic structure uncovered in the north is also not special apart from its location in the non-residential area.

ARCHITECTURAL VARIABILITY AND SOCIAL STRATIFICATION

The index of assemblage diversity (IAD) presents an ideal approach for direct household comparisons at Jachakala. By choosing lines of evidence that each represent a single aspect of the household's range of activities, those household units that score highest are the ones with the most diverse domestic economies. This is an approach that incorporates testing the Hirth model and that can reveal patterns within and among zones. Consequently, the following analysis is intended to provide a more systematic way of comparing the diversity of the domestic economies of the sample of nine excavated household units. These results can then be compared to the range of architecture described above to test for correlations among the IAD scores and architectural features like size and shape.

Though archaeologists' recommendations for using this statistic vary as widely as the range of formulas available in the literature, the one employed in this analysis has several advantages. Two dimensions of diversity relevant to this study include heterogeneity and richness. Heterogeneity depends on the frequencies of artifacts in the different categories. Richness is essentially the number of categories represented in a collection. Both are crucial aspects of diversity because an assemblage with more artifacts in a variety of categories is inherently more diverse than one with 100 artifacts of one type and one each of several other types. Many archaeological applications of diversity studies in fact ignore the heterogeneity component, thereby producing IAD scores that inaccurately reflect a collection's diversity. Consequently, the formula known as Simpson's Index (from Peet 1974) given below is used, since it addresses both dimensions of diversity.

Simpson's Index (L):

where n_j = the number of items in category j,
and N = the total number of artifacts in all categories

$$L = \frac{\Sigma\,(n_j(n_j-1))}{N\,(N-1)}$$

Categories included in the analysis were limited to those artifact types that represented craft production or exchange activities as a means to identify specific household units with evidence for increased diversification of the domestic economy as predicted by the Hirth model. Including ubiquitous basalt hoe production and consumption, camelid faunal, and utilitarian ceramic remains severely skewed initial calculations because of the extremely large numbers of artifacts in each category. These large quantities of basic goods downplay the heterogeneity of collections. Exclusion of ubiquitous subsistence remains also makes intuitive sense for the purposes of this investigation, since the expansion of the domestic economy and development of incipient socioeconomic complexity necessarily involves the incorporation of or emphasis on other kinds of activities. In other words, all households will continue their basic subsistence practices under political leadership regardless of their social strata. Therefore, wealth differences (and sometimes, the social rank differences associated with them) should be reflected in increasing interhousehold gaps in the range of activities represented in various domestic assemblages.

The categories employed here include obsidian and *ópalo* (a deep red volcanic glass from the mountains around La Paz) flakes and cores, projectile points (of basalt, obsidian, ópalo, quartzite, dacite, and so on), groundstone (grinding stones and *manos*), marine shell fragments, and weaving and spinning tools (ceramic spindle-whorl discs, bone awls, and needles). Two additional categories consist of decorated ceramic sherds (the vast majority of which are rim and body sherds from Tiwanaku-style ritual vessels) and unbaked ceramic figurine fragments. Also counted are bone scoops, antler digging implements, camelid-mandible tools, and incised or painted bone fragments (beads, flute or snuff tube fragments, and decorated pieces). Camelid-mandible tools are shaped bone tools of unknown function; these and the incised or painted bone fragments are found exclusively in the Tiwanaku state heartland and in Tiwanaku-contemporary strata of some south-central Andean sites.

Some of these artifact categories represent certain activities, such as the ritual vessels. Others are most likely markers of status; archaeologists often use differential distributions of long-distance imports to study social status. Projectile points made of obsidian are a good example of an item that might have increased the status of their owners at Jachakala and elsewhere. However, all artifact categories used in the IAD analysis reflect a kind of craft production or exchange activity that could have provided an opportunity for one or more households to accumulate wealth, social prestige, or both. Moreover, since all of these artifact types are found rather infrequently, the analysis should be unaffected by small sample sizes. The artifact counts in each of these eleven categories for the nine households are given in Table 13.1.

The IAD scores calculated for each household are provided in the last line of the table. Scores have been converted so that they range from zero (a collection with no diversity whatsoever) to one (an assemblage with the maximum degree of diversity, or equal numbers of artifacts in every category). As these numbers demonstrate, the household with the most diverse artifact collection is the central zone square structure (House 9), with a score of 0.7874. The second most diverse collection comes from the partial rectangular Isahuara period household excavated in the southern zone (House 2). The household units (foundation and associated midden) achieving the third through sixth highest IAD scores (Houses 4, 6, 5, and 8) all come from Jachakala Period central zone levels. The partial circular foundation underlying the southern zone rectangular foundation (House 1), the unique northern zone domestic structure (House 7), and the first (House 3) of the two houses atop slightly raised ashy surfaces achieved the lowest scores.

Tentatively speaking, emerging economic and social differences within the community seem to have an additional architectural dimension of standardized house shape. Though status differences were less well established than wealth differences at Jachakala (e.g., mortuary remains give no evidence for social ranking), the domestic remains at the site nevertheless present a cautionary tale to those assuming rigid links between ranking and architecture. Although differences of structural shape do seem to correspond with ranking, a quick perusal of the IAD scores, the range of interior areas of foundations, and the frequencies and relative ratios of most artifact categories reveal a continuum of variability rather than clusters of domestic groups (i.e., bimodal or trimodal distributions are expected when IAD scores are calculated and plotted for houses in very complex societies). These scores are graphed in Figure 13.4, which makes their continual distribution more visibly apparent. Had the relationship between status or wealth and architecture been more standardized or well established at Jachakala, one might expect subsistence differences between the zones, for instance, to be greater, with some household units able to maintain exclusive access to the most valuable packets of camelid meat or imported Tiwanaku-style pottery. Similarly, the largest houses (the two with the short extension walls like those off the corner of each temple) should have been those with the most diverse assemblages of non-subsistence artifact types if, in fact, those activities required (or justified) more internal space. Instead, household units with the three highest IAD scores are located in both zones, as Figure 13.5 shows.

The Jachakala case study does provide some support for the notion that shifts in the shape of domestic architecture are related to the richness and heterogeneity of households' artifact assemblages. Yet these results should be considered in context, since other aspects of architectural expressions of ranking (size, quality of construction, and so forth) do not correspond well with the rectangular-circular dichotomy at the site.

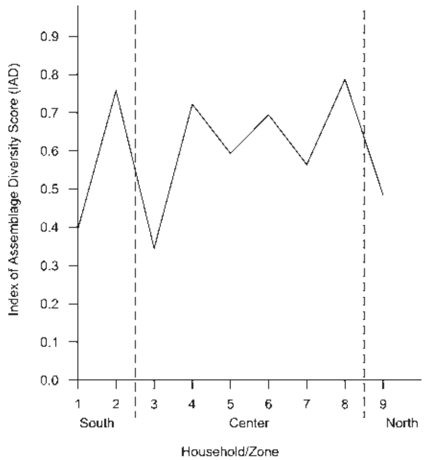

Figure 13.4. Distribution of IAD scores

What we also see in this continuum of economic variability is that no one household in the central zone is much more diverse than its neighbors. Were one or a few household units significantly more diverse than the rest in their area, as in the case of an emerging political elite, we could expect that to be revealed in direct interhousehold comparisons such as this one. That simply is not what Figure 13.5 shows.

THE INTERZONAL APPROACH

If no one household in the central zone is much wealthier or more economically diverse than its neighbors, then the significance of the walls dividing the site into two residential and one non-residential area becomes even more difficult to discern. One possibility that emerged early in the research was to group household remains within each zone to compare them to each other as groups. This interzonal approach has some theoretical merit in the Andes, where the ethnohistoric record describes a level of social, political, and economic organization between the household and the community. The *ayllu* was like a large, extended kinship group, often divided into two complementary moieties. It might be a stretch to push this intermediate level of socioeconomic organization back 500 years or so before the Inka to Jachakala, but something between the household and community could explain why a small village built large walls between groups of its residents.

The objective of the interzonal approach to Jachakala's assemblages then is to investigate domestic processes and patterns rather than to compare static architectural remains or individual household units. In particular, a comparison of areas of the community to one another will highlight spatial differences

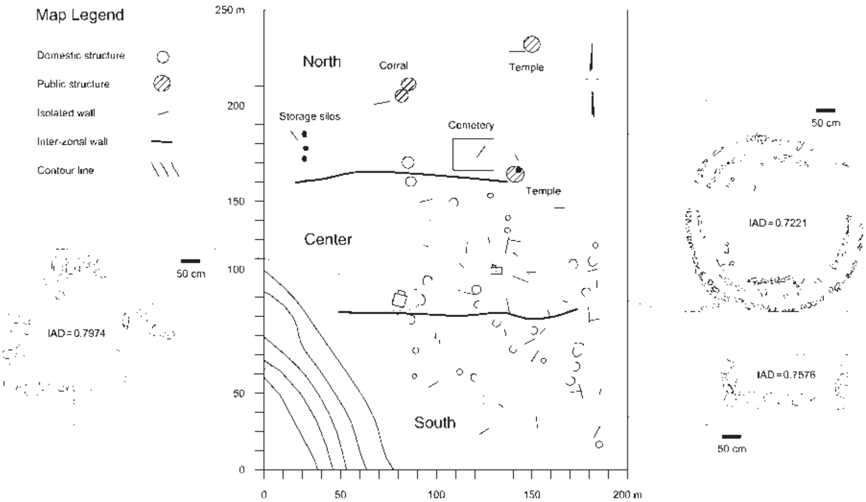

Figure 13.5. Location of household units with the three highest IAD scores

in the domestic economy that may be antecedent to later wealth differences, and that could reveal an intermediate level of socioeconomic organization. As Hayden and Cannon argue in their hallmark article on corporate groups, "while the error involved in interpreting most individual household assemblages is very large, it is greatly reduced when dealing with groups of households. Such grouping tends to *average out* the effects of specific historical and idiosyncratic factors acting on individual households" (1982:140, emphasis added).

Since household refuse was likely dumped nearer to residents' homes than to their neighbors' houses, we can compare assemblages from the two residential areas of Jachakala to test for spatial differences in the domestic economy of groups of households. In comparing these averaged central and southern zone collections for each of the three periods, I do not mean to imply that each zone was a definitive social (ayllu) or economic (corporate group) subgroup within the community. The materials from domestic features (though not houses per se) in the central and southern zones of Jachakala are compared by artifact class (lithics, faunal remains, ceramic wares, and so on) only to test for differences in the domestic economy of sections of the community. Note that the single identified household unit in the northern zone is excluded from this analysis because it is the only such domestic structure in that area of the community.

In fact, there are analytical advantages to comparing areas or zones of a community gained through this approach. House floor assemblages are more likely to consist of materials deliberately left during the structures' abandonment; small, easily overlooked items; or ones accumulated during post-abandonment events. Assemblages from such contexts tell us little about the domestic activities and organization of a house's original occupants and more about abandonment and post-abandonment processes. In contrast, exterior midden deposits reflect many years of steady deposits from a range of domestic activities, thereby mitigating some of the idiosyncrasies characteristic of floor assemblages. As such, middens are ideal windows on a household unit's range of domestic activities, because the material remains of all activities that occurred around that structure have an equal chance of being deposited in that one location, which does not certainly mean that all activities are represented in middens. Interzonal comparisons offer an advantage then in allowing archaeologists to ignore the palimpsest nature of individual house floors. The most important assumption underlying this approach is that refuse produced by households in the southern (or central) zone is more likely to be dumped around their dwellings than it is to be disposed of near the houses of people living in another area of the site.

JACHAKALA'S ZONES AND WEALTH DIFFERENTIATION

Artifacts from the seven units selected for analysis were judgmentally chosen from the seventeen southern and central zone units excavated to sterile soil. Five of the seven were 2-by-2-meter pits judgmentally placed next to house foundations on the surface to locate deep middens. The remaining two units were 2-by-2-meter pits randomly located at the site and systematically excavated in ten-centimeter levels down to sterile soil (reached between 140 and 195 cm below the surface). Three of the seven are located in the central zone, three lie in the site's southernmost zone, and a seventh unit, though technically on the border of these two zones, is classified as a central zone unit.

Instead of reciting the results of each interzonal analysis, I provide one particularly telling example here to illustrate some of the patterns revealed by this approach that were more indicative of changes in the site's history than the interhousehold analysis. These examples concern the lithic, faunal, and ceramic remains that were deliberately left out of the index of assemblage diversity test, since they would have significantly reduced the collections' heterogeneity if included. Both approaches were used to explore different classes of artifacts. However, this should not adversely affect their comparability, because it is their utility with regard to the correlates of the Hirth model, rather than the details of their applications, that concern here.

Faunal remains from the consumption of camelids were grouped into five meat units, called faunal "packets" below, including the cranium, vertebrae ("trunk"), forelimbs, hindlimbs, and ribs (Figure 13.6). These five packets have quite different amounts of meat attached to them in a typical adult llama. The individual elements and meat utilities assigned to each of the five are adopted from Mark Aldenderfer's work (1998). The results of a chi-square test comparing the relative proportions of faunal remains assigned to each of the five meat

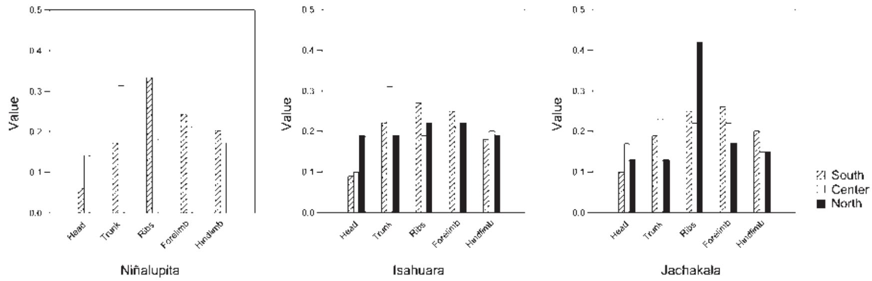

*Figure 13.6. Niñalupita (*top, left*), Isahuara (*top, right*), and Jachakala (*bottom*) period faunal-packet proportions in the southern, central, and northern zones*

packets in the Niñalupita period indicate that there is less than a 1 percent chance that differences derive from random variation ($X^2 = 15.1307$, $df = 4$, $p < 0.01$, Cramer's $V = 0.13$). Faunal packet proportions in the Isahuara period are also highly significantly different ($X^2 = 13.774$, $df = 1$, $p < 0.001$, $V = 0.10$). Comparing Jachakala period faunal remains from the southern and central zones indicates that there is less than a 1 percent chance that differences between them derive from the vagaries of sampling ($X^2 = 34.0111$, $df = 8$, p ƒ 0.001, Cramer's $V = 0.19$). Furthermore, since the meat utility value of the trunk packet is so much greater than the other packets, I also conducted a chi-square test on the number of skeletal elements in the trunk packet and non-trunk packet totals (equaling the sum of the forelimb, hindlimb, ribs, and head packets) in the south and center. Results were similarly strong and highly significant in all three periods.

This example of interzonal comparisons at Jachakala reveals that, overall, there was some meaningful variability in distributions of some of the meat units at the site. We can be fairly confident that residents in the south consumed proportionally more camelid forelimb packets than their neighbors. This might be expected in a domestic economy, under which a moderate degree of subsistence heterogeneity is expected within any community. However, the central zone's greater access to parts of the trunk throughout the community's history is more striking. Because the trunk packet has by far the highest meat utility value, this aspect of the interzonal dietary differences could indicate the center's greater involvement in herding, or perhaps they had greater access to or first choice of the meat packets from the animals killed. Either way, some or all of the household units in the central zone from all three periods consumed significantly more of this most valuable meat packet. These faunal differences are the earliest and most consistent indicators of early wealth differentiation at Jachakala. Other highly significant and moderately strong interzonal differences include distributions of lithic debitage from the manufacture and use/refurbishing of basalt agricultural implements, a variety of bone tools, some classes of

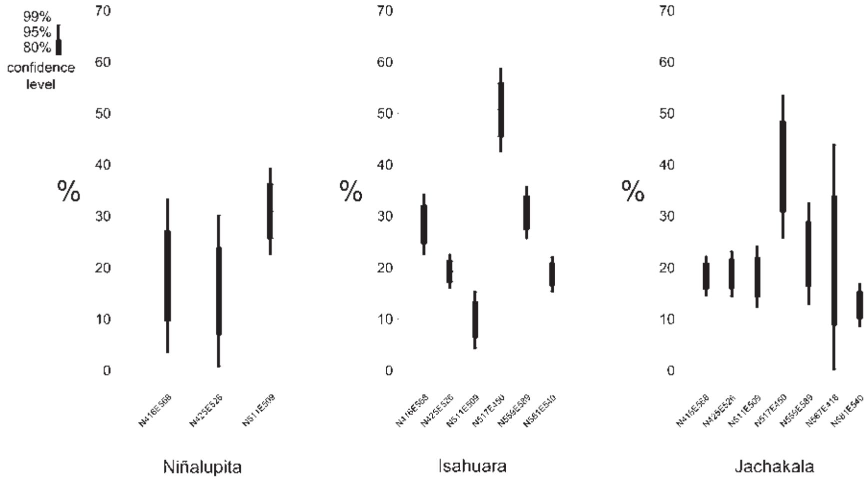

Figure 13.7. Proportions of trunk faunal packet elements from each household unit at Jachakala, at 80, 95, and 99 percent confidence levels, for the Niñalupita, Isahuara, and Jachakala periods

imported ceramic wares, and other exchange goods. However, none of these patterns were as consistent through time as the faunal packet differences. In fact, some reverse from period to period; for example, the lithic analyses reveal that residents of the southern zone were more involved in agriculture than their central zone neighbors, but that pattern reverses in the Isahuara period.

Here though we could again be looking at a case in which one or two household units disproportionally contributed to the central zone's significantly higher proportions of camelid trunk packet meat. A glance at the bullet graph in Figure 13.7 shows that was not actually the case. For each of the three periods in Jachakala's history, we see direct comparisons of each household unit's trunk packet proportions; one household unit (N517 E450) has greater access than the others, but not at a significance level above 90 percent. Moreover, the three household units with the highest IAD scores were not those with the greatest access to trunk packet meat. Therefore, early wealth differences (as measured by access to better cuts of camelid meat) do not correspond to economic diversification (as measured in the IAD analysis).

It would appear that differences in pastoral subsistence practices date as far back as the Niñalupita period. I cannot know if there was just a single household in the center more involved in herding camelids, but the entire central zone had greater overall access to the best cut of meat. There should be no reason to suspect that the two areas would be different, since each assemblage comprises the pooled domestic remains of multiple households. Because of this distribution, the differential proportions of trunk packet elements in the two zones may reflect a more systematic kind of interhousehold difference than Hirth described (1993a, 1993b) for a domestic economy. As a group, the southern zone households were doing something different in their meat-consumption patterns than the central zone households, which exceeds the moderate variability expected in a domestic (subsistence-oriented) economy. This intriguing pattern, repeated again and again in other interzonal analyses (Beaule 2002), is evidence of an intermediate level of socioeconomic organization: perhaps not an ayllu with dual moieties per se, but something akin to it.

DISCUSSION

Several points relevant to testing the Hirth model emerge from the interzonal faunal comparisons at Jachakala. First, faunal differences demonstrate emergent wealth differences, which are more comprehensive than just unequal levels of participation in ritual activities, trade, or the production and consumption of luxury goods in that the household units' access to subsistence resources varied by zone. (Other evidence suggests that the higher overall utility of the meat packets preferred in the central and northern zone structures is directly related to those residents' increased participation in the community's non-subsistence activities, such as the maintenance of trade caravans or ritual feasting.) However, camelid herds were one important source of wealth in the Andes, and so the center's consistently greater access to the most valuable meat packets indicates its greater wealth. This is one case study in which early wealth differentiation is not related to differential control over or access to crafts or exchanged goods (significantly, differential distributions of both classes of artifacts emerge during the Isahuara and Jachakala periods) but rather faunal subsistence (wool, bone, hide, and sinews) resources and transportation. Consequently, Hirth's prediction that the origins of an incipient political economy should relate to differential participation in craft production or exchange activities is not supported by Jachakala's data. Rather, the origins of wealth differentiation in this case are best described via interzonal comparisons of faunal subsistence remains.

One question that arises is, what exactly are we comparing when we contrast areas or zones within a community? If similarities and differences among such units of comparison (zones, neighborhoods, household groups, or the like) are meaningful, does it necessarily follow that they had some function as economic or social units in our ancient case studies? The southern and central zone collections I created from the Jachakala data contained artifacts from groups of domestic features in two areas of the site. Those midden features were associated with structures on or stratigraphically close to the surface of the site, and so were part of Isahuara or Jachakala period household units. On the surface, the zones represent social divisions, which correspond with economic differences, since Jachakala's residents divided themselves with walls. Below the surface, however, there is no evidence to suggest that these social divisions predate the construction of those dividing walls. The interzonal comparisons of Niñalupita and Isahuara period remains contrast the domestic economy of sections of the community that are averaged, in the sense that grouping households negates the effect of idiosyncratic outliers in the sample of household units or domestic features. By grouping all artifacts of each class recovered from a group of stratigraphic levels in pits whose placement was determined by later factors (including an association with a Jachakala period structure), each Isahuara period unit's collection is akin to a random observation of remains deposited over several centuries in one 2-by-2-meter spot. In this way, grouping artifacts from the units in the south or center provides comparable samples of domestic refuse.

CONCLUSIONS

One can question why an interzonal approach to a community's domestic economy might be advisable, especially if well-preserved household remains can be identified and explored. Indeed, interhousehold differences within zones are invisible in this approach, which is what prompted the interhousehold analysis in the first place. Of course, it is notoriously difficult to establish the contemporaneity of households in the absence of (and sometimes in spite of) written records, and so interhousehold comparisons must conceptually deal with the degree to which household studies can provide truly comparable observations of a society's domestic activities. In projects that aim to reconstruct a community's local diachronic history, rather than a synchronic comparison of particular house remains, the interzonal approach offers a number of analytical and interpretive advantages.

The assemblages of artifacts compiled within zones of the site include the grouped remains from several household units (floors, small features, and middens associated with domestic structures in the south and center, while the north includes artifacts from pits inside non-domestic structures). The excavation units I placed to uncover these household units were judgmentally chosen based on how well preserved they appeared to be on the surface of the site. Therefore, there is nothing is this sampling strategy that would produce a random, representative sample of Jachakala households within each zone or within the community as a whole.

Of course, what I really want to talk about in this study of the domestic economy are differences between households, regardless of whether the residents of individual structures or groups of people in spatially proximal structures were the basal socioeconomic units in Jachakalan society. The index of assemblage diversity analysis showed a continuum of scores that suggests a similar continuum in the degree to which sampled household units diversified the range of activities represented within each group of features. (In fact, the results of interhousehold faunal analyses, not reported here, show that the three household units with the highest IAD scores were not those with the greatest access to the trunk meat packet.) This *interhousehold* analysis suggests two things to me: first, that no single household unit in either zone was much of an outlier in terms of its diversity of activities, and second, that the *interzonal* analysis is a better way to paint in broad strokes community-level patterns in activities performed by and within households. Perhaps the interzonal approach fails to acknowledge that, ultimately, members of individual households were probably the ones deciding when to acquire new goods, make different tools than their neighbors, devote more or less time and energy to some tasks, consume or store different kinds of food, and so on. Zones were not necessarily units of social divisions or economic cooperation, even during the Jachakala period, but comparing them does more clearly reveal differences between their respective ranges of domestic activities. And these differences certainly could indicate a level of social and economic organization between the household unit and the community. This possibility is the best argument for comparing areas of a community to each other to test for such social divisions elsewhere. Areas of a village or town that lie on either side of a river or neighborhoods within a city are examples that could be tested for interzonal patterns in many activities.

The interzonal approach accomplishes both analytical aims: it allows one to describe broad synchronic and diachronic patterns in Jachakala's domestic assemblages, and it provides an indirect means of comparing groups of households. In these ways, the interzonal method is better suited to study changes in the domestic economy of a community. Household remains (i.e., individual structures) are necessary, however, to investigate questions about how households are organized and articulate with changing regional relationships, gendered divisions of labor, and other research objectives concerned with basic coresidential units. Even when such remains are available for study, a project's ultimate objectives (rather than the presence of particular types of features) should determine whether individual household units are the basis for comparisons. In the case of the Jachakala project, the results of both kinds of analytical strategies demonstrate the utility of comparisons among zones as an important complement to more traditional interhousehold analyses.

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FOURTEEN

Arrobas, *Fanegas*, and *Mantas*

Identifying Continuity and Change in Early Colonial Maya Household Production

DARCY LYNN WIEWALL

INTRODUCTION

In 1546 the Yucatán peninsula was officially deemed conquered and claimed for the Spanish Crown (Chamberlain 1948). On the Yucatán peninsula, there were no rich mineral resources that resulted in the Spanish appropriating land; therefore, the Maya were able to maintain control of the means of production. Instead, the Spanish colonists appropriated Yucatec Maya household labor and their products through state-imposed rules of economic exchange in the mechanisms of *encomienda*, ecclesiastical taxation, and *repartimiento* (Clendinnen 1987; Farriss 1984; Hunt 1974; Patch 1993; Restall 1997). The colonial economy was built upon the preestablished Maya elite tribute system that revolved around agriculture, animal husbandry, and textile production at a household level (Clendinnen 1987; Farriss 1984; Patch 1993). To a great extent the newly imposed systems were a continuation of an in-place mechanism for channeling goods and labor from peasantry to elite (Clendinnen 1987:38: Patch 1993:26). Even though the quantities of goods and labor extracted from commoners may have been excessive, it has been argued that these demands differed only in degree without requiring serious modifications of either Maya commoners' work habits or organization (Farriss 1984:56). It has also been suggested that the Spanish State economy operated outside the domain of the domestic unit with little or no effect on household producers and local production systems, thereby explaining the apparent survival of traditional Maya communities and promoting the relative autonomy of Maya commoners during times of political change (Clendinnen 1987; Farriss 1984; Redfield 1941). These interpretations have been emphasized at the expense of achieving a clear understanding of colonial institutions in the wake of Spanish conquest, which invariably affected Maya household producers much more so than scholars purport.

Indigenous communities are not solely relics of a pre-Columbian past but are in fact the products of colonialism mitigated by the ability of households and communities to integrate political change within their own productive capabilities (Wolf 1997). Colonization is a catalyst for change in indigenous societies and has profound effects on household organization, particularly the gender relations of production between women and men (Etienne and Leacock 1980; Gailey 1987; Silverblatt 1987). The assumptions that the organization of household production, division of labor, and gender relations remained static in light of the impact of the Spanish tribute and taxation are unsupported in other cross-cultural comparisons (Kellogg 1995, 1997; Nash 1980; Silverblatt 1980, 1987; see also chapters by Douglass and Gonlin, and Gonlin, this volume).

This chapter sets forth a predictive model for understanding the political-economic relationship between Maya households and the Spanish colonial regime during the Postclassic-Colonial transition in the Maya Lowlands. Here I focus on identifying aspects of Spanish colonial policies that potentially affected household production and consumption strategies, specifically their effects on the division of labor and gender relations in Maya households.

To address these issues four sections will be presented. First, I provide a working definition of the household. I then review data from ethnohistorical sources and evaluate what they tell us about how household production was organized in Postclassic Yucatec culture. I then discuss the three political-economic policies imposed by the Spanish State and Church, which appropriated Maya household labor and products. Finally, I explain how the archaeological record can potentially identify the impact of colonialism on the organization of Maya household production through spatial analysis of houselot components and their associated materials.

Recent archaeological research hints at the real possibility of identifying the degrees of continuity or change in early colonial Maya household economies (Graham 1991; Kepecs 1997, 1998; Masson 1999). If fully developed, investigations such as these promise to elucidate important issues of culture change during this critical, but rarely addressed, transition in Maya history, thereby contributing to an incipient understanding of this period and its effect on the development of colonial society. This is pertinent if we continue to make inferences from ethnohistorical documents to precontact societies without understanding the structure of the political-economic relationship between Maya households and the Spanish colonial regime during the Postclassic-Colonial transition.

WHAT IS A HOUSEHOLD?

As discussed by Douglass and Gonlin in this volume's introductory chapter, archaeologists understand that in traditional societies households are an elemental social unit (Ashmore and Wilk 1988; Wilk and Netting 1984). Households are a relevant level of analysis for examining broad social change, for it is within these groups that basic needs are met and social roles defined (Bourdieu 1985; Wilk and Netting 1984; Wilk and Rathje 1982). Over the last two decades, the household has become an important unit of analysis among Mesoamerican archaeologists. The main reason for this interest was a new definition of the household as an activity group. A household could be defined on the basis of its functions, including production; consumption; transmission of wealth, property, and rights; reproduction, coresidence; and shared ownership (Ashmore and Wilk 1988; Wilk and Netting 1984). This definition moved the concept of household away from a focus on kinship and residence toward a focus on ecology and political economics. Furthermore, this definition had material implications. By recognizing spatially delimited units in the archaeological record that have parallel sets of structures, features, and artifacts, archaeologists could examine the range of domestic activities. The material evidence of household behaviors could now be linked to interpretations of household activities and their organization. Examining the household as a set of interrelated and changing activities provided a more dynamic behavioral perspective capable of addressing culture change (Rapoport 1990; Wilk 1991; Wilk and Netting 1984).

For the purposes of this chapter, like many authors in this volume, when I refer to the "household," I am referring to a coresidential group composed of various actors—commoners, farmers, women, and children—wherein membership is defined by shared domestic and economic activities regardless of whether its members are linked by kinship or marriage (e.g., Bender 1967; Gillespie 2000; Kramer 1982). In all societies households produce goods for their own consumption and for social exchange (Wolf 1966). What each household is capable of producing is dependent on its access to resources such as farmland, labor, technology, and forest products (Grossman 1998; Netting 1993; Wilk and Netting 1984). As a unit of analysis, households become important because they represented a level in which individuals articulate directly with economic and ecological processes and a level at which adaptation can be studied (Wilk 1991; Wilk and Rathje 1982). As a culturally ordered space, the household reflects and reinforces the underlying conceptual structures of society and, by extension, the arena in which gender relations are constructed and negotiated (see, e.g., Bourdieu 1985; Giddens 1982; Hendon 1996; Spain 1992). Gender, as a culturally constructed ideology, structures women's and men's roles, relationships, access to resources, appropriate gender roles of production, and opportunities for control both within the household and in society as a whole (Gilchrist 1991; Hendon 1996; see also chapters by Gonlin, Gougeon, and Neff, this volume). It is within this social space that actions and behaviors are continually reorganized on short- and long-term bases. The arrangement of these different behaviors and economic tactics form the overall adaptive strategy of the household (Chayanov 1986; Wilk 1991). During times of political change, households will select the best risk-reducing socioeconomic strategies to survive, thereby altering the activities of the members of the household and their gendered roles of production (Wilk 1991; Yanagisako 1979). In the process, existing gender hierarchies may be intensified or new ones imposed (Gailey 1987). Thereby, household organization affects and is affected by relationships beyond the household (Wolf 1966, 1997).

To understand how political change impacts Maya commoner households it is necessary to reconstruct activities on a household level. It is through the comparison of individual household groups that insight into social organization (gender, age, class, ethnicity) and economic and political organization can best be understood (Brumfiel 1992).

DEFINING NORTHERN LOWLAND MAYA COMMONER HOUSEHOLD PRODUCTION

Before we can delve into addressing the impacts of Spanish colonial institutions on Maya commoner households, we must first identify what we know about how household production was organized in the Maya Lowlands. I review data from ethnohistorical sources most closely related spatially (northern lowland Maya area) and temporally (Late Postclassic–Early Colonial) to evaluate what they tell us about household production in Postclassic Yucatec culture (Marcus 1995). The purpose of this overview is to elucidate a baseline to discuss what areas of household production may have been most affected by the imposition of Spanish institutions. This overview is limited to ethnohistorical sources, since archaeological data focused on northern Maya commoner household organization during the Late Postclassic or early Colonial period are severely limited (for an exception see Kepecs 1997, 1998).

ETHNOHISTORICAL DATA

The 1569 census of Tixchel and the 1570 census of Cozumel identify a mixture of isolated nuclear-family households and multiple-family households in the northern Maya Lowlands with higher frequencies of multiple-family households (Roys 1957:155; Roys, Scholes, and Adams 1940:14; Scholes and Roys 1968). In either case, the household was the basic socioeconomic unit identified in the earliest colonial accounts. Households were composed on average of five to fifteen individuals residing in one large structure or in several smaller structures clustered within a residential compound (Farriss 1984:134; Roys, Scholes, and Adams 1940:14–22; Scholes and Roys 1968:470–481). Household members included subsistence farmers and craft specialists who produced goods primarily for their own consumption but also for barter and payment of tribute (Clark and Houston 1998; Piña Chan 1978; Roys 1972:34; Tozzer 1941:23, 97). Tribute payments commonly consisted of wild game, turkeys, fish, salt, maize, beans, chile, honey, fruits, and cotton cloth and thread (Piña Chan 1978; Roys 1957, 1972). Maize, cotton, beans, squash, and henequen were grown in adjacent or nearby agricultural fields (milpas) and non-citrus trees were maintained in the forest (Tozzer 1941:195). House gardens (see also Neff, this volume) located in the residential compound provided additional fruits and vegetables, such as chile, avocados, and jicama (Scholes and Roys 1968:170; Tozzer 1941:89, 196, 198). The residential compound was also where a variety of fowl; stingless bees, which were source of honey and wax; and possibly deer and peccary were raised (Pohl and Feldman 1982; Tozzer 1941:127, 201). Households also actively participated in various other activities such as hunting and fishing, gathering forest products, and production of ceramic vessels, lithic tools, textiles, basketry, and honey wine, or *balche* (Clark and Houston 1998; Noyes 1932; Piña Chan 1978; Roys 1957; Tozzer 1941: 91, 92, 201–205).

The Franciscan friar Diego de Landa (ca. 1566) penned the most descriptive accounts we have of the daily life of Maya commoners (Tozzer 1941). Landa's descriptions suggest that the organization of household production was characterized by a well-defined division of labor by gender. In particular, he pointed out the reciprocity of labor in many aspects of household production activities, such as agriculture, hunting, fishing, salt gathering, weaving, and spinning (Tozzer 1941:87, 96, 97, 127). These cooperative production activities were commonly divided by gender with a group of women or a group of men working together at their respective tasks; however, in some cases work was done on a community level and both men and women worked together (Tozzer 1941:87, 96, 97, 127).

Women's roles of production included weaving and spinning; food processing; raising animals in the household, notably fowl for consumption and exchange and birds for their feathers. They also cultivated gardens (Tozzer 1941:89, 91, 127–128, 194). Women also went to market to buy and sell their articles of production (Tozzer 1941:127). Landa characterized Yucatec women as great workers, as well as good managers and housekeepers. Women were responsible in large part for the support of their homes, education of their children, and payment of tribute. To meet these obligations, they often worked at night after completing their housework.

While Landa devoted a paragraph to specifically characterizing the production roles of Maya women, he did not concisely characterize Maya men in the same manner. He identifies men's roles of production as relating to agriculture, hunting, and fishing. Men practiced a wide variety of professions: although most were cultivators, some were warriors, potters, carpenters, surgeons, and traders (Tozzer 1941:94–97). Men took care of maize and other grains in granaries until ready for sale (Tozzer 1941:96).

Restall's (1997) investigations of colonial period wills and testaments (ca. 1646–1813) provide a separate line of evidence for the gendered division of household production. Many inheritance items are gender specific, bequeathed to males or females. However, there was a general tendency to provide evenly for one's spouse and children without excessive prejudice toward either sex (Restall 1997:110).

Maya men bequeathed agricultural land to their sons and all tools relating to agricultural production (machete, ax, digging stick, etc.) were willed to men without exception (Restall 1997:124–130). Men owned and left to their male heirs male items of cloth and clothing. The property that women bequeathed or inherited was focused on the residential compound, or houselot. Men owned the orchards, trees, and vegetable gardens, but they left such property to wives, daughters, or both (Restall 1997:124–130), and women were two times more likely to bequeath a houselot in a will (Restall 1997:124–130). Women inherited twice as many botanical items as men, almost twice as many fowl, and three times as many pigs (Restall 1997:126). In fact, the only mention of pigs and chickens occurs in wills by women. Likewise, the majority of bequeaths of beehives, which were located at the back of the residential compound, went to wives and daughters (Restall 1997:124–130). In other cases, beehives were bequeathed evenly to the two genders. Items related to textile production—looms, yarn, and lengths of cotton cloth—appear in women's wills and are not mentioned in men's (Restall 1997:129). Women also owned and left proportionately four times as many cloth-related items as men, and they owned and left a wide range of cloth-related goods pertaining to both sexes. Restall's interpretation of the wills and testaments argues for a strict division of labor between Maya men and women. Maya men were more likely to work away from the household, maintaining *milpas*, whereas Maya women tended to work within the confines of the domestic sphere (Restall 1997:124–130).

DISCUSSION OF THE ETHNOHISTORIC DATA

The ethnohistoric data suggest that the basic social unit of Yucatec Maya society was a multiple-family household living in a residential compound. The daily life of the household was characterized by a fairly well-defined division of labor, with men's activities focused on the milpa, hunting, and fishing and women's activities focused on textile production, animal husbandry, and the care of their homes and children. However, many economic activities were shared among the members of the community. This gendered division of labor is further supported in the inheritance patterns. Men and women had control over the products of their labor, selling these items at market and bequeathing these items to individuals of their choice.

We should keep in mind the inherent biases in ethnohistoric sources. First, it is doubtful that the ethnohistorical documents fully portray the realities of daily life from a commoner perspective and even less about lives of women and children. Landa and his Maya informants were male members of an elite class, which influenced their perspectives on Maya commoners; thus, these depictions may not be accurate or complete. The basic assumptions regarding the roles of Maya women and men in household production can be seen as idealized societal roles and expectations or reflections and constructions of sixteenth-century Spanish Catholicism (Silverblatt 1991:161). In particular, the productive roles of native women appear as colonial versions of Western stereotypes (Silverblatt 1991:162). The information drawn from wills and testaments dates to a period 100 years after the conquest, providing at least two generations of time during which Spanish patriarchal inheritance patterns undermined traditional patterns of inheritance (Cline 1998). Furthermore, the wills are not representative of the Maya population as a whole, as they are age- and class-biased (Restall 1997:233).

Despite these inherent biases, scholars have interpreted the apparent strict division of labor as indicative of a patriarchal society (e.g., Farriss 1984:135; Restall 1997:123–124; Tozzer 1941) or one based on gender hierarchy—in which one gender (the male gender) is said to dominate oppress, control, or set the agenda of the other (female) gender (Gero and Scattolin 2002:156). Cross-cultural studies have shown that a sexual division of labor does not always result in ranking men's roles as more powerful than women's roles (Rosaldo 1974). Furthermore, the explicit assumption that all societies have similar gender relations in which one sex is ideologically or behaviorally more important to the other, as occurs in Western culture, has been shown not to be universal or even meaningful (Hendon 1996).

Joyce (1992:67) views Landa's descriptive accounts of the productive activities of Maya women and men as one of gender complementarity—in which both men and women hold equal status in the economic and social arenas. Drawing on work by Devereaux (1987) in the Maya community of Zinacantan, Mexico, Joyce sees men's and women's labor as a sequence of production, which transforms natural raw materials into culturally defined forms. According to Devereaux, the ideal of male and female complementarity is deeply rooted in Zinacantan society. The gender ideology casts men and women as two necessary parts of a whole. The marriage is viewed as the union of male and female labors: "male labour produces the raw materials, and female labour transforms them into objects of use and consumption" (Devereaux 1987:93). Despite this complementary ideology, Devereaux demonstrates that a paradox exists between the ideology of gender complementarity and the reality of women's lives, in which their social and economic roles are actively devalued and they operate under a gender hierarchy.

The assumptions that Maya society at conquest was a gender hierarchy with males in positions of power over females have not been proven but are assumed. The degree in which division of labor along sex lines exists in any culture is varied and dynamic and does not indicate a separate but unequal relationship between genders. Gender relations of production are inextricably tied into other complex social and political relations, and we can expect that changes in one area of relations will effect changes in other areas (Etienne and Leacock 1980; Tringham 1991). We should not assume that Spanish males' perceptions of Maya gender relations are factual, nor should we assume that gender hierarchies in contemporary Maya communities are remnants of a pre-Columbian past., Rather, the issue of gender hierarchy should be considered a problem or a feature of social structure to be explained.

CHANGES IMPOSED ON THE MAYA HOUSEHOLD BY THE SPANISH STATE AND CATHOLIC CHURCH

The central feature of Spanish colonial rule was incorporation of subordinate indigenous people into a world economic system. The Yucatán peninsula lacked rich mineral resources for export and other economic enterprises that could secure a market among Europeans, such as wheat and sugarcane farming, remained small-scale or failed (Clendinnen 1987:42). Consequently, the *encomenderos* quickly determined that cotton-related goods, beeswax, honey, salt, and domestic animals (in order of economic importance) were the products by which they could produce profits and accumulate wealth. Both the Spanish State and Catholic Church imposed on the Maya household new institutions incorporating existing pre-Columbian tribute and labor systems into three new tribute-based policies that appropriated goods and labor. These new institutions granted the Spanish access to resources in Yucatán by means of the *encomienda*, ecclesiastical taxation, and repartimiento.

Encomienda

The essential form of the encomienda was relatively simple. The Spanish conquistadores who participated in the "pacification" of the Yucatán peninsula received the customary royal award of encomienda, which granted an individual the right to possess of land, to be exempt from state taxes, and to exact tribute and labor from a specified number of royal tributaries of the conquered population (Chamberlain 1948; Patch 1993:28). The grantee, or encomendero, was expected to maintain a house and family in the nearest Spanish villa, to oversee the material and spiritual well-being of his charges, and to maintain himself in readiness for military service (Chamberlain 1948; Clendinnen 1987:38; Jones 1989:41–42; Patch 1993:28). Maya tributaries were required to provide payment to their designated encomendero in the form of tribute and labor. By the close of 1545, all native towns and villages of the peninsula had been parceled out in encomienda grants (Clendinnen 1987:38).

Under the encomienda system, natives were required to perform all labor and provide all services that their encomenderos demanded of them. Many abuses arose from the imposition of labor and tributes at the will of the encomenderos, and many excesses resulted with serious detriment to the native population. As a result, the Crown required that an official taxation schedule of tributes and services be established to eliminate abuses of the native population, and the official schedule was put into effect in 1548–1549 (Chamberlain 1948:285, 286, 337). The assessment of tribute was to be in conformance with the capacity of each individual pueblo to pay, based on their population, resources, and local production activities (Chamberlain 1948:285). Even though assessments were measured in monetary value, payment was rarely in currency but instead in household goods. The definition of tributary and the quotas per tributary changed at various times and will be discussed below.

Under the new taxation policy, the assessments of 1548–1549 were based on the number of married couples after exemptions of the aged and infirm, members of the native ruling families, and holders of posts in town governments. In 1548, a typical encomienda, or civil tribute payment, required for a married couple included annual payment of one *manta* (ca. 10 sq. yards) of cotton cloth, one pound of beeswax, one-half *fanega* (bushel) of maize, one fowl (turkey or chicken), and other household items in smaller amounts such as beans, salt, fish, chiles, cacao, household utensils, and personal service (Cook and Borah 1974:9; Farriss 1984:41; Paso y Troncoso 1939 [1547–1549]; Patch 1993:28, 29; Scholes and Roys 1968:150–153).

A tribute manta consisted of four lengths (*piernas*) of cotton cloth, each four *varas* long and three-fourths of a vara wide, making a total of about ten square yards (English measure) per manta (Cook and Borah 1974:9). Maize and bean assessments were made in terms of the number of *fanegas* of each to be planted annually. A fanega is approximately one bushel in quantity. Beeswax, honey, salt, and fish were assessed in terms of *arrobas*, an arroba weighing approximately twenty-five pounds and measuring four gallons (Scholes and Roys 1968:151).

The first revision to services and quotas per tributary changed quickly. In 1552–1553, Tomás López Medel arrived on the peninsula and began enforcing the

New Laws of 1542, issuing a series of ordinances regulating Indian affairs. First, personal service to encomenderos was deleted from the assessments. Second, the annual quota of tribute in cloth changed from one manta per tributary to three-quarters manta (Chamberlain 1948:337; Cook and Borah 1974:9–10). On average it is estimated that the value of the goods each married couple paid was monetarily equal to 23 to 25 *reales* (8 reales = 1 peso) annually (Farriss 1984:39; Scholes and Roys 1968:151). The definition of a tributary, however, remained unchanged.

The first change in the definition of a tributary occurred sometime between 1561 and 1583 (Cook and Borah 1974:10). Pinpointing its precise date is difficult because of the lack of available materials, but by 1583 the new definition and a further reduction in the annual quota per tributary was official (Cook and Borah 1974:10n26; Farriss 1984:41). Unmarried women aged twelve to sixty and unmarried men aged fourteen to sixty, including widows and widowers, as well as bachelors and spinsters, were now defined as half-tributaries and were required to pay half the quantity demanded for a full tributary (Cook and Borah 1974:10; Patch 1993:28).

The new annual quota per tributary (Table 14.1) was reduced to include one-half manta of cotton cloth, one fanega of maize, two chickens, and one turkey—the cloth and the fowls payable in two installments and the maize deliverable in the installment due at Christmas (Cook and Borah 1974:11). The quota and the new definition of tributary lasted without further change at least until the end of the seventeenth century (Cook and Borah 1974:11; Patch 1993:28).

Ecclesiastical Taxation

The function of ecclesiastical taxation was similar to the system of encomienda in that it provided goods and labor for the maintenance of the religious establishment. However, *obvenciones*, as they were later called, differed in significant ways from civil taxation. The initial form of tribute the Franciscan clergy exacted from their Maya parishioners was called *limosnas* (alms), but they were far from voluntary contributions (Farriss 1984:40; Patch 1993:28). Limosnas, like encomienda, consisted of payments in native products such as cotton, maize, beans, honey, and beeswax per married couple. The quantities demanded of native goods and services were arbitrarily determined between each parish priest and the local Indian officials. Not until the early eighteenth century did the church officially regulate limosnas by setting a uniform and fixed tax schedule under the title of obvenciones (Farriss 1984:40, 85; Patch 1993:29). The quantities discussed below are derived from the per capita obvenciones and parish fees. It should be noted that these figures may not reflect the actual ecclesiastical fees collected by all priests in all pueblos in the late sixteenth century, but it demonstrates an approximation of what was required. In fact, the fixed schedule more

Table 14.1. Annual taxes owed by an Indian family in colonial Yucatán, 1583 (in *reales*)

Civil		*Ecclesiastical*	
Tribute per couple	18	*Obvención mayor* (males)	12.5
One-half cotton manta		*Obvención mayor* (females)	9
One fanega maize		(Cotton mantas, thread, salt, wax, chickens, beans, chile, honey)	
Two chickens		*Doctrina* (one egg, one jar of oil)	8
One turkey		Obvenciones menores	
		Baptisms (3 reales)	
		Confirmations (8 reales)	
		Weddings (10 reales)	
		Matrimonial inquires (4 reales)	
		Burials, adult (8–20 reales)	
		Burials, infant (4 reales)	
		Testamentos (4 reales)	
		Annual average	5[a]
Total	18	Total	34.5
Total taxes owed			52.5 reales

Source: From Cook and Borah 1974:10; Farriss 1984:table 1.1; Patch 1993:28.

[a] Based on a twenty-year period of an average Indian couple with three surviving children and three dying in infancy, thus including taxes for one wedding with matrimonial inquiries, six baptisms, three confirmations, and two adult burials with *testamentos* for the couples' parents (Farriss 1984:41).

than likely reflects reduced quantities of goods collected previously by parish priests. As noted by Robert Patch (1993:29), "the total collected by the Church must have rivaled and possibly surpassed [civil] tribute in importance."

Married couples were required to pay ecclesiastical tribute, or *obvención mayores*, on an annual basis. They were also required to pay on a weekly basis one egg and one jar of *hiquerilla* (oil) for each Indian child attending the obligatory catechism classes. In addition to annual tribute, Franciscan missionaries exacted fees from the natives for performance of the sacraments such as baptism, matrimony, and confirmation. The right column of Table 14.1 lists the annual average of ecclesiastical tribute a married couple and their three children would pay over a twenty-year period for performance of these sacraments (Farriss 1984:41).

Repartimiento

The system of repartimiento had several different meanings among regions and over time in colonial Spanish America (Farriss 1984:43–47; Hunt 1974:465–488; Patch 1993:30–32, 268n32; Scholes and Roys 1968:305–307). The repartimiento in

Yucatán was a form of advance payment in return for native products. Spaniards advanced money, raw materials, or imported European goods to individual Maya men and Maya communities in return for future repayment of stated quantities of specified local products such as beeswax, honey, and cotton products within a specific time period (Farriss 1984:43–45; Patch 1993:81; Scholes and Roys 1968:305–307). Prices charged for goods sold to the natives were usually in excess of current market values; prices paid for the goods supplied were normally lower than the actual market, and fraudulent weights and measures were used when collecting the goods (Farriss 1984:44; Scholes and Roys 1968:305).

Cotton textiles and thread were the most lucrative products that the Spanish could exploit for exorbitant profit. The most common repartimiento contract negotiated between Spanish and Maya men was the rate of one-half *patí* per female, but mantas and thread were also contracted. A patí is a piece of cloth slightly larger than one square meter. Each patí required six pounds of raw cotton to be spun and woven, and the women were paid four reales for their labor. In the 1670s, for example, raw cotton was acquired from the Maya at four reales per carga, but the market price was between eight and twelve reales. For each finished patí, profits were between 68 and 132 percent of the invested capital, between 44 and 122 percent for mantas, and between 33 and 100 percent for thread (Patch 1993:86–87). Women's labor, therefore, transformed raw cotton materials into finished merchandise worth many more times the cost of acquisition.

The encomenderos are credited with the initial organizing of repartimiento on the peninsula; however, by the mid-seventeenth century, repartimiento became the most popular and lucrative illegal method for non-encomenderos, primarily state officials and clergy, for extracting native products (Farriss 1984:43–45; Hunt 1974:465; Patch 1993:81). Repartimiento was defined as business transactions, but in reality, it was a corrupt and exploitive system of extortion, as the producers were forced upon pain of punishment to deliver the required goods (Farriss 1984:44; Patch 1993:32).

DISCUSSION OF THE HISTORICAL DATA

As outlined above, the colonial tribute economy revolved around Maya labor and production in agriculture, cloth-related goods, and animal husbandry on a household level. Imposition of multiple Spanish political-economic policies consequently had the potential to greatly affect the organization of Maya household production, division of labor, and gender relations. A review of the quantities and types of products collected from the first official tax schedule of encomienda is informative.

The Spanish colony of Yucatán, excluding the *villas* of Valladolid and Salamanca de Bacalar, received 47,813 woven cotton mantas, 26,812 chickens and turkeys, 2,182 arrobas (25 lbs./11 kg units) of beeswax, 2,035 arrobas of honey, 693 fanegas (bushels) of maize, more than 121 fanegas of beans, 223 fanegas of salt, and more than 118 arrobas of fish from 1549 to 1551 (Cook and Borah 1974; Paso y Troncoso 1939:103–181; Pohl and Feldman 1982).

The total civil tribute collected by means of the Yucatán encomiendas is quite incredible, but we must consider the amounts of products collected through other mechanisms to gain a better understanding of the extent of the goods collected. The example of the Franciscan repartimiento of 1700 is enlightening. The friars collected more than 44,000 patíes, more than 15,000 pounds of thread, 1000 mantas, and 68,000 arrobas of beeswax (Patch 1993:83–84). These numbers reflect only the total of repartimiento contracts carried out by the Franciscans and do not include what the encomenderos, secular clergy, and other state officials collected during the same year. If the ecclesiastical repartimiento is any indicator, the amounts of cotton textiles produced are staggering. Clearly, Maya households had to reorganize and increase utilitarian and agricultural production in response to the demands placed on them by the Spanish State and Church.

Of these products, the most striking aspect is that while the agricultural surplus of Maya men mainly fed local Spaniards through urban markets, Maya women's cloth-related goods, domestic animals, honey, and beeswax products supported the Spanish export market. These goods provided a means by which Spaniards could produce profits, accumulate wealth, and control both legal and illegal exports to other provinces in Spanish America, Cuba, and Spain (Hunt 1974:86; Noyes 1932:313). These data suggest that the products of Maya women's labor (cloth, thread, honey, fowl) became the cornerstones of the colonial Spanish economy in Yucatán.

Changes in the official definition of a tributary and Spanish required quotas are other areas that raise several questions about the Spanish State's role in shaping household organization. Ironically, the changes in 1583 in the definition of a tributary may have reduced the amounts couples were required to pay but did not lessen the burden on each household. The inclusion of teenagers and elderly adults as half-tributaries required the households where these individuals resided to increase production. Not only did the Spanish increase the size of the workforce and the amounts of goods they could obtain, but they also influenced changes in the traditional gender relations of production among women, men, teenagers, and elder adults.

THE HOUSELOT MODEL AND ITS ARCHAEOLOGICAL CORRELATES

Can we identify, archaeologically speaking, how Spanish colonial policies affected the organization of Maya household production and consumption activities, division of labor, and gender relations? Moreover, can we identify specifically the different behaviors and economic tactics that households select to be successful?

The social approach to household archaeology, as defined by Johnston and Gonlin (1998:143), views the household as a unit of socioeconomic organization that occupied the house and its surrounding area. This approach is defined as "social" because it is concerned with household organization and economic adaptation. The social approach examines the spatial disposition and formal attributes of objects and buildings thought to have socioeconomic significance (see, e.g., Deal 1985; Killion 1992; Santley and Hirth 1993), as well as remains that are not directly observable but are accessible through analyses such as soil chemistry and paleoethnobotany (see, e.g., Ball and Kelsay 1992; Lentz 1991; Manzanilla and Barba 1990; Robin 1999, 2002b; Terry et al. 2000). This approach is simultaneously concerned with building use, or "function" (i.e., who did what where), and the socioeconomic organization of its occupants. In the Maya region, the social approach to investigation of households is particularly advantageous because the houselot (house and surrounding area) has been determined to be a fundamental spatial unit of analysis (see, e.g., Deal 1985; Hayden and Cannon 1983:160; Johnston and Gonlin 1998; Killion 1992; Manzanilla and Barba 1990; Robin 1999; Santley and Hirth 1993; Neff, this volume).

The houselot model developed by Killion (1990, 1992) provides the opportunity to identify the behavioral processes that produce residential site structures. On the basis of his observations of contemporary farming households in Veracruz, Mexico, Killion identified four spatial components within a houselot: the structural core (living structures and storage buildings), the clear area (diversified activity zone and staging zone), the intermediate area (midden), and the garden area. The houselot area contains a dwelling unit surrounded by a swept patio or clear area maintained free of debris for the economic, social, and ritual activities of the household. The patio area in turn is surrounded by a zone of debris generated by the household and finally by a garden or toft zone of cultivated and wild vegetation. This basic structure forms the "playing surface" for the daily activities of the household (Killion 1992). Within this "lived space," members of the household participate in activities such as cultivation, animal husbandry, craft production, food preparation, and refuse disposal, which result in material and chemical traces of those activities (Robin and Rothschild 2002). Neff's (this volume) modeling of the greater household production area has positive implications for Killion's houselot model as well.

Household form and function are sensitive to variation in people's access to basic resources (Hayden and Cannon 1983; Santley and Hirth 1993; Wilk and Ashmore 1988). Variations in the relative sizes of the basic spatial components reflect the types and intensity of activities conducted both within and outside of the houselot. A small patio area suggests a sacrifice to maintain a sizable garden area, whereas a small garden may be a result of additional ancillary features such as pigsties and chicken coops, which become more important with outfield milpa cultivation (Killion 1992). Large patios and more formalized refuse disposal may result from the need for ample staging areas for agricultural or other production activities occurring near the community or within the houselot itself (Arnold 1990; Killion 1990). Ethnoarchaeological studies indicate that smaller available work space correlates with more formalized arrangement of activity areas in scheduling and segregation of space within the houselot (Arnold 1990; Hayden and Cannon 1983). In turn, these work spaces may become designated as activity-restricted, age-segregated, or gender-specific activity areas Kent 1990).

In addition to the basic spatial components of the houselot, the number and variety of ancillary features located in the patio and garden areas, such as wells, chicken coops, pigsties, *pilas* (water storage tanks), *rejolladas* (small sinkholes for planting), and linear stone foundations for apiaries, are important clues for determining strategies of diversification and intensification of production within the houselot (Alexander 1999; Fedick 1996; Gómez-Pompa, Flores, and Fernández 1990; Torrones 1994; Wauchope 1938).

Artifact densities and organic residues are also useful measures for identifying the location of activity areas and compound boundaries. Outdoor activity areas have been identified based on chemical and artifactual remains that correlate to the basic four divisions of the houselot model. In the structural core and patio area, entryways and other heavy-traffic sectors tend to be depleted of chemical residues (Manzanilla and Barba 1990; Robin 2002b). The sweeping of the patio produces a pattern of low-weight and small-piece-size refuse in the patio area and high-weight, larger-piece-size refuse in the garden. Studies have identified that the patio area can be differentiated from the garden area by measuring the falloff patterns of average sherd weight and count (Alexander 1999; Deal 1985; Hayden and Cannon 1983; Robin 1999, 2002a, 2002b; Santley and Hirth 1993). Heavily used work areas, such as for stone-tool manufacture and food processing, should be identifiable by the presence of small debris that become embedded in the ground despite sweeping. These areas may have elevated chemical levels, in particular manganese, which is associated with wood ash, and moderate levels of organic residue (Hastorf 1991; Robin 2002b). Chicken coops and pigsties located in garden areas are associated with high phosphate levels and high densities of inorganic debris (Alexander 1999).

Most artifactual materials of interest are found in middens or along structure peripheries. Middens contain the materials necessary for analysis of household socioeconomic organization because they consist of the aggregate detritus generated by all or some of the debris-producing activities once conducted within the household (Boone 1987:336–339; Killion et al. 1989:286). Refuse areas will be high in chemical levels, specifically phosphorous, and organic debris. Garden and orchard areas can be indicated by chemical residues of garden fertilization (see, e.g., Dunning 1989; Smyth, Dore, and Dunning 1995). Paleoethnobotanical remains are a line of evidence that can identify the variability of the range of staple crops, wild and cultivated fruit trees, wild fruits, and wild grasses being exploited and potentially traded (Graham 1987; Marcus 1982; McKillop 1994, 1996; Voorhies 1982).

The houselot model not only describes the spatial variation of socioeconomic activities, but it also has the potential to identify changes in gender relations and the division of labor. The household is the social arena in which gender relations are constructed and negotiated, and the role of features, artifacts, and organic residues within the houselot can provide insight into how gendered relations of production are organized (see, e.g., Costin 1996; Hastorf 1990, 1991; Hendon 1996; Kent 1984, 1990; Spain 1992). All societies have, to some degree, gender-specific work areas, and the separation of work space along gender lines reinforces and naturalizes ideas about gender differences (Kent 1984, 1990; Spain 1992). Women's and men's roles and tasks within the houselot influence the organization of space use for activities as well as for storage (Hastorf 1991). The positioning of facilities for production activities is related to the extent to which individuals need committed space for their work. For example, pottery production requires storage, preparation, and work areas (Wright 1991). The positioning of facilities by different genders is also indicative of their status and work demands within households (Bourdieu 1973; Hastorf 1991). The distribution of features, artifacts and organic residues can create spatial patterns within and across residential areas, identifying not only where activities take place in the houselot but also who may have participated in these activities (see, e.g., Brumfiel 1991; Hastorf 1991; Hendon 1997; Robin 2002a; Sweely 1999). The lack of spatial segregation and the interdependency of facilities located within the houselot may represent an integration of household activities and participants, arguing for a less restricted division of labor (Gero and Scattolin 2002; Hendon 1997; Robin 2002a).

The relative proportions of houselot components, the number of ancillary features, and distribution patterns of artifacts, chemical residues, and paleobotanical data are among a few of the archaeological correlates that are useful indicators of variation in household productive and consumption strategies. By identifying and comparing various household activities, we may begin to consider the degree of cooperation and specialization of labor, differential access to different resources, and the choices of individual households on how best to allocate resources. By doing so, we attempt to better understand the complex social and economic relations between households and the larger society.

THE ROLE OF HOUSEHOLD ARCHAEOLOGY IN CONTACT PERIOD SITUATIONS

The impact of colonialism provides important subject matter for archaeologists interested in comparative perspectives of culture change and constructions of identity, gender, class, community, and state (Paynter 2000a, 2000b). Integration of prehistoric and historical archaeological investigations in conjunction with critical evaluation of archival documents can provide insight into native lifeways just prior to and at the time of the arrival of Europeans (Lightfoot 1995). In the Maya area, reliance on the accuracy of Spanish colonial documents has not only hindered understanding of early colonial society but has also biased views of the complexity of pre-Columbian society. Household archaeology provides a means with which to investigate how the impact of Spanish colonial policies affected the organization of Maya household production and consumption activities, division of labor, and gender relations.

I have identified three Spanish policies that affected the organization of Maya household production and consumption: encomienda, ecclesiastical taxation, and repartimiento. To meet the new demands, Maya households had to specifically increase agricultural production (maize, beans, cotton), animal domestication (stingless bees, turkeys, chickens), and cloth-related goods (patíes, mantas, thread). How households responded to an increased demand for tribute products depended on their access to resources. Landholdings and environmental situations were not uniform for the entire Maya population, despite uniformity in the state-required tribute. Consequently, households responded to their situations with an array of different strategies, reflecting a specific household's situation in place and time and the political economy. Recognizing variations in the situations of households is an absolutely critical element in understanding the political economy (Grossman 1998).

As a household undergoes change, specific behaviors or activities may be abandoned or initiated, or the proportions of different activities may change relative to others. These changes can affect the spatial configuration of the houselot components and their associated features, artifacts, and refuse deposits. Spatial and artifactual variation in houselots can suggest evidence of continuity or change in Maya household economies, but it also has the potential to identify changes in gender relations and the division of labor. As noted above, most of the production changes imposed by the Spanish affected activities that took place within the houselot. For example, as a household incorporated specialized textile production into its definition of necessary tasks, this change must have resulted in reallocations of time and responsibility for women and other household members alike. This specialization increased women's work and more than likely pulled into the workforce children and elderly adults. Various aspects of the textile production process were more than likely assigned to different people as a way of facilitating the work, resulting in changes in the division of labor and gender relations.

We can expect the use of space within the houselot to vary depending on the types and intensity of activities conducted within and outside the houselot. For example, patio size could increase as the number of activities taking place within the houselot increases. Conversely, a small patio area suggests a need to maintain a sizable garden area, which could provide additional products for consumption, tribute, or barter. In turn, as the importance of a particular activity increases, we can expect space within the houselot to be designated as activity-restricted, age-segregated, and gender-specific activity areas (Kent 1990). For example, as beeswax candle production increases, the positioning of the facilities for the preparation of the beeswax, candle making, and storage may become segregated from other activity areas.

To increase animal domestication, households could select to increase the number of turkeys and stingless bees available for exploitation. Households did incorporate both Old World chickens and pigs into the houselot within two years of colonization (Paso y Troncoso 1939). The increase in domesticate animals could be manifest in the need for enclosed spaces such as chicken coops and pigsties. An increase in the number of apiary structures per houselot suggests an increase in honey and beeswax production. All three ancillary structures would have affected the use of space in the patio and garden areas. The presence of new tools to increase agricultural, textile, and apicultural production would include such items as machetes, metal-tipped digging sticks, metal needles, scissors, combs/cards, and candle-making frames.

Variation in the spatial distribution of artifactual and paleobotanical materials in houselots has the potential to identify changes in gender relations and the division of labor. There is general agreement that textile and food production were activities commonly undertaken by Maya women (Beadry-Corbett and McCafferty 2002; Brumfiel 1991; Joyce 1992). Assuming the accuracy of gender attribution (see, e.g., Conkey and Gero 1991; Pyburn 1999), spindle whorls, charred plant remains, and cooking pots are material correlates of spinning, food processing, and cooking and can be taken indirectly as indices of women's activities (see, e.g., Hendon 1997; McCafferty and McCafferty 1991). The presence of new ceramic forms that reflect a change in how households prepare and consume food, spatial changes in the location of food processing, variation in types and quantities of plants being processed, and an increase in artifacts related to textile production may reflect changes in household organization and gender relations (Brumfiel 1991; Hastorf 1990, 1991).

Each of the above propositions can be tested through the application of the houselot model. The houselot model of production can identify the range of activities that people participated in and the decisions they made about labor and resource allocations, thereby identifying continuity or change in household production (Killion 1992; Netting 1993; Robin 1999; Wilk 1991; Wilk and Netting 1984). By identifying and comparing the variability in household economic activities and subsistence activities among households, research such as this will provide data to interpret the range of household production strategies in early colonial Maya households.

SUMMARY AND CONCLUSIONS

The purported survival of traditional Maya agrarian communities into the twentieth century (Farriss 1984; Redfield 1941; Restall 1997) and continuities between beliefs and customs today and those in ancient time (see, e.g., Vogt 1969) have provided a foundation for analogical arguments that deny change through time, supporting the assumption that the condition of Maya commoners is diachronically consistent. These views rely, in part, on Spanish secular and ecclesiastical texts (Clendinnen 1987; Farriss 1984), as well as native Mayan-language sources (Restall 1997), which assume an elite-male standpoint on cultural changes in the early colonial period. Historical texts provide limited information on the organization of pre-Colombian production systems and even less on the common Maya (Restall 1997; Tozzer 1941). As a result, the impact of the Spanish State's development on Maya household organization and gender relations is poorly understood.

The purpose of this chapter was to provide an understanding of the political-economic relationship between Maya households and the Spanish colonial regime during the Postclassic-Colonial transition in the northern Maya Lowlands. I focused on identifying aspects of Spanish colonial policies that potentially affected household production and consumption strategies, specifically how these caused potential shifts in the division of labor and gender relations between Maya women and men.

Preconquest Maya women and men held complementary roles in the production of household goods. Women and men controlled different resources and the resultant products of their labor (e.g., maize and textiles), which provided them with the capacity to actively participate independently in the domestic economy (Tozzer 1941:96, 127). After conquest, the Spanish appropriated Yucatec Maya household labor and their products through the mechanisms of encomienda, ecclesiastical taxation, and repartimiento, thereby involuntarily incorporating the Maya into the developing world economic system. In particular, Maya women bore the brunt of the exploitive mechanisms of Spanish economic policies, primarily because their products and manufactured goods could be acquired at bargain prices and then resold for handsome profit.

The proposed predictive model demonstrates that both state and household decisions resulted in the increased reliance of household labor and production located within the houselot. As the demands for women's products became increasingly important for the Spanish export economy, household decisions revolved around how best to reallocate time and responsibilities to increase women's production. New responsibilities for women must have affected what other household members did, and they may have contributed to changes in the balance of power among the household members and how certain tasks were valued. Specifically, the patriarchal Spanish colonial system viewed the male as the representative of the household. As a result, the Spanish dealt directly with Maya males—to collect taxes and tithes and to arrange repartimiento contracts for the control of women's labor and their textile products—consequently excluding women from economic relationships that were formerly their prerogative (Etienne and Leacock 1980:19; Patch 1993:78). Changes in the definition of a tributary that incorporated teenagers and elderly adults further affected traditional gender relations of production. The imposition of encomienda, ecclesiastical taxation, and repartimiento raises several questions about the Spanish State's role in shaping Maya household production, the organization within the household, and the resulting new gender relations. Colonization did not change the mode of production, but it did serve to influence changes in traditional gender relations of production.

Indigenous populations are often perceived as passive recipients of the global economy who simply respond to conditions forced on them (Stern 1988; Wolf 1997). We need to address the complex processes by which indigenous modes of production were penetrated, subordinated, transformed, or destroyed as they came into contact with the world economy (Wolf 1997:23). For persons who are not well represented historically—such as indigenous people, commoners, farmers, women, and children—archaeology is their only means to contribute to discussions of culture change (Brumfiel 1992). By giving a strong analytical "voice" to these "other" groups, they are conceived as active participants in culture change (Brumfiel 1992; Wolf 1997:23).

Archaeologists can study the social relations and behavior of household decisions through a site structure analysis of the houselot's spatial patterning of dwellings, features, artifacts, and organ residues that link material evidence of discrete behaviors to interpretations of household activities and their organization. A social approach to household studies is particularly useful for investigating early colonial Maya commoner households because the focus is not on architectural remains of houses and their function but on the spatial patterning of the houselot, specifically features, artifacts, and chemical and paleoethnobotanical residues and their socioeconomic significance. Houselots are encoded with information about the organization of human behavior and provide units of analysis appropriate for discussions of changing household organization, division of labor, and gender relations (Bourdieu 1985; Giddens 1982; Hodder 1989). Households integrate political change with their own productive capabilities depending on their access to resources and social organization. By identifying and comparing the variety in economic and subsistence activities, we may begin to consider the degree of cooperation and specialization of labor, unequal access to different resources, and the choices of individual households of how best to allocate resources. Variations in household organization can become visible and meaningful and identify the flexibility of households to make choices in the reallocation of labor and resources to adjust to the imposition of tribute by the state (Brumfiel 1991; Gailey 1987; Hastorf 1990; Silverblatt 1987). Understanding the integration of Maya household producers with the development of the Spanish State facilitates a comprehensive view of how state formation affects household production, division of labor, and gender relations and, most important, how households integrate political change within their own productive capabilities as active participants in culture change.

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