THE UNIVERSITY OF CALGARY

CHRONOLOGY OF THE EL ZURDO SITE, CHIHUAHUA

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled, "Chronology of the El Zurdo Site, Chihuahua" submitted by Warren D. Hill in partial fulfillment of the requirements for the degree of Master of Arts.

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ABSTRACT

This thesis attempts to develop a site chronology for the archaeological site of El Zurdo, located in the Babícora Basin, Chihuahua, Mexico. El Zurdo is thought to be culturally affiliated with the prehistoric city of Paquimé, also known as Casas Grandes. Paquimé, located 100 kilometers northeast of El Zurdo, is presumed to have been the center of a large trade network, which flourished throughout Northern Mexico from the 11th to the 14th century. Clusters of smaller sites have been found in the Paquimé region during recent scholarly investigations in the area. Babícora sites are generally acknowledged to fit into the Paquimé system because of their characteristic pottery and architecture. However, the nature of the relationship of this southern Paquimé region to the heartland at Paquimé is not understood.

Cluster analysis is proposed as a means of grouping ceramic assemblages from El Zurdo, in order to develop a relative chronology. Temporal assignment is then derived by comparing the cluster groupings with other ceramic assemblages of known age from the Casas Grandes and Santa Maria Valleys. Other assemblages excavated at El Zurdo are discussed in light of their new temporal assignments. The results of these analyses suggest that Babícora sites should be viewed as an autonomous subsystem of the one based at Paquimé.

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I would like to thank the members of my committee, Dr. Jane Kelley, Dr. Scott Raymond, and Dr. Nigel Waters for their comments and help in completing this thesis.

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DEDICATION

This thesis is dedicated to the memory of my father,
who taught me the patience to pursue my goals.

Dr. Donald E. Hill
(1938-1989)

He dared to reach for one more dream.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 Scope of Research

This study is derived from a larger investigation by the Chihuahua Archaeological Project into the prehistory of west-central Chihuahua. The present contribution proposes a chronology for one site, El Zurdo (also known as CH-159), within the context of Northern Mexican prehistory. El Zurdo is located in a high (2250m A.S.L.) narrow valley near the continental divide in the Babícora Basin, Chihuahua, Mexico (please see Figure 1.1). The Babícora Basin lies within a high plateau ringed by mountains. Prehistorically, the basin contained a large lake, providing arable land along its shores. Numerous archaeological sites have been recorded along the fringes of the basin, especially in valleys containing arroyos which feed the lake.

El Zurdo is presumed to be related to a large interaction sphere which was centered at the prehistoric city of Paquimé[1] (also known as Casas Grandes), located 100 kilometers north of El Zurdo. Previous investigators (e.g., Di Peso 1974) have suggested that the trade network centered at Paquimé flourished from the late 11th to early 14th centuries A.D., a time known as the Medio Period. This period is marked by a substantial population increase at Paquimé and the surrounding Río Casas Grandes Valley.

Although contemporary scholars are not in complete agreement with Di Peso about the nature and development of the Paquimé system, they nonetheless support the concept that Paquimé was the center of a <u>regional system</u> (Minnis 1984;1988;1989). This system was composed of a number of

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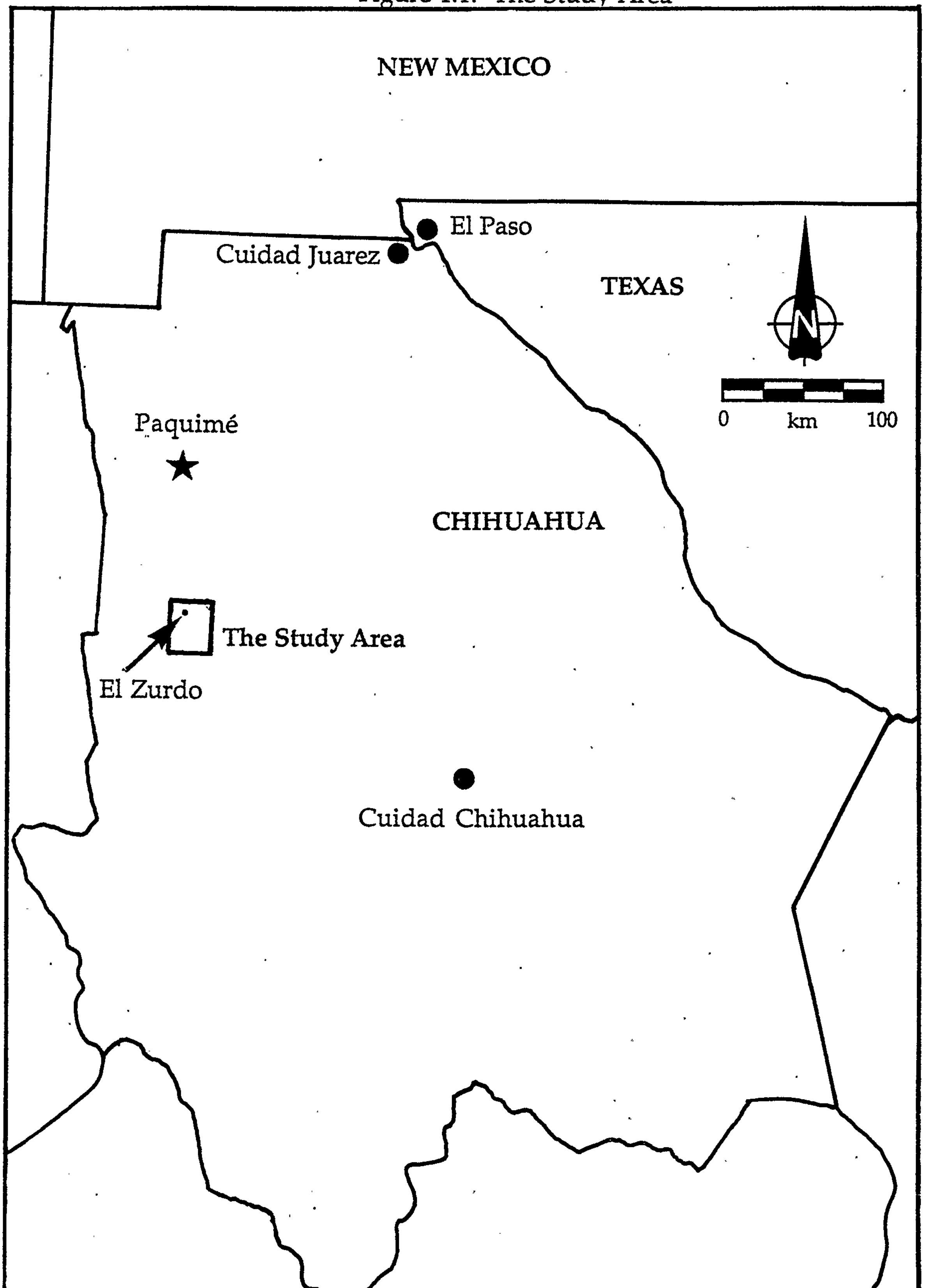
[1] Throughout this thesis, the word Paquimé refers specifically to the archaeological site of Casas Grandes. This is done to avoid confusion with the nearby modern town of Casas Grandes.

Figure 1.1: The Study Area



site clusters, some with secondary centers, in suitable locations along drainages within a 30 kilometer distance of the central site of Paquimé, with outliers which are found as far as 130 kilometers away.

The Babícora and Santa María basins contain a number of sites that clearly pertain to the Medio Period with its characteristic polychrome pottery and adobe architecture, including CH-159 in the El Zurdo drainage. However, it is not clear how these remote sites relate to Paquimé or to the Casas Grandes regional system. Are they to be seen as distant members on the outer margin of the Casas Grandes system or are they to be seen as regional systems in their own right? Should their relationships be modelled in some other way? It is clear that before alternative models can be tested a comprehensive understanding of the chronology and cultural developments in the different regions is required.

Research conducted at the El Zurdo site has provided more detailed information about the Babícora region than was previously available. This thesis will use the information obtained from the El Zurdo region by the Chihuahua Archaeological Project (CAP) as a platform to explore cultural developments and chronology within the Babícora basin. This in turn will serve as a prelude to considering the nature of the relationships between the Babícora and other regions, especially with regard to trade and exchange.

The El Zurdo site was brought to the attention of the CAP during the the summer of 1990. The site was bisected by several recent arroyos which provided various interesting stratigraphic profiles for easy viewing. Radiocarbon samples recovered from a burned zone in an exposed midden at the bottom of one deep arroyo subsequently gave an earlier date than expected, since the visible artifacts strongly suggested the site belonged wholly to the Medio Period. However, the depth of the cultural deposits and the early C^{14} date indicated pre-Medio Period deposits were present at the site. Excavations at El Zurdo have validated the existence of an earlier component.

Excavations conducted during the summer of 1991 confirmed that this site possessed three stratigraphically superposed midden zones in the central portion of the site, the lower two of which appear as a dense block. The stratigraphic record, derived from these excavations, suggests a long, continuous occupation. Through the use of type-frequency seriation of ceramics from the midden zones, coupled with the stratigraphic information, a relative chronology is proposed for El Zurdo. Cluster analysis is used to group excavation levels with similar assemblages. These groupings are then used to provide a temporal assignment to the site occupations. Information derived from lithic analysis, the study of botanical and osteological remains, and ground stone analysis are used to complement the ceramic information. These data sets help develop a picture of cultural developments at the site. The relationship of the El Zurdo site to others in the Babícora basin is important to any model of regional exchange and population dynamics. Survey information is used to place the El Zurdo site into a regional context, which in turn will be used to consider the relationships of the Babícora sites to the Casas Grandes system.

It is hoped that this contribution will provide some basic data needed to understand the complex prehistory of Northern Mexico. The analysis of the El Zurdo material will complement the corpus of information collected by the Chihuahua Archaeological Project, with its larger goals of understanding the subsistence and settlement of prehistoric people in west-central Chihuahua.

CHAPTER 2: ENVIRONMENTAL SETTING

The prehistoric inhabitants of Chihuahua were surrounded by a diverse range of microenvironments. This diversity makes Chihuahua one of the more interesting places in North America today. Since over a third of the state is mountainous, altitude is the major determinant of climate. In general terms, the higher one goes, the greater the amount of rainfall and the lower the mean annual temperature. The species of flora and fauna change accordingly. However, it should be noted that one may speak of the environment only in general terms. The current research is hampered by a lack of basic climatological data. The best source of environmental data remains the systematic collection of records on climate, as well as inventories of indigenous species. This process has only just begun for the study area in a formal manner.

The physical geography of Chihuahua creates natural boundaries for climatic zones and indigenous species. It also created boundaries for the prehistoric groups which inhabited the area. As a consequence, the physical geography of Chihuahua must be examined in order that we may understand how prehistoric groups interacted with their environment.

2.1 Physical Geography of Chihuahua

Chihuahua, the largest state in Mexico, is 247,000 square kilometers in area. The area is bounded by the U.S. states of New Mexico and Texas to the north and northeast, the Mexican state of Sonora to the west, the state of Coahuila to the east and the state of Durango to the south. The state lies between 25 30' to 31 45' North latitude and 103 10' to 109 07' West longitude. The state can be divided into two principal landforms, sometimes referred to as physiographic provinces or regions (Hawley 1969; Schmidt 1973;1975). These are the Sierra Madre Occidental, and the Basin and Range Country.

The Sierra Madre Occidental (also known locally as the Sierra Tarahumara) forms the spine or backbone of the state. This mountain region runs along the western flank of the state in a north-northwest direction for 560 kilometers (Schmidt 1973:10). The peaks of the Sierra average 2,270 meters in height, with summit elevations as high as 3100 meters, although summit elevations of 2,700 meters are more common. The Continental Divide runs through Chihuahua's western limit. In general, the topographic features of the Sierra Madre have an important impact on the climate of Chihuahua (Schmidt 1975:5).

The Sierra Madre creates a rain-shadow along its eastern slopes. Precipitation is most abundant at the higher elevations, as much as 1500mm annually, and becomes less as one moves eastward and lower in elevation, to as little as 100mm annually along the eastern border of the state. The large rivers of the state have their headwaters in the Sierra Madre. These rivers flow east and north, and create the principle hydrographic features of the Basin and Range country.

Along its western slopes, the Sierra Madre forms steep, rugged canyons. These canyons often have vertical differentials of over 1000 meters from top to bottom. The canyons are often tropical in nature at the bottom and sub-alpine at the top. In the southwestern corner of the state is the *Barranca de Cobre* or Copper Canyon. This canyon, in addition to having some of the most spectacular scenery in Mexico, is part of the indigenous homeland of the Tarahumara. These people still live in the Sierra today, and are well adapted to the diverse climatic zones created by the topographic undulation of the western slopes of the Sierra Madre.

East of the continental divide, the Sierra Madre slowly gives way to the Basin and Range, the second physiographic region of Chihuahua. This area is characterized by parallel mountain chains which create large interior drainage basins. These mountain chains usually run north to south, with the ranges averaging from 1,800 to 2,150 meters and the basins from 1,200 to 1,350 meters in elevation (Schmidt 1975:4). One major exception has been recognized for this region. This exception, which includes the study area of this thesis, is considered a subsection of the Basin and Range country, known as the Babícora -Bustillos subsection (Hawley 1969:137-138). This subsection is distinguished from adjacent basins and ranges by virtue of the elevation and size of its basins and ranges, and its different bedrock composition.

The Basin and Range country contains large interior drainage rivers. These differ from other large river systems of the state in two ways: one, the interior drainage rivers terminate in lakes or lagoons (lagunas) which evaporate and; two, the level of these rivers fluctuates widely. The interior drainage basins take up half of the area of the state (Schmidt 1975:5). The principal rivers of these basins and their termini are shown below:

RIVER	LAGUNA
Río Casas Grandes	Laguna Guzmán
Río Santa María	Laguna de Santa María
Río del Carmen	Laguna de los Patos

Taken together, these rivers systems occupy an area of 39,000 square kilometers. Two of these rivers, the Río Casas Grandes and the Río Santa

María, contain the majority of known archaeological sites which define the culture area of this thesis. The Río Conchos, which empties into the Gulf of Mexico, is the largest exterior drainage river system in Chihuahua, covering over a third of the area of the state (Schmidt 1975:5).

2.2 Climate

Since the Sierra Madre Occidental and Basin and Range Country generally control and define the climate of Chihuahua, microclimates are frequently encountered. These climatic zones were equally as important prehistorically as they are today. Diversity in precipitation, temperature, humidity, and growing season are a direct result of the topographic diversity of the state (Schmidt 1973:16). This diversity defies simple explanation. Thus generalizations about climate are intimately bound to the topography and must always be considered with this in mind.

2.2.1 Paleoclimate

Very little is known about the paleoclimate of Chihuahua. Most of what is known comes from research done in New Mexico, Arizona, and Texas. This research gives only a gross analog for the Chihuahua region. Virtually all of the paleoclimatic research done in Chihuahua has been conducted using packrat middens (Neotoma spp.) found the eastern half of the state (see, e.g., Elias and Van Devender 1990; Van Devender and Bradley 1990; Van Devender and Burgess 1985; Van Devender 1986). These middens are especially useful, as packrats collect a diverse range of plant fragments usually within 30-50 meters of their nests (Van Devender 1986:2). These fragments are hardened and preserved by the packrat's urine and fossilize. Thus, these middens provide reliable reflections of the local vegetation for a brief period of time. It is through a compilation of these midden sequences that a paleoclimatic record emerges. Currently, sequences developed through the use of these middens date as far back as 40,000 years B.P. for some areas of the U.S. Southwest.

In Chihuahua, most of the packrat midden samples are taken from the eastern half of the state, an area which is largely characterized by an arid climate. The packrat midden samples suggest that the wide climatic fluctuations of the late Pleistocene, which had dramatic consequences further north, had a much more moderate effect on the climate of Chihuahua. Specifically, the effect of the late Pleistocene climatic fluctuations appears to be confined to changes in the areal distribution of plant species. Episodic cooling appears to have allowed woodland species to move to lower elevations, while simultaneously displacing desert species further to the south (Van Devender 1986:15). Warm periods permitted the movement of desert species further north, and allowed the retreat of woodland species to higher elevations. This change in distribution had a more profound effect in the desert environment than in the uplands. The present climate appears to have been established about 4000 years B.P. (Van Devender 1986:14), and has remained relatively stable up to the present.

Aside from the packrat nest chronologies, little is known about the paleoclimate of Chihuahua. However, it is important to note that that topographic diversity of the state contributed to climatic variation in the past as well as in modern times. Although no formal studies of paleoclimate and its relation to altitude are available, we can infer from the packrat middens that temperature, rainfall, and frost-free days strongly correlated with altitude in the past, as they do today.

2.2.2 Modern Climate

Chihuahua is currently dominated by arid and semi-arid climates, largely due to the rainshadow effect in the lee of the Sierra Madre Occidental (Schmidt 1973:16-17). The highest rainfall occurs on the western slopes of the Sierra Madre and decreases to the east and north. This precipitation gradient is extreme. According to the annual precipitation averages recorded by the Mexican government, mean annual rainfall ranges from a high of 1131mm at Guadalupe y Calvo in southwestern Chihuahua to a low of 162 mm at El Barreal in the northern portion of the state.

The mean annual temperature also exhibits a considerable degree of variation. The highest mean annual temperature of 25°C is found at San Ignacio, located at the bottom of the Urique Canyon (~500m A.S.L.). This contrasts with a the lowest annual mean of 9°C recorded at Sierra Romurachic, located near the headwaters of the Río Conchos (2980m A.S.L). It is interesting to note that these two locations are only 100 kilometers apart horizontally. The highest temperature extremes are found in the desert region, in eastern Chihuahua. The highest temperature ever recorded was 48°C at Cuchillo Parado in extreme eastern Chihuahua, and the lowest -30°C at Villa Ahumada, in central Chihuahua, on January 11, 1962 (Schmidt 1973:17). These extremes also affect the number of frost-free days. Chinipas, at the bottom of the Urique Canyon, has a frost-free season of 307 days. San Juanito, high in the Sierra Madre, has only 87 frost-free days a year. This contrast, like so many others in Chihuahua, can be attributed to differences in elevation.

The modern climate of Chihuahua is slowly being affected by its inhabitants. Erosion, logging, and modernization are altering the landscape and, in turn, changing the climate. Although there are few official indices of climatic change at this point, it is evident that Chihuahua is feeling the effects of global climatic changes. Removal of vegetative cover for wood or agriculture is resulting in frequent dust storms, especially in the late winter and early spring. The major river systems are carrying increased sediment due to erosion. Irrigation is diverting water, causing widespread changes in the humidity and water table of areas downstream from the diversion. Sensitive microclimates are being affected, or in some cases eliminated, by small changes in humidity or temperature. These factors are rapidly changing the modern climate of Chihuahua.

2.3 Geology

The geology of Chihuahua is extremely complex. Given that a large portion of Chihuahua is remote, there exists a spotty and far from perfect understanding of the geology of the state. Nevertheless, Chihuahua remains Mexico's leading producer of mineral resources. Precious metals as well as ores are being actively mined throughout the state today.

The bedrock geology of Chihuahua is slowly being understood through a series of maps presently being compiled by the *Instituto Nacíonal de Estadistica Geografía y Informatica* (hereafter INEGI) in Mexico. These maps are composites of information collected by Mexican and American researchers, as well as the reports of commercial mining companies. At present, the largest scale maps available are at a scale of 1:250,000. Since the geology of the area is so complex, these maps are of limited use to the archaeologist, who requires a greater degree of precision. Through the efforts of the Chihuahua Archaeological Project, various lithic source locations have been pinpointed. However, a general discussion is merited for purposes of understanding the geological background of the area.

The Sierra Madre is largely composed of middle and late Tertiary volcanics overlying Mesozoic formations. The Tertiary volcanics are primarily rhyolite tuffs. Andesite is also common, as well as volcanics of intermediate composition (Schmidt 1973:10). Although it has been written that basalts are not abundant (see Schmidt 1973; Hawley 1969:136), it is clear from experience in the region that this is not the case. In fact, vesicular basalts are widely scattered throughout the Sierra Madre, particularly alongside drainages. Tertiary intrusives and pre-Tertiary sedimentary rocks are exposed in localized areas. The rhyolitic volcanics are locally faulted but do not appear to have any diastrophic disturbance, with the exception of a gentle tilt and uplift (Hawley 1969:136).

The Basin and Range country is grouped by Hawley into four major bedrock units. These units were determined from geologic maps, both published and unpublished. These units are: (1) carbonate sedimentary rocks; (2) rhyolitic to andesitic volcanics; (3) intrusive rocks, and; (4) basalt (Hawley 1969:138). It is important to stress here that these observations were field checked only briefly by Hawley and his colleagues and in limited areas. Observations not yet published made by the geologists of the Chihuahua Archaeological Project indicate that these are very rough classes. The Basin and Range country is extremely complex geologically and it lies beyond the scope of this thesis to define that complexity. Experience with the 1:250,000 scale geology maps compiled by INEGI suggests that these remain the best overall source for geological information published to date.

The Babícora-Bustillos subsection of the Basin and Range country has more in common with the bedrock composition of the Sierra Madre than with the Basin and Range, according to Hawley (1969:138). The exception to this rule is numerous kinds of vesicular basalt, which is widespread throughout the Babícora-Bustillos subsection. Also present are large quantities of chert in both areas. The geology of the Laguna Bustillos area is currently under study by the Chihuahua Archaeological Project. Preliminary results of this research indicate that the geology maps are useful as a general guide, but should not be substituted for field observations. These observations include an inventory of the widely scattered chert resources in the Laguna Bustillos area.

Unfortunately, very little research has been done beyond the site-specific descriptions published by mining companies. The Mexican government has published a series of 1:250,000 geology maps which remain the best source for general geological description. However, these maps require field checks. At the time of this writing, a series of 1:50,000 scale geology maps is apparently being developed for limited regions in Chihuahua.

2.4 Soils

A discussion of soils is barely possible given the small amount of pedologic information currently available. There exists a series of maps in preparation which will classify soils for Mexico. Although this author was unable to obtain these maps for the study area, the officials at INEGI say they should be available for Chihuahua in the coming year. Thus the information on soils is confined to that which has been collected by the Chihuahua Archaeological Project. Local stratigraphy will be described in Chapter 5, however some general observations should be made.

The soils in the state tend to increase in thickness, darkness, and organic-carbon content as one moves from the desert, in the eastern half of the state, toward the Sierra Madre (Hawley 1969:139). The richness of the soil tends to increase as effective moisture increases. Pedogenesis in the Laguna Bustillos area can be roughly derived from the 1:250,000 scale geology maps. In brief, there exist three major classes of soils: (1) eolian - wind-blown soils which are principally composed of fine and medium-grained sands, of quartz and plagioclasts. These are typically blown into dunes. The most notable representative of this class is a dunefield which forms the northeastern border of Laguna Bustillos; (2) lacustrine- thin, unconsolidated soils of fine-grained sand and clay, often muddy in consistency. These soils often form carbonate horizons, such as those which line the basin of Laguna Bustillos and; (3): alluvial - soils deposited by rivers and arroyos. Although they are of variable composition, they are typically composed of rock and mineral particles and other materials (e.g. sand and clays) which wash down from higher elevations. Alluvial soils form the majority of the soil types observed in the study area.

In eastern Chihuahua, sandy soils become more common, until one reaches the "true" Chihuahua desert, that is, the desert environment which has been present since the beginning of the current interglacial. The Chihuahua desert is the largest interior desert in North America, with an area of 357,000 km^2 (Schmidt 1986:41). This desert is dominated by sandy soils with occasional large dunefields (e.g. the dunes of Salamayuca). As a consequence, the non-irrigated arable land in Chihuahua is confined to the Basin and Range Country and the Sierra Madre.

2.5 Flora

For purposes of general discussion, the vegetation of Chihuahua falls into four broad categories which in turn form vegetation communities. These are: desert vegetation, grassland and oak savannah, pine forest, and subtropical deciduous forest. In general, the floral species of these communities are very similar to those of the Southwestern United States. These regions can be thought of as belts which transect the state in a diagonal fashion (please see Figure 2.1). A more complete inventory of the flora is available in Arnberger and Janish's *Flowers of the Southwest Mountains.*

2.5.1 Prehistoric Vegetation

The prehistoric vegetation appears to have changed in conjunction with climatic changes. In general terms, the wetland species of vegetation appear to have moved to lower altitudes when the climate cooled during the Wisconsin glaciation. Although much of what we know about Wisconsin climates and the Wisconsin-Holocene transition is generalized from the Southwestern United States, there are a few climatic sequences which have been proposed using packrat midden data from the Chihuahua desert region, as described in 2.2.1. Changes to the geographic distribution of plant species (zonation) can be indexed to changes in climate for the region.

Figure 2.1: Vegetation Zones of Chihuahua

All indicators suggest that the modern communities observed today formed during the Wisconsin to Holocene transition (Van Devender *et al,* 1987:332). At the end of the Wisconsin, woodland species retreated to higher elevations and desert vegetation established its present territory. The possible exception is the modern pine forest, which was apparently absent during the Late Wisconsin (van Devender *et al,* 1987:332). This community appears to have established itself rapidly at the beginning of the Holocene. However, the human antiquity covered by this thesis is from the middle to late Holocene. If the data from the U.S. Southwest can be generalized to include Chihuahua, then one can assume that the transition to the modern vegetation communities was complete before the beginning of the time period covered by this thesis.

2.5.2 Modern Vegetation

The modern vegetation communities are best understood using the four communities described in the previous section. Perhaps the most significant changes to these communities have occurred in the last 200 years. The introduction of cattle to the savannah regions has denuded the landscape, allowing desert vegetation to increase its domain. Foremost of the species making gains is mesquite (Prosopis spp.). In conjunction with cattle grazing, this deep-rooted tree is able to draw most of the available subsurface moisture away from surrounding plants and then take over as the dominant species. Consequently, areas which were once prime grazing land are now mesquite fields.

The clearing of large portions of the grassland and oak savannahs for agricultural purposes has also altered the landscape. These fields are now used for corn, beans, oats and other crops. These crops have changed the soil character and the natural vegetation species it will support. Poplar trees (Populus spp.) which were once only present near springs or other permanent water sources (e.g. along river valleys) have increased since the arrival of the Europeans. Most significant of these are Lombardy Poplars (Populus *nigra*), which have been widely planted as windbreaks along the margins of cultivated fields. These, coupled with an exponential increase in mesquite, have slightly modified the boundaries of the four vegetative belts.

In the Sierra Madre, deforestation for wood and farmland has also affected the modern vegetation. Mature Ponderosa pine trees (Pinus *ponderosa*) are being cut for paper products. Oak species are being cut at record rates to meet the growing demands for firewood, especially among mountain residents. The effects of this cutting is not currently known, but it appears that it contributes to ecological destabilization and allows more opportunistic species, such as desert vegetation, to gain a foothold.

A summary of the plant species is currently being compiled for the areas surveyed by the Chihuahua Archaeological Project. This summary is by no means complete, but it will provide a rough idea of the modern vegetation which is present in the study areas. For the rest of Chihuahua, a good source is Brown's *Biotic Communities of the American Southwest* (1982) which includes the northern half of Chihuahua. In addition, INEGI has compiled vegetation maps of various scales for the state. These maps are extremely useful as guides to the vegetational character of the area. However, as is the case with so many other facets of the ecology of Chihuahua, much work is needed. For instance, Chihuahua has over 100 species of pine trees, many of which have never been formally documented. It is this lack of information which handicaps any study of the complex ecosystem of the state.

2.6 Fauna

Chihuahua is home to thousands of faunal species. These species do not differ significantly from those found in neighboring deserts. An excellent beginning summary of the modern fauna of Chihuahua can be found in *Deserts* edited by James MacMahon. For purposes of this thesis, a discussion of the fauna which surrounded the prehistoric inhabitants is more relevant.

2.6.1 Prehistoric Fauna

Most of what is known of the prehistoric fauna of Chihuahua is known to us through work done north of the international border, in Arizona, New Mexico, and Texas. The majority of this information is derived from cave excavations. Within Chihuahua, the excavation of the site of Paquimé has provided valuable insight into species which were domesticated in this prehistoric city. In addition, packrat middens have also provided some clues to the character of the prehistoric faunal assemblage.

Within the context of mammalian species, the prehistoric megafauna of the Pleistocene are known to have ranged deep into Mexico. Mastodon and mammoth have been found in various contexts in the Chihuahuan desert region. In the summer of 1990, the author was shown mastodon bones which were apparently unearthed in a nearby arroyo by a local farmer. However, the bones were in a dubious context and their original provenience is unknown.

To humans, the most significant faunal species would have been those which represented potential food sources. Blood-residue analysis performed on projectile points by the Chihuahua Archaeological Project indicates the presence of rabbit, deer, antelope, mountain sheep, mouse, and dog. However, at this time no absolute dates are available to accompany these results. At Paquimé, the Medio Period faunal assemblage included domesticated dog and turkey, as well as antelope, rabbit, deer and bison.

The presence of domesticated fauna in the archaeological record is perhaps the most significant departure from the expected desert and mountain species one would expect in the region. With the exception of Paquimé, it is difficult to assign a value of importance with regard to diet of a particular species (e.g. rabbit). However, it can be said with reasonable certainty that the hunter-gatherer inhabitants of Chihuahua exploited a wide diversity of species for food.

2.6.2 Modern Fauna

The modern fauna differ from prehistoric fauna in two important ways. These are: (1) the presence of domesticated species and feral hybrids and; (2) extinction of once abundant mammal species. Domesticates, particularly cattle, have left a tremendous impact on the land which should not be underestimated. They have moved into areas which were once grazing land for wild ungulates, particularly the American antelope, and pushed other species to the verge of extinction. Black bears are extremely rare today, and grizzly bears were hunted to extinction in Chihuahua by the early part of the 20th Century. Once abundant wolves are also threatened due to the fact that ranchers consider them undesirable and usually attempt to destroy them.

Most notable of the species which are thriving are raptors and coyotes, both of which have increased food sources at the present time due to the growing number of beef cattle which fall victim to disease, accidents and exposure. Although a summary of the modern fauna lies beyond the scope of this thesis, some general trends apply in Chihuahua. Human encroachment on animal habitats has increased rapidly, marginalizing some species and driving others to extinction. However, despite this encroachment, Chihuahua maintains a high degree of faunal diversity. This diversity changes with climate, creating localized habitats which animals may exploit. As these local habitats change so will the character of the faunal species. A formal inventory of faunal species is badly needed in Chihuahua in order to quantify the extent of habitat destruction and to identify a faunal composition.

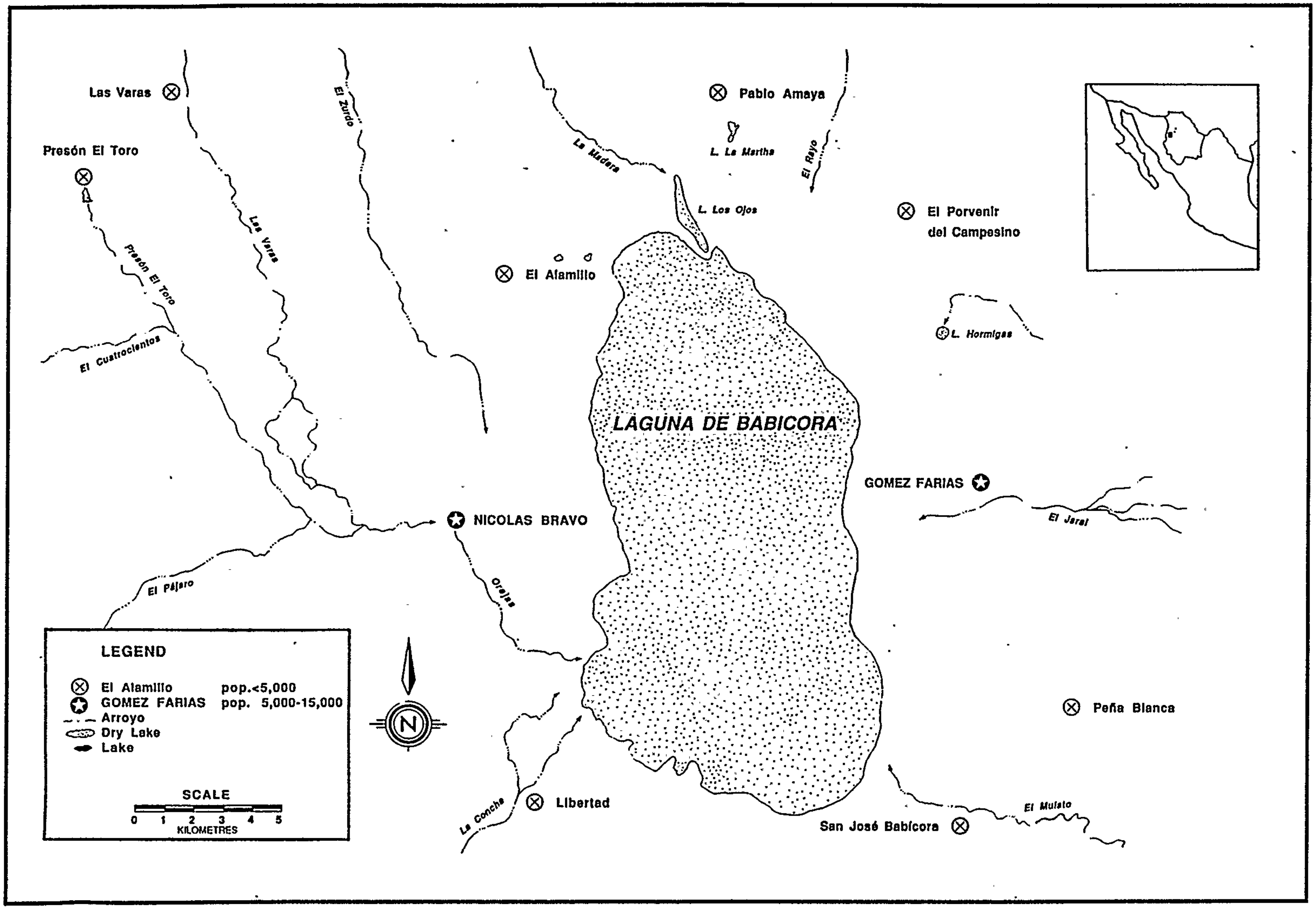
2.7 The Babícora Basin

The specific area which is the focus of this thesis is known as the Babícora Basin (see Figure 2.2 for location). This area is a high (2100m A.S.L) plateau located at the extreme western edge of Chihuahua. The area contains numerous sites which have captured the attention of previous investigators such as Donald Brand, Ted Sayles, A.V. Kidder, and Henry Carey. The proximity to the famed cliff dwellings of Chihuahua, such as Cuarenta Casas, peaked the interest of these archaeologists in their quests to define and understand the limits of the Southwest culture area.

2.7.1 Physiography

The basin itself covers some 1896 km^2 making it the largest upland plateau in the state. The basin floor, which is bounded on all sides by low mountains, rises slightly from east to west. Although no formal geomorphological

Figure 2.2: The Babícora Basin



analysis has been conducted there exists a possibility that the area was once a large caldera (INEGI 1990:75) . All drainages converge in the center of the basin, creating a large, shallow ephemeral lake, known as Laguna de Babícora. The laguna grows in size during each rainy season (July-October) and then shrinks again, often disappearing completely by late April. There are four passes in the form of narrow valleys which lead out of the basin, two to the west and two to the east. On the basin side, these narrow valleys give way to a broad, depressed plain which forms the center of the basin. Arroyos, water-carved channels created by intermittent flooding, drain the run-off from the mountains into the basin.

The climate of the Babícora is classified as $C(E)(w_1)(x')$ using the Köppen classification. This means the region has cool, dry winters, and warm, wet summers with a marked summer rainy season. Over two-thirds of the annual precipitation falls during July, August, and September when the concentration of precipitation often results in widespread flooding, as arroyos spill their banks. In the summer, powerful thunderstorms bring torrential rains and widespread destruction to the basin. Hail often accompanies these squalls, and damage to crops, livestock, and dwellings ensues. In areas where the land is cleared for agriculture, the rainy season also brings massive erosion along arroyo banks.

In the late dry season, lightning which often precedes the rains may cause forest fires. The dry forest litter ignites easily and may burn for weeks before the rains extinguish the fire. By October, early frosts are possible at this high altitude, and the growing season is somewhat contracted as a result. Topographic variation makes frost prediction difficult, but the general trend is for the early frosts to occur in the westernmost aspect of the basin. The basin is virtually guaranteed 120 frost-free days per season. Snow is infrequent, perhaps falling only once or twice per winter. The snowcover melts within a few days. The mean annual temperature is 11.3°C for the Babícora region, with a mean high temperature of 3.8°C in January and a mean high temperature of 20.1°C in July. Cold snaps, with low temperatures well below zero, are common in the the winter months, but do not last long.

2.7.2 Current Land Use

The warm, wet summers provide excellent growing conditions. The nutrient-rich soil of the laguna region is almost wholly devoted to agriculture. Corn (*maíz*) dominates, with secondary cultigens being beans, oats, and potatoes. Irrigation is uncommon -- most farmers (*campesinos*) rely on the summer rains for water. Thus the timing of planting is crucial. Farmers who plant too early may watch their crops wither in the June heat, while those who plant too late will see their seed washed away by a torrential downpour. According to local farmers, most wait until after the third week in May before planting corn. This usually negates the worry of a late frost, while anticipating the rains to come at the end of June. Long-term rainfall averages indicate that the rains arrive at the end of the third week in June. After four weeks, the corn needs the moisture of the rains to survive. Thus when a farmer plants is a combination of many highly variable factors. In the agricultural communities which line the fringes of the basin, the coming of the rains brings great relief to both the farmer and the rancher.

Most agricultural land in the Babícora is held either in *ejidos* or *colonias*. The main difference between these two land types lies in their ownership; ejidos are public lands in the public trust, while colonias are private lands held in trust by a commission of private owners. In ejidos, campesinos have fields which are no more than a few hectares. The campesinos do not actually own the land, but are usually given what amounts to a life estate of their fields. With agrarian reform in the 1930s, much of Mexico's farmland was divided into public fields which became known as ejidos. In Chihuahua, these ejidos were created from lands which once belonged to the great *haciendas*, or huge private ranches, prior to the Mexican Revolution of 1910-1920. Each ejido is administered by an elected ejido council. The council controls all aspects of land use, from irrigation rights to farm size. All disputes are settled by the council whose word, for all intents and purposes, is final, although appeals are occasionally made to higher authorities. All males over the age of 18 are eligible for land. These aspiring farmers are usually given a small parcel of "starter" land in order to prove their farming prowess to the council. When new fields are to be allocated, competition between campesinos for the new land can often be intense. However, it is important to note that very little private ownership of farmland exists at the present time. This policy may change rapidly as a result of new policies announced in the fall of 1991.

Beef cattle ranching consumes almost all the land not allotted for agriculture. The toll of cattle on the land is devastating. Before the coming of the rains, cattle graze all available pasture land right down to topsoil. The high winds of late spring create large dust storms and cause widespread erosion. By late June, many of the cattle have died of starvation and disease. A rancher may pay to graze his cattle on colonia land, if there is no other land available for grazing. As mentioned previously, these lands are held in private ownership and are administered by the colonia council. Within the study area, there are two colonias: Colonia Los Pinos and Colonia Esmerelda. Both of these colonias possess large tracts of land which are generally to rocky or hummocky to be suitable for farming, and are therefore used almost exclusively for grazing. As is the case with ejidos, the council makes binding decisions regarding the use of the land. It is important to note that these pastures normally contain numbers of cattle which exceed the carrying capacity of the land. This unfortunate situation jeopardizes the ability of the land to rebound from overgrazing. As the number of cattle increases, the erosion due to vegetation depletion increases rapidly. This loss, coupled with the clearing of land for agricultural purposes, has denuded much of the landscape.

In sum, the current land uses of the Babícora basin place major stresses on the land. The production capacity of the land is exceeded along various dimensions. The long-term effects of these stresses are still unknown. However, even with the current levels of stress, the land is still productive, and we can assume that is must have been a productive environment in the past as well as the present.

CHAPTER 3: ARCHAEOLOGICAL BACKGROUND

In any attempt to summarize the prehistory of a large area, a composite picture usually emerges from a synthesis of the plethora of available literature. In Chihuahua, however, the opposite is true. Our knowledge of Chihuahuan prehistory is confined to the paucity of published material which is currently available. Compared with the amount of work done on the U.S. side of the international border, the work done in Chihuahua is dwarfed by the scale and pace of American research. More fieldwork is completed on the U.S. side of the border in any given year than has ever been done on the Mexican half (Phillips 1990:374). Scholars currently working in Northern Mexico, most notably Jane H. Kelley, Joe Stewart, Paul Minnis, Michael Whalen, and David Phillips have all lamented this fact. What is needed first as we move to fill this void is basic archaeological fieldwork.

Archaeological research in Chihuahua has occurred in fits and starts since professional archaeologists first began working in the region. The logistics of conducting an archaeological project in Chihuahua coupled with the demands of academic life have conspired to dampen the enthusiasm of many dedicated scholars. A quote from A.V. Kidder best illustrates this phenomenon:

> "Dr. Hewett, in his talks to us, emphasized the importance of Chihuahua as a region which should supply links between the cultures of the Southwest and those of Mexico. Later, in Washington, he showed me specimens of beautiful old-ivory tinted pottery from Corralitos. And I decided that when I had finished my novitiate in the Rito de Los Frijoles I would devote myself to the study of Chihuahuan archaeology. Circumstances, however, have relentlessly thwarted that ambition and have limited me to a couple of all-too-brief trips below the border..." (Kidder 1939:221).

Kidder was just one of many scholars who was unable to make his full contribution to Chihuahua archaeology. This chapter will attempt to chronicle the colorful history of archaeological research in Chihuahua and will also provide a brief synopsis of the culture history as it is currently understood. This task begins with a description of the pre-ceramic period of Chihuahua.

3.1 Pre-ceramic Settlement in Chihuahua

The Paleo-Indian period as well as the Chihuahua Archaic are poorly known. Thus the pre-ceramic sequence for Chihuahua has been inferred or generalized from sequences in the Southwest United States (Phillips 1990:376-377). Using this approach, it is possible to suggest that the Clovis phase of the Paleo-Indian period (marked by the presence of Clovis technology) dates to between 11,500 and 11,000 B.P. (Haynes 1980:115). There are only two recorded Clovis points in Chihuahua to date. One point was found at the Timmy Site, located 75 kilometers southwest of Deming, New Mexico, in northwest Chihuahua by Charles C. Di Peso, the principal investigator of the site of Paquimé (Di Peso 1965:83-87). The other was recently discovered in a dunefield east of Samalayunca (Phelps 1990:49). In both cases, no other Paleo-Indian artifacts were found in association. A possible Clovis base has also been reported by the Chihuahua Archaeological Project in its research along the shores of Laguna Bustillos. However this find is as yet unpublished.

Remains of Folsom technology are equally as rare, with only one projectile point reported for Chihuahua (Aveleyra 1961). Without a clear archaeological context or association, we must again turn to average dates derived from specimens found in the United States. The dates for the Folsom horizon cluster between 10,000 and 11,000 B.P. (Haynes 1980:115). These two finds constitute the entire basis for continued Paleo-Indian presence in Chihuahua. It should be mentioned that site visibility plays a significant role in the discovery of Paleo-Indian sites. These sites are often deeply buried, and thus are obscured to the archaeologist. It should not be assumed that they do not exist in Chihuahua, rather, they are not a highly visible part of the archaeological landscape.

The Paleo-Indian period is followed by an equally ill-defined Archaic period[2]. The dates for the Chihuahua Archaic currently are generalized from the Southwestern United States. MacNeish and Beckett define four periods for the Chihuahua Archaic: (1) Gardner Springs Complex (6,000± 500 to 4,000± 300 B.C.); (2) Keystone Phase (4000± 300 to 2,500± 200 B.C.); (3) Fresnal Phase (2,500± 200 B.C.); (4) Hueco Phase (900± 200 B.C. to A.D. 250± 200). These four periods are known to MacNeish and Beckett as the *Chihuahua Archaic Tradition* (MacNeish and Beckett 1987:10-16; MacNeish 1989:28-38). Despite what the name implies, all of the periods of the Chihuahua Archaic defined by MacNeish and Beckett were based upon investigations done in south-central New Mexico and generalized to include Chihuahua. A formal analysis of the Chihuahua Archaic is currently being undertaken by the Chihuahua Archaeological Project using data collected wholly within Chihuahua.

Phillips (1990:378) suggests that scholars interested in the Chihuahua Archaic look to various local adaptations of the Archaic in Sonora, Durango,

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[2] The term "Archaic" is used here in order that the culture sequence may be compared with that of the U.S. Southwest. In Mexican archaeology, the term Archaic has a very different and specific connotation. Therefore, Mexican archaeologists use the term "hunter-gatherer" period to refer to the Chihuahua Archaic sequence.

and the Sierra Madre of Chihuahua for better cognates then those found in the American Southwest. Phillips argues that based upon the Archaic complexes identified by archaeologists in Northern Mexico, we can assume that Archaic peoples once occupied the entire area of the present state of Chihuahua. He further argues that in order to understand the variability of environments and resources utilized by Archaic peoples, "we must move beyond viewing northwest Mexican Archaic patterns as mere extensions of their better-known U.S. counterparts" (Phillips 1990:379). This view casts doubt on the sequence defined by MacNeish and Beckett which was based upon data collected entirely north of the U.S. border.

It is clear that current ideas and definitions of the Chihuahua Archaic may soon undergo radical transformation when more data are made available. Phillips' position challenges researchers to search within Chihuahua for answers to the variability of the Archaic. A similar challenge to understand the later ceramic periods within Chihuahua instead of at a distance, was answered by Charles C. Di Peso some 35 years prior to Phillips' article. Di Peso's work is by far the most comprehensive source available on the ceramic periods of Chihuahua and merits more detailed examination.

3.2 The Archaeological Anchor of Chihuahua: Paquimé

By the 7th century A.D., farming was beginning to replace hunting and gathering as a primary means of subsistence throughout the Casas Grandes Valley. This transition is best tracked by the presence of pottery throughout the Casas Grandes Valley and westward into the Sierra Madre. Throughout the region, the earliest pottery has been likened to that of the Mogollon, of southern New Mexico and Arizona. While this point is still debated, the parallels between Mogollon and Early Ceramic period in Chihuahua are strong. For now, we shall lay this issue aside and look at Paquimé which possesses the best archaeological record of any site in Chihuahua.

Paquimé was an enormous (over 2000 rooms) pueblo community on the banks of the Río Casas Grandes. Paquimé was also thought to be the hub of a large-scale inter-regional exchange network. This role was first ascribed in a formal detailed analysis of Paquimé by its principle investigator, Charles C. Di Peso. Di Peso led the excavation of Paquimé as director of the Joint Casas Grandes Project from 1958 to 1961. His work is chronicled in his eight volume *Casas Grandes: A Fallen Trading Center of the Gran Chichimeca.* To date, this seminal work remains the sourcebook for anyone working in Northern Mexico.

3.2.1 Work of Charles C. Di Peso

Charles Di Peso founding director of the Amerind Foundation of Dragoon, Arizona, turned his attention from Arizona archaeology to Chihuahua archaeology in 1958. He mounted an expedition which would carry on three years of excavations at the site of Paquimé. Di Peso was perfect for the job. His breadth of knowledge about Mexico, his fluent Spanish, and his lifelong interest in Northern Mexico made him well-suited for this research. Di Peso did not disappoint. Although it would be a dozen years before his Casas Grandes volumes would roll off the presses, he had already established Northern Mexico as an area which could no longer be glossed over by Southwest archaeologists.

In his Casas Grandes volumes, Di Peso introduced and developed the concept of the *puchteca* as the primary impetus for the construction and continued existence of Paquimé (Di Peso 1974:58-59; 297-301). Although Di Peso entertained other possibilities for the rise of Paquimé, he always held the puchteca as a central tenet to his theories. The puchteca, in Di Peso's view, were the emissaries of the sophisticated societies of Mesoamerica who were sent north to exploit the economic potential of the vast northern frontier (the north, in this case, being the area which lies north of the Tropic of Cancer). Puchtecas were small in number, perhaps only a few elite individuals. These individuals left little evidence of their presence along the way during their great trek northward (Di Peso 1974:59). Highly organized and skilled in manipulation, the puchtecas directed the construction of Paquimé and then maintained themselves as the ruling elite.

Di Peso attempted to bridge the gap between Mesoamerica and the Southwest with his puchteca model but his ideas were generally not well received by Southwest archaeologists. Di Peso found the conventional framework of Southwest prehistory lacking, and challenged it to include Northern Mexico. Most positive of the changes initiated by Di Peso was a healthy discussion of the plausibility of a Mesoamerica-Southwest trade corridor with Paquimé as its hub (Hedrick *et al* 1971; 1974; Mathien and McGuire 1986). J. Charles Kelley, who was chronicling the Chalchihuites culture area further to the south, supported Di Peso's efforts to integrate the Southwest with Mesoamerica. He and Di Peso in their respective efforts, changed the direction, albeit briefly, of traditional thought of Southwest prehistory.

The criticisms of Di Peso's work were largely directed at the chronology he proposed for Paquimé, however it is important to note that the critics attack Di Peso on two general fronts: (1) His Medio Period chronology and; (2)

the Mesoamerican presence at Paquimé. Finally, it should not be forgotten that many scholars question or reject outright the notion that puchtecas directed the development of Paquimé. Evidence of the puchteca at Paquimé is ephemeral at best. No one today seriously questions the existence of an elite at Paquimé (perhaps even a ruling elite). However, the same evidence Di Peso used to infer foreign puchtecas, is now interpreted as evidence of a local elite within a regional system (Minnis 1989:294-296; Ravesloot 1988:70).

The corpus of Di Peso's research focused on what is called the Medio Period of Paquimé. The Medio Period was the time of greatest florescence at Paquimé in all respects. Consequently, it has also commanded the lion's share of research efforts. Charles Di Peso, more than any other scholar, was responsible for bringing the Medio Period to the attention of Southwest archaeologists.

3.2.2 Chronologies of Paquimé

Chronology is integral to any interpretation of Paquimé. As chronological sequences are refined in other areas of the U.S. Southwest, the apparently minor variations in the Paquimé chronology become more significant. The Paquimé chronology is crucial to any model which purports any form of large-scale interaction and exchange between societies. Thus an examination of Di Peso's and alternative chronologies is necessary before proceeding to a more general discussion of the site which is the focus of this thesis.

3.2.2.1 Di Peso's Chronology

The Di Peso chronology is outlined in volumes I through III of his Casas Grandes series (Di Peso 1974). In brief, Di Peso divided the history of the Casas

Grandes area into three major periods each consisting of three phases. These periods are known as Viejo (old), Medio (middle), and Tardio (late). The dating on each of these periods was based on variety of different sources, each weighted differently for any individual period. That is to say, it appears that Di Peso arbitrarily selected some of the dates to support his view. Di Peso relied on the following techniques to derive dates: Spanish records and archives, dendrochronology, Carbon ^{14}, and obsidian hydration (Di Peso 1974:45-47). Of these techniques, C^{14} and dendrochronology were relied on most heavily. The dates of these periods and their respective phases, as given by Di Peso, appear in Table 3.1 below:

Table 3.1: Di Peso's Chronology

PERIOD/Phase	DATES (A.D.)	TYPE SITE(S)
VIEJO PERIOD		
Convento Phase	700-900	Convento Site
Pilon Phase	900-950	Reyes Site I
Perros Bravos Phase	950-1060	Reyes Site/Paquimé
MEDIO PERIOD		
Buena Fe Phase	1060-1205	Paquimé
Paquimé Phase	1205-1261	Paquimé
Diablo Phase	1261-1340	Paquimé
TARDIO PERIOD		
Robles Phase	1340-1519	Paquimé /Casas Valley
Sporadic Spanish Contact	1519-1660	Paquimé /Casas Valley
San Antonio de Padua	1660-1686	San Antonio Mission

Di Peso favored this chronology as it allowed him to relate Paquimé with the Toltecs and to extend the Paquimé sequence to include Spanish contact. Numerous researchers have raised valid criticisms with regard to the agenda

Di Peso followed while developing his chronology (see, e.g., Le Blanc 1980; Lekson 1984; Braniff 1986; Dean and Ravesloot 1988; Phillips 1989; Phillips 1990).

3.2.2.2 Alternative Chronologies

By 1980, scholars interested in Mesoamerican-Southwest interactions had generated several books which further developed the idea of a "Mesoamerican Southwest" (see, e.g., Hedrick *et al* 1971; 1974) along with various articles. In addition, healthy discussion of the Casas Grandes volumes was occurring in conferences. Skeptics began to re-examine the Casas Grandes chronology. In an article which appeared in American Antiquity in 1980, Steven Le Blanc's critique provided the first printed alternative chronology to Di Peso's (Le Blanc 1980). Specifically, Le Blanc questioned Di Peso's dating of the Medio Period. Le Blanc used data from the Mimbres Valley to argue that the Medio Period could not possibly have begun in A.D. 1060, as proposed by Di Peso. Le Blanc argues quite persuasively that there is little evidence to show interaction between Casas Grandes and Mimbres Phase sites (Le Blanc 1980:803). This lack of interaction is significant. The end of the Mimbres Phase occurs around A.D. 1130-1150. A common hallmark of so-called "Classic Mimbres" is the pottery ware known as Mimbres Classic Black-on-White. This ware was widely traded throughout the region until the end of the Mimbres Phase. The Mimbres Phase is immediately followed by the Black Mountain Phase, which begins ca. A.D. 1150. It is in the Black Mountain Phase sites that an overlap with Paquimé in trade wares is seen. Since the Black Mountain Phase is linked to the expansion of Paquimé, it seems plausible that the Medio Period begins in

A.D. 1150. Le Blanc argues that the intrusive nature of Black Mountain Phase sites into the long Mogollon sequence is clear evidence of the regional expansion associated with the beginning of the Medio Period (Le Blanc 1980:803-804). Summarizing Le Blanc's chronology, we see the following:

Viejo Period: pre-A.D. 900 to A.D. 1150
Medio Period: A.D. 1150 to A.D. 1300
Tardio Period: A.D. 1300 to A.D. 1450

The difference of 100 years appears small, but it is very significant to any model of regional interaction. Based on dates from hundreds of sites, the Mimbres chronology is by all indicators more reliable than the Paquimé one. Since Di Peso tended to view Paquimé as contemporary with the Chaco system and Classic Mimbres, he linked the two regions with the Medio Period expansion at Paquimé. Given Le Blanc's argument, it appears that both societies were well into their decline before the Medio Period florescence at Paquimé.

Le Blanc's critique left the door open for re-interpretations of the Medio Period. Although Le Blanc differed with Di Peso on the issue of the beginning of the Medio Period, he had no quarrel with the end of the Medio Period occurring around A.D. 1350.

Other scholars, most notably Steven Lekson, suggested that both Di Peso and Le Blanc ended the Medio Period too early. Lekson suggested that the tree-ring dates Di Peso relied on so heavily for his chronology may be flawed. Furthermore, Di Peso's use of uncalibrated C^{14} dates to support his chronology was a mistake.

Lekson cross-dated the Medio Period through the presence of Gila Polychrome at the site. The dating of this polychrome, considered by Di Peso to be the hallmark of the Medio Period, was done by using the tree-ring dates already shown to be flawed. In brief, Lekson suggests that the established dates of A.D. 1300-1450 for Gila Polychrome call into question the end date of 1340 for the Medio Period given by Di Peso (Lekson 1984:56). If this polychrome is indeed the hallmark of the Medio Period, then cross-dating suggests the Medio Period ran as late as A.D. 1450, well into Di Peso's Robles Phase. Lekson further argues that the Diablo Phase should be shortened on the basis of other trade wares which disappear at the end of the Paquimé Phase. Thus Lekson (1984:59) redates the Medio Period as follows:

Buena Fe Phase	A.D. 1130/1150-1300
Paquimé	A.D. 1300-1400
Diablo	A.D. early 1400's

These revised dates suggest a Medio Period which began and ended about 100 years later than those proposed by Di Peso. This difference is significant for any model of inter-regional exchange.

Following Lekson's critique, other scholars began to question the early dates associated with Medio Period. Braniff (1986) suggested that the Medio Period ran as late as 1500 A.D., long after the collapse of the Toltec empire in the 13th century. Dean and Ravesloot (1988) also attacked the Di Peso on the basis of his [Di Peso's] use of tree-ring dates and uncalibrated radiocarbon dates to assign dates to the Medio Period. Theirs was the first critique to systematically reanalyze each date Di Peso used to develop his chronology. They conclude that the dates available to Di Peso chronology do not necessarily justify the breakdown of the Medio Period into phases (Dean and Ravesloot 1988:19). They suggest that a large amount of overlap between the revised dates make phase designation problematic. Thus the Medio Period is best considered as a single unit or phenomenon. However, they also suggest that looking at individual phase assignments may also yield significant cultural patterns.

Dean and Ravesloot also consider the implications of the new dates for the dating of Gila Polychrome. They note that with the later placement of the Medio Period it is no longer necessary to draw complicated parallels between Paquimé and Chaco Canyon, the latter having been abandoned by the period of major development at Paquimé (Dean and Ravesloot 1988:29). They conclude that the revised dating places Paquimé contemporaneous with groups such as the Salado of central Arizona, and the Animas and Cliff Phases of southwestern New Mexico. Furthermore, the new dates would make Paquimé contemporaneous with Pueblo IV sites which have no documented direct association with Paquimé. The authors conclude that this relationship merits further investigation, since there must exist some method of transmitting Mexican influence into Anasazi sites at this time (Dean and Ravesloot 1988:29-30).

Along the Mesoamerican front, there are further implications of a later date for the Medio Period. The new dates suggest that Paquimé developed after the fall of the Toltec system but before the rise of the Aztec Empire, in the 15th century. If this is indeed the case, then no Mesoamerican state existed during the Medio Period to link with Paquimé (Braniff 1986:79). The implications of this for Di Peso's puchteca theory of culture change become obvious. Thus, it would appear that the alternative chronologies imply radical differences in the way in which Paquimé is viewed.

Finally, some authors (e.g. Phillips 1990) have suggested that the Medio Period extended much later into Di Peso's Tardio Period. Phillips (1990:5), for example, has argued that the Robles Phase of the Tardio Period never existed.

He demonstrates that the dates used for the Robles Phase were, in fact, contemporary with the Medio Period. His analysis casts further doubt on Di Peso's vision of the Medio Period. In light of all the aforementioned arguments it would appear that a generalized acceptance of a later Medio Period (i.e. ~1150 to no later than 1450) is in order. This revised chronology and a comparison of other selected chronologies for the region appear in Figure 3.1.

3.3 Summary of Paquimé Cultural Sequence

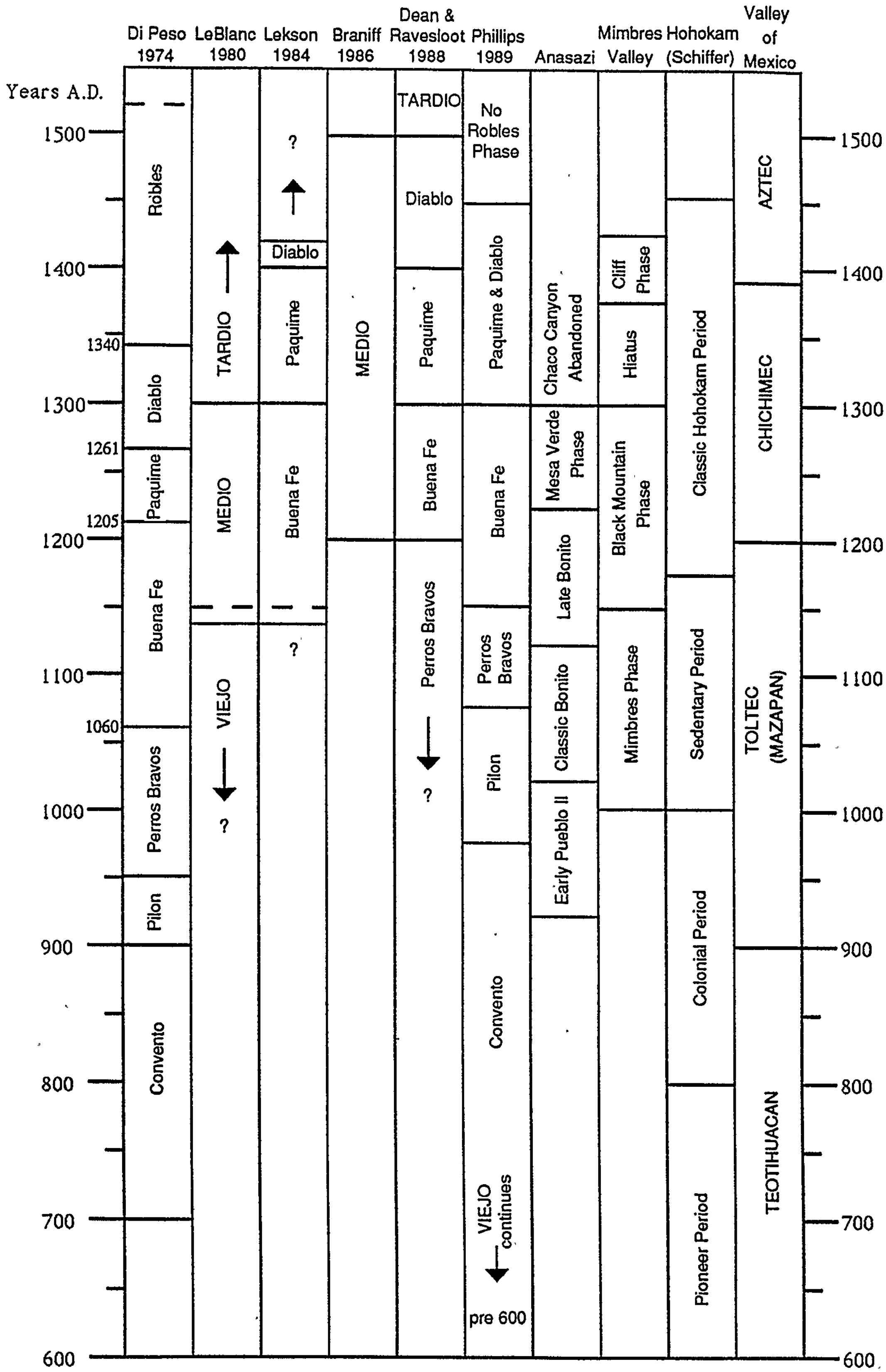
The Paquimé cultural sequence is largely based upon the internal site chronology developed by Di Peso. This chronology has already been shown to have been flawed in several respects. However, the chronological debate is focused on questions of when the periods began and ended in absolute time. Most scholars agree that the broad cultural periods assigned by Di Peso represented real culture change within the Casas Grandes region.

It is important to note that Di Peso remains the sole source of information on the nature and character of all three periods in the Casas Grandes region. Of these periods, the archaeological information with regard to the Medio Period is the most reliable, having been derived from Di Peso's excavations at Paquimé. Information on the other two periods is much more sketchy in character. In order to understand these periods, it is important to examine each period in greater detail.

3.3.1 Viejo Period

From Di Peso, we learn that almost the entire basis for the creation of the Viejo Period comes from three sites, the Convento Site (CHIH:D:9:2) and the

Figure 3.1: Comparative Chronologies for Paquimé and Selected Regions



Reyes sites (CHIH:D:9:13, CHIH:D:9:14). All of the Viejo Period C^{14} dates come from charred corncobs (Di Peso 1974:102). The application of dates from these two sites into the larger Casas Grandes chronology is significant, as it affects the placement of the Medio and subsequent periods. This will be discussed further within the context of the controversial dating of the Medio Period. For now, this discussion will be confined to the defining characteristics of the Viejo Period.

According to Di Peso, farming had permanently replaced hunting and gathering as a way of life by 700 A.D. By this time, in the Convento Phase, small, crude dwellings made of wattle and daub were being built alongside the Río Casas Grandes and elsewhere in Chihuahua. These dwellings were constructed in shallow pits which had been excavated to form a foundation. These were known as "houses-in-pits" to Di Peso and are more commonly known as pithouses throughout the American Southwest. Such dwellings are common indicators of the transition to farming and sedentism throughout the region. Although the pithouses of the Casas Grandes Valley differed in raw materials and construction techniques, they nonetheless fall within the general category of pithouses observed throughout the area.

The people of the Viejo Period relied more on agriculture as a means of subsistence than hunting and gathering. Maize (*Zea mays*), beans (*Phaseolus* spp.), and squash (*Cucurbita* spp.) were the primary cultigens, supplemented by wild plants which were gathered locally. Game was hunted, as it had been in the preceding Pre-ceramic Period, but to a lesser degree. Large game, most notably the American bison (*Bison bison*), continued to be an important food source throughout the Viejo Period. However, reliance on large game appears to have declined steadily with an increase in agricultural intensification.

Without a doubt, the hallmark of the Viejo Period is its ceramics. Decoration of pottery becomes common in the Convento Phase. Corrugated, scored, incised, tool punched, painted, and textured wares proliferate during this time. The variety and complexity of decoration also increases throughout the Viejo Period. Di Peso (1974:128) notes that similar textured pottery appears in the Cave Valley area at the same time. However, the varieties of textured wares are not present in other sites to the north and west. Thus Di Peso concludes that these wares were not as popular as they were at Casas Grandes (Di Peso 1974:128).

The increase in ceramic trade, coupled with architectural changes (mostly village expansion and rebuilding) forms the basis for Di Peso's second Viejo Period Phase, known as the Pilon Phase (900-950 A.D.). During this phase, the population of the Casas Grandes Valley increased, and the people responded by building new houses utilizing more space (Di Peso 1974:137). The Pilon Phase people increased trade with Mimbres and Anasazi peoples, as evidenced by an increase in trade wares found in Pilon contexts. Other items, such as 3/4-grooved axes for felling trees appear during this time. Their villages began to take on a new form. The circular-shaped community house is enlarged, a rectangular plaza is constructed, and dwellings tend to encircle the community house, forming a large outer circle (Di Peso 1974:142-154). This pattern appears to be repeated throughout the Casas Grandes Valley.

Di Peso (1974:249) defines 21 ceramic trade wares found in Viejo Period contexts. On the basis of the presence of these wares, Di Peso began to construct his puchteca theory of culture change. It is at this time [the Viejo

Period] that the puchtecas began to exercise their influence over Casas Grandes society. Although the mechanics of puchteca influence are not fully described by Di Peso, it appears that puchtecas must have been present by the end of the last phase of the Viejo Period, the Perros Bravos Phase, in order to have directed the construction of Paquimé.

Around 950 A.D., the Pilon Phase pithouses are razed and replaced by a very different architectural theme, the rectangular surface structure. Dwellings at this time are built around plazas which are delineated by wing walls (Di Peso 1974:180). The presence of so-called "southern" pottery (i.e. Mesoamerican styled) is concurrent with this architectural change. In addition, pyrite plaques, figure-eight shaped beads, and copper amulets appear in Perros Bravos contexts. These items, coupled with the rebuilding of the settlement into a plaza-oriented community, are the grist for Di Peso's ideas about Mesoamerican influence during this phase.

The new construction techniques developed during the Perros Bravos Phase are important both culturally and conceptually. Culturally, they may indicate a shift in social structure of the community. The small, simple pithouses of the previous phases are abandoned in favor of a larger, more group-oriented community, as evidenced by the presence of the central plaza. The plaza is to become the focus of social activity, as we shall see in the Medio Period. Conceptually, these changes must be precipitated by some factor or factors, either internal or external to the community. As Di Peso (1974:193) notes, the move to rectangular structures exposes more of the structure to the elements of nature, thus requiring a greater labor investment in maintenance of the structures. The engineering of above- surface structures requires an understanding of the load-bearing post. Without this conceptual understanding, this form of architecture is not possible.

The artifact inventory of the Perros Bravos Phase shows a number of traits not present in earlier phases. The introduction of these traits parallels the introduction of above surface structures. Among the new items are exotic or imported goods whose source was a great distance from the Casas Grandes area. Shell tinklers, used as pendants, and turquoise, for jewelry, were found in Perros Bravos Phase contexts. The increase in frequency and distribution of these items during this time suggests some change in social relations regarding exchange. Whether or not the impetus emanates from Mesoamerica, it is clear that a transition to greater inter-regional exchange occurs during this phase. The ceramic vessels tell a similar story. Southwestern pottery styles begin to proliferate during Perros Bravos, such as an increase in pottery trade with the Mimbres Valley. The frequency of textured wares declines, while polychrome decoration increases (a complete list of trade ceramics can be found in Di Peso 1974:249).

The end of the Perros Bravos Phase marks the beginning of the Medio Period. As previously discussed, the absolute dating of this period is very controversial. However, there exists a solid archaeological basis for the creation of the Medio Period. More than any other period, the Medio Period commands a large share of archaeologists attention. The reasons for this will become clearer with a discussion of the characteristic features of Medio Period culture.

3.3.2 Medio Period

A complete summary of the Medio Period consumes volumes and will not be attempted here, rather, I will attempt to summarize its more salient features. The Medio Period sequence is based on the construction and development of the city of Paquimé. According to Di Peso, in 1060 A.D. Mesoamerican merchants (puchtecas ?) directed the indigenous Viejo Period inhabitants to build Paquimé over portions of the older village (Di Peso 1974:290). This time of rebuilding is known as the Buena Fe Phase. Dwellings in this new city took the form of single-story, ranch style house clusters. Throughout this phase, the occupants added more dwellings, eventually forming four enclosed plazas (Di Peso *et al* 1974:476). During this phase, the framework was laid for the development of a large city. Water drainage systems, formal plazas, underground ceremonial structures, and outer retaining walls appear in Buena Fe times. The architecture of the Buena Fe Phase reflects considerable forethought on the part of its builders. Di Peso (1974:370) notes that architectural changes afforded the occupants certain material advantages such as sleeping platforms, a domestic water system, and raised cooking hearths. The design of the compound provided an added defensive advantage, by virtue of its high outside walls. In addition, T-shaped doorways and load-bearing walls appear in this phase (Di Peso 1974:372). In short, most of the features which are considered the hallmark of the Medio Period appear during the Buena Fe Phase.

Following Di Peso's views, Paquimé underwent a great expansion and remodelling, after a century and a half of Buena Fe occupation. The occupants began to construct multi-story apartment dwellings. Public space took on new dimensions. Large, open air plazas and markets appeared. The area of the city expanded exponentially, eventually covering an area of over 36 hectares. Ceremonial platform mounds, I-shaped ball courts, huge stone-lined roasting pits, macaw nesting boxes, turkey pens, specialized workshops, religious centers, and large-scale ceramic production appear during the Paquimé Phase. The Paquimé Phase is when the most sophisticated trade occurs. Huge underground warehouses held thousands of kilograms of marine shell, turquoise, and copper which were beautifully worked by the artisans of the city. Mercantile exchanges take place on a scale previously unseen. The city of Paquimé becomes a cultural and religious mecca, with a ruling elite exerting control over the entire Río Casas Grandes Valley and adjacent basins. As the trade network grew, specialization of production increased. Paquimé "outliers" or secondary centers of production appear throughout Northern Mexico and were kept in contact with the hub at Paquimé by a sophisticated system of pathways and fire communication network known as *atalayas*. These outliers probably served as intermediary trade centers as well as producing goods for Paquimé.

During the Paquimé Phase, Di Peso suggests the power became more centralized in the hands of a few ruling elites. Grave goods found in Paquimé Phase burials indicate a non-egalitarian social system (Ravesloot 1988). Production of polychrome pottery reached massive proportions at Paquimé. Trade wares from other regions also proliferated. As the market for particular products (e.g. worked shell) increased, the mercantile system based at Paquimé expanded. Recent investigations have suggested that the extent of this expansion ranged no more than a 130 kilometer radius from Paquimé with most sites concentrated to the northwest of Paquimé (Minnis 1984:190;

1989:289). Thus it would appear that the sphere of direct political influence of Paquimé may have been smaller than expected by Di Peso.

Exchanges took many forms, a few of which merit further mention. The scarlet macaw (*Ara macao*), a bird native to the humid lowlands of Mexico, was bred at Paquimé. Remains of this bird and its plumage have been found at over 140 sites throughout the American Southwest (Hargrave 1970). However, no other breeding facilities have been discovered, which leaves Paquimé as the sole producer of macaws for the entire region. Similarly, turkeys were also domesticated and bred at Paquimé. The plazas have been found to contain hundreds of headless carcasses buried under the floors of the pens. It is thought that both these birds were raised for their feathers, and not for consumption (Di Peso 1974:469). The exchange of marine shell is also significant here. Some 4,000,000 pieces of shell were found in various contexts, however most (96%) of the shell was found in two large storerooms. Minnis (1984:185) has suggested that this represents some form of hoarding by social elites rather than simple storage for later exchange, as suggested by Di Peso. Minnis' suggestion indicates shell might have lesser significance as a generalized trade item, and more as a marker of social status.

The Paquimé Phase represents the classic Casas Grandes society as it is currently envisioned. The system based at Paquimé spread to its largest areal extent at this time and influenced or directed the development of other sites in the region. The population at Paquimé is estimated to have peaked at 4700 people. Although this section has only hinted at the achievements of the Paquimé Phase, the major cultural changes are apparent. The developments of the Paquimé Phase become the index by which other developments are measured.

Following the Paquimé Phase, the city fell into a state of decay. New construction ceased, maintenance was neglected, and dead were buried unceremoniously, dumped into the public drainage system, or left where they fell. The walls of Paquimé began to crumble. Crude alterations were made to public spaces for habitation (Di Peso 1974:319). Finally, the entire city was set ablaze around 1340 A.D., according to Di Peso, or 1450 A.D. according to the revised dates. This phase of decline is known as the Diablo, or "devil" Phase. Di Peso (1974:320-321) suggests that Paquimé was attacked by a marauding enemy, but there is little archaeological evidence to prove or disprove this notion. The burning of Paquimé brought to an end the Medio Period, with all its achievements. The system which was centered around Paquimé also appears to have disappeared or fallen apart. Finally, the area was abandoned by those who survived, although Di Peso believed that much of the regional population regrouped in the cliff dwellings of the Sierra Madre. This idea has fallen into disfavor, as the dating of the cliff dwellings is uncertain. It is the remaining doubts about what followed the burning of Paquimé that form the basis for the Tardio Period discussions.

3.3.3 Tardio Period

The Tardio Period was a time of fragmentation of groups in the entire region and is poorly known archaeologically. Phillips (1989; 1990) argues persuasively that there is no archaeological basis for the creation of several phases within this period. All of the sites assigned to the Robles Phase by Di Peso actually date to the Medio Period, thus casting severe doubt on the validity of the Tardio Period. Di Peso constructed the Tardio Period by using dates obtained from the remains left by people who, while moving nomadically, probably camped for short periods at or near the ruins of Paquimé . There is evidence for marginal reuse of the site, but not for any extended period of time. Di Peso also created this period to account for Spanish contact, which occurred in Mesoamerica in 1519. As the Spaniards pushed northward, signs characteristic of their presence were recorded in the archaeological record in sites along their route. Thus the Tardio Period as conceived by Di Peso appears to include the time from the burning of Paquimé to the arrival of the Spanish. In the 1660's, a church mission, called San Antonio de Padua, was built over the Viejo Period Convento site to Christianize the Suma Indians who then lived in the Casas Grandes Valley. This mission provided a foothold for European settlement in the valley. Di Peso used the Tardio Period data to speculate on the origin of these puebloan groups and their possible relationship to Casas Grandes. Unfortunately, his work in this time period remains largely speculative and is not based firmly upon archaeological evidence. Although the Tardio Period was clearly marked by extreme changes, it appears that we lack the archaeological evidence to understand the nature of this period. Thus, this study will concentrate only on those events which occurred prior to this period.

3.4 Previous Investigations in Chihuahua

Although much of what we know about Chihuahuan prehistory comes from Di Peso, there exists a complementary, although very incomplete, record from various explorers and surveyors who travelled Chihuahua in the latter 19th and early 20th centuries. Their observations provide a means by which further surveys may be conducted and provide a general idea of the archaeological landscape. An examination of the notes and records left by non-archaeologists begins this discussion.

3.4.1 Investigations by Non-archaeologists

John Russell Bartlett first published sketches of the ruins of Paquimé in 1854 (Bartlett 1965). These were the first drawings that many Americans had seen of the famous ruin. His drawings and descriptions enticed other explorers, such as Adolph Bandelier, to make trips to the area and describe what they saw. Bandelier (1883) also drew sketches and described the state of the ruins of Paquimé. His survey was more comprehensive than Bartlett's. Bandelier made forays into the Sierra Madre during several journeys to the region. His survey was part of larger study commissioned by private institutions and the United States Government to inventory the archaeological resources of the Greater Southwest region (Bandelier 1970).

Karl (Carl) Lumholtz made the region famous when the journal of his travels was published in 1902 under the title *Unknown Mexico* (*Mexico Desconocido*). Lumholtz described in vivid detail the cliff dwellings in the Sierra Madre. His journal remains a historical source for charting the condition of these sites, as well as providing a glimpse of some of the artifacts present at the time of his journey in 1892. Lumholtz travelled from Sonora to Chihuahua, over the continental divide, and spent several weeks visiting cliff dwellings. Lumholtz possessed and developed a sophisticated understanding of the region. He used interpreters to describe the traditional ways and values of the Tarahumara Indians. Lumholtz (1902:100) noted that Chuchichupa meant "place of the dead" in Tarahumar, the language of the native Americans who were inhabiting the region. This could have referred to the burial caves in the region. Lumholtz's contribution is useful as a guide to the state of the prehistoric resources of the area in the last quarter of the 19th century.

Lumholtz's writings inspired others to make forays into the remote Sierra Madre. A. Hooton Blackiston (1905;1906;1909) made reconnaissance surveys to the same region and published romantic descriptions of the cliff dwellings and the site of Paquimé. Blackiston also made collections from each site he visited, however the whereabouts of these collections is unknown. More significantly, he published blueprints or plans of the structure and dimensions of the cliff dwellings. These were the first formal descriptions which were probably seen by American archaeologists (Lumholz's journal was not translated into English until after Blackiston's articles). Southwest archaeologists must have taken note of the archaeological potential of the region, as several expeditions were being planned by the early twenties.

3.4.2 Surveys and Excavations by Archaeologists

The twenties were an exciting time in American archaeology and Southwest archaeology was no exception. American archaeologists were anxious to apply stratigraphic methodology to their work. This task was undertaken on a large scale by A.V. Kidder at Pecos Ruin, New Mexico. Kidder's work led him to attempt to understand Southwest prehistory in a regional perspective. He included Northern Mexico in this task, but was unable to carry out more than a short trip to the Babícora region in the summer of 1924. His foray strengthened his convictions on the importance of Northern Mexico to the framework of Southwest prehistory. The Gila Pueblo was also convinced of the importance of Chihuahua and sent E.B."Ted" Sayles to survey the region.

3.4.2.1 The Sayles Surveys: 1929-1940

In the summer of 1929, Ted Sayles was sent by the Gila Pueblo to survey the western half of the state of Chihuahua. This was a formidable task for one man to accomplish. Sayles began by dividing the state into blocks, each represented by a letter designation. The blocks were each 15 minutes of a degree by 15 minutes of a degree in size. As Sayles snaked his way through the survey blocks, he recorded a plethora of archaeological sites on standardized forms created for the project (Sayles n.d.). Sayles used local informants to assist him in locating sites. He also made a series of collections, which are now housed at the Arizona State Museum. The result of his 11 year endeavor was the most complete site inventory ever compiled for Chihuahua. His survey resulted in a publication, *An Archaeological Survey of Chihuahua, Mexico* (1936), which methodically described his travels and ideas. Sayles' original survey forms remain a primary source for archaeologists currently working in the region. Regrettably, they also provide the modern archaeologist with an index of site destruction. In the Chihuahua Archaeological Project's attempt to relocate many of the sites recorded by Sayles, it was discovered that many had been completely destroyed or were badly looted. Sayles also conducted test excavations at several sites, however, inconsistency in his methodology have hampered efforts to glean reliable information from these soundings.

3.4.2.2 Carey and Kidder in the Babícora Basin

During the summers of 1928 and 1929, Henry Carey excavated several mound sites in the Babícora basin, including some along the Río Las Varas. These excavations were the first of their kind in the Babícora region, and turned up many artifact assemblages which were similar to those observed at Paquimé. Carey worked in three areas in the Babícora: along the Río Las Varas, at Babícora (near the modern town of San José Babícora), and at San Juan, near Peña Blanca. Carey noticed that the ceramic composition varied from one mound group to another within the Babícora. Based on the different number and quality of pottery types found at each of these mound groups, he concluded that each group must represent a distinct population center (Carey 1931:360). The spatial separation of the mound groups supports the idea of distinct population centers. He noted that the pottery designs of the Babícora region were the same as those found in the Casas Grandes valley, but they were of an inferior quality (Carey 1931:337). Carey concluded that the culture represented in the Babícora region was probably older than that found at Casas Grandes (Carey 1931:339). The floor plans of the mounds he excavated are indicative of Medio Period construction, although on a smaller scale than sites in the Casas Grandes Valley. It is not clear from his article whether or not an earlier component was represented at these sites. In addition to the excavations, Carey published more detailed descriptions of the cliff dwellings in the Sierra Madre.

A.V. Kidder, already mentioned, also conducted a small excavation near Las Varas in 1924, prior to the work done by Carey. However, Kidder's work was published after Carey's article, and makes numerous references to the Carey excavations. Kidder's work is almost purely descriptive, but does note the extent of site destruction. The village he excavated had been burned, and several charred beams were recovered. Carey, in contrast, noted a conspicuous absence of beams from the sites he excavated. However, Kidder found no stone tools. Charred botanicals were also present. Like his predecessors, Kidder published descriptions of the cliff dwellings in his article, but did not elaborate further.

3.4.2.3 Brand

Donald Brand was one of the first researchers to attempt to synthesize the spotty information which was available at the time with the larger framework of prehistory which was being developed for the American Southwest. To accomplish this, Brand visited over 400 archaeological sites in the region (Brand 1943:116). Brand, a geographer by training, recognized and delineated archaeological sites as belonging to particular drainages. He defined environmental zones and described each site in relationship to its environmental setting. Brand (1935:287) suggested the use of the term "Northwest Mexico" to describe the culture areas of Sonora and Chihuahua. He was the first to note that the cultures of the region were undoubtedly affiliated with the American Southwest (Brand 1935:287-288). He systematically traced these affiliations through a pottery type analysis. This analysis showed similarities between types produced at Paquimé and those found at other sites throughout the Greater Southwest. Thus Brand provided the first systematic assessment of the exchange network which dominated Chihuahua during the Medio Period.

3.4.2.4 Guevara Sánchez

The archaeological resources of Chihuahua suffered widespread destruction at the hands of looters and pothunters prior to coming under official government protection with the establishment of a regional office of the *Instituto Nacional de Antropología e Historia* or I.N.A.H., the Mexican antiquities agency. In conjunction with opening a regional office in Chihuahua City, several archaeological projects were announced which would greatly enrich our knowledge of the prehistory of the region, as well as increase badly-needed protection for archaeological sites. Two major projects were undertaken by I.N.A.H. in the region: one, the establishment of an archaeological zone or park at Paquimé and; two, a survey and excavation of some of the cliff dwellings in the Sierra Madre. The former was overseen by Eduardo Contreras Sánchez until his death, and the survey of the cliff dwellings was undertaken by Arturo Guevara Sánchez. The work of Guevara Sánchez was particularly significant, as it represented the first archaeological research conducted outside the zone of Paquimé since the thirties (with the possible exception of a brief survey by an American, R.H. Brooks in the sixties). Guevara Sánchez described the Cuarenta Casas region, along the Arroyo Garabato, in great detail (Guevara Sánchez 1984; 1986). Although his contribution is too lengthy to summarize here, it is important to note that he found assemblages closely related to those at Paquimé. This apparently confirms the observations of previous visitors to the area who noted some degree of affiliation between the two areas.

The preceding overview hopefully will place the El Zurdo site in its archaeological context. Much of what is known about the site and the region must be pieced together from the reports and notes of previous researchers and explorers. With the exception of Di Peso, whose work is without question a massive contribution, one must look at each summary for its own merits, since each work was limited by the techniques and resources available at the time. Modern research will continue to profit from these works and complement their respective contributions.

CHAPTER 4: MODERN INVESTIGATIONS IN CHIHUAHUA

In the past twenty-five years, many new techniques have aided archaeologists in locating and analyzing archaeological material. However, in those same twenty-five years little archaeological research has been conducted in Chihuahua. Several recent investigations have sought to rectify this hiatus by surveying and excavating sites in the region. The results of these projects are not yet complete, but their research goals are known.

4.1 The Chihuahua Archaeological Project

The Chihuahua Archaeological Project (*Proyecto Arqueológico Chihuahua*), under the direction of Jane H. Kelley (University of Calgary) and Joe Stewart (Lakehead University) began an opportunistic survey of five regions in west-central Chihuahua in the summer of 1990. Crews surveyed the region around Laguna Bustillos, the area to the west of Cuauhtémoc, the Río Santa María Valley, the Babícora Basin, and the Río Santa Clara Valley. The project is multidisciplinary in nature, with specialists in geology, osteology, protein residue identification, archaeobotany, and isotopic analysis. One of the general goals of the project is to understand regional adaptations through time and the relationships between regions within Chihuahua and the Greater Southwest. To accomplish this goal, the project has emphasized the importance of developing a solid regional chronology, in concert with environment and resource reconstruction. In addition, settlement patterning, site distribution, and resource procurement studies complement the data. To date the project has located, mapped, and made systematic collections from over 100 sites, and has conducted controlled excavations at three large sites within the study blocks.

The initial site surveys have revealed a wide-ranging site distribution. Many of the sites located around Laguna Bustillos clearly belong to the ill-defined Archaic Period. In contrast, sites in the Río Santa María Valley and the Babícora basin often have a Medio Period component, suggesting they are roughly contemporaneous with Paquimé. The project has located many key resource areas which may have been utilized in prehistoric times. Information regarding site size, artifact assemblages, and environmental setting is currently being compiled. It is hoped that this information will help the project gain a fuller understanding of the pattern of sites along the southern margin of the Paquimé sphere.

The El Zurdo site (CH-159) was recorded by the project in the summer of 1990. It was immediately apparent that this site possessed a Medio period component, and was therefore recommended for further testing in 1991. The following summer, test excavations were placed in key locations at the site. The results of these tests are of interest here, and form the bulk of the analytical data for this thesis. The Chihuahua Archaeological Project is currently obtaining C^{14} dates from samples derived from El Zurdo in 1991. A dark burn zone was discovered in one of the arroyos which bisects the site in 1990. A sample taken from this zone dated to 1340± 80 B.P. This date proved especially significant, since it predated the Viejo Period at Paquimé. In the summer of 1991 an entire crew was devoted to excavations at El Zurdo. Many of the results of these excavations are discussed in this thesis.

The Chihuahua Archaeological Project is scheduled to complete its fieldwork in the summer of 1992. By that time, our understanding of the prehistory of the region should be greatly enriched.

4.2 The 1989 Regional Survey Of Paquimé

In the summer of 1989, two archaeologists, Paul Minnis (University of Oklahoma) and Michael Whalen (University of Tulsa) surveyed with small crews the area surrounding the site of Paquimé. The goal of this project was to explore the regional character of the Paquimé system through a reconnaissance survey. Small crews surveyed river drainages where "clusters" of sites were previously identified, mostly by Di Peso and the Joint Casas Grandes Project. The project recorded 87 sites in all, most within a 30 kilometer radius of Paquimé. As anticipated, the largest clusters of sites were located to the northwest of Paquimé, an area which leads directly to the Mimbres Valley of New Mexico. The project surveyed both systematically and opportunistically, the latter usually involving the use of informants. One of the findings of this project was that sites located within 30 kilometers of Paquimé exhibit a very different character than those further than 30 kilometers. Specifically, the investigators note that these differences are evident in macaw production, architecture, and artifact patterning. These differences, they argue, create a "core" of the Paquimé system. They suggest that further research be directed at understanding the development and nature of this core.

4.3 Other Current Research

The Chihuahua Archaeological Project and the Regional Survey of Paquimé are large-scale projects which are undertaking huge assignments which will make significant contributions to our understanding of the prehistory of the region. In addition, a number of smaller projects are making contributions to the growing body of knowledge. The regional office of I.N.A.H. in Chihuahua has received two new full-time archaeologists in the past two years. One of them is attempting to compile a complete site inventory for the state, while the other is surveying the eastern portion of the state, an area long neglected. In the Sierra Madre, a dendrochronologist, David Pearson, has been taking cores from timbers in various cliff dwellings and other archaeological sites in an attempt to develop a key for the region as well as provide an outline of paleoclimate. Other I.N.A.H. archaeologists are working to synthesize the various contributions into a coherent presentation of regional prehistory. The nineties promise to be an exciting decade for Chihuahua archaeology as more resources and critical thought are devoted to unravelling the complex picture of Chihuahuan prehistory.

CHAPTER 5: THE EL ZURDO SITE (CH-159) AND ITS CHRONOLOGY

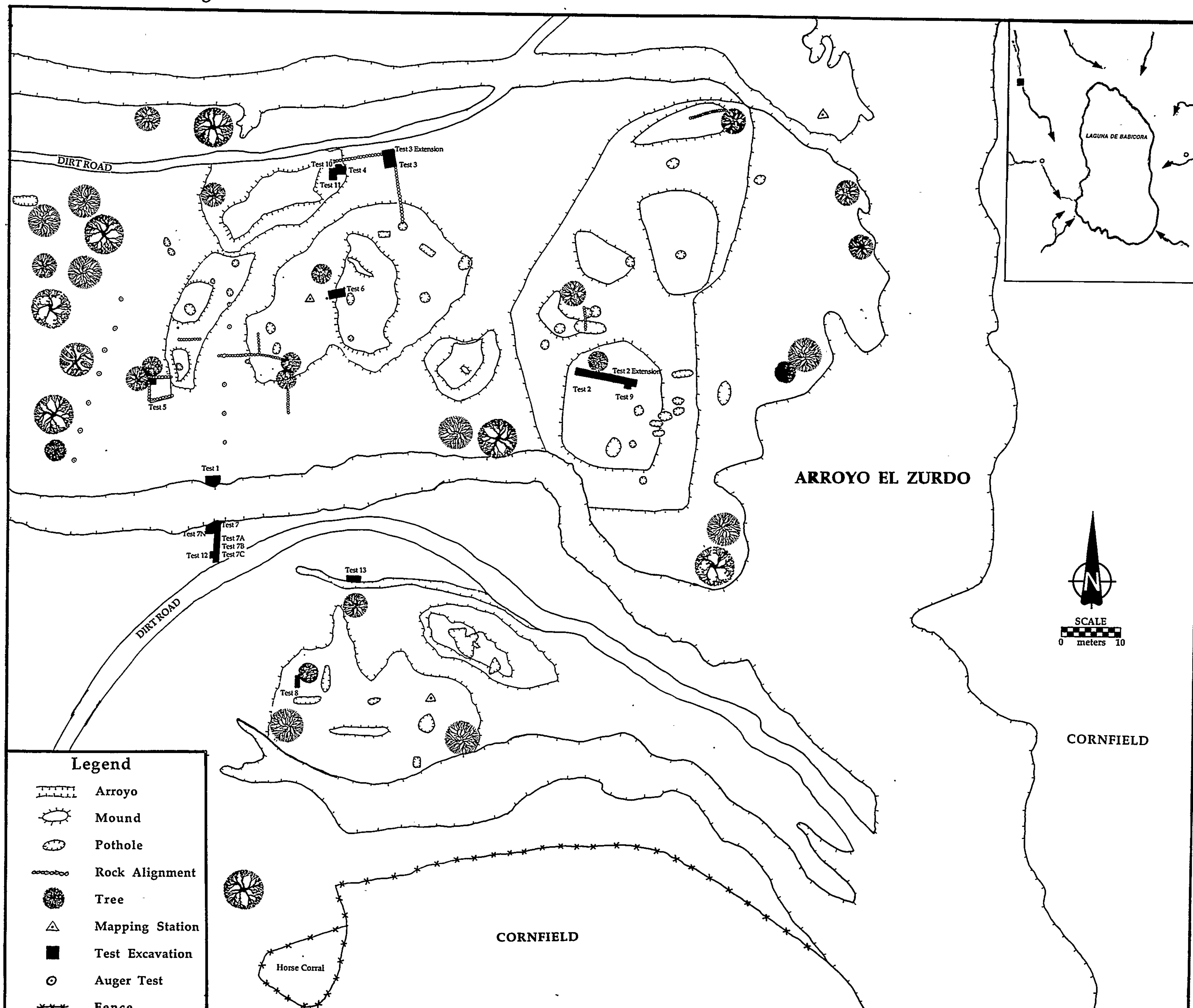
5.1 Introduction

The El Zurdo (CH-159) site was recorded during the summer of 1990 by members of the the Chihuahua Archaeological Project. The site is named after a large arroyo, El Zurdo, which forms the eastern margin of the site (please see Figure 5.1). Its size, location and surface assemblages are indicative of a site which possesses a Paquimé Medio Period component. The site was recommended for test excavation in the summer of 1991. The excavations of 1991 produced the expected Medio Period component which proved responsible for the surface expression of the site. This chapter attempts to document the nature of the Medio Period and previous site components.

Figure 5.1 shows that the site is cross-cut by several large arroyos, some of which have eroded the soil to expose the underlying bedrock. In a few areas, these large cut banks have exposed full profiles of the depth of occupation at the site. Resources were focussed on these areas in a attempt to define a sequence of occupation for the entire site.

El Zurdo has a special significance due to its unique location. Di Peso postulated that traders coming north from Mesoamerica or east from the coast would have passed directly by the El Zurdo region. In this region, trade goods, technologies and ideas may have passed through El Zurdo throughout its history. The relationship of sites such as El Zurdo to Paquimé is poorly understood. It is thought this relationship can be better understood through basic site data for the entire region. A site chronology of El Zurdo becomes critical if we are to develop a framework of prehistory for Northern Mexico which includes this mountain region.

Figure 5.1: The El Zurdo Site (CH-159)



5.1.1 Physiographic Setting

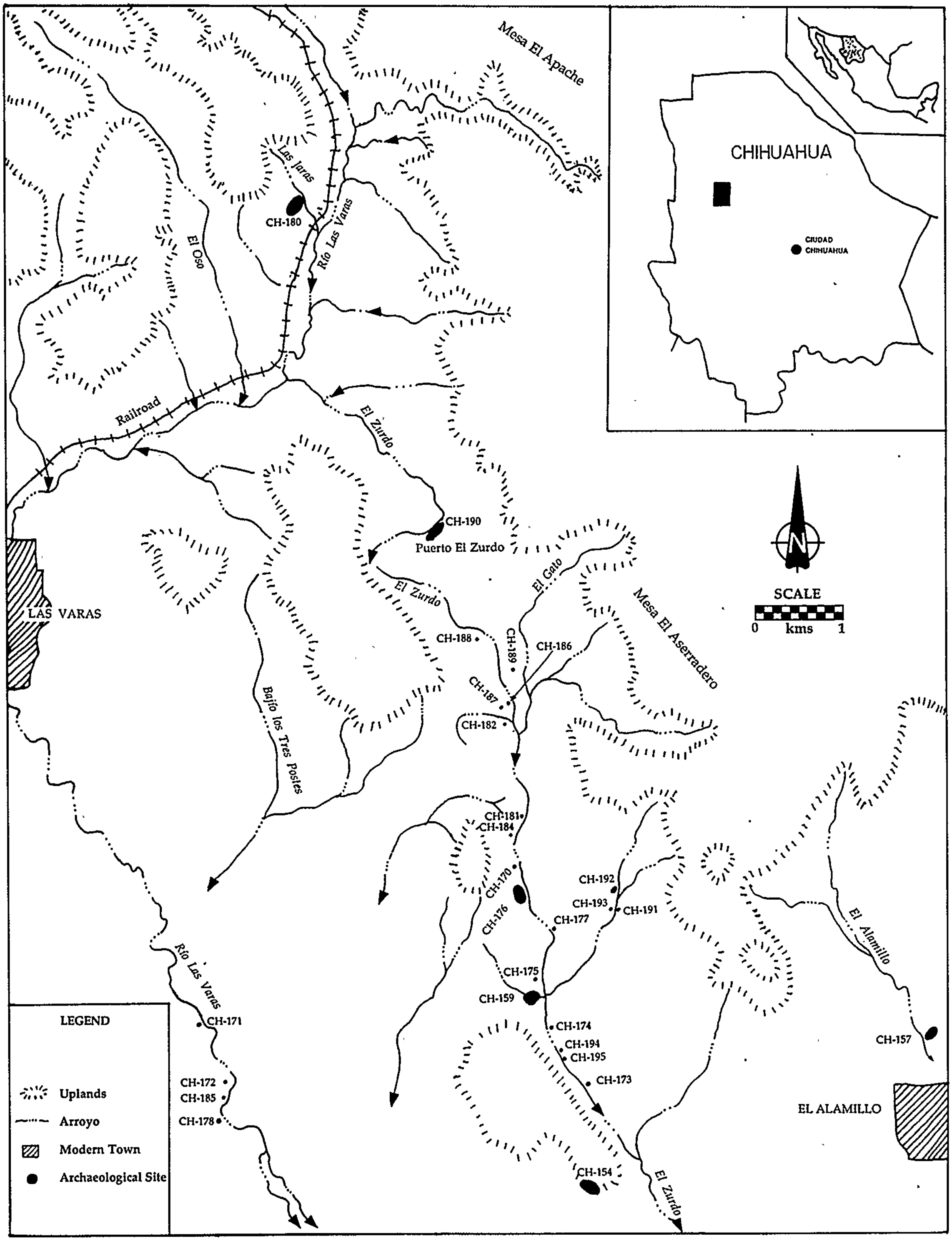
El Zurdo (Ch-159) is located in a high narrow valley, less than 30 kilometers east of the continental divide. The Arroyo El Zurdo drains into the Laguna de Babícora approximately 10 kilometers southeast of the site. The Arroyo El Zurdo joins the Río Las Varas 8 kilometers upstream from the site. The site is flanked by two low hills, the Cerro La Bandera to the north and Cerro La Manzanilla to the east (please see Figure 5.2). A small rise covered with pine trees obscures the view of the open basin, which lies less than three kilometers south of the site. The geographic coordinates of the site are: 29°26'25"N; 107°57'35"W at an altitude of 2200 meters A.S.L. A small spring is located 200 meters north of the site, in the arroyo El Zurdo. Numerous springs dot the arroyo and are a perennial source of water. As mentioned in Chapter 2, the area in the immediate vicinity of the site is used for both agricultural and ranching purposes. This places extreme stress on the small alpine pastures which surround the site, and contributes to the depletion of vegetation.

Torrential rains cause the arroyos near El Zurdo to fill quickly which contributes to widespread erosion. The running water cuts the arroyo banks, making them first deeper and then wider. Many of the local arroyos have been stripped of all their topsoil leaving only exposed bedrock.

5.1.2 Archaeological Sites along the El Zurdo Drainage

Ch-159 is one of thirty-two sites located by the Chihuahua Archaeological Project in the 1990 and 1991 field seasons in the El Zurdo region. Site types represented in the El Zurdo and surrounding drainages include lithic scatters, stone fieldhouses, pithouse-like structures, hilltop fortifications, and large

Figure 5.2: Archaeological Sites in the El Zurdo Area



mound sites (with an area > 2,500 m^2). Sketch maps and surface collections were made at all of these sites, with the exception of two sites which lay in plowed fields.

Due to the limited time and resources of the project, none of these sites could be test excavated and only three of them were augered. Auger tests revealed both ceramics and lithics; however, nothing diagnostic of temporal placement was recovered. In general, lithic scatters tended to be small concentrations of locally available green and black cherts. These scatters were usually located along the margins of the arroyos, near the source of the chert, which was found in the arroyo itself. A brief investigation of the lithic material revealed debitage suggestive of both primary and secondary core reduction. A formal analysis of all lithic material has not yet been conducted and thus the identification of specific activity areas or patterns of lithic variability are currently unavailable.

Small rectangular stone structures dubbed "fieldhouses" were located along the upslope borders of the hills which flank the Arroyo El Zurdo. These fieldhouses were depressed in the center, suggestive of semi-subterranean houses which collapsed. Unidentified burnt organic material (possible hearth fill) was recovered from one auger test, and charcoal was recovered from another test of a nearby fieldhouse. The composition of all the auger tests suggests a single component for each fieldhouse tested. The spatial patterning of the fieldhouses may be a product of survey strategy, as the eastern margin of the arroyo is difficult to survey. In addition, local farmers often toss stones onto the fieldhouses, since they lie in close proximity to their fields. This practice makes the houses seem more fortified than they actually may have been. The fact that the fields are so rocky that they must be cleared may help explain why the fieldhouses were made of stone and not something more temporary such as wood or brush.

Fieldhouses have been identified elsewhere in the Southwest as specialized structures built to allow farmers to stay in close proximity to their fields (Moore 1976:10). It has been suggested that these fieldhouses are the result of a complex interaction of cultural variables, such as the distance from village to farmlands, population expansion, and the need for refugia from large villages (Moore 1976:11-13). The position of the fieldhouses along the arroyo margins cannot be ignored. The need for temporary shelter while tending crops is but one functional explanation for these structures. However, it may be more important to recognize the relationship between these structures and the large sites in the region. Since few artifacts were gleaned from the fieldhouses, it is impossible at present to evaluate the nature of this relationship.

Hilltop sites are rare and do not possess the characteristic spiral rock alignments common to the Medio Period atalayas. In the El Zurdo region, the two hilltop sites recorded by the Chihuahua Archaeological Project are not located on hills which command full views of the surrounding region, a hallmark trait of atalayas. Although these are not atalayas in a strict sense, they do appear larger and more fortified than their fieldhouse relatives. They are both located on small knolls near secondary divides, no more than 100 meters above the surrounding small valleys. Their locations among heavily forested hills casts doubt on their function as lookout sites. Further investigation may be directed at their possible role as ceremonial places or other special purpose sites. The inability to assign a temporal placement of these structures is a major obstacle to further interpretation.

The final site type observed was that of the large mound sites. These sites are all located on the relatively flat margins of arroyos and permanent streams. Six of these sites, located along the Río Las Varas, were most likely the same as those recorded in by the Sayles (n.d.) and Carey (1931) surveys. The Chihuahua Archaeological Project found that relocation of these sites recorded by previous investigators was problematic due to poor locational descriptions and the extensive changes in the landscape in the intervening fifty years. Further, portions of the modern town of Las Varas have probably been built over these ruins. The large mound sites shared the following characteristics: polychrome ceramics, ground stone used for processing plant material, adobe architecture, and an areal extent of greater than 2,500 square meters. One of these sites, CH-180, is comparable in size, perhaps even larger, than El Zurdo. CH-180, like El Zurdo, has been extensively looted, and is completely obliterated in some areas. However, these two sites must be considered important neighbors, as only a small divide and an eight kilometer walk separate the two. CH-180 lies alongside one of the few passes which lead out of the Las Varas region toward the plains of Mata Ortiz and the site of Paquimé. Its intermediary location cannot be ignored and its shared Medio Period component implies this site must have been a member of the same regional system as El Zurdo.

The settlement patterning in the El Zurdo and adjacent drainages is difficult to assess with the small amount of information currently available. Given the long-term continuous occupation evident at El Zurdo, it is reasonable to assume that many of the nearby sites likely represent the same temporal span and may reflect regional expansion. Moreover, large mound sites are likely contemporaneous with the later component at El Zurdo. The fieldhouses are more problematic, as their absolute chronology is unknown. Carbon 14 analysis of material from these sites will help to secure their temporal placement. The fieldhouses may be the result of agricultural intensification and regional aggregation. For now, it is important to note their close proximity to both arable land and large sites.

5.1.3 Site Condition

The condition of site El Zurdo poses challenging problems for the interpretation of the data derived from excavations. Specifically, pothunting and other looting have left few undisturbed areas of the site. Portions of the site, especially the room blocks, have been extensively mined for antiquities. Plowing for agricultural purposes, cattle grazing, and erosion have destroyed entire areas of the site. Flash floods and human intervention have created arroyos through the site and have widened existing ones, such as the Arroyo El Zurdo. Bioturbation, most notably that of mice and rats, has also contributed to the deterioration of the site. All of these processes factor significantly into the interpretation of the site stratigraphy.

5.2 Excavation Strategies

A concentration of cultural debris was noted in one of the arroyos during the 1990 field season. Upon further examination, it appeared as though the arroyo bisected a midden. Multiple excavation strategies were utilized during the 1991 field season in order to target specific areas within the site as well as provide data for a basic site chronology. Since a marked difference exists in the condition of different areas of the site, each excavation unit was tailored to meet specific circumstances. The site was initially mapped using an

Electronic Distance Meter to produce a contour map of the area. The site contained so many potholes that only the very large ones could be mapped. From the contour map and surface examination, three areas of the site were defined and each area was subsequently tested. These areas were: the midden, the room blocks, and the "patio" area. Table 5.1 shows each excavation unit, its dimensions, and other relevant information. In addition, a looters hole (Test 2) was excavated in an attempt to define the extent of damage to the site, as well as identify areas which were favored by pothunters. Two other tests (Test 6 and Test 9) were excavated specifically to identify aspects of architecture.

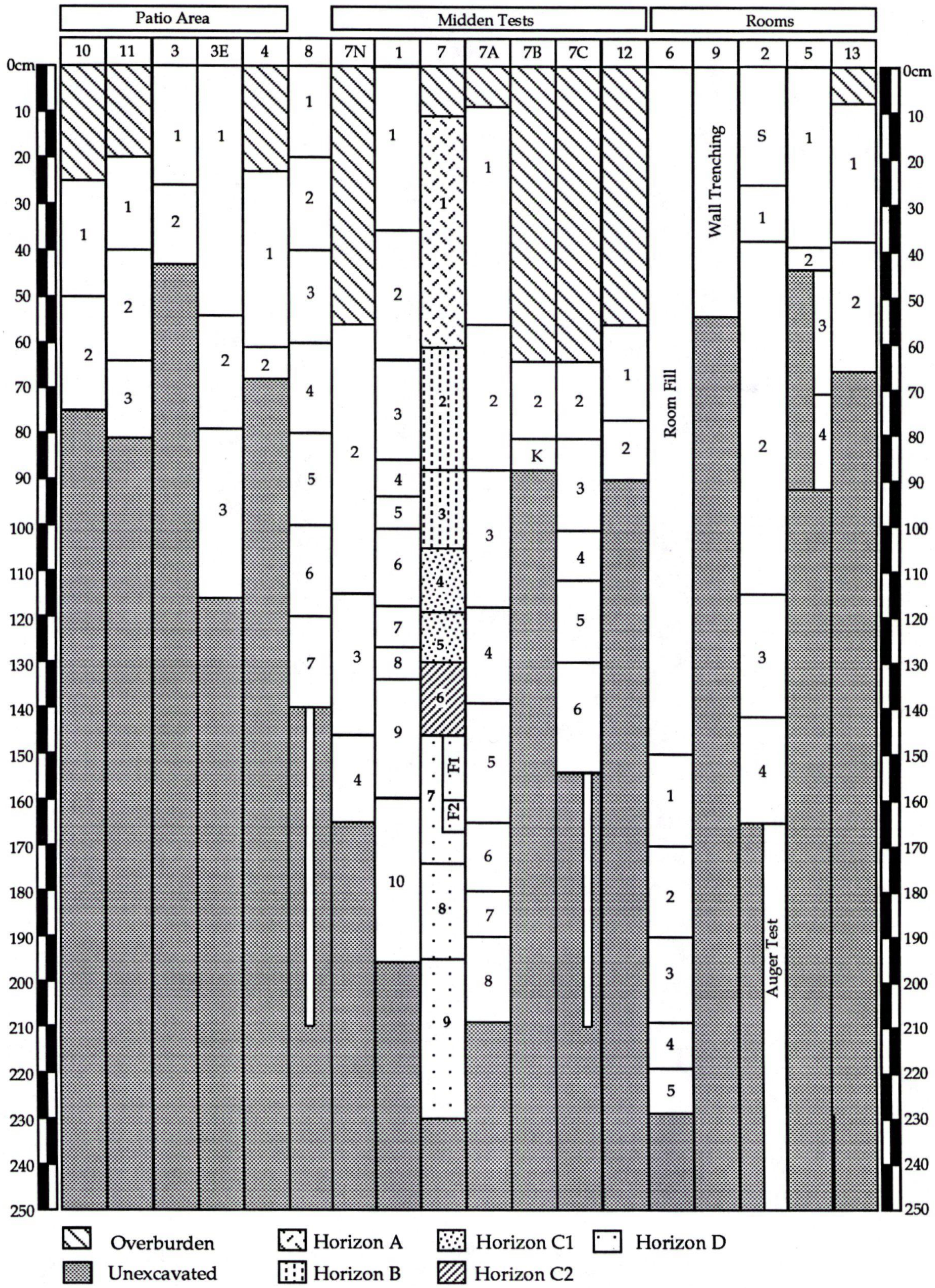
Each test was excavated by natural strata when possible. If natural strata were not verified, then arbitrary excavation levels were employed. Occasionally, a combination of both strategies was used, as was the case with the midden. In the event a feature was encountered, a new level was usually designated to make a clear association between the feature and the assemblage. In disturbed or looted areas, excavations levels are often disparate in size, owing to the problem of excavating a backfilled hole. All units were excavated to a sterile stratum, bedrock, or to the bottom of a feature (e.g. a floor). Augering was occasionally done to verify continued sterility and to locate the below surface level of bedrock. A total of eighteen units were excavated using these techniques during the 1991 field season. These units, broken down by excavation levels, are shown in Figure 5.3.

All excavation levels, except the overburden and test trenches, were screened using one-quarter-inch hardware mesh screen. Artifacts were bagged separately by artifact class and kept together by level number. Botanicals were wrapped and placed in plastic vials to prevent deterioration.

Table 5.1: El Zurdo Excavation Units

Unit	Dimensions	# of Levels	Max Depth (BD)	Excavation Strategy	Features/Associations
Test 1	2m X 2m	10	195cms	Arbitrary (20cms)	
Test 2	1.5m X 3m	4	165cms	Arbitrary (by fill)	Plaster floor
Test 2 (ext)	1m X 3m	2	110cms	Arbitrary (by fill)	Plaster floor; "J" -Adobe wall
Test 3	2m X 2m	2	42cms	Arbitrary (by feature)	"A"- Trash pit
Test 3 (ext)	1m X2m	3	116cms	Natural Levels	Sheet midden
Test 4	1m X 3m	2	64cms	Natural Levels	"B"- Slab-lined pit w/ cairn "G"-Adobe floor w/wall "H"-Rock-lined pit; possible fire pit
Test 5	2.5m X 2.5m with 1m X 1m subunit	4	110cms	Natural (by feature)	"C"-clay floor "D"-cap stones over burial "L"-double inhumation
Test 6	1.25m X 3m	6	230cms	Arbitrary (fill removed then by 20cms levels)	"E"-burial
Test 7	1m X 2m	9 + 2 (feature)	230cms	Natural	"F"- borrow pit
Test 7A	1m X 2m	8	209cms	Arbitrary (10cms/20cms)	
Test 7B	1m X 2m	2	84cms	Natural	"K"- Rock-lined fire pit/hearth
Test 7C	1m X 1.5m	6	154cms	Arbitrary (20cms)	"M"- Rock-lined pit feature associated with lower midden zone
Test 7N	2m X 1.7m	4	169cms	Natural Levels	"I"- Clay pit
Test 8	2m X 1m	7	144cms	Arbitrary (20cms)	
Test 9	1m X 1m	1	55cms	Arbitrary (to expose a wall feature)	"J"- adobe wall stub
Test 10	1m X 1m	2	76cms	Natural	"G"- Adobe floor/wall
Test 11	1m X 1m	3	81cms	Arbitrary	
Test 12	1m X 0.5m	2	93cms	Natural (by feature)	Rock-lined pit feature
Test 13	2.5m X 2m	2	65cms	Natural (by feature)	"N"-Room with wall, hearth, floor

Figure 5.3 Excavation Levels by Activity Areas



Charcoal and other carbonized remains were wrapped in aluminum foil and point provenienced. Flotation samples were taken from every excavation level, with the exception of the inhumations. In the case of inhumations, a unit of sufficient dimensions to capture the entire burial was excavated. In total, two individuals were exhumed from one unit. Both individuals were initially analyzed in the El Terrero laboratory. Samples from both individuals were removed for isotopic analysis. Occasionally, unit size and orientation were altered to avoid disturbing an inhumation. No artifacts were analyzed at the site and all were taken to the El Terrero laboratory for analysis. Time and personnel limitations prevented the excavation of large areas of the site. As a consequence, the assessment of horizontal relationships at the site is often problematic. The midden tests are generally deeper than those of the roomblocks and the priority on the midden area reflects the emphasis on defining the temporal depth of the midden itself.

5.3 Stratigraphy

Stratigraphic profiles were drawn after excavation for several units. It was hoped that the strata could be linked together by means of matching similar layers. In the case of the midden, it was not possible to cross-match the strata on different sides of the arroyo (i.e. Test 1 on the north side and Test 7, 7A, 7B, 7C, 7N, and 12 on the south side). Thus no single stratigraphic sequence emerged. The largest profile comes from Tests 7 and 7A whose strata appeared as follows:

> **Horizon A-** a single unit composed of gravel fluvial deposits and silt layers. Five discrete zones of angular gravels separated by fine silt were identified as representing flooding episodes.

Cultural materials were sparse in this horizon and were not collected during excavation.

Horizon B- a zone of cultural deposits which was dubbed the "upper midden zone" as it represented the first discrete cultural layer of the midden. Soils were dark gray, loosely compacted loams with gravels interspersed and a high organic content. This zone contains dense, undifferentiated trash deposits forming an extensive sheet midden. This horizon is associated with the later occupation of the site.

Horizon C- also a zone of cultural deposits known as the "lower midden zone." This zone is subdivided into two horizons **C_1** and **C_2**. There is a slight color and texture change between between these two horizons. C_1 is a brownish-gray compacted zone of sandy loam with some clay. A high density of undifferentiated cultural debris forms this stratum. C_2 is separated from C_1 by a sharp contact plane. This horizon is a tightly-compacted zone of light brownish-gray soil, with more clay than C_1. This horizon contains dense trash deposits much the same as C_1. Within C_2 there are six closely-spaced burned zones. These zones are composed of carbonized vegetal material and charcoal. The lowest of these burned zones rests on bedrock.

Horizon D- this is a stratum of sand and gravels interspersed with clays and decomposed rock. This zone is sterile and rests on bedrock.

As previously mentioned, bioturbation, pothunting, and fluvial activity have made a significant impact on the condition of these strata. A test trench was placed across the arroyo floor in an attempt to define corresponding strata between the midden tests on each side of the arroyo. However, the bedrock in the arroyo prevented the examination of this continuity. Thus the strata observed in the profile of Test 1 do not correspond directly with those of Test 7 and associated tests. Furthermore, there was no exact continuity between the midden strata and those observed in the profiles of the room block tests. Since no Munsell color charts were available, colors indicated in the previous descriptions are useful only for purposes of general comparison.

In general, the correlation of the various strata is problematic. No overall key to site stratigraphy has yet emerged. The midden tests reveal three major layers of cultural debris, the lower two of which appear as a continuous block. These three zones provide useful groupings from which a relative chronology may be proposed.

5.4 Relative Chronology of El Zurdo

The relative chronology of El Zurdo must ultimately be derived from a synthesis of the site stratigraphy and those cultural remains which are deemed valuable as indices of culture change. Since the ceramic assemblage constitutes the largest excavated assemblage at El Zurdo, it can be considered the appropriate assemblage with which to develop a relative chronology. The value of ceramic analysis as a key to chronology has long been known to archaeologists. Throughout the American Southwest, changes in ceramic assemblages over time have provided archaeologists with fine temporal control over the region. The chronology of the archaeological anchor of Northwest Mexico, the site of Paquimé, was first proposed through changes observed in its ceramic assemblages. However, unlike Paquimé, and many of the sites in the American Southwest, the El Zurdo sequence has not been C^{14} dated, with the exception of a single date from the lower midden zone. Also, due to limited testing, there exist no clear cultural horizons by which the ceramic assemblages may be analyzed. As a consequence, the chronology which will be proposed must be considered within the framework of the disturbed context of the site itself. The abovementioned factors with regard to the site stratigraphy must always be kept in mind. Further, multiple excavation strategies present unique problems for interpretation.

In its attempt to organize the large quantities of sherds from El Zurdo, the Chihuahua Archaeological Project utilized several different methods at different phases of analysis. These methods included a separate analysis for rim sherds and body sherds. However, this division did not occur until a later phase of analysis. The sample used in developing this chronology reflects this change. Inter-observer bias, difficult field conditions, and differential recovery rates for individual excavation units also contribute to the difficulties of interpretation.

5.4.1 Ceramic Seriation and Cross-dating

The ceramic analysis conducted for this thesis was a two-fold process. The first phase of analysis involved a preliminary analysis of sherds in the El Terrero lab headquarters. Since artifacts could not be removed from the country, the entire ceramic assemblage had to be processed during the field season, and this analysis was by necessity brief. Given the limited amount of time and an unknown culture area, the lab directors decided to make as descriptive an analysis as possible for each sherd or sherd group. The second phase, conducted at the University of Calgary, involved a statistical analysis of the descriptive data in an attempt to reveal patterning within the ceramic assemblage. It was thought such patterning would yield a means of cross-dating El Zurdo with other sites in the region and possibly with the site of Paquimé. The next two sections will describe the two phases of the ceramic analysis and discuss the results in light of the chronology of El Zurdo. A description of the ceramic analysis begins this process.

5.4.2 Ceramic Analysis: Phase One

In brief, phase one of the ceramic analysis generally proceeded as follows: (1) Sherds kept together by Lot number were separated into analytical categories on the basis of vessel part, i.e, rim, body or appendage. (2) The body sherds were then grouped into categories on the basis of finishing attributes (e.g. painting, texturing, etc.). This step involved taking sherds from the large group and breaking them into smaller groups which shared common attributes. For example, all sherds which possessed corrugations were set aside as one group. This process continued until the only plain or undecorated sherds were left. (3) A written description of each group, along with the number of members in the group, was made for each new group. (4) Each group was then weighed, and bagged separately. (5) Rim sherds were then analyzed and weighed individually. The information collected for the rims differed significantly from that of the body sherds and is summarized in Table 5.2 below.

Table 5.2: Description of Rim Sherd Variables

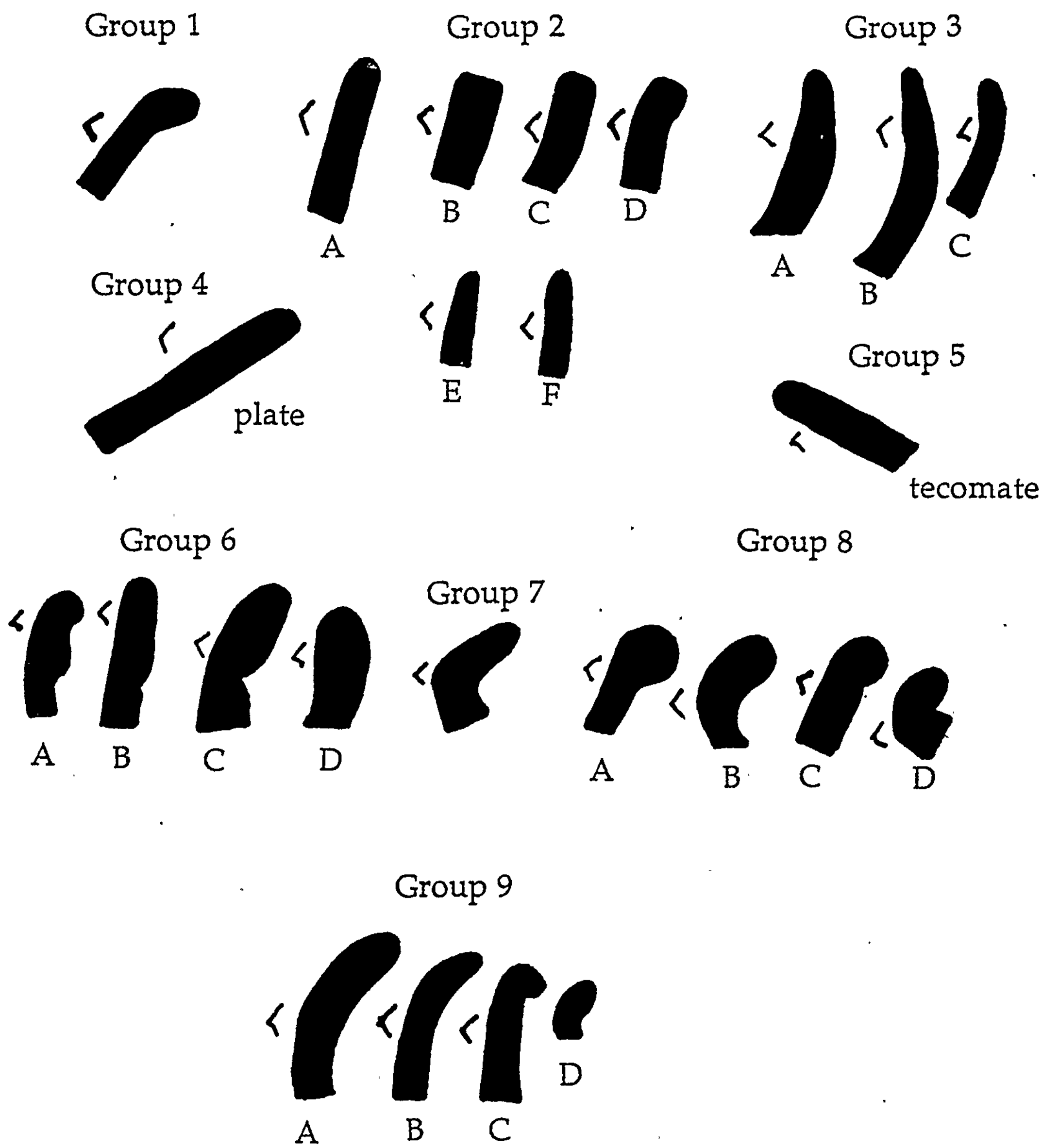
1. **Weight** - weight in grams of each sherd
2. **Kind/Type** - color and or broad category of sherd (e.g. polychrome or textured)
3. **Rim Height to <** - the height of the rim in millimeters to a point defined by "<". Please see Figure 5.4 for an example.
4. **Rim Profile** - each rim was profiled against a standard group of profiles devised by the lab directors. The closest match was then coded as the profile. Please see Figure 5.4 for profile groupings and codes.
5. **Fold** - presence or absence of a fold in the rim.
6. **Exterior Treatment** - this category was originally intended to describe specific texturing methods, but later evolved to broader categories such as rough and smooth.

Table 5.2 continued

7. **Exterior Finish** - this category is often the same as exterior treatment. However, it is used to describe specific finishing techniques, such as polishing.
8. **Exterior Color** - the dominant exterior color.
9. **Interior Treatment** - same as exterior treatment but for interior portion of rim.
10. **Interior Finish** - same as exterior finish but for interior.
11. **Interior Color** - same as exterior but for interior of rim.
12. **Lip Treatment** - specific finishing techniques, such as polishing or slipping which are observed on vessel lip.
13. **Rim Thickness** - thickness of the rim (in centimeters) at its widest point.
14. **Wall Thickness** - thickness of the vessel wall (in centimeters) at the base or thinnest portion of the rim.
15. **Estimated Rim Diameter** - a template was used to measure the orifice radius of each sherd. This figure was then used to estimate the percentage of the total vessel orifice present. This procedure is difficult to apply to very small rims and therefore is often missing.
16. **Exterior Wall Treatment** - this category was intended to identify differences between exterior rim treatments and wall treatments. However, its inconsistent application rendered a very small number of rims analyzed using this category.
17. **Paint** - this was intended to identify the paint colors and locations on the rim, but was not collected for all rims and is therefore of limited used.
18. **Comment** - any comments about the rim itself (often used to note anomalous rims or rims which could be reconstructed).

The rim categories often contain overlapping information, however, it is important to note at this juncture that the separate analyses for body and rim sherds were devised to reflect the different quality and quantity of information available for these sherd categories. (6) Finally, all rim sherds were bagged together and replaced along with the body sherds (which were separately bagged by type) in the original Lot bag.

Figure 5.4 Rim Groups and Profiles Used in the Ceramic Analysis



5.4.3 Ceramic Analysis: Phase Two

The second phase of ceramic analysis consisted of standardizing the collective written analysis into countable units of discrete variables. To accomplish this, repeated or common written descriptions were assigned code numbers for variables which were created to be mutually exclusive. The body sherds were especially problematic, as the information on the rim sherds was already recorded for the pre-defined variables mentioned in Table 5.2.

For the body sherds, four new variables were created based upon the range of variation observed. These are: *color, texture, treatment,* and *type*. *Color,* the first variable, was almost always recorded for each sherd group. *Texture,* the second variable, was recorded for all cases which contained some element of texturing. Texturing techniques were assigned arbitrary numbers. Combinations of techniques (e.g. corrugated, brushed & striated) were given their own code number, in order to keep the analysis as specific as possible. These specific cases could be merged with other cases later into more general groups. For example, the sherd with corrugation and incision can be assigned to three possible groups: corrugated, incised, or corrugated and incised. A total of thirty-five texturing techniques were encoded in the analysis. The third, variable, *treatment,* was coded for those attributes excluded by the textured category. The values for this variable closely mimic the *exterior finish* variable in the rim analysis. Included under *treatment* are finishing techniques such as slipping, polishing, burnishing, painting, etc. Like the variable *texture, treatment* contains combinations of traits, such as polishing on the exterior as well as interior. It is apparent that a case may be be coded for *texture* as well as *treatment*. While these are intended to be mutually exclusive categories, a small percentage of cases are coded for both variables.

These are assigned to either one category or the other for analytical purposes, and are given a new code number which reflects their membership in more than one variable class. Finally, the variable *type* was coded for each sherd. *Type* may reflect all, none, or a combination of the preceding variables. *Type* is based upon pottery "types" previously defined by Di Peso and others. An example will best illustrate how this category functions. Suppose we have a sherd which has red and black paint forming interlocking spirals on a tan or brown background. The red and black painted design of interlocking spirals is known to Di Peso and others as the pottery type "Babícora Polychrome". The example sherd belongs to this pottery type. It is therefore given a numeric code number for Babícora Polychrome. However, it is clear that the variable known as *type* is based upon a number of traits all of which have been coded for prior to the assignment into a type class. In the previous example, the Babícora Polychrome sherd would have also received a color code (i.e. polychrome) and a treatment code (i.e. red and black paint). Thus the variable *type* is a summary variable and is often useful as a means of summarizing and checking previously encoded information.

All data were originally entered into the Microsoft Works database for Apple Macintosh. The data were then imported into Microsoft Excel and saved as a comma separated value file (CSV). The CSV file was then sent via modem to an AIX mainframe computer. The file was then imported into SPSSx, version 4.0, for compilation of statistics. SPSSx programs were written to create individual records for each sherd. All cluster analyses in this thesis were conducted using SPSSx software. The final data file contained a total of 11,562 records, equal to the same number of sherds. After statistics were compiled, SPSSx outputs were downloaded by a modem to a Macintosh computer. These files could then be imported as text files into Microsoft Word. Within the Microsoft Word program, commas may be substituted globally for spaces contained in the original SPSSx output. This substitution allows the Microsoft Word file to be imported into a variety of statistical packages, such as Statview, or graphics packages, such as Cricket Graph. All graphs produced in this thesis were constructed using Cricket Graph software for the Macintosh. Occasionally, these graphs were exported as PICT files for use in MacDraw II drawing software. This software allows for more sophisticated manipulation of PICT images.

Once all the data sheets were encoded into a matrix, the preliminary analysis began. The matrix was split by unit number and subdivided by excavation level. The data were then randomly checked for coding errors. This was accomplished by taking the coded output, referring to the original data sheet and checking the coded information vis-a-vis the original information. The coded information successfully reflected the original information for almost every case (98% of all cases checked were deemed an appropriate match). Cases which did not match were corrected. This process also revealed coding errors, which were included in the tabulation of the accuracy rating of the encoding procedure. Once the matrix was corrected, statistical procedures were then utilized to identify sources of ceramic variability within the site and to correlate ceramic levels between different units.

5.4.3.1 Statistical Analysis of Ceramic Data

The first procedure utilized is known as crosstabulation. This procedure is useful as a tool to identify ceramic trends within a single level, unit, or throughout the entire site. Changes in the percentage composition of a certain texturing technique or a vessel treatment can be identified in this analysis. The matrix was split into excavation units and arranged by level. Each variable in the matrix was then crosstabulated by excavation level. The ideal result allows the analyst to see trends in ceramic production through time. The idea is to identify chronologically sensitive variables for use in further analyses. However, in this case, the specificity of ceramic attributes makes comparisons difficult. For example, there are 35 possible values for the variable texture. If we crosstabulate these variables with a unit which has ten different excavation levels, 350 crosstabulation cells result for the one unit. Comparison of multiple units at this level of specificity is impractical. A more practical solution is to limit the number of variables and values compared in the crosstabulation. This is accomplished by grouping pottery into conventional general classes and then identifying variables for further analysis. Normally in a statistical analysis identifying sources of variation within a data matrix is accomplished by univariate analysis. However, in this case the level of measurement is the lowest possible, namely, the nominal level. Nominal data have no absolute relationship between their values. In this matrix, the value assigned for corrugated, the number 5, could easily have been 10, or 20, etc. The number 5 merely serves as an identifier for the value corrugated. There is no inherent relationship between the values for the variable *texture*. Crosstabulations standardize these values as percentages. The new percentages are of the highest level of measurement, known as the ratio level. The relationship between the percentage composition of a value for *texture* are now expressed as ratios, with the value of zero being absolute. Thus crosstabulation accomplishes two things: one, it allows the analyst to see sources of variation within the data matrix and; two, it provides a means of standardizing the data as percentages, where more powerful statistical techniques may be applied.

Crosstabulations of all variables in the matrix were performed. For the aforementioned reasons, many of the original variables produced outputs too large for comparative purposes. However, variables with fewer values, such as *sherd type*, produce manageable outputs which allow for inter-unit comparisons. To reduce the number of variables used in later phases of analysis, broad general categories were created from the existing specific categories. These conventional categories are: plain, textured, red, black, and painted. Input programs were then written to assign individual cases to the appropriate category. Sherds that crossed multiple categories were classified on the basis of a dominant or salient attribute. For example, a sherd which was both blackened and textured would be assigned to the textured category, as texturing is considered the primary decorative technique. Although this method of classification eliminates one form of variation (i.e. blackening) it nonetheless represents a consistent way of splitting the few cases which do not fit very well into these major categories. At times, individual sherds were so difficult to classify, that they were designated as missing values. This represented a very small percentage of the entire assemblage.

Throughout this phase of analysis, rims and body sherds were grouped together, since both of these sherd types can be classified on the basis of general categories. Their combination strengthens the assemblage size and more accurately reflects the entire sherd population. Ultimately, these general groupings may be split into finer groupings in the future. At this phase, however, these broad categories provide the means of identifying sources of variation within the sherd population. This is especially useful, since multivariate statistical techniques cannot be applied to the data in its raw form.

Once each sherd is re-categorized, its ratio to the other sherds is then calculated and expressed as a percentage of all the sherds for that excavation level. Excavation levels with less than 25 total sherds were then eliminated from further analyses. This eliminates the problem of small numbers (n of sherds) greatly influencing the overall ratios. The value of this is apparent. With such small numbers of sherds, the analyst can only make limited statements about these levels.

5.4.3.2 Classification of the Ceramic Assemblage

Once units with very small numbers are eliminated, the next task involves grouping together levels with similar ratios of sherds. The grouping of cases which share similar characteristics can be accomplished through the use of a clustering procedure. Cluster analysis is a widely used statistical technique which groups like objects into mathematical groups or "clusters" based upon proximity measures of their values for certain variables. Clustering estimates the similarity or distance between two cases in the data. Cluster analysis has been used in archaeology to identify temporal sequences within ceramic assemblages (Johnson and Johnson 1975) and as a generalized tool for examining trends in archaeological data (see, e.g., Hodson *et al* 1966; Hodson 1969; 1970). In this case, cluster analysis will be used to create groups using the pottery categories of plain, textured, red, black, and painted. Since the values for these variables are expressed as percentages, there is no need to standardize the data, as all the variables use the same scale of 0 to 100 percent. They are ready to be clustered.

The clustering method used in this analysis is known as the *squared Euclidean distance* method. This method calculates the mathematical distance between two cases as the sum of squared differences between the values of the clustering variables (e.g. the percentages (values) for each variable of one level with those of another level). The resulting value, when expressed as a number, provides a measure of proximity between two cases. Once these values are created, they must be joined or "linked" into clusters. Several methods exist for linking clusters. The one used in this analysis is known as the single linkage or nearest neighbor method. This method links cases which have the smallest values of squared Euclidean distance between them. The distance between the linked cases of the new cluster is then computed for that cluster and the next case. This continues until all of the cases are grouped into clusters. It is important to understand that this is a hierarchical procedure. Once clusters are formed, they cannot be broken. However, initial cluster means are always based upon the average distance between one case and its closest neighbor. Thus at each step, the distance between clusters is the distance between their closest points.

To illustrate clustering, we can take two levels which have the following values for the five clustering variables:

	Plain	Textured	Red	Black	Painted
UNIT X, L1	51%	20%	3%	4%	22%
UNIT Y, L1	48%	18%	6%	2%	26%
	3^2(9)	**2^2(4)**	**3^2(9)**	**2^2(4)**	**4^2(16)**

Then add the numbers in parentheses 9 + 4 + 9 + 4 + 16 = 42

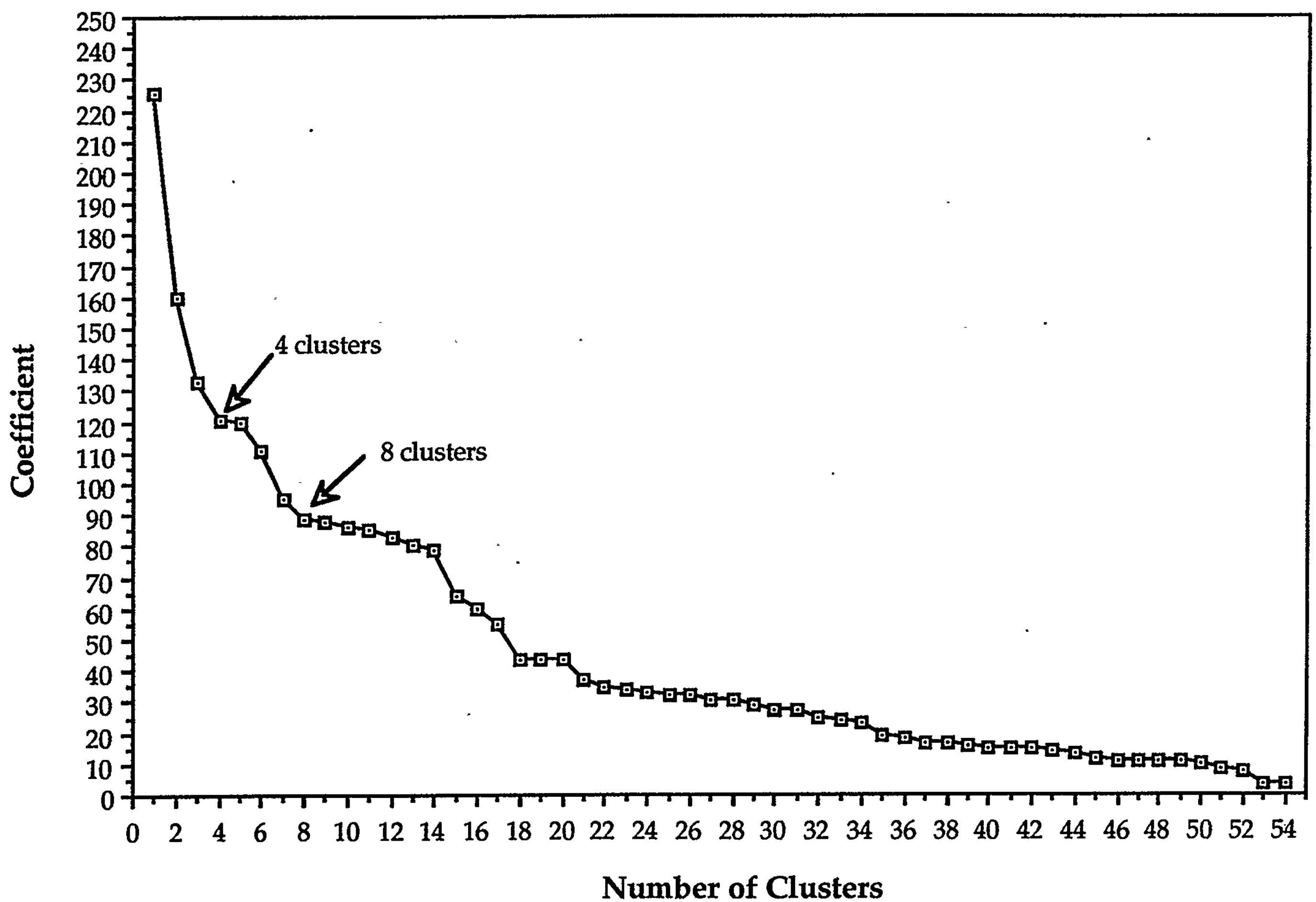
The number 42 represents the squared Euclidean distance between the two levels being compared. This number can then be compared with other pairings to achieve a measure of proximity. The number 42 is often called the clustering coefficient, because it provides the analyst a quick way of determining the strength between cluster linkages. One caveat must be mentioned at this stage. The differences between very dissimilar cases may still produce the same cluster coefficient. For example, the coefficient 42 may also be reproduced through a variety of combinations of values for each variable. This, however, is rare and each case must be examined in the final output to determine if such a error has occurred. Graphing the cluster values provides a way to illustrate the membership of each cluster. Normally, the coefficients may be ranked in order from lowest to highest. A large jump (or drop if going from highest to lowest) in the coefficient is often an indication that the optimal number (in a statistical sense) of clusters has been reached, however, the coefficient serves only as a guide to determining the optimal number of clusters. No absolute determinant exists in this context.

5.5 Results of Clustering Procedures

An examination of the cluster coefficients for El Zurdo reveals a steady increase in the value of the coefficient until it reaches 30 linkages, at which point the coefficient jumps very high. This indicates that many of the cases are unique in this assemblage. However, a specific number of clusters must be pre-assigned to any further procedure. The task then becomes limiting the number of clusters and identifying which cases belong to which cluster. Given the variety of ceramics observed at El Zurdo, we minimally have two groups or clusters of ceramics. What is required at this stage is a means of determining the optimal number of clusters which should be created. Although it is possible to have as many clusters as there are cases, we essentially return to the original problem if we do not limit the number of clusters apriori. The clustering coefficients provided a guide by which the number of clusters can be limited. The graph shown in Figure 5.5 provides a means of illustrating this process. As the number of clusters increases on the X-axis, the coefficient drops in value. In this case, two drops in the value are of use here. The first drop is from a three to four cluster solution. Since each case is being added to the previous one in a hierarchical procedure, then the optimal minimum number of clusters would be four. However, Figure 5.5 reveals several large jumps in the value of the coefficient, at 18, 8, and 4 respectively. It is important to realize that there is no best answer in a statistical sense. Rather, choosing an optimal number of clusters depends on a variety of assumptions. Again, the coefficient merely functions as a mathematical guide to determine the optimal number of clusters. In this case, an 18 cluster solution is too high to be of any practical use, as cluster membership would be small and many clusters would have only one member. An eight cluster solution is much more practical. It represents a good balance between the low coefficient 18 cluster solution and the high coefficient 4 cluster solution. Thus, an eight cluster solution will be used in the next step of the analysis.

As discussed previously, cluster centers are formed for each cluster and are expressed in this analysis as the means of all variables for the members of each cluster. Thus the cluster center does not represent any "real" excavation level, with the exception of clusters with only one member. In this instance, the anomalous case may be eliminated from further cluster analyses in an

Figure 5.5: Determining the Optimal Number of Clusters for All Excavation Units



attempt to create clusters whose members are more similar. In the El Zurdo assemblage, clustering procedures continued to create a unique cluster for the assemblage recovered from Test 13 when a high number of clusters was assigned (N=18). When this assemblage was forced into clusters with other assemblages, it was thought it would skew the cluster means. However, Figure 5.6 indicates that the removal of Test 13 does little to change the clustering coefficients or the optimal number of clusters. While Test 13 may be unique in some respects, the assemblage shares characteristics common to other units. Clustering represents one way to determine its closest relatives.

5.6 New Cluster Classifications

Figure 5.7 shows the cluster membership and percentage composition of all eight clusters. All eligible units are included in the clustering procedure. The eight clusters were then tested for significant differences between their variances using oneway analysis of variance (ANOVA) with post-hoc comparison tests for each of the five categories. Statistically significant differences between the categories of the clusters indicate significant changes in the variance for that category from one cluster to another. For example, in the eight cluster solution, the number of plain wares in Cluster 1 is significantly different from all the other clusters except Cluster 7. From this example, we see that changes from cluster to cluster in the number of plain wares, or any other category, can be be tested for their mathematical significance. The implications of this should be apparent. Observed changes in ceramic production may or may not be statistically significant. Analysis of variance provides an objective means to test the differences among clusters, especially when multiple categories make the changes difficult to investigate.

Figure 5.6: Determining the Optimal Number of Clusters Using Selected Units

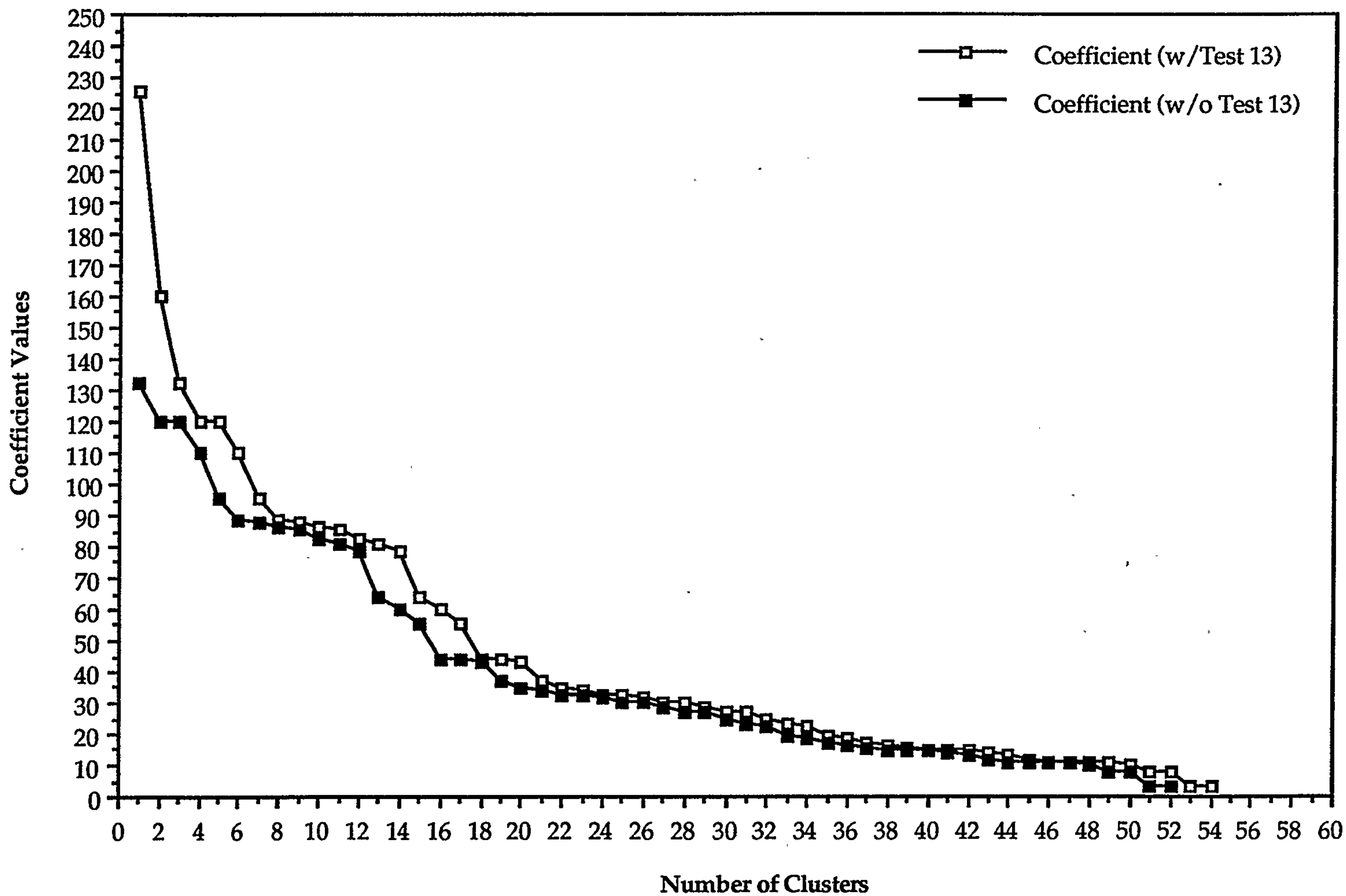
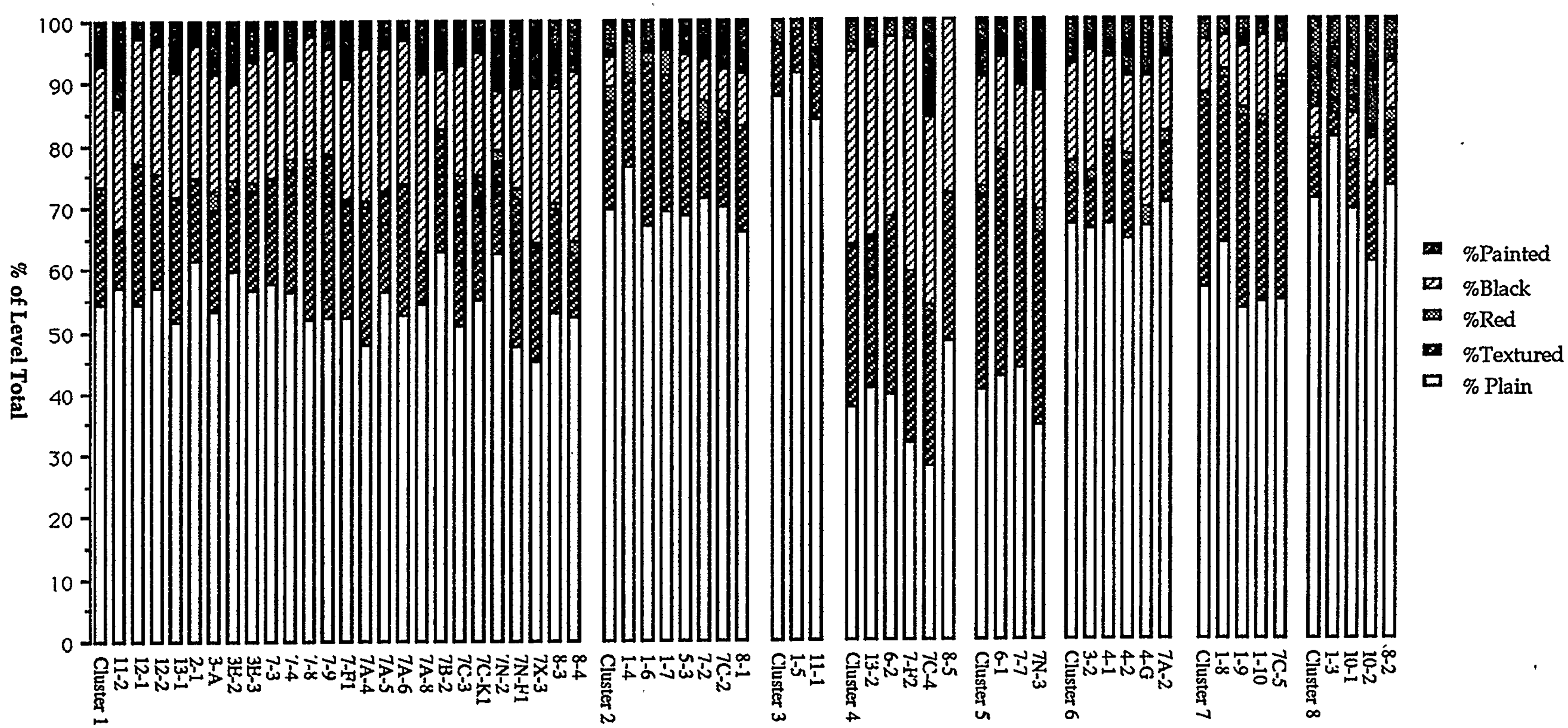


Figure 5.7: Cluster Membership and Percentage Composition of All Eight Clusters



All clusters except Cluster 3 were significantly different in a mathematical sense from all the other clusters. In the case of Cluster 3, the number of cluster members (N=2) was too small to produce significant changes. Post-hoc comparisons revealed a statistically significant difference between the variances for each category, with the exception of red wares. The result for red ware may be interpreted to mean that there is no significant change in the production of red wares over time or space. However, a more cautious interpretation would be to suggest that there is no significant change between *cluster* variances. This does not negate that there may be culturally significant changes in red ware production, rather, given this method of grouping (i.e. clustering) no change is observed. This result limits the effectiveness of red ware as a future category of analysis.

5.6.1 Temporal and Spatial Distribution of Ceramic Clusters

Upon closer examination of Figure 5.7 it is apparent that some clusters contain members with widely differing proveniences. Ultimately, the numerical groups must relate to the archaeology in order to have meaning. There are several means of reconciling the stratigraphic information with the ceramic groupings. One way is to examine the results of a clustering procedure on a cluster by cluster basis. This information, when interpreted in conjunction with information about the site stratigraphy, can help reveal patterns in ceramic production.

5.6.2 Cluster Profiles

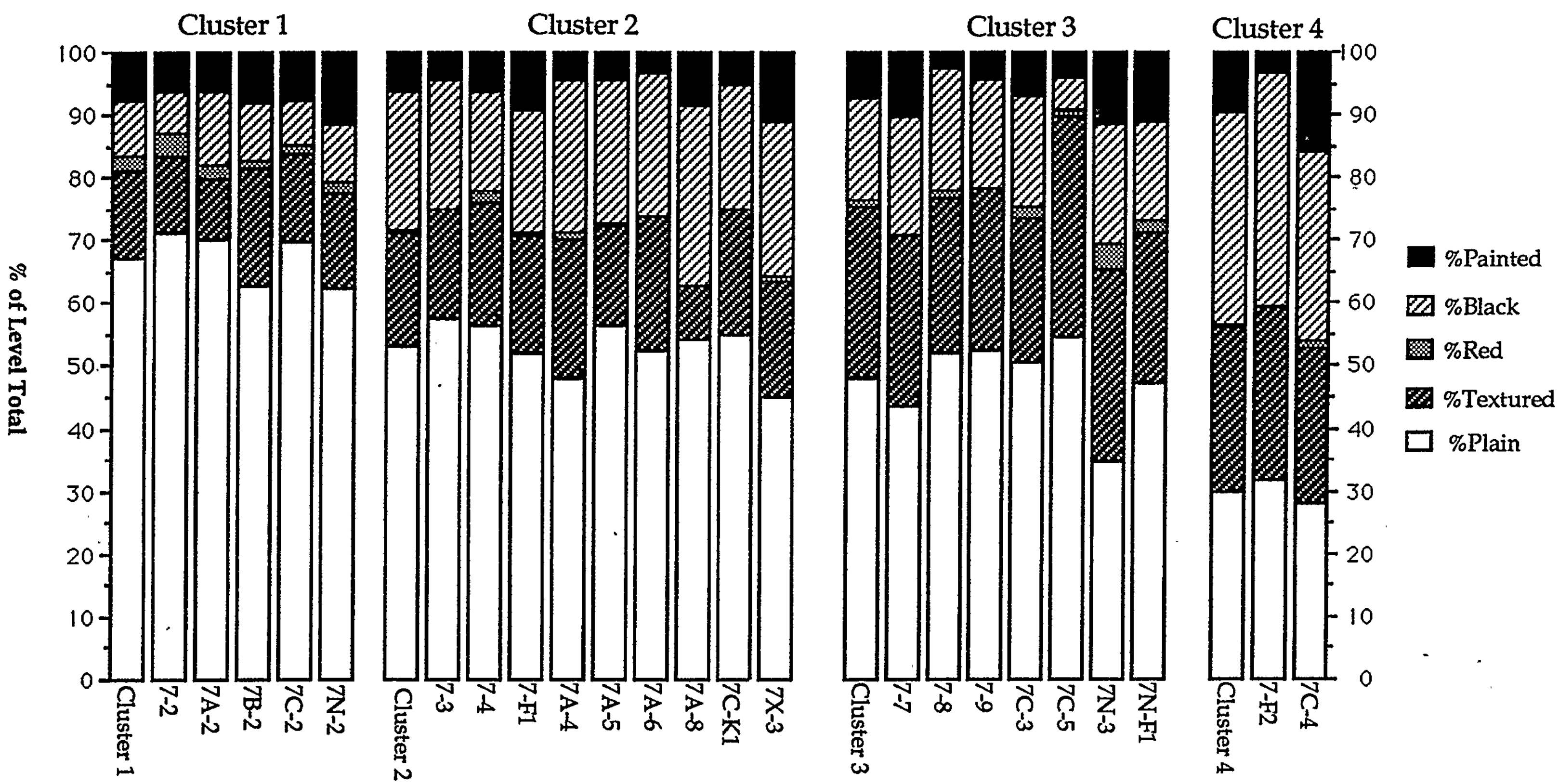
The majority of the members of Cluster 1 are levels of the midden, specifically Test 7 and its associated units (7A, 7B, 7C, and 12). Test 1, located in the midden directly across the arroyo, is conspicuously absent from this cluster. The southern portion of the midden (Test 7 and related units) was excavated by natural levels, using the natural stratigraphic units revealed in Test 1. In contrast, Test 1 was excavated by arbitrary 20 cm levels, as well as natural levels, possibly cross-cutting natural strata. Test 8 was the only unit which was excavated entirely by arbitrary levels. Thus Cluster 1 shows the differences between excavation strategies (i.e. arbitrary vs. natural levels) quite strongly. In addition, levels from Tests 3, and 13 are represented, suggesting a degree of shared similarity in the composition of their levels and the midden. However, in spatial terms these units are widely separated and appear to pertain to very different activity areas of the site. One way of checking this is to cluster the midden separately. This will be done at a later stage. An overall view of Cluster 1 suggests that the midden composition is different from that of the rooms and other activity areas of the site. However, the union of the midden and non-midden levels also suggests that the midden at least partially reflects the debris of other areas of the site. This, of course, is the expected result. The presence of Tests 11 and 12 strengthens their association with the midden itself. Test 11, however, is located near the north "patio" area while Test 12 lies within the midden. Again, these findings suggest at least some portion of the midden is a temporal correlate with the assemblages recovered from these tests.

The heterogeneity apparent in Cluster 1 suggests that cluster groupings are reflecting both spatial and temporal dimensions. Along the spatial dimension, different activity areas are revealed. The midden zone and the room blocks tend to appear in different clusters, although there are exceptions. It was initially hoped that the discrete zones within the midden would correlate with the corresponding room blocks which would dictate their temporal placement. However, the separate clustering of the room and midden areas may be the result of differences in use and discard patterns of ceramics at El Zurdo. Further, the sample from the room blocks is much smaller than the midden sample.

The division of levels into clusters found in Figure 5.7 represents only a preliminary step toward understanding the total ceramic assemblage. The spatial dimension of the problem is revealed through cluster analysis. However, the conflating of the spatial and temporal dimensions is so great that the two cannot be separated through visual examination. A new cluster analysis applied to the midden allows the temporal dimension to be elucidated without the inclusion of the spatial element. Cluster analysis applied to Test 7 and its associated tests reveals four new ceramic clusters (Test 12 is absent from this analysis as it was excavated as part of a feature). These new clusters, shown in Figure 5.8 suggest a steady increase in the production of plain wares through time. This change occurs concurrently with a slow but steady drop in the percentage of textured wares. Painted wares, in contrast, remain relatively constant through time. At this point, it was thought that the textured wares could be broken down into even finer divisions, which may be temporally sensitive. However, this analysis did not indicate any significant trends in the production of specific textured wares, such as changes in the production of corrugated wares through time.

Figure 5.8 also shows the anomalous cases, namely Test 7, Level F2 and Test 7C, Level 4. Both of these levels were dug as part of pit features, and are probably best associated with the features themselves. Without these two excavation levels, we have a steady change in three discrete clusters. This

Figure 5.8: Percentage Composition of Midden Clusters



change would appear to confirm the three zone midden idea suggested by the site stratigraphy.

The relatively homogeneous cluster in the upper midden zone strata most likely represents the trash deposits from the Medio Period. The next step is to compare the midden assemblage of Cluster 1 with its original cluster membership with all the excavation levels of the site. One assumption which must be articulated is that the trash in the midden in some way mirrors that found in the room tests. However, the eight cluster solution suggests only a partial correlation exists between these two activity areas. If this is the case then the members of midden Cluster 1 can then be contrasted with their original cluster membership. The associated levels in the original cluster most likely belong to the Medio Period. When this relationship is examined, we see that Cluster 2 of the original cluster procedure contains the excavation levels 7C-2 and 7-2. The associated levels include the first midden zone of Test 1 (levels 4, 6, and 7) and the uppermost level of Test 8. The other cluster in original clustering procedure which contains a member of the upper midden zone is Cluster 6. This cluster contains the lowest levels of Test 4 and Test 3. These latter tests are located in the north "patio" area, a hardened living surface which lay within the confines of a stone wall. The association of these tests with the Medio Period is strengthened by the inclusion of the upper midden zone of Test 1 in this cluster.

A ceramic profile of the Medio Period begins to emerge out of the cluster classifications. If Cluster 2 and Cluster 6 are merged together into one Medio Period grouping, then a profile of the Medio Period assemblage appears. Specifically, the Medio Period ceramic assemblage shows a high percentage of plain wares (μ=68.5%), followed by textured (μ=13.5%), black wares (μ=9.5%), painted wares(μ=6.2%), and finally red wares (μ=2.1%). This profile is surprising. A very high frequency of painted wares was expected, but not observed. The high percentage of plain wares could be the result of an increased demand for more utilitarian wares. An increase in the population due to regional aggregation is one plausible source of this demand. Further, one of the whole vessels recovered from the burial (Feature L) is a plain vessel, suggestive of a dual significance for plain wares during the Medio Period. The high percentage of plain wares has a strong correspondence to the site of Paquimé, where plain wares composed 54.1% of the entire Medio Period assemblage and 63.3% of the Buena Fé Phase pottery (Rinaldo 1974:108). Contrast this with the Viejo Period assemblage where plain wares form a much lower percentage of the total (48.4%). In addition, early Viejo Period ceramics show a greater preference for texturing than later Viejo Period ceramics (Rinaldo 1974:39). An increase in plain wares occurred concurrently with a decline in textured wares throughout the latter phases of the Viejo Period (Di Peso *et al* 1974:528)

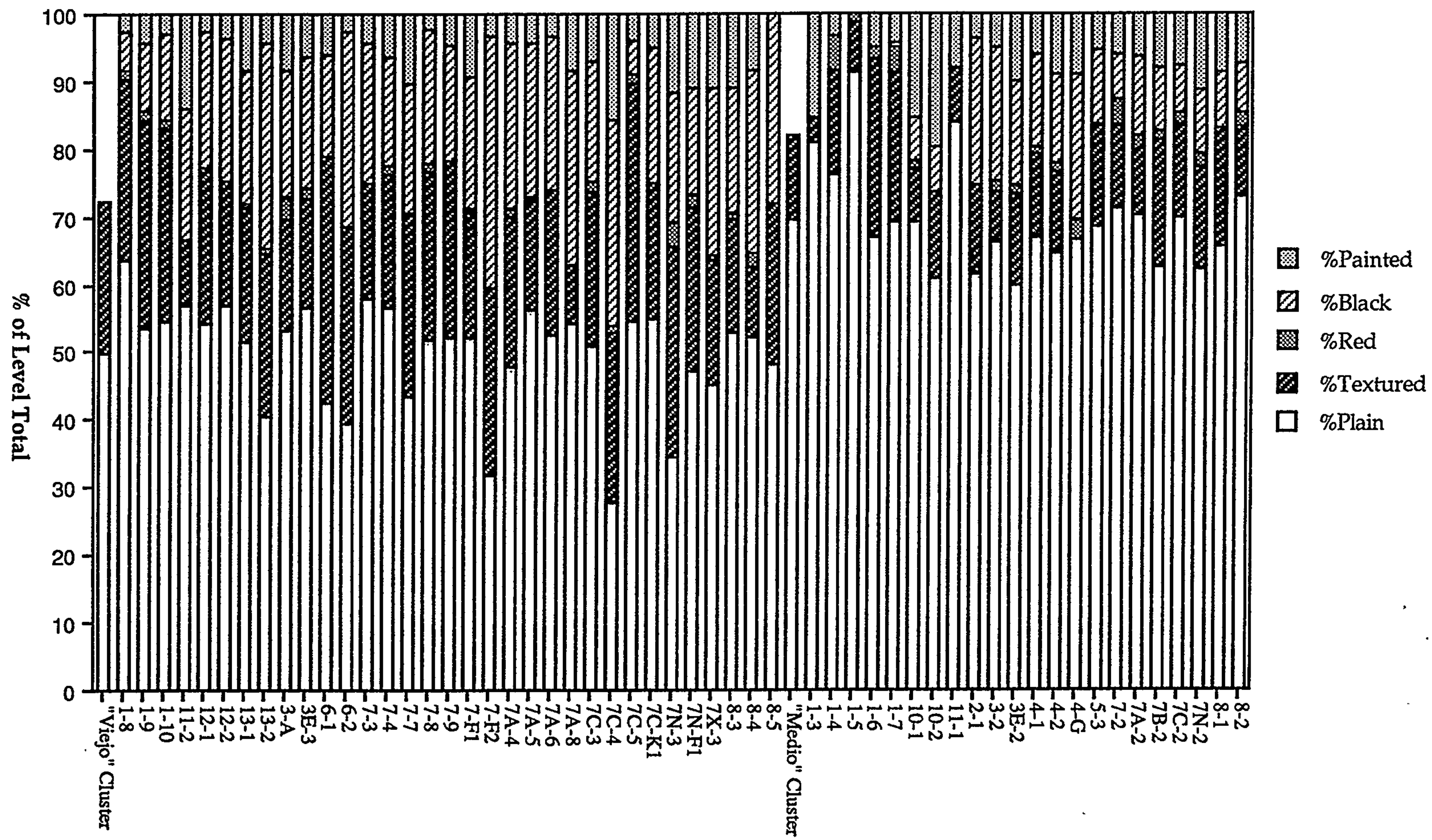
Large-scale production of painted wares during the Medio Period at El Zurdo is not indicated by this analysis. One possibility for lowered production of painted wares is that they were produced almost exclusively for export during the Medio Period. The low frequency of painted wares in both the midden and the room blocks tested cannot be ignored. However, the overall percentage of painted wares at Paquimé was less than 18%; 11.8% of these were Ramos Polychrome, a pottery type almost non-existent at El Zurdo. If we subtract the Ramos percentage from the total painted percentage, we are left with 6.2% painted wares. This figure is, coincidentally, the same as the percentage of painted wares in the El Zurdo Medio Period assemblage.

Di Peso focussed his interpretations on the trade wares and exotic painted wares present at the site of Paquimé. However, the general trends in ceramic production at Paquimé and sites in the Casas Grandes Valley are available from Di Peso's work. A summary of these trends shows a remarkable similarity to the overall picture emerging at El Zurdo.

If the relative percentage of plain wares and textured wares is compared for the Viejo and Medio Periods in the Casas Grandes region, a significant change is observed in the relative frequencies of each category. Plain wares increase from the Viejo to the Medio period, while textured wares decline. It is possible to examine this trend at El Zurdo through a simplified two cluster solution using the variables *plain* and *textured*. The results of this procedure, shown in Figure 5.9, indicate a dramatic increase in the number of plain wares from the first to the second cluster coupled with a decline in the frequency of textured wares. These differences are significant ($p < .05$) in a statistical sense.

The results of this procedure suggest that a two cluster, two variable solution is useful for identifying broad trends in ceramic production. The original eight cluster solution is perhaps best for revealing both the spatial and temporal dimensions of the problem. However if we concentrate solely on the temporal dimension, two major groups emerge. In order to check the validity of these groups, ceramic assemblages from other sites in the Santa María and Casas Grandes Valleys were compared with the El Zurdo assemblage. The Río Santa María assemblage comes from two sites excavated by the Chihuahua Archaeological Project, CH-11 and CH-151. In brief, both of these sites appear to be single component large mound sites which possess Medio Period assemblages. The ceramics recovered from test excavation were

Figure 5.9: El Zurdo Assemblage Using a Two Cluster - Two Variable Solution



recorded in the same manner previously described. The Casas Grandes assemblages come from three sites in the Río Casas Grandes Valley: the Convento Site, the Reyes Site, and Paquimé. Both the Convento and Reyes sites have large Viejo components followed by a Medio component. Only the Medio Period assemblage was used for the site of Paquimé. Percentages were computed for these sites using tables available in Volume 6 of Di Peso, 1974. These sites were then entered along with the Santa María sites and El Zurdo. A two cluster solution was used to split these sites and individual excavation levels into two groups.

The results of this new clustering procedure assign all of the Santa María assemblages to the first or "Medio" cluster, as shown in Figure 5.10. As anticipated, the site of Paquimé was a member of this cluster. The El Zurdo members of this cluster remained the same. The Viejo Period component of the Convento and Reyes sites fell within the second or "Viejo" cluster, as shown in Figure 5.11. All of the original members of this cluster from El Zurdo remained. Thus, on the basis of the relative percentage of plain and textured wares, a means of temporal assignment emerges. ANOVA with post-hoc comparison tests revealed significant differences between these two clusters for both plain and textured wares. The members of each cluster can then be considered as belonging to either the Viejo or Medio Period respectively.

The new groupings have important implications for El Zurdo. The inclusion of the upper levels of the patio area, the room blocks, the double burial, and the upper midden zone within the Medio cluster identify this component as Medio Period. Similarly, the inclusion of the lower levels of Test 1, Test 7 and associated tests, as well as Test 13, suggest these levels belong

Figure 5.10: The Medio Period Cluster

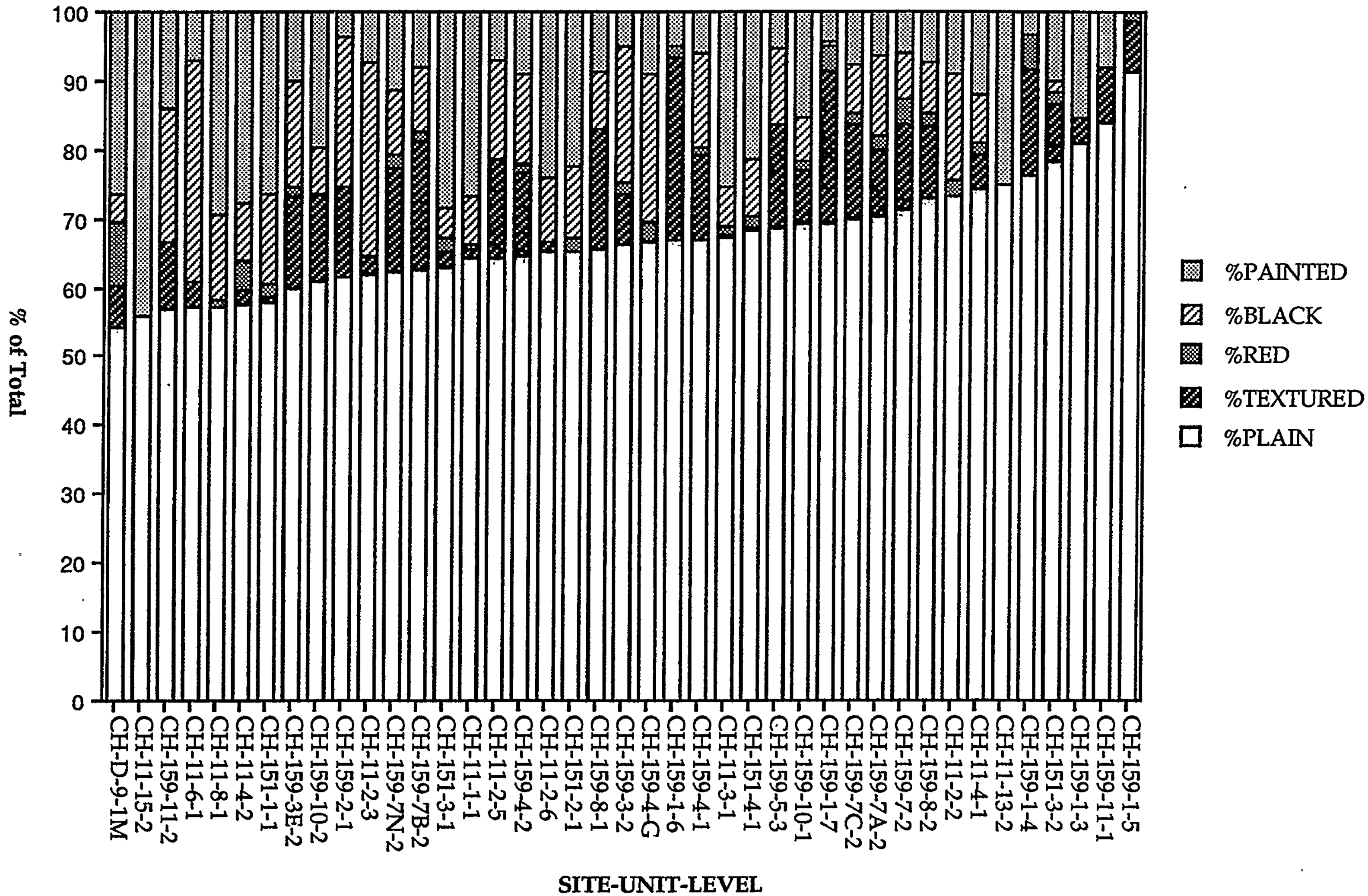
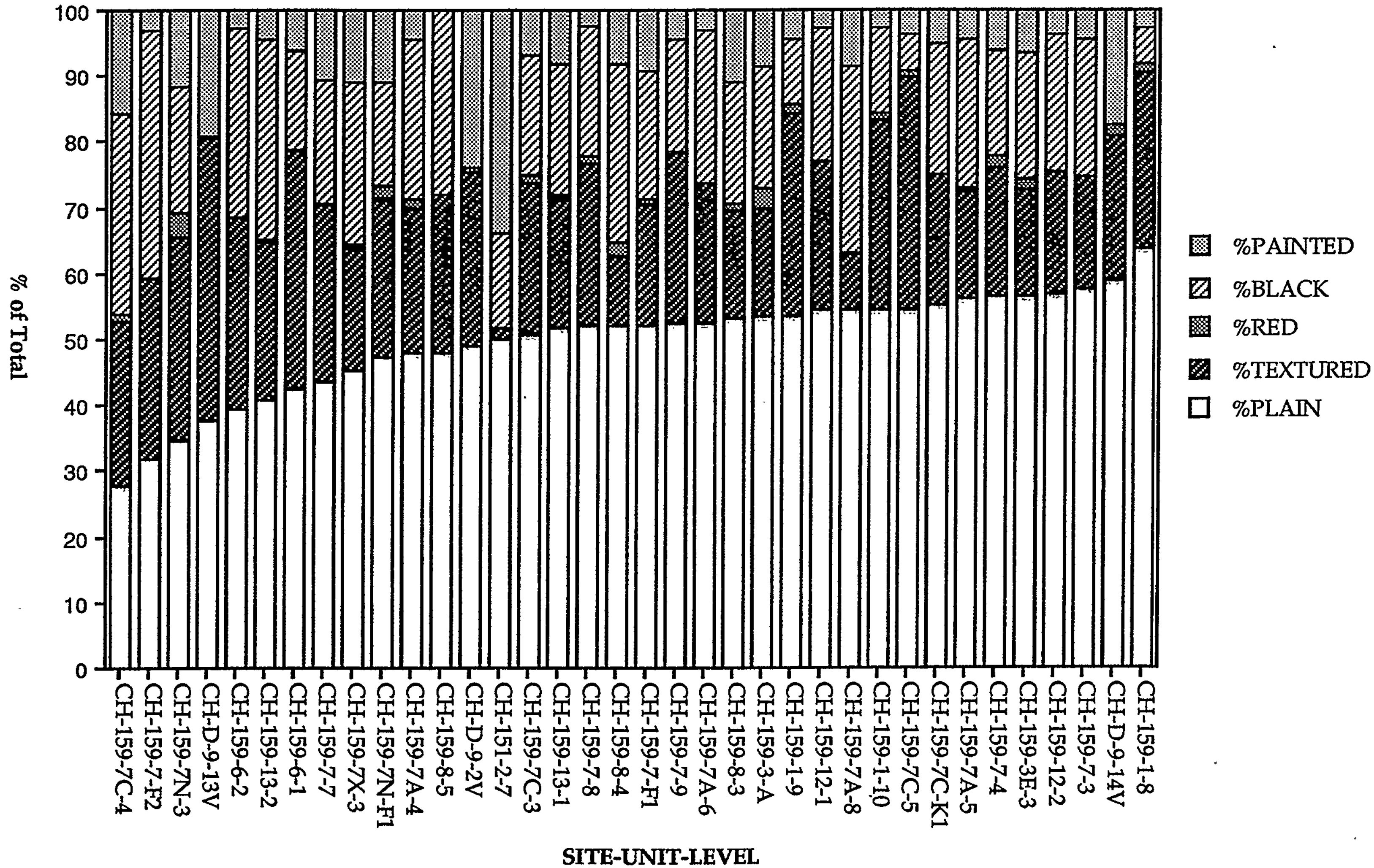


Figure 5.11: The Viejo Period Cluster



to the Viejo component. It would appear that the Medio Period component of the site was built over a previous Viejo Period village. Although the nature of the Viejo Period component is still sketchy, the rock-lined pit features located in Tests 3E, 7B, 7C, and 12, are clearly associated with the Viejo Period. Based upon its associations, the partially-mummified burial in Test 6 is would appear to date to the Viejo Period. This association will be discussed in greater detail in the section on burials.

The Viejo and Medio Period clusters are also significantly different with regard to black and painted wares ($p<.05$). The higher frequency of painted wares during the Medio Period is the expected result, and is consistent with all other Medio Period assemblages. However, black wares decline in frequency during the Medio Period at El Zurdo, a trend opposite of that observed at Paquimé. One black ware, Ramos Black, proliferates during the Medio Period at Paquimé, but is virtually nonexistent in the Viejo Period at either the Convento or Reyes sites. These results might suggest that the production of black wares began early in the Babícora region and spread northward to the Casas Grandes Valley by the Medio Period. The pottery type *Ramos Black* described by Di Peso (1974:160) bears a striking resemblance to the polished black ware recovered from El Zurdo. Occasionally, a textured variant of this pottery type was observed at Paquimé, as well as at El Zurdo. Di Peso (1974:161) speculates this type may have been adopted from the Nayarit region, along the west coast of Mexico.

Another possible explanation for the abundance of black wares involves an analytical decision made in the field. It was often difficult to distinguish sherds which were intentionally blackened versus those which were accidentally blackened during firing. Furthermore, variation in color over the total vessel often resulted in assigning sherds of one vessel to different categories. For example, one vessel which was reconstructed after it was classified was initially placed in two separate categories, black and plain. Upon reconstruction of the vessel, it was observed that the blackening was a result of reduction on one portion of the vessel during firing. Unintentional blackening and partial blackening may often be confused with intentional blackening, resulting in a higher frequency of sherds assigned to the black ware group. Thus, it is difficult to distinguish blackening as a design decision versus blackening from other sources in this analysis.

Finally, it may be suggested that black wares diffused out of the El Zurdo region into the Casas Grandes Valley. The precipitous decline in the production of black wares at El Zurdo coupled with their rise in production at Paquimé merits further investigation. The high frequency of black wares during the Viejo Period appears localized to the Babícora region, as black wares do not constitute a large proportion of any other assemblage studied.

In sum, a relative chronology of the El Zurdo region can be developed based upon changes in the frequencies of plain and textured wares. The rise in frequency of plain wares coupled with the decline in texturing as a decorative technique creates two distinct ceramic groups at El Zurdo. Clustering procedure provides a quantitative means of assigning individual excavation levels to their appropriate group. Inclusion of assemblages of known age and provenience provides a means of substantiating new cluster classifications and dictates their temporal assignment. The clear division of the El Zurdo ceramic assemblage into two groups suggests two broad periods of site occupation. The first of these occupations is called the Viejo Period, following Di Peso's terminology. The second of these occupations, the Medio

Period, is of particular interest to archaeologists. The ability to assign temporal placement to individual excavation levels and features provides a means of assessing the local development of the Medio Period outside of the site of Paquimé. Clustering of the entire ceramic assemblage from El Zurdo suggested spatial and temporal differences within the site. The remaining assemblages may now be discussed in light of these divisions.

5.7 Cultural Remains

The ceramic analysis provides a foundation for interpreting the other cultural remains at El Zurdo, as well as means of giving a temporal assignment to the other cultural remains. The following sections are a discussion and interpretation of the other assemblages based upon their ceramic associations and/or their general provenience within the site. The artifact classes described below represent broad categories and should not be taken as an exhaustive list of all artifact classes found at El Zurdo.

5.7.1 Lithics

The lithics recovered from El Zurdo remain largely unanalyzed, as the classification of ceramics has taken precedence over the lithic analysis. However, a formal analysis of the projectile points was conducted in the El Terrero field laboratory. The analytic procedures used to describe lithics were as follows: (1) all points were catalogued and their condition recorded; (2) the morphological attributes of each point were encoded; (3) a series of metric variables was measured and recorded for each point. However, the small sample size precluded the application of multivariate statistics to these data.

All of the projectile points recovered from El Zurdo were arrowheads. These arrowheads fell into three main groups based upon notch location and style: basal notched (8.7%), corner notched (34.8%) and side notched (56.5%). These styles, shown in Figure 5.12, were found at various proveniences in the site, many of them on the surface. Due to the small number of points found, few relationships can be inferred from this analysis. The points were of two major lengths, one group with a mean length of 18 mm and another group with a mean length of 30 mm. Other dependent variables such as weight and thickness, were highly correlated with changes in overall length. Source material, as shown in Figure 5.13, is overwhelmingly chert of three colors: pink (2.9%), black (2.9%), and gray (88.6%). All chert is locally available, nodular chert, found widely scattered in the arroyo El Zurdo and adjacent arroyos. Obsidian, possibly imported, accounts for 5.7% (N=2) of all source materials.

Without temporal correlates or a firm projectile point typology, very little can be said about lithic technologies at this point. The projectile point sizes and shaped are consistent with points found at Paquimé, but the small number of points (N=37) suggests the arrowheads were not routinely used at El Zurdo and must have been carried elsewhere. The small number of points found on the surface and upper levels may also indicate a decreased reliance on hunting during the Medio Period, or it may indicate the effects of looting. The fact that all of the larger arrowheads were found on the surface may be the result of collecting bias and site disturbance by the numerous disruptive activities that occur.

Figure 5.12: Frequencies of Notch Types at El Zurdo

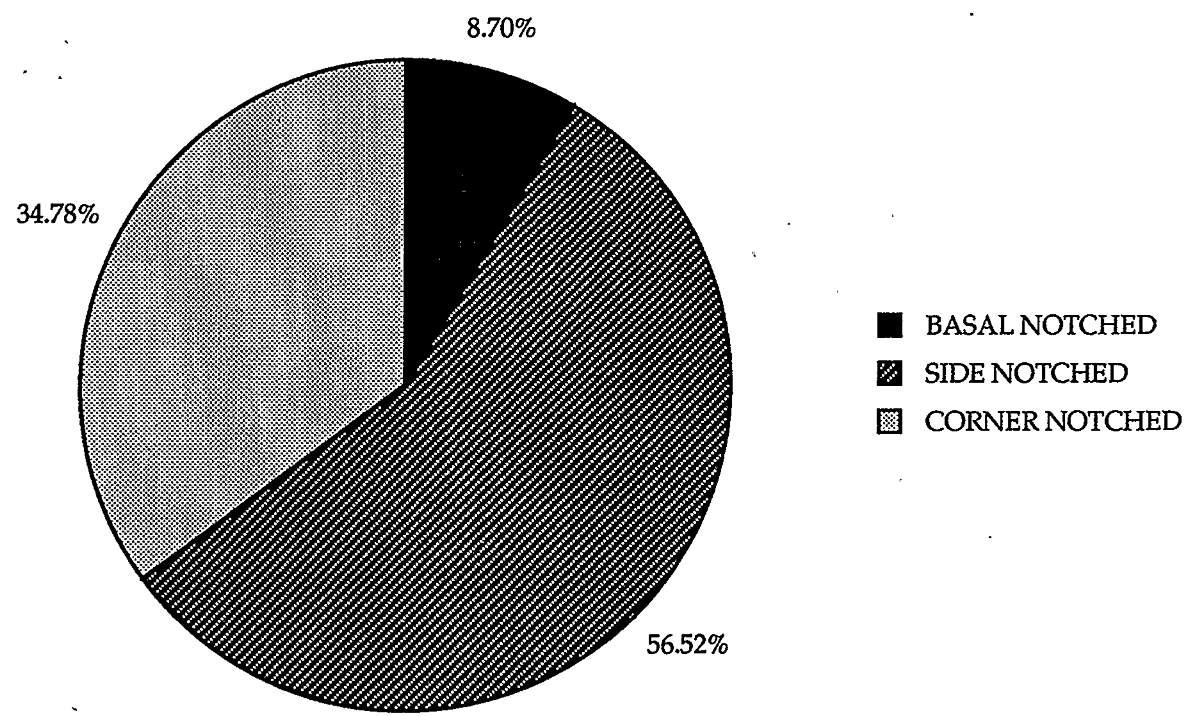
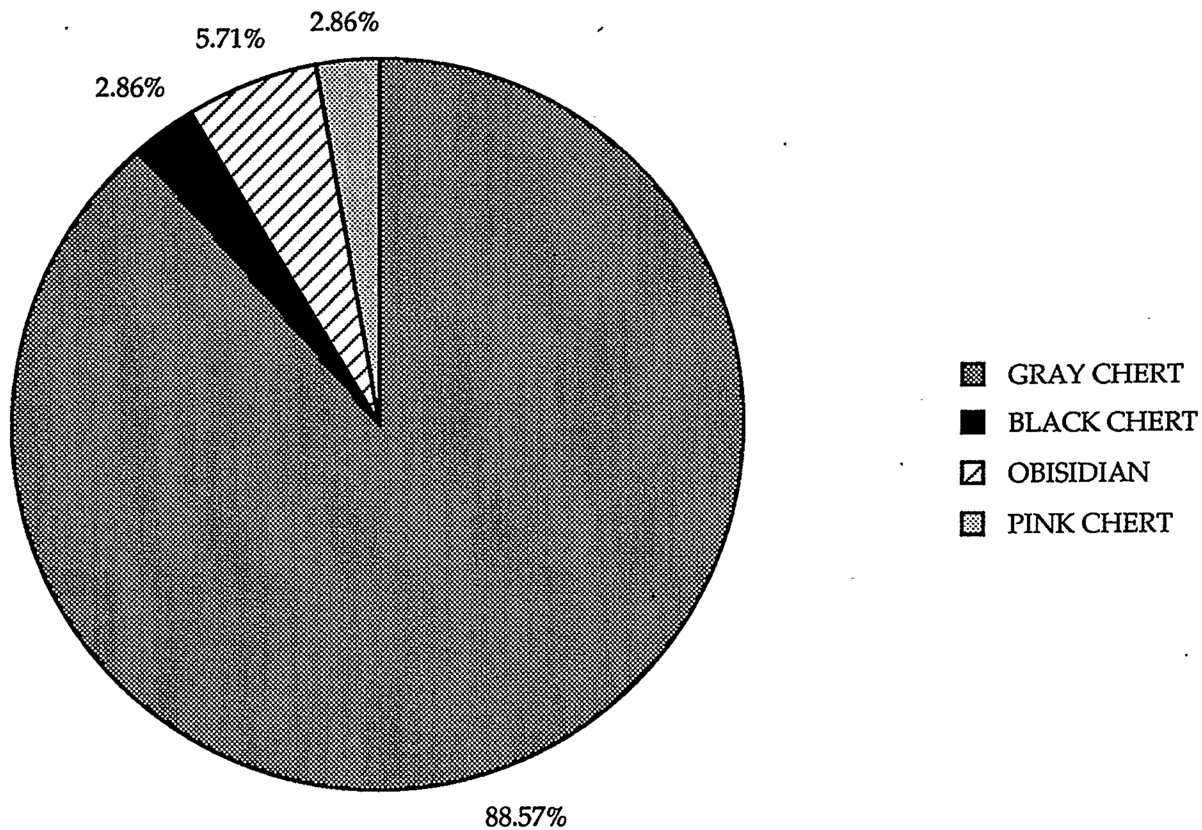


Figure 5.13: Lithic Material Types at El Zurdo



5.7.2 Ground Stone

All artifacts manufactured by means of pecking or grinding were grouped under the major category of ground stone. The members of this artifact class include hand axes, hammerstones, shaft straighteners, manos, metates, pestles, mortars, and macaw nesting box stones (MNBS). Most of the ground stone was recorded as part of a survey of the site surface. Few ground stone artifacts were found *in situ*. The shaft straightener was the first of its kind recorded by the Chihuahua Archaeological Project and was found in a secondary arroyo, near the main El Zurdo arroyo. The artifacts associated with plant processing were well-worn, consistent with long-term intensive use. Deep trough metates and two-handed manos are indicative of maize agriculture. These manos and metates were very similar to those found at Paquimé and other sites in the region. Vesicular besalt was the preferred manufacturing stone, followed by rhyolite and andesite.

The most significant find appears to the macaw nesting box stone. Prior to this find, MNBS's were found only at Paquimé and at sites within the Casas Grandes core, suggesting that Paquimé maintained tight control over macaw production in the region. This find would appear to confirm the presence of macaw breeding facilities at El Zurdo. Preliminary analysis suggests that while control over macaw breeding was exerted by Paquimé within the Casas Grandes core, the Babícora might have been a secondary center of macaw production (Minnis *et al*, in press). Work is still needed to determine if other breeding facilities exist and, if so, where are they located in relation to Paquimé. The presence of the macaw stones at El Zurdo strengthens the evidence for some form of direct relationship between El Zurdo and Paquimé.

The total number of ground stone artifacts is quite high for El Zurdo compared with totals from the Reyes sites in the Casas Grandes Valley (Di Peso 1974:40). This result may be indicative of agricultural intensification on a large scale in the El Zurdo vicinity during the Medio Period. Large flagstones with worked edges were also found at various locations throughout the site. These were thought to be hatchcovers and possess dimensions which are consistent with a stone used to cover a small opening on a rooftop. A number of these flagstone fragments were also found at CH-180, a site very similar in surface expression to El Zurdo. The presence of flagstones provides strong indirect evidence for pueblo-type construction at El Zurdo.

In sum, the ground stone found at El Zurdo is consistent with the Medio Period assemblage at Paquimé , and is representative of a high degree of agricultural production. However, despite its surface abundance, few pieces were recovered from solid archaeological contexts. This limits the amount of information which may be gleaned from a formal analysis at this point. Future research may be directed at developing a seriation for metate styles, which would be especially useful as an index of agricultural intensification for the site and surrounding region.

5.7.3 Shell

Almost four million pieces of shell were recovered from Medio Period excavations at Paquimé and other sites. Shell was traded throughout the Paquimé region from as far away as western Baja California, on the Pacific Coast of Mexico. Although the species identifications were often difficult, almost the entire assemblage excavated at Paquimé was marine shell which came from the Gulf of California. Shell was worked by local artisans into bracelets, necklaces, beads, pendants, and "tinklers" worn as charms. The concentration of shell in Medio Period storehouses at Paquimé has led researchers to believe that it was highly valued and its production was under centralized control (Minnis 1988:187). Therefore it is significant that several pieces of shell were recovered from El Zurdo during the 1991 excavations. Although this amount is quite small, it nonetheless confirms the presence of shell at El Zurdo. One of these pieces was a worked shell bracelet, made from the *Glycymeris gigantea* shell, a species whose closest available source is the Gulf of California. Although this piece was found in a disturbed context, there exists a high probably that it belongs to the Medio Period, since shell is much more rare in Viejo Period contexts.

The presence of shell also increases the known areal distribution of shell in the region. The intermediary location of El Zurdo between the Gulf of California and Paquimé strengthens its hypothesized role as a inter-regional exchange center. Di Peso (1974:401) and others speculated that shell was traded by means of an inland trail, which crossed the continental divide near Nácori Chico, a modern town only 25 kilometers from El Zurdo. Alternatively, shell may have been traded via a northern route, across Sonora. In this scenario, shell would come to El Zurdo directly from Paquimé. More work is required so that the role of El Zurdo in this form of inter-regional exchange may be fully understood.

5.7.4 Bone

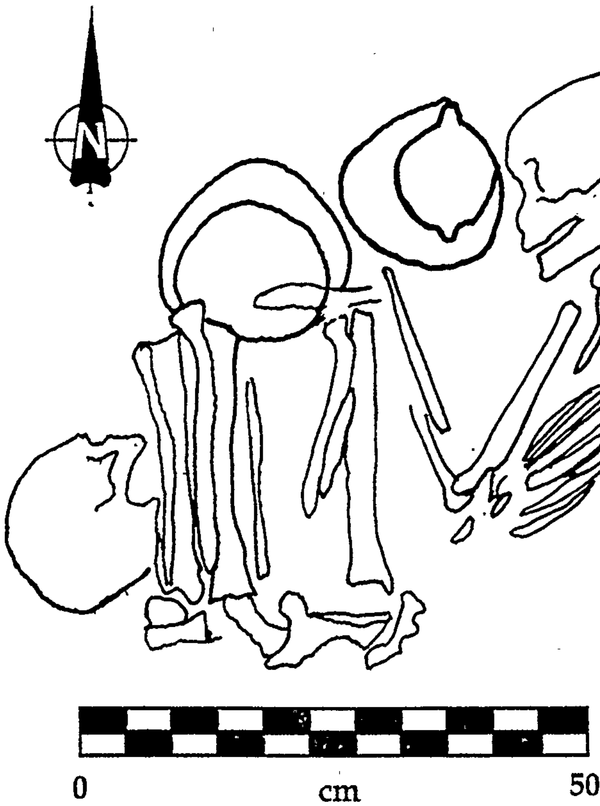
Bone, both human and animal, was encountered throughout the course of the 1991 excavations in a variety of archaeological contexts. The majority of the bone came from disturbed contexts such as potted rooms or looter's backdirt. However, a double inhumation was found *in situ* below the floor of a Medio Period room (Test 5). This burial was excavated by Sylvia Abonyi of the Chihuahua Archaeological Project and samples were submitted for isotopic analysis. Most of the remaining non-human bone was in the form of small fragments which were burned or exhibited some form of post-depositional trauma. Thus comparisons with other faunal assemblages is difficult.

The faunal assemblage produced several bone tools: a spatula-shaped bone hair ornament, a bone awl, and a unidentified piece of worked bone. The remainder of the faunal assemblage showed no signs of having been worked. Animal bones, most of which remain unidentified, were also found in various contexts throughout the site. In general, faunal bone was found in greater concentrations in what appears to be Viejo Period contexts. Burn zones, located in deep stratigraphic tests, produced the largest volume of bone fragments. However, these fragments remain unanalyzed to date.

The Medio Period bone artifacts are consistent with those found at Paquimé . No bison bones were found, however, none would be expected in this alpine region. The utilitarian bone implements span the entire site occupations, as is the case for Paquimé . Given the limited number of bone artifacts recovered at the site, little more can be offered until a formal analysis is completed. However, the general scarcity of faunal remains may be indicative of a higher degree of agricultural specialization with a decreased reliance on hunting. While this idea is speculative, I believe the small volume of faunal remains is significant here.

The human bone provides some information about the inhumation practices of the Medio Period. Specifically, the Chihuahua Archaeological Project excavated a double interment inside a room which appears to date to the Medio Period. A description of the burial will help place it context. Both individuals were interred in a flexed position and were laid on their sides (please see Figure 5.14). The burial was recorded as feature "L" and the individuals are known as L-1 and L-2. Their descriptions, which rely on Ms. Abonyi's analysis, are as follows: L-1 is a female interred in a very tightly flexed position, with her cranium north and facing west. All long bones are broken at the joints, the possible result of extreme flexing. Dental examination revealed multiple dental caries and extremely large abscesses. Pathological analysis indicates the individual was arthritic (with the involvement of the lumbar vertebrae) at the time of death and was 35+ years old. Individual L-2 is a male not as tightly flexed as the female, and none of his joints or long bones were fractured. He was buried with his head facing west and his face looking north. He is a robust individual, with strong muscle markings on all limbs. All teeth are present except a left canine (which was lost postmortem); several caries were observed. This individual presented evidence of severe arthritis in the left femur head with involvement of the left acetabulum. He also show evidence of bone resorption, all indicative of an older individual. Since the pubic symphyses and aricular surfaces on the innominates were severely eroded, it was not possible to assess with accuracy the age at death. However, all epiphyses were fused and the arthritis and dental pathology are indicative of an older adult (35+).

Figure 5.14: Double Burial from Test Unit 5



Both individuals were buried at the same time and were associated with two whole ceramic vessels. One of these was a Babícora Polychrome olla (pot) and the other a plain brown olla. They were interred in a shallow pit, capped by stones and under a plaster floor in the northwest corner of a room. The right hand of individual L-2 covered one of the pots.

The association of a Babícora Polychrome vessel with this burial provides the strongest evidence for a Medio Period temporal assignment. The orientation, flexing, and grave associations are all consistent with the Medio Period burials at Paquimé . Therefore, isotopic analyses from these individuals can provide an accurate picture of Medio Period subsistence.

In brief, isotopic analyses are used by physical anthropologists to obtain information about prehistoric diet. These analyses are based on the fact that C_4 and C_3 plants differ in the way in which they photosynthesize carbon dioxide. Since humans consume these plants, the ratio of C_4 to C_3 carbon in human bones can be utilized to determine the primary composition of human diet (Vogel and Van Der Merwe 1977:239). The ratio of these carbon isotopes, when expressed as the difference between the two (known as $\delta^{13}C$) provides an index from which human diet may be reconstructed. Ethnobotanical reconnaissance of plants in the Babícora region indicates they are primarily C_3, which include most trees, flowering plants and wild grasses. In contrast, there are few C_4 plants which naturally occur in the Babícora. Thus isotopic values high in C_4 are indicative of a people who relied on a C_4 cultigen, such as maize, as a primary dietary staple (Vogel and Van Der Merwe 1977:239).

Carbon isotopes from individuals L-1 and L-2 indicate a very strong C_4 plant-based diet. Their $\delta^{13}C$ values are -7.1 and - 7.2 respectively. Both of these are suggestive of a diet high in maize consumption. In fact, these values are so strong that it can be argued that maize was a very important component of the diet of these individuals. Unfortunately, the values for the other individuals being isotopically analyzed are not currently available.

Human bone from other contexts in the site is less informative than that from Feature "L". Two juvenile mandibles were found in the "patio" area. A portion of a cranial vault was found near the plastered floor of Test 2, but given the disturbed context, its associations are unclear. A textured vessel was reconstructed from sherds which were in association with the cranial vault. No isotopic values were available for this individual. The same is true for the burial in Test 6. This burial was badly eroded, and only some partially mummified tissue could be sampled. Again, no isotopic values could be obtained. This is especially unfortunate, as the burial appears to be in a Viejo Period context.

The information derived from the osteological analyses provides a useful index of Medio Period subsistence and burial practices. The information from earlier periods is sketchy. More excavation is required in order to develop a profile of diet for the two major occupation periods at El Zurdo. An examination of the botanical remains will complement the discussion on bone.

5.7.5 Botanicals

On the basis of the botanical evidence gathered at El Zurdo, it appears that maize agriculture was being practiced throughout the occupational history of the site. In addition, flotation and macrobotanical samples indicate that squash (*Cucurbita* spp.), chenopods (*Chenopodium* spp.) and piñon nutshells were also being cultivated or routinely collected. Charcoal from *Pinus* spp., *Quercus* spp., and *Juniperus* spp. was recovered by flotation.

Macrobotanical samples were removed from pit fill and burned layers in the midden. These burn zones were rich in charcoal and vegetal matter. A corncob unearthed from one of the lower burn zones of the midden during the 1990 field season was submitted for Carbon 14 dating. It yielded an uncorrected date of 1340±80 B.P., which when corrected falls between 636 and 766 at one sigma place (μ=666 A.D.). However, the exact stratigraphic context could not be pinpointed due to a one year hiatus between the extraction of the sample and the formal excavation of the midden. However, this find suggests maize agriculture was being practiced in the El Zurdo region by 700 A.D., at the beginning of the Convento Phase of the Viejo Period in the Casas Grandes region, and possibly prior to that date. Remains of single-year plants, such as corncobs and squash seeds, were submitted for Accelerator Mass Spectrometer dating. The results of this are expected by late 1992.

A brief ethnobotanical study was conducted in the El Zurdo area by Dr. Karen Adams of the Crow Canyon Archaeological Center. This study indicated a wide variety of edible plants were available within a one kilometer radius of the site. The same was true for wood, as the site is surrounded by pine, oak and juniper trees. Informants noted a number of medicinal and food uses for the nearby plants. A search along the shoreline of the ephemeral Laguna de Babícora revealed no riparian plant communities. Their absence is consistent with a lake which fills very briefly each year and then evaporates.

The ethnobotanical evidence suggests that the inhabitants of El Zurdo could have complemented their maize diet with a wide range of locally-available plants. This mixed economy could have provided a survival advantage during crop failures or prolonged droughts. The botanical remains coupled with the diet information and ground stone inventory provide a composite picture of agricultural subsistence during the Medio Period.

5.8 Summary

The beginning of this chapter discussed the ceramic analysis and the problem of classifying a large assemblage. Cluster analysis was proposed as a means of grouping excavation levels based upon their relative frequencies for five ceramic categories. The cluster analysis revealed both the spatial and temporal dimensions of the El Zurdo site. Further, cluster analysis was used to divide the ceramics into two broad groups, based upon their percentage of plain and textured wares. It was argued that this division could be viewed as a temporal one, with two broad periods of site occupation represented. The ceramic assemblage used to create these two periods was subsequently tested against ceramic assemblages from the site of Paquimé of known age and composition. The placement of these groups within the two cluster groups from El Zurdo indicated the appropriate temporal assignment for each El Zurdo group. The provenience of each group, given as its excavation level, could then be used to give a temporal assignment to the associated items within a given level. The other cultural remains were then discussed in light of their new temporal placement.

A connection exists between the artifact inventories and the ceramic groupings created by the cluster analysis. This connection allows for a general description of the site occupations at El Zurdo. What follows is an attempt to clarify the nature and expression of each occupation at El Zurdo.

CHAPTER 6: DISCUSSION AND INTERPRETATION OF THE SITE OCCUPATIONS

The relative chronology provides the means by which archaeological features at El Zurdo may be assigned to two broad periods: the Viejo Period and the Medio Period. Taken in order, the site occupations appear to have profiles which are very different. A summary description will help illustrate their contrasts. First, however, a brief general synthesis is required.

The long-term occupation at El Zurdo appears by all indicators to be validated. The evidence for continuous long-term occupation comes from the depth and quantity of the midden deposits. The C^{14} date (1340±80 B.P.) from a corncob from one of the burn zones in the lower midden demonstrates the relatively early development of agriculture at El Zurdo. Human presence appears to continue uninterrupted from this time until the end of the Medio Period. However, this evidence may be interpreted in another way. Although we have no evidence for a break in human occupation, there exists a possibility that El Zurdo was seasonally occupied during the early Viejo Period component. Evidence for this comes from the deposition of the midden in fairly discrete layers at lower levels. These layers can be interpreted as seasonally deposited. Unfortunately, we lack the complementary data required to evaluate this idea, and nothing further may be offered here. The site population appears to increase at the beginning of the Medio Period, when new dwellings are constructed over the previous Viejo component, and other Medio Period sites appear in the Babícora basin.

The history of site occupations is crucial to our understanding of local development of the Casas Grandes-related system throughout the larger Babícora basin. The sites which lie along the Río Las Varas, as well as the San

Juan and Babícora mound groups, are indicative of Medio Period expansion. It is therefore most significant that El Zurdo possesses a long-term occupation. A description of both site components will help to synthesize the diverse range of information which has now been accumulated.

6.1 The Viejo Period Component

The Viejo Period was a time when many groups throughout the Greater Southwest were making a transition from a generalized hunter-gatherer mode of subsistence to one based upon agriculture. In Northern Mexico, this change is reflected in the appearance of semi-subterranean houses which form small villages, the advent of pottery, and artifact assemblages which reflect an emphasis on domesticated plants. In Chihuahua, this early agricultural period is known as the Viejo Period and was described in Chapter 3 (see also Di Peso 1974:95-252). The Viejo Period component at El Zurdo reflects these general trends. By the time the Viejo Period began at El Zurdo, the general climatic pattern observed today had already been established. The moist summers and cool dry winters provided excellent conditions for the sowing of the first domesticates in the Babícora region.

Pit structures, especially those which lie in close proximity to the midden, are clearly associated with the Viejo Period. Remains of domesticated plants from the lower levels of the midden confirm that agriculture was an increasingly important component of Viejo Period subsistence. The ethnobotanical research suggests the Viejo Period dwellers at El Zurdo were able to utilize a wide variety of wild plants to complement their diet. As the Viejo Period progressed at El Zurdo, the village expanded. By the late Viejo Period, dwellings became larger and more rectangular. Test 13 provides an excellent example of a later Viejo Period room, similar to those constructed during the Perros Bravos Phase in the Casas Grandes Valley. Unfortunately, the horizontal exposure of Viejo Period structures at El Zurdo is limited and therefore little is known about the actual plan of the Viejo Period village.

Texturing was favored as the primary ceramic decorative technique during the Viejo Period. Corrugating of vessels is the most popular of all texturing techniques. The number of plain wares stays below fifty percent of the entire ceramic assemblage. By the end of the Viejo Period, texturing begins to decline as a decorative technique, having been eclipsed by an increase in the number of plain wares, and a marginal increase in painted wares. Thus texturing as a decorative technique emerges as one of the diagnostic traits of the Viejo Period at El Zurdo.

The excavations of 1991 revealed only small portion of the Viejo Period occupation at El Zurdo. Based upon the vertical profile of the midden, there are at least two phases of the Viejo Period represented at the site. However, these two stratigraphically-determined phases are difficult to identify in other parts of the site. The Viejo Period occupation appears to continue uninterrupted until the Medio Period.

In sum, the Viejo Period is poorly known at El Zurdo, as most of this component underlies the Medio Period component and was tested in very small exposures. However, this first occupation was responsible for the pit structures, caches, and perhaps some of the rectangular semi-subterranean houses, such as Test 13. Much more work is needed to define the nature of this component at El Zurdo, and intensive survey coupled with excavation may help define the Viejo Period component within a regional context. It is believed that site CH-180 represents a parallel case with regard to Viejo and

Medio Period occupations. Test excavation planned for 1992 will help determine if this is the case.

6.2 The Medio Period Component

The Medio Period component at El Zurdo is built almost entirely over the preceding Viejo Period component. The Medio Period at El Zurdo is marked by population expansion as inferred from ceramic production increases, the founding of large towns in the Babícora basin, an increase in trade goods and exotic items, macaw keeping, agricultural intensification, and the building of a large, multi-storied pueblo. Fieldhouses and other special purpose sites in the El Zurdo drainage, both upstream and downstream from the El Zurdo site, are believed to pertain to the Medio Period. Other large sites begin to appear throughout the Babícora basin and the Santa María Valley. Polychrome ceramics, most notably Babícora polychrome, are the hallmark of the Medio Period, but are not found in great abundance.

The Medio Period development at El Zurdo, and in the Babícora basin, generally mimics that of sites in the Casas Grandes Valley. However, it differs in two important ways: one, while El Zurdo appears to be a regional production center of some form, as evidenced by its macaw stones and shell trade items, the scale of production appears much smaller than at other Medio Period sites closer to Paquimé and; two, it lacks some of the characteristics features of other Medio Period sites, such as a large central plaza or a ballcourt. Addressing the former, identification of specific areas of production and storage will help us understand the spotty artifact record of the 1991 season. The current information only hints at the potential wealth of information which remains uncovered. Regarding the latter, the lack of features characteristic of the Medio Period may be a function of excavation strategy, rather than a complete absence of features. However, not all Medio Period sites have ballcourts or central plazas. More work is needed to determine the overall character of Medio Period sites outside of the Casas Grandes core zone.

No complete picture of the Medio Period at El Zurdo can emerge from the current information. Since the excavation strategy emphasized the definition of temporal depth at El Zurdo, there were no large horizontal exposures which would provide a composite view of the surface of the site. Due to the high degree of site destruction, looters backdirt and potholes often obscured or destroyed Medio Period architectural features. The Medio Period rooms which were tested appeared to incorporate stone in their construction, most likely as part of the foundation. Thus the Medio Period pueblo at El Zurdo may have been built using locally-available rocks for foundation materials and attached adobe walls aboveground. These walls would have weathered and melted in the intervening centuries. This explanation may account for the absence of "classic" adobe architecture at El Zurdo.

The Medio Period burials and the botanical remains of the upper midden provide the best evidence for maize agriculture at El Zurdo. The isotopic values obtained from these burials are indicative of a diet high in maize consumption. This finding is consistent with other artifacts associated with an agricultural society, such as manos and metates, a large number of which were counted at El Zurdo. Other sites in the area such as fieldhouses are also indicative of an agricultural-based society during the Medio Period at El Zurdo.

Finally, many questions remain regarding the development and expression of the Medio Period at sites such as El Zurdo. This thesis has provided strong indirect evidence for an association between Paquimé and El Zurdo. However, the nature of this association may only become clear after more sites in the region are excavated. One possibility is that the El Zurdo site and others in the vicinity represent a regional group of sites which were more autonomous during the Medio Period than those sites which lie in closer proximity to Paquimé. Again, testing of other sites as well as a large horizontal exposure at El Zurdo are the best means by which we may come to understand these relationships.

6.3 The El Zurdo and Babícora Basin Cultural Subsystem

Although El Zurdo and other sites in the Babícora share many of the salient traits of the Paquimé system, a number of contrasts revealed by excavation suggest that this region may be viewed as a semi-autonomous region related to Paquimé (Minnis *et al* In Press). Compared with sites in the Casas Grandes core, El Zurdo shows very little evidence of the large-scale trade which marked the Paquimé-based system. While trade goods such as shell were recovered during the 1991 excavations, the quantities found are far less than expected for a site which was part of a major exchange network. This could be a product of excavation strategy, i.e., we have not yet uncovered a storehouse or cache. However, it is equally probable that shell did not move through the Babícora area in the large quantities in which it is found at Paquimé.

The ceramic evidence bolsters the view that El Zurdo was not a large-scale secondary trading center. The textured to plain ratios described in this thesis were used as temporal indices of larger cultural changes. In this case, these ratios provided evidence for the Viejo to Medio Period transition. Equally important in this context is the fact that El Zurdo pottery shows few imported styles. As noted in the previous chapter, the percentage of painted wares was considerably lower at El Zurdo than at Paquimé. However, this difference was accounted for by subtracting the percentage of *Ramos Polychrome* pottery found at Paquimé. This pottery type, which was widely traded during the Medio Period is uncommon at El Zurdo; it may indicate that El Zurdo was not fully integrated into the Casas Grandes system. Further evidence for this idea is the absence of *Gila Polychrome* at El Zurdo. This type was also widely traded throughout the region and is completely absent from El Zurdo. Survey collections from other sites in the Babícora have not yet produced this type. Thus it would seem that El Zurdo and other Babícora sites either lack or have small amounts of the two hallmark pottery types from the Medio Period.

More evidence for local autonomy comes from the apparent lack of monumental public architecture at El Zurdo. Sites within the Paquimé core generally possess ballcourts, plazas, or some other form of public architecture. None of these features were observed at El Zurdo or other sites within the Babícora. Although these may yet be found, the fact that two of the largest sites in the Babícora region, CH-180 and El Zurdo, and Medio Period sites in the Santa María basin appear to lack these features demands explanation. I believe the best explanation lies in viewing Babícora sites as a semi-autonomous region which was marginal to the core system which lay to the northwest of Paquimé.

The geographic boundaries described in Chapter 2 result in the relative isolation of the Babícora region from the sites closer to Paquimé. The rugged mountains which lie between Paquimé and El Zurdo may have affected interaction between the two regions. Sites in the Carretas Basin northwest of Paquimé appear to have been an integral part of the Paquimé system. These sites are a greater horizontal distance from Paquimé than those in the Babícora. However, the fact that they lie at the same elevation as Paquimé may have made access from Paquimé easier, even though their are horizontal distances are greater than to the Babícora. Finally, it should be noted that the Babícora was and continues to be a productive environment without the aid of irrigation. However, irrigation is almost a requirement in the Casas Grandes Valley and areas to the northwest. This dichotomy of irrigated/non-irrigated lands may have allowed the Babícora to sustain a population through droughts or drier years. Such a dichotomy would have produced a very different set of living circumstances for the two areas, possibly contributing to the variation currently observed between the Babícora sites and sites in the Paquimé core area. Much work is needed to determine if the Babícora and other regions (such as the Santa María) were autonomous subsystems of the Paquimé system. Future research should be directed at defining the variability of sites within the Paquimé system, with special emphasis on site function and location.

6.4 Conclusion

In the analysis reported here, a preliminary cluster analysis helped to reveal the spatial and temporal patterning within the ceramic assemblage at El Zurdo. This patterning suggested that different activity areas as well as different time periods were being observed at El Zurdo. This initial analysis also revealed which variables would serve as reliable indices of temporal change. These variables were then used in a second cluster analysis, which clustered only one activity area, the midden. This second analysis suggested that a transition between midden zones could be observed by looking for changes in the ratios of plain to textured wares for the entire site. A final cluster analysis was applied to the entire ceramic assemblage in order to elucidate the Viejo to Medio Period transition at El Zurdo. This analysis demonstrated that the number of plain vessels increases through time as the number of textured vessels declines. This change allowed for El Zurdo ceramics to be placed in two broad groups or clusters, which were deemed to correspond to the Viejo and Medio Periods on the basis of their stratigraphic associations. These two groups were then checked by means of another cluster procedure against other assemblages of known temporal periods. The results of this procedure indicated that the El Zurdo groups possessed similar ratios of plain to textured wares for the two ceramic groups. The assignment of the El Zurdo groups into two temporal categories based upon plain to textured ratios is strengthened by their association with sites of known temporal periods possessing similar ratios.

The cluster analyses conducted in this thesis provided a relative chronology by which other assemblages could be given a temporal assignment. The associations created by this method allowed for the development of composite pictures of both the Viejo and Medio Periods. These profiles, while still sketchy, help illustrate various facets of the history of El Zurdo and related sites. The description of the site occupations show that a connection exists between the site of Paquimé and El Zurdo. However, the nature of this connection is still vague and more work is needed to obtain the data necessary to address this connection.

The results of the various analyses and relative chronology developed in this thesis suggest that sites in the Babícora region should be viewed as a regional subsystems in their own right. While the plain to textured ceramic ratios provide a index of the Viejo to Medio transition, there exists in the El Zurdo data enough difference from the Paquimé ceramic profiles to indicate a certain degree of local autonomy for sites outside the Paquimé core. At the same time, the Babícora and Paquimé regions share major trends which make the two regions unmistakably linked. This variation, coupled with the morphological differences in site architecture, size, and artifact assemblages at Babícora sites suggests they have a different relationship to Paquimé than sites which lie closer to Paquimé. The natural boundaries and unique microclimates created by the topographic variation of Chihuahua must factor into any discussion of inter-regional variation. Site variability as a function of the geographic location of the Babícora basin merits continued investigation.

The site chronology proposed in this thesis represents a preliminary step toward understanding the prehistory of the Babícora basin region. However, more fieldwork is required in order to examine the relationships postulated by this thesis. It is hoped that the data presented here will complement the database being compiled by the Chihuahua Archaeological Project. Further, the changes in ceramic ratios developed in the relative chronology may serve as a key to defining Medio Period components at other sites. This thesis has provided some basic archaeological data which may now allow us to move toward developing a clear picture of regional prehistory in west-central Chihuahua.

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