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Hohokam Structures: Subregional Variations in Architecture and Activity Areas, and Their Functional Relationships

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HOHOKAM STRUCTURES: SUBREGIONAL VARIATIONS IN ARCHITECTURE AND ACTIVITY AREAS, AND THEIR FUNCTIONAL RELATIONSHIPS

by

John W. Molfese

A Thesis Submitted to the Faculty of the Graduate School of Loyola University in Partial Fulfillment of the Requirements for the Degree of Master of Arts

June 1973
APPROVAL SHEET

The thesis/dissertation submitted by John W. Molfese has been read and approved by members of the Department of Anthropology.

The final copies have been examined by the director of the thesis/dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis/dissertation is now given final approval with reference to content and form.

The thesis/dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

DATE

ADVISOR'S SIGNATURE
I would like to thank all those who gave their time and knowledge while the research for this thesis was being conducted. I wish to express my gratitude to those people whose advice and assistance has been greatly appreciated. They are Rev. Francis X. Grollig S. J. and my advisor, Dr. Donald E. McVicker, whose patience and assistance made this paper possible.
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INTRODUCTION

HISTORY OF HOHOKAM ARCHEOLOGICAL INVESTIGATION

Of the three major subareas of the American Southwest, the Hohokam has remained largely ignored in favor of the Anasazi or Mogollon subareas (See Map 1). Minor and major archeological investigations were and still are inconsistent and sporadic in comparison to the other two subareas. The reasons are diverse; two of these reasons representative of problems faced by the archeologists are the extreme climatic conditions and the Hohokam sites themselves.

These are critical problems when considering the financial expenditures and time spent in excavation. Sites are difficult to locate and excavate because the typical Hohokam house structure was a pit house. Climatic conditions which affect excavations are high summer temperatures, the lack of water, and arid terrain. However, this latter problem immediately evokes the question: Why had the Hohokam occupied such an environment?

The history of the exploration of the Hohokam covers a considerable span of time. The first archeological investigation which can be correlated with what is presently known as the Hohokam culture began in the late 1880's (Haury 1945 b:3). The Hemenway Expedition was interested in the extent of the irrigation canal systems around and southeast of Phoenix, Arizona.
MAP 1.
ARCHEOLOGICAL SUBAREAS
OF THE SOUTHWEST
(AFTER WILLEY, 1966)
Although not much was accomplished in modern archeological terms this expedition did, however, provide useful material on site description and the geographical limits of the Hohokam in that region. One most important site located was Los Muertos. At the turn of the century, there were many small scale ventures into the Hohokam subarea. They were all concerned with the extent of the canal networks (Patrick, 1903). Other aspects of the material culture were subsidiary to the investigation and tracing of the irrigation canals.

Though nearly all investigations of Hohokam revolved around canal systems, Fewkes (1912) did take the opportunity to excavate the most famous Hohokam site at Casa Grande, Arizona. Its unique architecture in comparison to the later uncovered Hohokam architecture is still the subject of controversy and speculation. However, archeological investigations ceased in the Hohokam subarea for more than a decade until the first Pecos Conference convened to discuss and to regulate the archeological sequences and the ceramics in the Southwest.

At that conference in 1926, A.L. Kroeber introduced a "new" and "inconclusive" archeological culture known as the Gila-Sonora culture (Brand 1939:229); it was later to be known as the Hohokam. Kroeber (Brand 1939:229-231) had attempted to define Hohokam in terms of ceramic differences from those of the northern Pueblos. He had found that these distinctive ceramics were concentrated in the Gila River drainages and in Sonora, Mexico; therefore, he called it the Gila-Sonora culture. After the ceramic evidence was presented many archeologists believed the Red-On-Buff ceramics were insufficient to warrant a new archeological culture.
They replaced Hohokam with "Hokum".

While the Pecos Conference was still in a quandary over the legitimacy of the "Hohokam", "Red-On-Buff" culture, or "Gila Sonora culture", H. S. Gladwin was already attempting to substantiate Kroeber's claim by locating the extent of the distribution of the Red-On-Buff ceramics. Gladwin produced several monographs which discussed the distribution of the Red-On-Buff ceramics (Gladwin 1929, 1930, 1935).

Since Hohokam was defined by ceramics, there was obviously a need for additional categories of data to separate it from Anasazi or Mogollon. Toward this end, a combined field project was initiated in 1934 to substantiate a Hohokam sequence. The site chosen was Snaketown, Arizona which remains the scale to which all Hohokam data were compared.

To scientifically substantiate the Hohokam sequence at Snaketown, Gladwin maintained explicit stratigraphic control of the excavation. From his data, he devised a Hohokam cultural sequence of three periods and eight phases; later, another period was established which was composed of 2 phases. From the ceramic surveys and the excavation of Snaketown, Gladwin supported Kroeber's suspicion.

After the Hohokam sequence was established at Snaketown (Gladwin, 1937), the sequence terminology with their cultural implications were extended to other sites "alleged" to be Hohokam or having cultural elements similar to the Snaketown data. The sequence extended as far as the ceramic distribution of Red-On-Buff pottery; this coincided with the ceramic surveys of 1929, 1930, and 1935. Now there was a geographical dimension, a
ceramic dimension, and a cultural sequence for the Hohokam.

In the last three decades, archeological surveys and excavation have been irregularly undertaken. In most cases they have produced limited, but reasonably scientific data on the Hohokam. There are still constant criticisms and controversies about Gladwin's Hohokam sequence which have not been resolved. The reasons for them not being resolved are the lack of sufficient data.

Furthering the cause of Hohokam culture history is E. W. Haury who has contributed the largest amount of useful data. His investigations span more than four decades from the 1920's into the 1960's (Haury 1928, 1937, 1945, 1950, and 1967). Haury has given needed support to cultural origins of the Hohokam from the Cochise culture and has supplied pertinent data on the Classic period of the Hohokam.

There are some other noteworthy entries to the history of archeological investigation of the Hohokam. In 1957 W. Wasley produced some valuable data on Hohokam from the Painted Rocks Reservoir, Gila Bend, Arizona. The data were readily comparable to the Snaketown data of Gladwin and provided other propositions concerning types of sites, house types, distribution, "temple mounds", and settlement patterns. In 1964 E. W. Haury re-excavated a section of the Snaketown site; he produced data similar to those produced by Gladwin 30 years earlier. In 1967, D. Breternitz working in the Verde River Valley added geographical data on the distribution of Hohokam culture. Though the last decade has provided some valuable scientific data on the Hohokam, there are only a few articles which have appeared recently that can further the knowledge of Hohokam culture history (Morris, 1970; Molfese, 1970).
With the present re-evaluation of archeological theory toward a more scientific approach, theoretical propositions which involve socio-cultural manifestations should be tested in the Hohokam subarea. Therefore, this research thesis will attempt to employ a "new and more scientific methodology" towards the investigation of socio-cultural manifestations, rather than to employ a traditional approach to establish cultural chronology and historical contacts. Given the data limitations this can not be the most definitive theoretical work on the Hohokam, but this research can be a beginning towards such an objective.

PROBLEM

The theoretical problem concerns the cultural concept of house structures which the Hohokam occupied, and it investigates features of construction, materials, and activity areas in or adjacent to these structures. In all of the categories concerning structures, there are cultural and environmental forces which may determine a "correct" form of structure, feature, or activity.

This research investigation relies on three aspects of cultural adaptation which must be encountered by each existing culture. First, the environment to which a people adapt does in various ways affect the type of structure in which they live. This is not to suggest that cultural preferences in types of structures is directly determined by the environment. Certain elements of the different environs have a decided effect on exploitation of that particular environ, on activities, and logically on the structure as well. Second, the structures, themselves, are affected by cultural norms. Certain elements of house structures,
features, or location of particular activities could be in this manner "culturally determined". There could be a set of traditions which controls the correct way to design, build, and operate within a house structure. Activities and activity areas are the third of the vital aspects in this research investigation; they could affect the size of a structure as well as type of features needed within the structure. There are many categories to be considered, though they may be grouped under the headings of technological activities, social activities, and ideological activities.

The three aspects which affect house structures may be assumed to be interrelated in various ways. For example, activities for the purpose of subsistence exploitation of the environment are partially dependent on the environment and partially dependent on the cultural norms. How these aspects are dependent upon one another and how they function together is the goal of this research investigation.

A series of preliminary questions which would indicate these interrelationships was considered. For example:

1. What is the type of environment associated with the Hohokam subarea? Does it vary? How does it vary?

2. What activities are being performed in the structures? What are their areal limits? What are the associated artifact inventories? Do the activities have associated features within the structure?

3. Can there be culturally determined norms regulating the "types of structures"? Do they vary with time, space or both?
The questions as the answers were numerous; yet, they all had three main themes which seemed necessary to any anthropologically meaningful discussion of house types. They were environment, activities, and structural types.

In line with these themes the appropriateness of certain classes of data is next considered.

APPROPRIATE CLASSES OF DATA

The first class of data which is needed for a discussion of house structures is the environmental variations. This class of data will be discussed under the following headings: terrain, river systems, soil variations, climate, flora and fauna. Subsistence system will be discussed in conjunction with settlement patterns. It is hoped that the natural subregions of the Hohokam will become apparent. Some pertinent data about the regional exploitation of the various environs can be derived from the excavation material such as flora and fauna found in association with the site.

The second needed class of data is structural information for the formulation of house types. It would be hazardous to assume that this class of data is consistent; it lacks quality and details. Yet, there are sufficient, explicit and detailed resources to give some solid basis to this research. Every possible resource has been sought out and has been incorporated.

In this class of data certain specific elements of house structures must be collected for our purposes. The needed data are the following:
floor features, wall features, roof features, entryway, design and construction materials. These can be further subdivided into the following: composition, treatment of surfaces, and quantity (See House Typology Work Sheets, Appendix C). Obviously, the data collected for the structures would be the basis for a comparative typology to which all resource material can be scientifically compared.

In conjunction with the house structure data it is hoped that activity area data can also be obtained. This is the third class of needed data. From the archeological record, activity areas can be inferred from the distribution of certain associated artifacts and features. These would appear as clusters such as manos and metates near fire pits. There could be further subdivisions of activity areas according to the specific industries such as lithic, bone, wood, and ceramics. Distribution, quantity, stage of manufacture, and association with any structural feature would be of great value. This final subdivision is crucial to this research investigation.

Two of the three classes of data are artifactual and could be derived from the archeological record; the third class of data is non-artifactual and can be derived partly from the archeological record and partly from environmental data from other sources. The artifactual classes are the activity areas and the structural information; the non-artifactual data are the environmental conditions. However, certain aspects of exploitation of the environment can be inferred from the flora and fauna recovered by excavation.
Based on the survey of the data the following observations and statement were made.

**OBSERVATIONS**

a. Variations in architectural features could be dependent upon activity areas which in turn reflect the socio-cultural norms of the Hohokam culture. Changes or variations in these norms will affect the architectural features of the structures involved.

b. Variations in architectural features could also be dependent upon ecological variations. The adaptation to various subregional potentials could account for the variations in architectural features of the Hohokam structures.

**STATEMENT**

Each observation indicates a possible explanation for the observed variations in the architectural features of the Hohokam structures. The assumption that these two determinants, activity areas and ecological adaptations, do affect architectural features leads to a series of testable hypotheses.

**HYPOTHESES**

A.1 If it can be shown that the distributions of activity areas (defined by artifact association) within the Hohokam structures are arranged in a non-random manner (i.e., cooking facilities in direct line with entryway and food preparation in the vestibule), then it may be assumed that architectural features are correlated with the distributions of the activity areas. Therefore, variations in the distributions of
the activity areas would also indicate a corresponding variation in the architectural features of the Hohokam structures.

A. If it can be shown that there is a random distribution of the activity areas relative to architectural features, then it may be assumed that the socio-cultural norms which are regulating activities are not regulating architectural features. If this were the case, then we must look for independent factors which influenced architectural features.

B. If $A_2$ receives the strongest support, and if there are ecological variations in the Hohokam region which indicate that there are various subregional potentials to which to adapt, then it may be the case that these various potentials were the most powerful determinants of the subregional variation in Hohokam structures.
CHAPTER I.

THE HOHOKAM AND REGIONAL ENVIRONMENTAL VARIATIONS

The following chapters will discuss several aspects of Hohokam culture history. Included in these discussions will be the subsistence system and settlement patterns, ceramics and other artifacts, and burial custom data where available. These particular elements of Hohokam culture are necessary for later comparisons as well as establishing a group of traits which are traditionally considered to be indicative of Hohokam. This thesis will use the generally agreed upon set of elements indicating Hohokam culture to show where and in what ways the traditional Hohokam traits differ on a regional basis.

ECOLOGICAL SETTING

It is necessary to examine features of the natural environment which would show the adaptive mechanism of the Hohokam. The features of the natural environment are the following: the terrain, river systems, climate, flora and fauna composition of the Hohokam area which could be assumed to have existed at the time of their habitation. During that time period and even today the environment of the Hohokam area has not changed appreciably.

TERRAIN

The terrain of the Hohokam area is considered to be one of the most hostile environments for cultural adaptation in the Western Hemisphere. The majority of known Hohokam habitation sites are located in the present
State of Arizona; the extent of their territory can only be surmised from the ceramic distribution. The range of their territory was bounded on the West by the Colorado River, on the East by the spurs of the Mogollon Rim, on the South by the Lower Sonoran Desert, and on the North by the Upper Drainages of the Verde and Salt Rivers. With the exception of the Upper Drainages of the Salt and Verde Rivers, this range is roughly equivalent to the Upper Sonoran Desert. Dunbier (1968) has presented the most useful data for environmental conditions; it is from his work that the majority of environmental data has been taken.

The only redeeming quality of the Upper Sonoran Desert is the few perennial rivers which flow through it. They are the Gila, Salt, and to a lesser extent the Rillito-Santa Cruz Rivers; each river was extended by its numerous tributaries and washes. One of the primary characteristics of the Hohokam culture was their ability to adapt to this desert environment which can be concluded from their extensive network of irrigation canals. Yet, canals are generally found in only one region of the Hohokam area, the Lower Salt-Gila Basin Region. Other geographical features vary the adaptive mechanism in the other two proposed regions, the Upper Salt-Verde and Santa Cruz-Rillito Regions. This variability of the Hohokam area can best be shown when discussing each river system separately.

RIVER SYSTEMS

The Gila River (See Map 2) begins in the low foot hills and mountains of the Gila Range, it flows in a primarily westerly direction across the lower quarter of the State of Arizona. It proceeds unobstructed through these low foot hills until it reaches the Gila Valley near Florence, Arizona
MAP 2.
THE UPPER SONORAN DESERT
AND ITS MAJOR RIVERS

SONORAN DESERT
--- BOUNDARY

NORTH

VERDE RIVER

TONTO CREEK

CHERRY CREEK

CEDAR CREEK

SALT RIVER

LAKE ROOSEVELT

PHOENIX

GILA RIVER

GILA BEND

SANTA CRUZ RIVER

TUCSON

FLORENCE

SAN PEDRO RIVER

RILLITO RIVER
where it descends to the valley floor. As it enters the valley, the Gila River resembles a swollen creek rather than a river. As it passes through the vast arid land from Florence west-northwesterly towards its junction with the Santa Cruz and Salt Rivers, the Gila River is low and broad with many tributaries flowing into its main channel. After passing the junctions of Santa Cruz and Salt Rivers, it enters into the heart of the Upper Sonoran Desert with its many miles of flat, hot, and arid land as far west as the Colorado River. The only obstruction which diverts the westerly flow of the Gila River is the abrupt southward swing around Gila Bend after which it continues westward. There are countless washes which intersect the 300 miles of the Gila River; those of interest are the washes which enter the main channel between Florence and Gila Bend, Arizona. Washes served several purposes; the most important uses could have been as a "pre-built" irrigation canal or as a "flood control" system.

The only main water course to converge with the Gila River before its junction with the Salt River is the Santa Cruz River. Its source is in the higher elevations south of Tucson; it carves a northwesterly channel toward the Gila River. As far as rivers are concerned, the Santa Cruz has not been a consistent source of water. When sufficient rain does fall to fill the Santa Cruz and Rillito Rivers, they become raging torrents of uncontrollable force. Their channels are deep and not readily adaptable for harnessing canal irrigation because of the sporadic nature of the river. However, there is more rain in the higher elevations which lessens the need for canal irrigation.

The movement of the Gila River is slow and not readily conducive to
meandering; however, at certain times of the year the Gila River can become a swiftly moving and dangerous river. There is an agrading (silt depositing) characteristic attributed to the Gila River; during the rainy season, the river deposits large amounts of fertile silt in the surrounding terraces. It was at flood periods when canals carried off surplus water and silt to fields farther inland from the channel. This was a form of flood-water irrigation which allowed the Hohokam to increase the productivity of their lands. This agrading characteristic is directly opposite to the eroding characteristic of the Salt River. The Santa Cruz River resembles the Salt River in this respect.

It is along the Gila River and to some extent the Santa Cruz-Rillito Rivers that most Hohokam sites have been identified, especially at Gila Bend, the confluence of the Gila-Salt Rivers, and the confluence of the Gila-Santa Cruz Rivers.

The last river, which is important to the discussion of the environmental conditions of the Hohokam area, is the Salt River. It parallels the Gila River in its westerly movement until its junction with the Gila River southwest of Phoenix, Arizona. The westward flow of the Salt River begins in the White Mountains, Mogollon Rim spurs, and Mazatzal Mountains; as with the Gila River, the Salt River is joined by numerous tributaries draining from the many canyons which flank the Mogollon Rim. Some of the more important tributaries are the Verde River, Tonto, Cherry, and Cedar Creeks. All are important to the Salt River because of the greater volume of water draining from these tributaries.
The Salt River is a narrow and fast moving river in comparison to the shallow, broad, slow moving Gila River. The Salt River carries a greater volume of water because of the numerous tributaries entering into the main channel. The perennial flow of the Salt River was a major natural resource to the Hohokam; in fact, the flow of the Salt River is more conducive to actual canal irrigation than the flood-water irrigation agriculture as is found in the Gila Valley. This is substantiated by the vast network of irrigation canals which exceed 175 miles in the Lower Salt Valley as compared to approximately 75 miles in the Gila Valley Basin and 50 miles in the Santa Cruz-Rillito Drainages.

The entry of the Salt River into the basin begins at the northeastern extremity of the Upper Sonoran Desert immediately west of its junction with Verde River. There is a noted similarity in the low, flat, and arid land of the Salt River Valley west of the Verde River to that found in the Gila Basin.

There are additional problems with the Salt River such as the deep channel cutting, land erosion, and uncontrollable nature of a swifter moving current during a flood season. Yet, the Salt River was harnessed to serve the Hohokam; they managed to construct a more vast network of irrigation canals than was constructed in the Gila or Santa Cruz-Rillito Rivers. There also appears vestiges of Hohokam culture traits and irrigation canals in the Verde Valley but to a lesser degree than in any other region of the Hohokam area.
The boundaries of the Hohokam culture coincide with the limits of these river tributary systems. The extent of useable land was greatly extended by the development of vast irrigation systems. The Hohokam were agriculturalists, and their basic crop economy required water either by rainfall, flooding, or irrigation canal systems. Rainfall has to be eliminated as a source of water because the average rainfall is insufficient to grow crops. Therefore, flooding was used in the Gila Valley where the surrounding land was low and flat; irrigation systems were used in the majority of cases in the Salt Valley. The adaptations were particular to the variations in the river systems. The Hohokam exploited these washes, creeks, and tributaries to expand their sites away from the river courses. In addition to over 500 miles of rivers (Gila, Salt and Santa Cruz), there was an additional 300 miles of canals used for irrigation purposes.

The general geological composition of the Hohokam territory varied little from the farthest western extension of the Gila River near the Colorado River; south, along the Santa Cruz into Mexico; east, to the foot hills of the Gila Mountains; and north, along the Salt River to the Mogollon Rim spurs and White Mountains. As there are several different river systems, Gila, Salt, and Santa Cruz-Rillito it would be expected that there would also be some culturally important variations in the overall uniformity of geological conditions. For example, the soils of these river valleys vary. The Upper Salt-Verde River Valleys have coarse soil which is a result of mineral decomposition; the soil is formed in the "bajadas", a term referring to a fan shaped cut in a mountain side.
Naturally, this section is higher in elevation and rainfall. On this basis, the Salt River can be divided in half; the Upper Salt River is part of Salt River-Verde Region while the Lower Salt River is part of the Gila Basin Region. They both show Hohokam characteristics with some variations and they both show variations in soil composition.

The largest region of the Hohokam area is considerably different from the Upper Salt-Verde Region. The Gila Basin Region includes the Gila River and the Lower Salt River from west of the Verde River junction to the Gila River junction. This region also shows soil variations.

As the tributaries begin the formation of the Gila River, the streams carve slits into the sides of the foothills and mountains forming the "bajadas". The minerals from the "bajadas" decompose into the coarse soil. This is also the case in the upper course of the Salt River and Verde River. However, there are some vestiges of Hohokam there; but none has been recorded in the upper drainage of the Gila River. The coarse soil is extremely fertile in composition and supports a greater quantity of vegetation.

It would appear from the soil composition of both river systems that they are similar; therefore, the question arises as to why the lack of Hohokam sites in the upper drainages of the Gila Valley while there are Hohokam sites existing in relatively the same ecological environment in the Upper Salt-Verde Valleys. If the Hohokam are considered to be primarily agriculturalists and with a high degree of fertility of this coarse soil, then there must be other factors involved which determine the
lack of Hohokam sites in the Upper Gila Valley.

As the Gila River flows into the valley proper, the soil changes from coarse to a fine and silty texture. From the middle Gila Valley to Gila Bend area all the adjacent alluvial plains and terraces are covered by this fine, sandy soil. The flood plains along the course of the river are extremely wide and flat; it floods readily when the Gila River overflows. The condition is duplicated in the Lower Salt Valley. Considering the flood potential of the Gila River, irrigation canals would not necessarily be needed for water; yet, a system of dikes, dams, and basins would be needed to control flood waters and retain needed moisture. Although the soil conditions are approximately the same in both lower valleys, the Salt Valley does not possess extensive alluvial plains; in this valley the solution could be an extensive irrigation system which would be a response to the nature of the Salt River.

A few further comments on the nature of the soils are necessary. The soil in the Lower Gila Valley was defined as a fine and sandy type which does not lend itself as well to agriculture as the coarse and fertile soil washed down from the low foothills. This fertile soil was deposited on the aboriginal soil; this was the important feature that could be found in the Lower Gila Valley. Because the Lower Gila Valley has low flat alluvial plains and terraces, the quantity of irrigation canals was less. The reason is that the flooding river deposited fertile soil over the aboriginal soil. This reduced the necessity for both water to be brought by irrigation canal and fertilization of the aboriginal soil. On the other hand, the Salt River Valley does not have these features; therefore,
there is an increase in the quantity of irrigation canals which at least supplied the needed water for agriculture.

The Gila River is an agrading river which corresponds to the lesser number of irrigation canals. With a richer soil composition and possibly a greater productivity, the population might well have been concentrated in the Gila Valley rather than in the Salt Valley, which it was not. The reason why it was not may appear obscure at this point; it centers around an "alkaline bog" reaction of the soil after considerable irrigation.

The Upper Gila River which is outside the boundaries of the Upper Sonoran Desert does not indicate any Hohokam habitational sites; the Upper Salt and Verde Valleys which are outside the Upper Sonoran Desert show a number of Hohokam habitational sites. What is curious and significant about this section of land between the Verde Junction and Gila Junction is the greater number of Hohokam sites and canals. There would appear to be two habitational correlations for the Hohokam. One would be the low, flat, and alluvial plain sites which are the most abundant of all the Hohokam habitational sites. The second would be a different ecological adaptation to a higher and rougher terrain as found in the Upper Salt-Verde Region. The second habitational correlation has very few Hohokam sites. It could be assumed that the majority of the Hohokam occupational tradition was adapting to the river basins while a marginal segment of the population was adapting to a different ecological situation. But, the Hohokam in the Verde Region still maintained agricultural activities.

By the deepening of the main channel of the Salt River caused by a
greater volume of water, the adjacent alluvial plains and terraces could not easily be flooded during the rainy seasons as could the Gila Valley. Neither, was it readily conducive to silt deposition; if flooding had occurred, it would result in soil erosion. To overcome these problems, an intensive irrigation project was undertaken along the Salt River. The greater volume of water and pressure were more than sufficient to create an optimum irrigation network.

The adjacent river lands could become fertile and productive for agriculture if the proper amount of water could be brought to the lands away from the main channel of the river. Water diversion and control could be one response to the situation. The data indicate that there were numerous irrigation canals in the Salt River Valley which could be inferred as the solution to which the Hohokam did in actuality use. The network of the canals in the Lower Salt River Valley was two to three times the extent as that found in the Gila River Valley (Forbes, 1911; Fewkes, 1912; Halseth, 1936; and Turny, 1929). Water diversion by means of irrigation canal could be extended and controlled almost ten miles or more from the channel with only a few degrees drop in gradient (Halseth, 1932; Shetrone 1945: 379-387).

The geological information is sufficient to understand that there exists two different river systems with particular features. There is, however, one simple and curious effect that irrigation has on each river system which was the "alkaline bog" reaction of the soil. Underlaying the greater percentage of both river systems, there exists a hard-pan clay underneath the soil which is called caliche. The composition is an
alkaline mixture of lime stone elements and salts; it is extremely hard and forms a clay-pan beneath the soil.

"As the irrigation of land increased, the soil absorbed approximately 20% of the water used in irrigation" (Shetrone 1945: 380). When the water reached the caliche hard-pan clay, it formed a hard, solid, non-porous seal which divided the caliche from the top soil. An increase in irrigation caused the water table above the caliche to rise to the surface and affected the crops. The result was disastrous to the Hohokam crops; water-rotting of the vegetation caused an alkaline sediment at ground level. At the surface the intense heat evaporated the rising water table leaving salt deposits on the top soil and destroyed the fertility of the soil. It is easy to see its effect on areas as the Salt River Valley where there was the greatest irrigation network. The time element for this alkaline reaction is not exact but from all available resources dealing with the Hohokam, the situation appeared at least once if not twice in their history (Schroeder 1953: 174-94). The time element and chemical reaction can vary depending on the depth of the caliche, water evaporation, flooding of lands, and soil composition dependent on the intensity of irrigation.

It appears that the effect of intense irrigation might have been more severe in the Salt Valley than in the Gila Valley. It was remarked that the course of the Gila River was conducive to periodic flooding. The periodic flooding of the alluvial plains and the terraces of the Gila River had a beneficial effect on the condition of the soil. Flooding of the alluvial plains removed the saline top soil and washed it away. In the wake of the flooding, the Gila River deposited silt washed down from
the "bajadas". The Salt River did not have this effect but rather the opposite. The information as exhibited in this geological frame of reference could and did affect the distribution of the Hohokam settlements. How it affected the distribution will be discussed later in settlement patterns, but the "alkaline bog" situation should be remembered as having an effect on the over-all settlement distribution.

To conclude this section on the geologic composition of the Hohokam area there are a few additional variations which need to be stated. First, the Lower Salt Valley is similar to the Middle and Lower Gila Valley Basin Region. They do show similarities in Hohokam occupation through time. They vary in types of methods used to supply water to the arid land; the Gila River is conducive to flood-water irrigation while the Salt River is more conducive to canal irrigation. Second, the Upper Gila and Salt River Valleys are approximately the same; there is one interesting and unique variation. The Upper Gila Valley is slightly lower in terrain than the Salt River Valley; the soil, however, is the same in both valleys. Yet, the Hohokam have been found in the Upper Salt-Verde Valleys while the Upper Gila Valley does not show any Hohokam habitational sites. Some possible explanations could be that the Hohokam were restricted by other populations in that area or that the extension of the marginal population of the Hohokam into the Upper Salt-Verde Region provided for better exploitation of the natural environment; or variation in growing conditions required a different ecological system.

The Santa Cruz-Rillito River Valleys are similar in soil content and water distribution to the Gila River Valley. Yet, the Santa Cruz-Rillito
Valleys are higher in elevation than the Gila Valley and represents an ecological intermediate between the Gila Basin Region and the Upper Salt-Verde Region.

CLIMATIC CONDITIONS

The Hohokam area is located in the Upper Sonoran Desert which is extremely hot and has little rainfall. Under these conditions successful agriculture requires irrigation. Assessing these conditions of the Sonoran Desert, Dunbier (1968: 28-30) in his chapter on Climate says, the area was too far south from the mid-latitude westerlies (winds) and too far north to partake of any more than short periods of rain...the mountain ranges which surround the desert forming a cone removed the moisture from the desert area.

The desert region is devoid of moisture in the form of rain due to its geographical location; the only stable form of water supply from which to draw is the Gila, Salt, and Santa Cruz Rivers.

The only rain which does fall in the Upper Sonoran Desert varies with relation to the mountains which enclose the desert. The rainfall (Dunbier 1968: 15-22) varies from a maximum of fifteen inches in the east where both the Gila and the Salt Rivers have their origins in the mountains to a maximum of 8 inches in the west where the Gila empties into the Colorado River. The majority of the Hohokam lived principally in the middle range of these two extremes where the average rainfall is between six to nine inches. When rain does fall it appears in two "rainy" seasons, the winter season and the summer season.

The winter rainy season from November to March covers large areas of
the Upper Sonoran Desert. The heaviest rainfall during this season appears in the central highlands (Upper Salt-Verde Region) which are located on the northeast boundary of the desert. This is also the demarcation line which separates the arid from the semi-arid lands at the 3,000 foot level.

The summer rainfall from July to September is composed of tropical air from the Gulf of Mexico which is laden with moisture. The greater percentage of the moisture is trapped in the mountains, but the rains that do enter the desert are brief showers and sometimes short intensive thunderstorms. These storms which hit the mountains prior to the desert can produce twice as much rain as the entire winter rainy season. The rainfall pattern is invariably difficult to determine because rain is so scattered and is never of long duration.

Some moisture is trapped in the mountains surrounding the Sonoran Desert in the form of snow. It is extremely important in providing run-off water for the sources of the Gila River, the Salt River, and the Santa Cruz River. Again, this all takes place above the 3,000 foot level.

The summer temperatures (Dunbier 1968: 26-28) are hot ranging from 90 to 100 degrees and the mean winter temperatures are cool to mild ranging from 50 to 70 degrees. Only the higher elevations bordering on the northern boundaries are subject to freezing temperatures. The over-all frost free days in these elevations average about 220 days.

The Upper Salt-Verde Region frost free days (Dunbier 1968: 28) are much less than in the other two regions. The lack of humidity and the high temperatures give long periods of dry hot days in the desert basin;
this is sufficient in number of frost free days to almost produce two growing seasons of 120 days for corn. It is observed that the average period of maturation for corn, from planting to harvest, is approximately 120 frost free days. If this can be assumed to be a reasonable number of days, then the Hohokam could have possibly had two such planting seasons. Of course, this is speculation; the climatic conditions, crop rotation, soil depletion, and available water resources had control over this hypothetical proposition. However, these two planting seasons could be considered in view of the number of frost free days and possible irrigation of land.

In conjunction with rainfall, temperature, and wind currents, their effects should be considered. The low relative humidity and intense heat of the Lower Basin coupled with the prevailing winds of the Northern Pacific High and the Sonoran Low cause extensive evaporation of moisture. Moisture in the top soil is quickly evaporated and carried out; this produced the desert conditions of the Hohokam territory. All the southerly and easterly wind's moisture is trapped in the mountainous rims circling the Upper Sonoran Desert. Those winds which pass into the desert were exceptionally dangerous in one respect. As mentioned above (page 22), if the fields had been under irrigation for a considerable period of time, then the water table would rise to ground level. The hot blowing winds would evaporate the ground water and leave the saline deposits on the surface of the irrigated fields. The reaction of the soil causes the "alkaline bog" and unproductive fields.

Today the problem is still in existence; the remedies for the
removal of the saline deposits are electrolysis of the water being irrigated to prevent this situation or the flooding of the valley plains to wash the saline deposits away. This last remedy could have been undertaken by the Hohokam in the Gila Valley (Shetrone 1945: 379-87). The periodic flooding by the Gila River could accomplish both water distribution and saline soil removal.

The climatic conditions throughout the Hohokam area appear uniform in rainfall, temperature, wind conditions, and rates of evaporation. There are variations which are minor in respect to the over-all climatic conditions; yet, they are significant when considering adaptation to a particular environment. An ecologist whose primary goal is to be explicitly objective may not record what he considers as being "minor" ecological variations in the over-all investigation of the area. However, minor ecological variations are extremely significant to cultural adaptations to the various environments. Therefore, these subtle variations would be sufficient causes to allow for regional variations in adaptations.

These are some of the regional variations according to the environmental data. In regard to rainfall the Upper Salt-Verde Region receives more rain than either the Lower Salt-Gila Basin Region or Santa Cruz-Rillito Region. This region is above 3,000 feet in elevation and shows changes in soil, vegetation, and wild life; these characteristics are different from those attributed to the majority of Hohokam sites of occupation.

Rainfall and wind conditions in the Santa Cruz-Rillito Region vary
from those of the Lower Salt-Gila Basin. There is a slight increase in rainfall near Tucson as well as an increase in elevation and mountain ranges while a decrease in wind velocity. There is a definite difference in all three regions regarding climatic conditions.

There is also a question as to the number of frost free days in the Upper Salt-Verde Region; the increased altitude may affect the number of frost free days by decreasing them. However, to compensate for the possibility of a lesser number of frost free days, there could be a corresponding increase in exploitation of the higher potential of the more varied flora and fauna present the year round.

FLORA AND FAUNA

The vegetation patterns should parallel the investigation as found in the terrain, climate, and river system divisions. The areas of general classification are the semi-arid Uplands (Upper Salt-Verde Region) and the arid Desert Basin (Lower Salt-Gila Basin) below the 3,000 foot mark.

The Uplands (Upper Salt-Verde Region) are composed of the low foothills and mountains which circumscribe the Upper Sonoran Desert; these are also the locations in which the origins of the Gila and Salt Rivers are found. In addition to the fertile soil there are other environmental conditions which affect the vegetational patterning in the Uplands. The altitude and the climate show direct relation to the increase in vegetation of the Uplands. The increase in altitude above the 3,000 foot level shows a marked differentiation between the semi-arid Uplands and the arid Basin. There is a more dependable supply of moisture as rain or ground water; this
increases the distribution of the various vegetational forms. The higher altitude indicates a greater percentage of rain; the climate, of course, changes to a cooler range of temperatures. The amount of frost free days is decreased in proportion to the higher altitudes, but the average number of frost free days for domesticated corn is ample for at least one full growing season.

The Desert Basin Lowlands (Lower Salt-Gila Basin) of the Upper Sonoran Desert are in most cases opposite to those described for the Uplands. Considering the Desert Basin, there should be a marked difference in the vegetation below the 3,000 foot level. Based on the observation that altitude and climate shape the vegetational areas, it is assumed that this region has less vegetation. The region is extremely arid as compared to the Uplands. There is a drop of approximately 1500 to 2000 feet from the Uplands to the Basin which would account for the extreme aridity. The soil changes to a fine, sandy composition which lacks the fertility for all but the hardiest plants. The only fertile soil to speak of is that which is washed down from the bajadas of the Gila Mountains; in the Salt River this does not necessarily occur. As the elevation decreases from the mountains to the basin floor, the temperatures increase and the humidity decreases. Moisture appears only in the form of rivers, creeks, or small wells; the vegetation at these points is thick and rich. The vegetation of the hardiest desert variety appears in conjunction with these arroyos and washes; the ground water is obtained along these routes by deep penetrating roots. The winds which bring moisture as rain are caught in the mountain altitudes, and the rain deposited there. By the
time the winds reached the basin of the Gila and Salt Rivers, the humidity was reduced and the temperatures increased. This of course, helps to maintain the desert environment.

In summary, there are two different ecological subsystems involved in this discussion of the Hohokam. If environment can be assumed to affect the cultural manifestations of any given culture, then it could also be assumed that with two different ecological subsystems, the Upper Salt-Verde and Gila Basin Regions, there could be two different ecological potentials for the Hohokam to exploit. What appears to be slight variations to the ecologist may be considerably significant to an archeologist investigating cultural adaptation. Slight variation in environmental and artifact content from sites in the two regions could be inferred as regional exploitation of each ecological subsystem. If the two ecological subsystems were extremely diverse in this case really different systems, then adaptive pressures would be sure to provide a wide variation in the artifact inventory. Since, as will be discussed below, the variations in artifact inventories are not great, it could be assumed that although the two ecological subsystems are slightly different, they did not warrant major adaptive changes. Also, it could be assumed that each region's total potential is being exploited to some degree. In this discussion of regional Hohokam divisions it will be assumed that this is the case.

The division of the flora will coincide with the separation of the environmental zones above and below the 3,000 foot level; in addition, the material on flora will only consider the natural vegetation. The
domesticated vegetation will be discussed under the heading of Subsistence System (Chapter III). The Upland (Upper Salt-Verde Region) vegetation is richer, more diverse, and better distributed than the Desert Basin.

The vegetation (Dunbier 1968: 46-60) in the Hohokam area ranges from small bur bushes to Saguaro cactus to pinon, juniper, and pine trees in the mountainous regions. The most striking difference from Upland to the Desert Basin is the great density of vegetation. The most dominant variety of vegetation in the Desert Basin is the creosote bush, burro bush, and the Fremont bur sage; these varieties are the hardiest vegetation in the Basin.

In the Uplands (Dunbier 1968: 52-60) above the 3,000 foot level there is a greater amount of ground water to support the following varieties of vegetation: palo verde, mesquite, cacti, Fremont thornbush, crucillo, staghorn cactus, prickly pear, cholla cactus, barrel or bizenga cactus, the organ pipe cactus, galleta grass, and to a lesser extent the saguaro cactus and the ironwood. The variety and compact distribution of vegetation is not a problem in the Uplands as compared with the Desert Basin. The conditions in the Uplands are suitable for the compact distribution and variety because of the aforementioned ecological reasons (See Appendix A, Vegetational Subregions Map p 134).

To complete the information on the vegetation, we turn to the Desert Lowlands (Lower Salt-Gila Region) of the Upper Sonoran Desert. There is a less diverse, less numerous, and less well distributed variety of vegetation than is found in the Uplands. The vegetation is sparse and only
the hardiest of desert vegetation can endure the intense heat, low moisture, and sandy soil.

The varieties of vegetation (Dunbier 1968: 46-52) are composed mainly of creosote-bush and burro bush; these plants make up 95% of the vegetation below the 3,000 foot level in the arid Basin. Both these plants are well adapted to the desert because they are drought resistant and need little moisture. The remainder of the vegetation is composed of the following: palo verde, mesquite, ironwood, and galleta grass. Any increase in the density of the vegetation can be attributed to the location of acquifers (underground pools) along the washes and the arroyos (See Appendix A, p.127). Again if one considers the climate and the altitude, it would be reasonable to expect the scarcity of vegetation; those that survive are hearty, drought resistant, and desert adaptive plants.

These data again indicate that there is a slight variation in the two ecological systems. The Lower Salt-Gila Basin Region shows the most adverse ecological conditions of the two; yet, the majority of the Hohokam sites could be identified in this region. It also shows the longest sequence of occupation in the entire Hohokam area. If exploitation of the natural environment was the basis for the subsistence system of the Hohokam, then it would appear that the Upland Region would be more amiable to this type of economy. But, it appears that the Hohokam were primarily agriculturalists rather than hunters and gatherers; this may be inferred from the artifact inventory of the Hohokam as well as from the extensive irrigation networks.

Although the Upland was more suitable to a hunter-gatherer economy,
the Hohokam in this region also maintained an agricultural economy. The Upland Region shows a later development of Hohokam cultural traditions; this could be a result of later migrations of Hohokam peoples into the Upper Salt-Verde Region. Because of the slight variations in the ecology of the two regions, there is little evidence to assume that the Hohokam in this region were adapting significantly different. The exploitive potential was present; yet, there was no apparent shift in the form of subsistence while there were slight variations in utilitarian artifact inventories of the Hohokam in the Upland Region. This could be inferred as a more successful adaptation to a more varied ecological potential.

To complete the ecological picture of the Hohokam area, the fauna must also be discussed. Again, the availability of fauna resources can only be spoken of in terms of the environment which supported them.

Approaching the Uplands the dominate game was deer, antelope, and sheep. In addition there are several other animals which could be described as food sources, animals such as gopher, rabbit, squirrel, rodents, turkey, and raven as well as sturgeon (Gladwin, 1937; Kroeber, 1939; and Dunbier, 1968). The Lowland Basin, climatically, limits the variety of animal resources in the region. The decrease of other natural resources as vegetation below the 3,000 foot level proportionately decreased the available game. In the Lowlands the "primary game" was rodents, rabbits, and wild turkeys. The rabbits and rodents appear as the main sources of animal protein because of the great numbers of bones recovered from archeological excavations. The Pima, according to Castetter and Bell (1943), Gladwin (1937), Underhill (1941), and Ezell (1963), are the
present living descendants of the Hohokam who also occupy the same territory; the Pima say, "they (Hohokam) are eaters of rabbits" (Castetter and Bell 1943: 151). In addition to land game sources for animal protein, river sources as sturgeon were used to supplement the need for protein in the Hohokam diet. Other means of non-vegetal food sources were several varieties of birds such as eagles, ravens, and hawks.

In reviewing the faunal inventory for the Hohokam area, there are some concluding remarks to substantiate the problem of regional subdivisions. The Basin Region is composed of the Lower Salt and Gila Rivers which lacks the variety and quantity of vegetation which could support a large number of game. There may be many other adaptations which could have been incorporated by the Hohokam in the Desert Basin. Two such possible adaptations could utilize the available natural resources as flora and fauna which indicates a hunter-gatherer economy or agriculture. However, it is suspected that these could be the extreme cases and that in actuality the subsistence economy would be a combination of the two possibilities. This could be a reasonable assumption because the Hohokam in the Gila Basin did possess agriculture, but they also utilized the natural resources to compliment their agricultural diet. This could be assumed to be a better balance between the natural environment and the domesticated produce; one or the other could be relied upon depending on the ecological conditions in the region which could be jeopardized by drought, soil fertility, or natural calamities.

The Santa Cruz-Rillito Region of the Hohokam area, in reality, is in the same ecological position that the Gila Basin Region is. But, a slightly
higher altitude, more rainfall, and a greater distribution of vegetation could produce a slightly richer faunal resource potential which could have produced a better balance between natural resources and food producing resources. In times when agriculture could not be relied upon for one reason or another, then natural resources could be temporarily exploited.

An even greater exploitation of natural wild life could have taken place in the Upper Salt-Verde Region. The environmental conditions indicate a greater abundance of wild game for use as food supplies. All of the other environmental indicators would point to this observation. If this can be substantiated, then there exists a greater possibility that reliance on natural resources, as wild life, could replace a strict agricultural adaptation. Although there is an ample number of frost free days for growing corn, exploitation of the greater available wild life might be shown to be a greater part of the Hohokam diet than grown staples. Ecological variations in climate, rainfall, vegetation, or number of frost free days might not be a pre-requisite for survival in the Upper Salt-Verde Region because of the abundant natural resources. Yet, there were indications of both agriculture and exploitation of the natural environment with what appears to be a greater exploitation of the natural resources than in any other region of the Hohokam area.
CHAPTER II

THE SUBSISTENCE SYSTEM AND SETTLEMENT PATTERNS

The domesticated plants which were probably used by the Hohokam must be introduced to complete the environmental conditions. The question of where or how these domesticates were introduced into the area is not the concern of this thesis.

DOMESTICATED SUBSISTENCE RESOURCES

Some corn has been found in the archaeological record as well as some beans and rinds of pumpkins. But, for the most part extensive recovery of corn from archaeological sites is non-existent; there is also the lack of botanical investigation as to the species of maize, beans, and pumpkins which is related to the lack of recovery from the excavation. A possible solution to the lack of extensive amounts of corn being found in the archaeological record can be inferred from the ethnographic data for the Pima and Papago Indians. The Pima today do not discard corn cobs which may still have kernels of corn; they, instead, use the corn cobs as a source of fuel. This would be reasonable considering the lack of other fuels, such as wood. The corn cobs are used as wood for heat during cool nights; the burned cobs leave a powdery substance which is easily diffused into the soil. Therefore, it would stand to reason that much of the information on the variety of maize would be lost, if it can be assumed that the Hohokam were using the discarded corn cobs in the same way. Other data which are lost are the botanical data on the number of rows of corn; it can not be
determined whether the corn type was of the 8, 10, or 12 row variety.

Evidence for cotton was also found in the archeological record which could be used to infer that weaving was being done; at Snaketown there is good evidence that cotton was used for weaving as seen by the cloth found in the archeological record. Other domesticates in evidence were screw beans and squash.

In regards to the distribution of the domesticates in the three regions of the Hohokam area, an areal investigation has not been attempted. They do indicate that there was corn being grown in all three regions; there is no information as to the varieties of the corn as found in these regions. The other domesticates mentioned above have not been found in the data presented in this investigation. The situation is one of extreme importance in understanding the regional adaptation of the Hohokam; it would be most interesting and add considerable support to this theory if the other domesticates were absent in the other regions, but each region appears to have cultivated corn.

In considering the vegetation distribution, variations can be seen. The most notable geographical location is the Upper Salt-Verde Region; it could be expected that natural vegetational resources would be more abundant than in the Lower Salt-Gila Basin Region. Following the geological and the climatological data natural vegetation should prosper. Therefore, there is a growing suspicion that besides the domesticated resources there could be a greater quantity and variety of natural resources being utilized by these Hohokams. This should appear in the archeological record as either the natural materials themselves or those
artifacts which may be inferred to be used in preparation of those natural resource materials. Again, there are insufficient data to compare the regions with regard to exploitation of natural resources; they can only be inferred from the variations that exist in the environment. The assumption taken here, based on the environmental data presented in this investigation, would appear to indicate that the exploitation of the natural resources is regionally different.

The domesticated resources may not vary in accordance with the variation of the natural environment. The domesticates because of irrigation were probably available in all the regions of the Hohokam; the reliance upon these domesticates as the principle subsistence resource is another issue. If there are these ecological variations which appear in the geographic, geologic and climatic conditions, it could also be expected that adaptation to the natural environment could vary as well. Therefore, there may also be variations in other adaptive characteristics such as activities, activity areas (defined by artifact association), and structural features.

Extensive irrigation canal systems have been frequently referred to in the previous sections. This is one of the most distinctive features of the Hohokam tradition. As the Hemenway Expedition revealed in their research, the irrigation canals were a complex and extensive means of drawing water from the Salt River. Many canals have vanished because of natural erosion and disintegration as well as the destructive intervention of man. However, there are many indications that the ancient Hohokam canals are still being utilized by the Pima and Papago Indians (Castetter and Bell, 1943; Gladwin,
In this discussion, the object is not to define in every detail the aspects of Hohokam irrigation canals but to describe the range of distribution of these canals.

The Gila River was conducive to flood-water farming. Canals in the Gila River system were primarily for drainage and redistribution of the flood-waters rather than bringing water to an otherwise arid country. On the other hand, irrigation canals in the Salt River Valley are more extensive. The flow of the Salt River is not conducive to flood-water farming. The Salt River is an eroding type of river and with a greater water supply; the Salt River could be treacherous when flooding. These factors could be adapted to support an extensive irrigation system to bring water for agriculture as far away as 10 miles from the river channel (Halseth, 1932; Hodge 1893: 123-30). The expedition maps of Hemenway showed the complexity of the irrigation network (Haury, 1945b). In addition to irrigation of agricultural lands, the canal systems formed a flood control network as well. As in the case of flood control in the Gila River system, control of water from the Salt River was also necessary.

The Santa Cruz-Rillito Region does not indicate an extensive irrigation network. It is plausible that other means of water diversion other than irrigation canals were used. Washes, dried creek beds, and riverlets could be pressed into service; there are many of these systems scattered throughout the Santa Cruz-Rillito Region. Even today these drainage systems are used during the "flood season" to divert water from either the Rillito or Santa Cruz Rivers. The use of natural drainages has been found in all regions of the Hohokam area, but it appears that the terrain in the
Santa Cruz-Rillito Region would allow this type of water diversion to flourish. The natural drainage systems would accomplish the same goal with a comparatively limited amount of time and labor.

After examining the various types of irrigation systems and the proposed regional variations of the Hohokam area, there are some basic correlations which could be advanced to further support regional variation of the Hohokam. There are actually three types of irrigation systems in use throughout the Hohokam area; these are natural drainage irrigation, flood-water irrigation, and canal irrigation. These different irrigation systems can be related to the different terrains of the area; they also would indicate the variations in the adaptive mechanisms of the regions. The natural irrigation by use of natural drainages can be found in the Santa Cruz-Rillito Region; the flood-water irrigation system can be found in the Gila River system while the canal irrigation system can be found in the Salt River Valley. The individual systems reflect the diverse natures of the river systems and the terrains involved with each region. Each system does have cultural consequences for the Hohokam. If the various means of irrigation systems can be assumed to reflect the variations in the adaptive mechanisms, then there could also be other variations in other aspects of the Hohokam culture.

SETTLEMENT PATTERNS AND HOUSE TYPES

Settlement patterns are important and valuable tools in the investigation of environmental adaptation. The ramifications are worthy of the time spent in this discussion of how man adapts to the natural en-
environment, his structures, their relationships to other structures and the
distribution of the sites themselves. Adaptation and distribution are key
factors in this research; their importance and usefulness will be stated
after presenting the definitions of house types derived at the Snaketown
site. The association of house types with regional adaptation will be
investigated. Theoretical propositions concerning house structures and the
various adaptations will be advanced.

A typology of houses at Snaketown was established in two ways. The
first was based on controlled stratigraphic excavation of the site. The
oldest house type or "reconstructed" house type is that which is
stratigraphically the deepest beneath the surface. The second method was
based on the cultural evolution of the house styles proceeding from the
most crude to the most refined or from largest to the smallest in floor
area or vice versa.

At Snaketown these were the criteria for describing and defining house
types: shape or floor plan, wall and roof features, entryway, construction
features, and materials. In some instances there can only be "hypothetical
reconstructions" of certain house type features because of the incompleteness
of the archeological record. Yet, there was sufficient archeological data
on which Gladwin could base a "hypothetical" model. This hypothetical model
of Hohokam house features only provides information on general architectural
features which will be presumed to be the "normative" design. This model
will provide a general framework against which explicit detailed statements
may be made when comparing and analyzing the Snaketown house type data with
the other two regions of the Hohokam area.
The Hohokam culture tradition begins in the Vahki phase of the Pioneer period at the Snaketown site (See Table 1, P. 51). House structures were exceedingly large in all categories when compared to later structures. They were square (about 12 m), having subterranean foundations, earth-covered walls and roof, primary support by large (exceeding 15 cm. in diameter) posts in each corner, secondary support from a series of peripheral poles around the edge of the subterranean foundation, and lateral entryway. Through the following Estrella phase the dimensions of the floor plan shifted to a smaller surface (6-8 m square) area and primary support was by rows of posts. During the Sweetwater phase, the change to a smaller floor area is in evidence with a change from a square floor plan to a more rectangular floor plan; the other feature changes show a change in location of primary support and a decrease in the over-all dimensions to an average of 5 m by 5-7 m. in rectangular plan. The last phase of the Pioneer period, Snaketown, continued to show a trend towards the rectangular floor plan; the other feature changes show change in location of the primary support towards the center line of the structure and a decrease in the over-all dimensions to an average of 3 m by 5-7 m in rectangular plan.

The Colonial period composed of two phases, Gila Butte and Santa Cruz, continued in the same fashion as the Snaketown phase. However, there is evidence of some stability in the dimensional characteristics and all other features. One exception may be the rounding of corners of the rectangular house floor plan. Another was the increase usage of a narrow covered vestibule leading to the entry of the structure. Major support was along the central axis with secondary support peripheral to the foundation.
The final house type from the Snaketown site is the Sacaton phase type of the Sedentary period; this is the last phase of occupation at the Snaketown site. The Sacaton phase shows variations in floor plan, support, entryway and construction. The floor plan changes from rectangular with rounded corners to oblong or elliptical. Major or primary support is produced by 3 large posts along the major axis. The entryway is changed from the long and narrow type to a short bulbous one. Changes are noted in construction techniques such as pole support and floor rimming.

There are seven phases defined at the Snaketown site with their associated house types. An additional phase determination in the Sedentary period, the Santan phase, has been removed because of insufficient data to warrant its division from the Classic period (Gladwin, 1948). It appears that the elements which were used to define the Santan phase were more closely related to the Classic period in architecture, ceramics, and site distribution than to the same elements in the preceding Sacaton phase of the Sedentary period. The Classic period is composed of two phases, Soho and Civano, which are not represented at the Snaketown site. The Soho and Civano phases are defined elsewhere in the Hohokam area; Los Muertos and Casa Grande reflect these house types defined for the Classic period. Since the above house type information is specifically associated with the Snaketown site, the information on Classic period house types will be presented in Chapter III.

Some additional information should be introduced concerning the frequency and continuation of the house types at Snaketown. The house data from the Snaketown site are limited in quantity and description of the
early phases of occupation there. For example, the earliest phase, Vahki, is represented by only two structures; only one is described in the literature. There is only one Estrella structure at Snaketown which is described; there are two Sweetwater structures at Snaketown of which only one is described. Finally, there are seven Snaketown phase structures which only five are described. This should indicate that there will be discrepancies between the actual numbers of structures found at Snaketown and the actual data used for this investigation. However, certain statements about frequency could be made based on this data such as the architectural features of the floor plan. For example, with only two examples of Vahki structures present at Snaketown, the square floor plan appears to be the trend for that phase. In the Sweetwater phase there are seven examples of this house type; only five are described. However, they do not appear to be uniform; three are rectangular and two are squarish. The frequency of one particular floor plan could immediately be questioned in this phase. These are two of the existing problems; another is continuation of "apparently" similar floor plan through the entire occupation of the Snaketown site.

The square plan appears in both the Vahki and Estrella phases while in both the Sweetwater and Snaketown phases there appears to be both square and rectangular plans. In the Colonial period the house floor plan appears to be consistently rectangular; in the Sacaton phase of the Sedentary period the house floor plans are oblong. Variations in the range of dimensions of the floor plans appears to decrease in total area from the Vahki phase to the Snaketown phase where the floor area in rectangular form remains constant through the end of the Colonial period. The Sacaton phase floor
plan is oblong and shows a slight decrease in total surface area.

AREAL DISTRIBUTION OF HOUSE TYPES

On the basis of data presented in the above section, it may be assumed that these house types would not be found in all three Hohokam regions. The distribution of the house types defined at the Snaketown site would only refer to one of these subregions, Lower Salt-Gila Basin. How the distribution of these house types varies in the Upper Salt-Verde River Region and the Santa Cruz-Rillito Drainages and how this class of data may be related to adaptation to specific regional environment is the subject of this thesis.

The Hohokam were adapting to three slightly different regions with three slightly different cultural potentials. The Lower Salt-Gila Basin is one of those regions; it is in this region that the exploitation of the natural resources is extremely limited. The adaptive mechanism operative to warrant the tremendous number of Hohokam sites sustained for over 1,000 years was flood-water agriculture and the use of irrigation canals. In this manner, the Hohokam agriculturalists could have produced sufficient supply of staple crops to maintain its population. The house types associated with this region are those described for the Snaketown site.

The Upper Salt-Verde Region is more conducive to exploitation of the natural resources rather than production of domestic crops. However, there are vestiges of both agriculture and exploitation of the natural resources. The Hohokam in this region range from late Colonial period through the end of the Classic period; the regional sequence is from the Hackberry phase
through the Tuzigoot phase (see Table 1). In this subregion it could be assumed that reliance upon domestic agriculture was not the total means of subsistence. If this were the situation, there could be many variations in the artifact inventory, activities, and ultimately house structures as compared to the house sequence defined for the Lower Salt-Gila Basin. Architectural variations do appear in this region. Some of these variations are the types of material used in construction as slab masonry and wooden panels, to variations in features of support for roof, to variations in floor features as storage pits in the floor, and to variations in floor plan (See Appendix C, Comparative Feature Tables).

Through the Santa Cruz-Rillito Drainages are similar to the Gila Basin, there are some significant variations in environment, water sources, and occupational history. On the basis of settlement, this region is later in time than the Lower Salt-Gila Basin Region; these regional sites begin 800 years after the earliest known Hohokam occupation in the Gila Basin. It would seem that if environmental conditions such as increased water availability could be influential to settlement in this region, then why had the Hohokam occupied this region much later than they did in the Gila Basin? One possible explanation which could be advanced would be that the Hohokam established themselves in the Gila Basin devising a productive means of flood-water agriculture, then expanding population caused migration of peoples into different regions. With the natural drainages in and around the Santa Cruz-Rillito Region, the Hohokam did not have the same water resource situation which was in the Gila Basin. The river systems in this region did not have the same effect that the Gila River had; yet, there was
a better supply of rain-water than in the Gila Basin. With increase in rainfall and the use of natural drainage systems, the Hohokam in this region established an agricultural economy. The apparent variation in this adaptive mechanism could also be correlated with variations in other aspects of cultural traditions such as house types. This seems to be the case since there is a significant variation from the house type sequence in the Gila Basin. Some of these variations in the architectural features are the stepped entrance in place of the vestibule type, a rectangular to squarish floor plan throughout the entire length of occupation of the Hohokam in this region, and the presence of contiguous structures which are absent at Snaketown. Therefore, the significant ecological variations which will be assumed to affect the adaptative mechanism of the Hohokam in this region may have also affected the house sequence in this region when compared to that established for the Lower Salt-Gila Basin Region.

The data for this discussion of house type and site distribution were collected from sources which included excavation data. These data are few in number; most site information is based on ceramic identification often based on surface collection of ceramics only. Ceramic identification is valuable in locating the distribution of the actual number of sites by phase in the Hohokam area. But, there are many more aspects of cultural manifestations which are needed to solve archaeological problems. The data needed for further investigation of this problem are house type information, burial customs, artifact industries other than ceramics, distribution of houses within a site, the distribution of artifacts within a structure, and flora-fauna associations found within the site and the structures.
What site distribution information there is reveals that the Hohokam occupied the Lower Salt-Gila Basin from the Vahki phase through the Civano phase; the Upper Salt-Verde Region sites were occupied from the Santa Cruz phase through the Civano phase (Hackberry through the Tuzigoot phases); the sites in the Santa Cruz-Rillito Drainages range from the late Santa Cruz phase through the Civano phase (Rillito-Rincon through Tucson phases).

The exact number of known sites will be presented in the later discussion of the data on house types. Discussion of variations in artifact content, activities, industries, and house type information will be summarized after further review of the Hohokam sequence and cultural manifestations at Snaketown.
CHAPTER III.

REGIONAL VARIATIONS IN ARCHITECTURE, CERAMICS
AND OTHER ARTIFACTS

To establish a pattern of developmental change it is necessary to begin to work within the framework of the traditionally accepted divisions of the Hohokam culture (See Table 1).

The periods and phases were established on a ceramic sequence at the first Pecos Conference 1926. Since both the existence and development of the Hohokam culture was predicated on the ceramics, the author of this paper tried a different approach to the determination of the period-phase designations. Several other "diagnostic" variables were compared to the traditional southwestern ceramic sequence; these "diagnostic" traits were house architecture, stone artifacts, and burials.

For example, one diagnostic trait assumed to be associated with the Hohokam was the cremation of their dead. This trait was traced in lieu of ceramics. In the early phases of the Pioneer period, there were some inhumations existing side by side with cremations. However, where cremations have been identified with Hohokam sites, there is always ceramics of that particular phase associated with the cremation. Cremations continue in all phases while the ceramics which are associated with the cremations vary from phase to phase.

Only in the Gila Basin did the architecture of the houses parallel the
<table>
<thead>
<tr>
<th>PERIOD</th>
<th>GILA BASIN (GLADWIN, 1937)</th>
<th>SANTA CRUZ (HAYDEN, 1957)</th>
<th>PAPAGUERIA (WITHERS, 1944)</th>
<th>VERDE VALLEY EASTERNITZ, '62</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLASSIC (1100-1450 A.D.)</td>
<td>CIVANO</td>
<td>TUCSON</td>
<td>SELLS</td>
<td>TUZIGOOT</td>
</tr>
<tr>
<td></td>
<td>SOHO</td>
<td>TANQUE VERDE</td>
<td>TOPAWA</td>
<td>HONANKI</td>
</tr>
<tr>
<td>SEDENTARY (900-1100 A.D.)</td>
<td>SANTAN</td>
<td>RINCON</td>
<td></td>
<td>CAMP</td>
</tr>
<tr>
<td></td>
<td>SACATO</td>
<td>RILLITO</td>
<td>VAHORI</td>
<td>VERDE</td>
</tr>
<tr>
<td>COLONIAL (500-900 A.D.)</td>
<td>SANTA CRUZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GILA BUTTE</td>
<td></td>
<td></td>
<td>SQUAW</td>
</tr>
<tr>
<td>PIONEER (300 B.C. - 500 A.D.)</td>
<td>SNAKE TOWN</td>
<td></td>
<td></td>
<td>PEAK</td>
</tr>
<tr>
<td></td>
<td>SWEETWATER</td>
<td></td>
<td></td>
<td>DRY</td>
</tr>
<tr>
<td></td>
<td>ESTRELLA</td>
<td></td>
<td></td>
<td>CREEK</td>
</tr>
<tr>
<td></td>
<td>VAHKE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 1: Comparison of Regional Hohokam Sequences**
developmental sequence of the ceramics. The lithic artifacts produced little information to contradict the developmental sequence of ceramics. It is apparent that in constructing the Hohokam ceramic sequence there is emphasis on the stylistic variations from one phase to another. Lithics in this case remained fairly constant; there were little stylistic variations in the lithic industries which have been recorded by the investigations. The lithic artifacts did not show a wide variety of uses which could be inferred as stabilized uses of lithic tools for grinding purposes, projectile points for hunting, and bowls for storage. The subregional variations will encompass the majority of this investigation.

Ceramics present only one aspect of cultural manifestations. They can give the time-space distribution, but they do not give other information on the site itself, the types of houses, the subsistence, the other artifact industries, and the full range of activities being performed in and around the structure. The other aspects of the culture are important as well. The approach used in this investigation attempts to utilize other aspects of cultural manifestations. Data on architecture, for example, could produce information on the type of structures, the materials being used and how they reflect the exploitation of the environment, the distribution of houses and their relation to the natural resources or to a central feature of the site. Activity areas and industries other than ceramics could reveal patterns of activities and distribution of those activities within and around the structures. They could also provide data for describing the various stages of manufacture. There are many aspects of Hohokam culture and its regional adaptability which the classes of data used in this investigation could reveal, which ceramics could not possibly
Pioneer Period: (300 B.C. to 500 A.D.)

The Pioneer period is broken into four phases each lasting 200 years in duration from 300 B.C. to 500 A.D. Prior to the excavation of Snaketown (1934), the earlier phases of the Hohokam were hypothetical. There are still few known sites which can be placed in the early phases of the Pioneer period. These sites generally are located in the Basin. There is little agreement concerning the origins of the Hohokam, and most speculation has been based on ceramic resemblances and theories concerning the development of ceramic styles.

Certain individuals feel that the Hohokam were migrants known as the Hakataya who moved north from Mexico... based on the strain of corn, treosente, which was readily adaptive to low moisture and the ceramic similarity to the wares of the Tarascan area of Mexico (Schroeder 1964: 297-310).

Still others indicate a regional development from the Cochise culture (Martin and Rinaldo, 1951). Ceramically, there are a great many resemblances in the pottery of the Hohokam Red Ware to that of the Mogollon culture's Brown Ware. Some early Hohokam sites west of the Mogollon Rim (Upper Salt-Verde Region) and in near proximity to the Mogollon culture could possibly show some similarities due to diffusion. However, such resemblances could also have developed in a parallel manner from the basic Cochise culture. Others (Haury 1950: 58) prefer to attribute Hohokam culture to an indigenous group which adapted to uplands and then the desert basin during the Pioneer period. Gladwin specifies these traits as
diagnostic of the first Pioneer period phase, the Vahki:

<table>
<thead>
<tr>
<th>Special</th>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>House</td>
<td>Handstone and Hammerstone</td>
</tr>
<tr>
<td>Absence of decorated pottery</td>
<td>Stone Vessels</td>
</tr>
<tr>
<td>Nano and Metate</td>
<td>Shell Disc, bracelets, thin</td>
</tr>
<tr>
<td>Cremation Type</td>
<td>Beads, Turquoise Pendants</td>
</tr>
<tr>
<td>Small flat abrading stones</td>
<td>Projectile Points, figurines</td>
</tr>
<tr>
<td></td>
<td>Rubbish in pits</td>
</tr>
</tbody>
</table>

(After Gladwin 1937: 253).

The Vahki phase can be defined as an adaptation to the Desert Basin areas. It is identified ceramically by an unpainted pottery of either brown, gray or red color, smooth and mica specked, with the same approximate type of paste (See Ceramic Chart for the Snaketown Site, Appendix B). The absence of painted ceramics separates the Vahki from the later Estrella phases.

Architecturally, the Vahki phase house was a large square pit house averaging about 12 m by 12 m. The depth of the pit houses were approximately .5 to .75 m in depth. The roof was flat or slightly gabled and supported by several roof posts and cross beams. The entrance faced usually to the east with a ramp entrance grading down into the house structure. The whole structure was covered by a generous application of caliche over brush piled over the central frame structure. The Vahki phase house has been considered to be a "communal house" which may have housed more than an extended family (Gladwin, 1937; Breternitz, 1962).

Burials were cremations which were found in two contexts. They were either of a single pit cremation or of a trench variety; in either case the burials were accompanied by ceramic bowls and jars usually broken; few
points and amulets of stone were found in the cremation.

Other stone artifacts indicated preparation of vegetal matter with two handed manos, metates, mortars and pestles, hammer stones, carved bowls, and projectile points were also present, and resembled Cochise culture (c.f. Martin, et. al., 1951).

The Estrella phase continued in what Gladwin proposed as an evolutionary-developmental sequence. The ceramics were used to demonstrate this sequence. There was a continuation of the Vahki Red Ware and the plain wares of brown and gray. The additional painted ware was Estrella Red-On-Gray with variations in design from fine lines to blob design. Surface treatments included incising and coiling marks.

Architecturally, the house type showed a evolutionary-developmental progress toward a smaller compact house. The size of the structure was reduced from 12 m² to 6-9 m². The roofs were flat and there was no need of extensive roof support by virtue of the smaller house size. The house was a pit house with the brush and caliche mud covering. The entrance remained ramped and usually facing east.

Burials were predominantly of cremation variety as found in the Vahki phase with the same broken ceramics associated with the cremation. The cremations were either of the individual pit type or were of the trench type. Stone artifacts were a continuation of those discussed in the Vahki phase.

Gladwin indicates the primary changes from the Vahki phase to the Estrella phase by the following:
Practically all traits found in the Vahki phase are also present in the Estrella phase. Distinction between the two: Houses, which are smaller than the Vahki phase, but larger than other phases; pottery which showed painted decoration; and whole shell beads.

(After Gladwin 1937: 254).

Gladwin defined the Sweetwater phase on the following:

Pottery, greater refinement
Houses, smaller than Estrella
Turquoise, used in mosaic
Incised bone, cut shell pendants
Stone Vessels, carving and incising appeared
Sheet rubbish and pit rubbish

(After Gladwin 1937: 254).

The Sweetwater phase showed a marked variation in ceramics. The straight lines of the Estrella phase were replaced by chevron patterns, spirals were drawn, and curvilinear designs were introduced to the decoration repertoire of the Hohokam. The Vahki Red Ware and the Gila Plain (brown and gray pottery) continued as well as the formulation of a new decorated ware, Sweetwater Red-On-Gray. The curvilinear design elements distinguish it from the straight line design of the Estrella Red-On-Gray.

Architecturally, the structures remained fundamentally the same. The houses were the same in the type and construction as those in the Estrella phase. The only change was a continued reduction in the total floor area. The reduction in the size, in this case the total floor area, could be inferred as more suited to a smaller family unit.

Burials continued as either the earlier pit or trench cremations with the associated ceramics of that phase. Stone artifacts showed a tendency toward a finer and more ornate design.
The lithic work was a better grade of workmanship than in the previous phases. The majority of stone artifacts seemed suited to serve utilitarian needs, though finely carved bowls, jars, amulets, and palettes are also present.

The last phase of the Pioneer period was labeled Snaketown. According to Gladwin (1937: 254), all the traits established in the Pioneer period reached their culmination during this phase. The Snaketown phase marked an end to the initial adaptation and manifestations of the Pioneer period.

The most affected artifact industry was the ceramic industry of the Snaketown phase. There was a continuum in the two traditional wares of the utilitarian variety; these were the Vahki Red and the Gila Plain pottery types. Each phase of the Hohokam sequence has been defined by variation in stylistic attributes of their ceramics; in later phases the distinctive styles of decorated pottery separated those phases. Snaketown phase produced distinctive pottery, Snaketown Red-On-Buff. Prior to the Snaketown phase, the red decoration overlaid a gray base; now, the red decoration was placed over a buff surface. This particular type of Red-On-Buff Ware has been considered the most typical of Hohokam pottery. The application of the design showed a marked variation of curvilinear and straight lines, paneling, hatching, and cross-hatching while there was a decrease in other surface treatments.

Architecturally, there was a shift from the squared structures of the earlier phases to a more rectangular design as well as a change in the
design of the supports and caliche mud covered brush roof. The rectangular style of house plan. The Snaketown phase structures remained a pit house type, continued to use the brush and mud covering; but it reduced the number of supports within the structure and placed them outside the structure around the periphery of the pit. The floor area remained constant; if there was a trend in evidence, it would be that the floor area dimensions were being slightly reduced in total surface area. This would coincide with the need of less interior support for the entire structure.

Burials continued in the cremation tradition. Little information has been collected from the burials other than the ceramic data. Inhumations have also been noted in this phase (Breternitz 1962: 18-19). The reliability of using cremation as a diagnostic element for the Hohokam cultural tradition is questionable.

It appears that the Snaketown phase was producing a more varied class of stone objects. The suggestion is that specialization of tools for more diverse uses within the society had occurred. There was a stylistic continuum along the bowl, jar, palette, projectile point lines.

The traits which define the Snaketown phase can be listed as:

Pottery; designs, although chiefly geometric, were distinct from those of the earlier phases, negative painting, hatching, cross-hatching.

Projectile points, first appearance of the laterally notched Stone Bowls; first appearance of the handled dipper

Bordered Palettes

Carved Bracelets

Figurines, more detailed

Ground stone tools; as in earlier phases, reamer, whetstone, knife, polished stone

Axe; three-quarter grooved, with raised ridges beside the groove.

(After Gladwin 1937: 255).
Colonial Period: (500 A.D. to 900 A.D.)

The basic adaptation to the Hohokam's areal environment had most assuredly been accomplished by the time of the Snaketown phase in the Gila Basin. During the Colonial period amplification and diversity were the key words to indicate the spread of Hohokam sites into all the subregions. The Colonial period has been divided into two phases: the Gila Butte phase and the Santa Cruz phase. The first phase has been called a transitional phase between the Pioneer period and the Colonial period. The majority of diagnostic traits which had appeared in the Pioneer period were carried over into the Gila Butte phase. According to Gladwin (1937: 256) "all earlier features were present, but it now clear that new influences began to make their presence felt...the first contact with the Basketmakers is shown by ceramic intrusion". There was considerable speculation that this already existed in the early phases, but has remained a hypothesis.

The Gila Butte phase is defined by:

Pottery: decline in former techniques as scoring, hatching, geometric designs, use of conventionalized scrolls, repetition of elements life forms, trailing lines, flare rim bowls.
Palettes: true palettes, thin, rectangular, raised, ornamented.
Cremations: offerings of whole vessels were placed with the remains of burned bones, ash.
Mosaic Plaques: with straight sides, made their appearance.
Figurines: heads modeled more true to nature.
Rubbish piled on low mounds rather than scattered as a sheet.
Ball Courts: made their first appearance.

(After Gladwin 1937: 257).

The ceramic information indicates a flair for more expressive designs and patterning of the designs. The basic types of ceramics found in the sequence were the Gila Butte Red-On-Buff and the continuation of the Gila
plain Ware. The Red Ware which had been in all the phases of the Pioneer period was no longer made; instead, there was a shift to strictly plain ware. The Gila Plain was a continuation of a tradition which remained throughout all phases.

Architecture of the Gila Butte phase was similar to that of the Snaketown phase. The rectangular layout of the Snaketown phase house was supported by the numerous roof and wall supports as was the Gila Butte type. The Gila Butte phase continued to decrease in size of floor surface dimensions. It can be described as narrower in design with less roof support by posts and additional wall support. The vestibule entrance continued as well as the materials for roof construction of brush and mud over a slightly gabled roof.

Burials were restricted to cremations in pits; trench cremations had disappeared. The cremations were again associated with the particular ceramics of the phase with additions of beads, amulets, and palettes.

Stone artifacts continued as they did in the Snaketown phase with one exception. Palettes which had been present in all earlier phases were found in greater numbers. The designs appear to be more ornate than those from the preceding period.

The final phase of the Colonial period was the Santa Cruz phase. It had been suggested (Gladwin 1937: 260) that this phase initiated the peak of the Hohokam culture which generated the following Sedentary period. At this junction the question arose as to why this phase was separated from
the Sedentary period; the answer seemed to be that the Santa Cruz phase amplified the traits of the Colonial period only. Just as the Pioneer period accomplished the basic adaptation to the arid environment, so the Colonial period, especially the Santa Cruz phase represents the beginning of the amplification of the Hohokam culture. Gladwin based this conclusion solely on his assessment of the aesthetic developments in ceramics, architecture, and stone artifacts.

The Santa Cruz phase was based primarily on the establishment of a Santa Cruz Red-On-Buff ceramic type. Each phase was predicated on a particular Red-On-Buff ceramic type. Following the traditional Gila Plain came the introduction of a Santa Cruz Red-On-Buff and a Santa Cruz Buff Ware. The latter was the same type of ware upon which Santa Cruz Red-On-Buff was based but without the red decoration. The designs of the ceramics were a continuation of the flow and smoothness of line of the Gila Butte Red-On-Buff type.

Architecturally, the house design was the same for both phases. The two phases were separated by the ceramic types which were found in each. Burials were primarily pit cremations as described in the Gila Butte phase. Gladwin judged the stone artifacts to be of a slightly better workmanship in the Santa Cruz phase then they were in the Gila Butte phase.

The traits which distinguish the Santa Cruz phase are:

Pottery: absence of any exterior scoring, small repeated elements fringe design, characteristic small jars with wide flaring rim, band designs, patterned, panel, life forms, line work, solid lines. Cremations: trench cremations were given up and replaced by pit. Houses: rectangular with rounded corners. Shell: rings, bracelets, pendants, beads, shaped for mosaic work.
Canal Irrigation
Axes: raised ridges, special forms.
Projectile Points: specialized, barbed, harpoon like, slender, tapering.
Palettes and Figurines.


Sedentary Period: (900 A. D. to 1100 A. D.)

The first investigation of the Hohokam culture began at the massive site at Casa Grande. The aesthetic apex of the Hohokam culture was supposed to have appeared in the "Classic" period, but it appears to have begun in the Sedentary period. The theory was that the Classic period defined by the massive structures which were similar to those of the Northern Pueblos Classic period implied the same cultural manifestations. However, this "apex" could not be demonstrated in other classes of artifactual data. The stylistic development in the lithic, and shell industries did not parallel the architectural development. Stylistic development in these industries appeared to peak during what is now labeled as the preceding Sedentary period.

This Sedentary period was first broken into two phases. The Sacaton phase, which was followed by the now questionable Santan phase. Gladwin (1948: 1-111) subsequently removed the Santan phase because he felt it lacked sufficient distinctive characteristics to separate it from the following Classic period. The only elements which initially were used to establish the phase were one ceramic type, Santan Red, and surface structures which were architecturally indistinguishable from the Soho phase of the Classic period. Yet, most phase divisions are based on these types of subtle variations.
If the Colonial period amplified the adaptation of the Pioneer period, the Sedentary period was the cultural peak of the Hohokam in the Gila Basin according to Gladwin (1937: 263).

The definition of the Sacaton phase includes the following:

Pottery: elaboration of design with emphasis on woven patterns, increase in number of decorated vessels, shapes as four pointed rims, cauldrons, tripods, and tetrapods, trays, basket shapes, effigies both human and animal, flare rims, shouldered, banded patterns, solids, composite elements, life forms.

Houses: greater refinement of detail; elliptical, bulbous entrance, with step entrance, encircling rim.

Projectile Points: triangular, lateral notches, wide bases.

Copper Bells: small pear-shaped, some with copper clappers.

Etched Shell Hoe, only one instance.

Ball Courts: reduced in size.

Bone Tools Figurines: plain

Palettes: declined in number and workmanship.

(After Gladwin 1937: 263).

The Sacaton phase was ceramically innovative in that it added new and varied forms which had not existed prior to this period. There was a continued tradition of Gila Plain which must have been the primary utilitarian ware and the reoccurrence of the Buff Ware known as the Sacaton Buff Ware. The reintroduction of a red ware, Sacaton Red, signaled a return to a red ware which was discontinued at the end of the Pioneer period. Of course, the Red-On-Buff Ware of the Sacaton phase was called the Sacaton Red-On-Buff. The quality of wares and the fineness of manufacture indicated further refinements in the craft. The designs were well patterned and intricate; the execution of the design made the Sacaton Red-On-Buff immediately recognizable from earlier phases. The buff, red, and plain wares appeared in many new forms which had not been directly
traced from the preceding phase.

Individual house structures showed a variation from the rectangular floor plan, rounded corner, pit foundation type of structure to a smaller, compact, oblong floor plan, pit foundation, bulbous entryway structure with a low lip of caliche surrounding the foundation of the pit. Arrangement of the interior support, three centrally located posts, and covering materials of brush and caliche remained in use.

Burials continued to be pit cremations with secondary interment into large jars covered by an inverted ceramic bowl cover. These burial ceramics were composed of a variety of the phase ceramics. Offerings were found in the secondary burial with associated broken ceramics.

Stone artifacts were numerous and more diverse in nature than any previous phase. Although there was an increase in the usage of lithics, the fine carving skill noted on individual pieces assigned to earlier phases seemed to be declining. The Sacaton work appeared as a mass copying system of one form. There is less emphasis placed on the fineness of lithic workmanship on the one hand, and on the other there appears to be an increase in utilitarian lithic tools. If there were problems in providing a stable food supply, then an increase in utilitarian tools better adapted for exploitation of the natural environment would be expected. This could also indicate a shift to sources other than agriculture for subsistence. With such pressures for maintaining a staple subsistence, the Hohokam ceased manufacturing ornately carved lithics.
The Santan phase had been originally proposed by Gladwin (1937: 264); he wrote the Santan phase is defined:

Pottery, the presence of Santan Red with smoked interior, unpolished exterior. Houses were sometimes contiguous; walls were made by building of an interior frame (jacal) with adobe. Houses were enclosed within a compound wall. Cremations, remains of burned bones and ash were collected and placed in small pottery urns with inverted bowls over them.

The Santan phase was identified at only three sites: Adamsville, Casa Grande in the Gila River, and Pueblo Grande in the Salt River. The evidence for the Santan phase was based on one ceramic ware and on contiguous house structure. Santan Red, the diagnostic trait for this phase, was questionable. The appearance of red ware was a revival of a tradition which had already appeared in the Sacaton phase.

What was more diagnostic about the Santan phase was the separation of the phases based on architecture. The individual structures changed from shallow pit houses, mud covered, lip surrounded, bulbous entrance, and compact structure to an above ground, contiguous, multi-room, jacal structure.

Other criteria used here as burials and stone work appear to be continuations of the traditions established in the Sacaton phase.

Classic Period: (1100 A. D. to 1400 A. D.)

A great change took place within the Hohokam culture which marks the distinctive separation between the Sedentary and the Classic period. Whether the change can be attributed to the influx of migrant peoples from
the Tonto Basin who carried the "Salado" culture or to internal pressures is not known. In fact, there was such a disjunction of diagnostic traits that it was questionable whether the Classic period was Hohokam or Salado. This could have been the reason behind the interjection of Santan phase which between the Sacaton phase and the Soho phase synthesized the transition.

The Classic period is subdivided into two phases of approximately the same duration, the Soho phase and the Civano phase. The Soho phase is characterized by the Casa Grande Red-On-Buff which was a decorated buff ware similar to the straight line paneling of the Estrella phase. There was a decline in the fluidity and the curvilinear lines characteristic of the Sedentary period. The Gila Plain continued as the major produced ware with addition of a Gila Red similar in color and form to that of the Santan Red.

The traits of the Soho phase were:

Pottery: jars were made vertically, cylindrical, decorated with panels of straight lines, use of Gila Red, polished surfaces, orange and black interiors.
Houses: were sometimes contiguous, but never more than one story, the feature which, more than anything else, distinguishes the Soho phase from the Civano phase is the absence of great houses.

(After Gladwin 1937: 266).

Architecturally, there was a massive change in style and construction of the structures. The Hohokam house style was no longer the pit house, but an above ground, contiguous, multi-room, jacal constructed, compound complex structure. The same materials were used in construction but the form was different. The house size was small in floor area but larger
than the Sacaton phase; the plan was rectangular to square in nature with the same interior features as the preceding phase. The distinctive features of this phase were the compound walls and the house platform indicating a possible Meso-American influence. If the walls were for defense, then it would have been the first time for any defensive structure because through the entire sequence of the Hohokam they had never chosen a site for defensive purposes.

Burials were inhumations of the extended variety with the association of offerings placed with the dead in a rectangular pit and covered. Cremations were either pit cremations or secondary burials in ceramic jars or trench cremations in which the body was cremated in a scaffold over the trench pit. When the cremation was completed the scaffold would fall into the trench with the offerings and then be covered up.

Stone artifacts showed a break from the fine and detailed work which began to decline in the Sacaton phase. The emphasis appeared to be utilitarian equipment rather than the finely polished work found earlier. The utilitarian stone artifacts were in the form of projectile points and equipment used in hunting rather than in farming which could indicate a shift in subsistence pattern.

The Civano phase can be defined as follows:

Salado Traits: Great houses; multi-storied Gila and Tonto Polychrome Pottery Inhumation, accompanied with Salado Pottery Compound Walls Hoe Adze Arrow-straightener
Hohokam Traits: All those which have been listed as occurring in the Soho phase.

(After Gladwin 1937: 267).

The final phase of the Classic period and of the Hohokam sequence was the Civano phase. Though the Civano phase and the Soho phase are easy to distinguish from the earlier phases, the Classic phases are only separated by one ceramic type and one architectural feature.

Civano phase ceramics continued the Casa Grande Red-On-Buff, Gila Plain, and Gila Red traditions. The most diagnostic ceramic type was Gila Polychrome which was the first non-intrusive polychrome. It employed a traditional style with the paneling and line motif with several variations of cross-hatching using the Red-On-Buff with black and orange.

Civano phase architecture maintained contiguous, above ground, multi-roomed, compound enclosed structures. The only additional architectural feature was the multi-storied "Great Houses" which were found only in association with the Classic Civano phase ceramics. Based on their evaluation of the "Great House" Gladwin and others hypothesized that this period was the Classic period of the Hohokam. This, however, was not the case; the Classic signaled the decline of earlier Hohokam tradition.

Burials remained the same as in the Soho phase. The stone artifacts remained utilitarian primarily hunting equipment and artifacts which are necessary in extracting a living from the natural environment.

This completes the review of diagnostic traits which have been used to define the phases and the periods of the Hohokam in the Gila Basin.
These manifestations of the Hohokam tradition have been considered to be the "norm" and standard to which all "alleged" Hohokam sites are compared.

The cultural characteristics exhibited by the data recovered from the Snaketown site (Gladwin, 1937) pertain to the Lower Salt-Gila River Basin. There exists the obvious question of whether such sequential data can be related to the other two regions of the Hohokam area. Environmental data have been presented which supports the ecological variations in the area. Therefore, the proposition has been advanced that there are several regions; these variations were dependent on what appears to be subtle, yet significant, differences in the environment. In terms of archeological data there is support of the regional sequence data have been based on artifact types and little data have been based on the actual environment. It is hoped that a further clarification and better understanding of the environmental variations has been presented.

UPPER SALT - VERDE REGION

To substantiate the existence of subareas (Gladwin, 1937; Schroeder, 1952 and 1953; Dipeso, 1956) in terms other than natural environmental, the diagnostic artifact inventory of the other regions should be presented for comparison. A "*" will indicate a marked variation from the Gila Basin Region (Snaketown data). David Breternitz (1962: 19-25) has presented a reasonable summary of data for the Verde Region; these data will be introduced and compared to these from Snaketown. Table 1 shows the phase sequences used in this report compared with phase designations and dates from adjacent areas.
Dry Creek Phase: (2,000 B. C. to A. D. 1)

Little is known of this phase and only more work can definitely determine the full range of traits and its time period. The extensive little sites on Coffee Creek and Spring Creek appear to be pre-ceramic and surface indications resembles the tools excavated at the Dry Creek Site (Breternitz 1962: 19).

Shutler (1950: 10) feels that the Dry Creek Site material most closely resembles the Chiricahua stage of the Cochise, but with the exception of grinder tools the Dry Creek artifacts are like the tools of the Amargosa Culture (Rodgers 1939: 60-6; 1958: 4-21).

The majority of the information on the pre-ceramic material from the Gila Basin Region which may have been Hohokam in origin comes from sites other than Snaketown. Some artifactual material collected by E. Haury (1950) at Ventana Cave. The artifacts which are found at Snaketown which are similar to those found in Ventana Cave are the following: manos, metates, grinding tools, and mortars with pestles to name a few (Breternitz 1962: 19).

Squaw Peak Phase: (A. D. 1 to 700 A. D.)

This phase was named for Squaw Peak, Yavapai County, Arizona. It equates typologically and, in part temporally, with the San Pedro Stage of the Cochise and Basketmaker II.

Dwellings were surface structures or shallow, semi-subterranean-pit houses. A diagnostic house feature was sub-floor, bell-shaped storage pits. There were two house types, round and rectangular with rounded ends. These may represent two "components" of the Squaw Peak phase.

There was no pottery in association with either of the Squaw Peak phase houses. This phase ended with the introduction of fired pottery at about A. D. 700, a date which may have to be pushed back to about 500 when more data was available.

Grinding tools were typically round to oval manos and handstones, used on flat or basin grinding slabs or stones. Flake knives-scrapers were the only common flaked tools.

Antelope bones were associated with the Squaw Peak phase but were not found in any of the other pre-1100 phases in the Middle Verde Valley. This may indicate a food preference or a climatic ecological change.
The method of disposal of the dead is not known.

The finding of two dwelling units of the Squaw Peak phase was fortuitous as both were at sites which were occupied during later phases and there were no surface indications of their presence.

(Breternitz 1962: 19-21).

Hackberry Phase: (A.D. 700 to 800 A.D.)

The Hackberry phase was named from the Hackberry Basin, Yavapai County, Arizona. This site is dated between A.D. 700 and 800. The tested site of this period is NA 3607 (Shulter, 1951) where a slab-lined pit house was partially excavated. Ceramic material was at the base of the trash mound at NA 3528 was associated with this phase. Red-On-Gray and early Red-On-Buff sherds from the surface of seven additional sites also indicate occupation of the Verde Valley during this phase.

Fired pottery began in the Hackberry phase and Verde Brown was the local plain ware. This type was the Verde Valley variety of Gila Plain. Gila Plain: Verde variety will be discussed in the summary of the Cloverleaf phase. Intrusive pottery was Lino Gray and Lino Black-On-Gray from the Basketmaker III (Anasazi) and Snaketown Red-On-Gray and Gila Butte Red-On-Buff from the Gila-Salt Basin. There was no locally manufactured painted pottery at this time.

Basin metates are to be expected on the basis of the round to oval manos and handstones which were typical for the phase. Projectile points from NA 3607 included several thick, irregular drill-like blades like the Snaketown phase specimens from Snaketown (Gladwin, et. al., 1937).

The A.D. 700 to 800 period in the Verde Valley represented the beginning of the Hohokam movement from the Gila-Salt Basin. Whether this was a wholesale population movement, a migration of small numbers of Hohokam peoples who enforced their culture on the indigenous group, or a simple diffusion of traits into the Verde Valley without an accompanying population shift will be discussed below.

(Breternitz 1962: 21-22).

Cloverleaf Phase: (A.D. 800 to 900 A.D.)

This phase was named for the Cloverleaf Ranch near the middle Verde where a large Hohokam site was leveled by agricultural activities.
There were established villages along the Verde River during the Cloverleaf phase. Too many traits are present that have been described as Hohokam from Snaketown (Gila Basin), the Grewe Site (Gila Basin), Roosevelt 9:6 (Upper Salt-Verde), and Paloparado (Santa Cruz-Rillito) to doubt that the Hohokam peoples moved into the Verde Valley during the Colonial period.

The irregular oval houses at NA 2385 were not the neatly defined structures described from Snaketown and Roosevelt 9:6, but the basic shape and associated material culture leaves no doubt that they were Hohokam of the A. D. 800 to 900 period. The single house with notched floor supports* in place at House 7 at NA 2385, could be lost in the series of houses from Roosevelt 9:6 (Haury, 1932). Unfortunately it was not possible to fully excavate this house.

The communal house* at NA 2385 (House 4) differed from the Santa Cruz phase community house in Paloparado (Dipeso 1956: 222-224) only by being one meter less in length and width. This spread of like houses over an area 200 miles in a north-south line in south central Arizona indicates a wide-spread and general cultural patterning during A. D. 800 to 900 period.

Verde Brown was the utility pottery of the Cloverleaf phase. All other plain wares combined never exceeded 1% of the total utility sherds from any house of the four excavated. Shapes and method of manufacture leave no doubt that this type should be called Gila Plain: Verde variety. Verde Brown is not known to have been made until the Hohokam intrusion into the Verde Valley and the local clays constitute the only observable and distinctive feature distinguishing Verde Brown from the parent type Gila Plain. This also indicates that pottery came from the south, and not from either the Mogollon, or the Anasazi.

Kana-a Black-On-White (Anasazi, Northern Arizona) and Santa Cruz Red-On-Buff were the diagnostic decorated, intrusive types in this phase, with smaller amounts of Deadman's Black-On-Red present. Black Mesa Black-On-White (Anasazi, Northern Arizona) appeared at the end of the phase or was derived from another occupation of the site. Snaketown Red-On-Gray and Gila Butte Red-On-Buff occurred also. This seems to indicate that Snaketown Red-On-Buff, Gila Butte Red-On-Buff, and Santa Cruz Red-On-Buff were at least in part contemporary, or could be ascribed to lags in trading decorated vessels accompanied by the retention of traded pieces as heirlooms.
During the Cloverleaf phase there was a change in the grinding tools. Though metates and rectangular manos replaced the basin metates and the round to oval manos and handstones used earlier. Hammerstones were very abundant and pestle-pounders appeared. Flow: Basalt hoes, saws, and knives were common. More specialized stone artifacts appeared, but these were rare items such as slate palettes, uncarved stone bowls, basalt cylinders, stone rings, and pendants.

Flake tools* of stone were not abundant, no projectile points* are known for the Cloverleaf phase. One ground-edged scraper was found.

Glycymeris shell bracelets and cut shell indicate importation, probably from the Salt-Gila Basin, of finished luxury products. Canis sp. is the one important addition to the faunal remains. Although the bones cannot be definitely identified as dog, as distinguished from coyote, the implication is that during the Cloverleaf phase the domesticated dog was present.*

No definite burials or cremations were found. However, the infant burial in the rectangular subfloor pit* of House 4 at NA 2385 may be in this phase. Cremation is postulated for adults.

(Breternitz 1962: 22-23).

Camp Verde Phase: (A. D. 900 to 1100-1125 A. D.)

More work has been done on this phase than any other Hohokam period in the Verde Valley. It was the first defined by Colton (1939: 50-51).

In the Verde Valley a dichotomy of house types is shown by typical Gila-Salt Basin Hohokam houses and four-post, pithouse type houses. Two house types were also reported from the Grewe Site (Woodward 1931: 9-11) and from Snaketown (Gladwin 1937: Fig. 25). Schroeder (1955) believes that the four-post pithouse represents the dwelling used by an indigenous population who continued to occupy them after the Hohokam intrusion. The houses of the two different types contained, however, material culture items that are similar in type and frequency.

The communal Camp Verde phase house* at Montezuma Well is so designated because of its size. It has a floor area 10 m by 6 m and a trench with post-holes that is thought to be the base for a screen deflector.* The bulbous entrance was oriented east, as the Cloverleaf phase Communal House at NA 2385. This unit has recently been re-excavated and roofed by the National Park Service as part of the Montezuma Well Exhibit.
Surface sherds around several Casa Grande type ball courts indicated they were used during the Camp Verde phase.

The predominate plain ware was still Verde Brown. The Tuzigoot Types (Tuzigoot Brown, Tuzigoot Brown Smudged, Tuzigoot Red, and Tuzigoot Red Smudged) began during the late Camp Verde phase. These types are dated after A.D. 1150 by Colton and Hargrave (1937: 169) and also 1125 by Schroeder (1955), but amounts up to 34% of the utility sherds present from any one excavated unit, appear by A.D. 1050, the late Camp Verde.

The diagnostic decorated and intrusive pottery types for the Camp Verde phase Black Mesa Black-On-White, Black Mesa-Sosi Black-On-White (Broad-line Black-On-White from the Kayenta Region, Northern Arizona, which could be either Black Mesa or Sosi Black-On-White), Tusayan Black-On Red (Anasazi, Northern Arizona) Tusayan Corrugated and Sacaton Red-On-Buff. Snaketown Red-On-Gray and Gila Butte Red-On-Buff continued to be associated with Camp Verde phase. The same associations are indicated by Dipeso (1956: Fig. 40) at Paloparado.

Verde Red-On-Buff (Colton and Hargrave 1937: 168) was the only locally made decorated pottery during the Camp Verde phase. Five sherds of Sacaton Red-On-Buff, made with Verde Brown paste, were found at the three sites excavated by the MNA in 1957 and 1958.

Perforated and unperforated sherd discs were present, the majority made from sherds of Verde Brown. One pottery anvil, made with Verde Brown paste, was found on the floor of the communal house at Montezuma Well.

Trough metates and uniface and biface, rectangular manos were the common grinding tools. Biface round to oval manos, handstones, and grinding slabs or grinding stones occur. Other common grinding tools were rubbing stones, hammerstones, and flow basalt hoes-saws-knives. Pestle-pounders were present. Also occurring, but rare, were: grooved abrading tools, basalt cylinders, stone rings, stone beads.

Flake knives-scrapers and small, undiagnostic scrapers were common. Projectile points were slender and triangular, with or without side notches. Choppers were present.

Glycymeris shell bracelets were common and several types appeared as trade from the Gulf of Mexico or the Pacific Ocean. The shell artifacts probably came from the Gila-Salt Basin as finished products. Bone awls, both splinter and with the articular head head split were present. Deer were utilized for
food, with jackrabbit and cottontail rabbit probably used also. No dog bones were found with the Camp Verde phase material, but if dog occurs in the Cloverleaf phase, it is probable that Camp Verde phase had them also.

At least some of the dead were cremated, but no cremations were found during the MNA excavations. However, during the 1930's when the approach to the Clear Creek Bridge at NA 2385 was dug "many" cremation pots were found. Howard Winfield has described these pots to Breternitz and they were probably Sacaton Red-On-Buff. Jackson (1933: 85) mentions cremations from NA 2385 and his descriptions of the Black-On-White vessels fit Black Mesa Black-On-White. Extended inhumation was also suggested by at least two of the burials at NA 2385.

(Breternitz 1962: 24-25).

Honanki Phase: (A. D. 1100-1125 to 1300)

Colton (1939: 44-5) defines the Honanki phase to the Southern Sinagua. This period of villages of masonry in the open and masonry cliff dwellings is much better known than the earlier phase sequence in the Verde Valley. One early Honanki phase dwelling, House 5 at NA 2385 was excavated by the MNA in 1957.

(Breternitz 1962: 25).

Tuzigoot Phase: (A. D. 1300 to 1425 A. D.)

Colton (1939: 45-6) assigns the Tuzigoot phase to the Southern Sinagua. It is typified by the large, masonry pueblos and classic cliff dwellings such as Tuzigoot and Montezuma Castle. From the end of the Tuzigoot phase until historical contact with the Northeastern Yavapai by Espejo in 1582 (Schroeder, 1952), there is a gap in the archeological record of the Verde Valley.

(Breternitz 1962: 25).

There are some important variations in characteristic traits in the Verde material. As in the Santa Cruz-Rillito Drainages, the Verde Region could be considered a later manifestation of Hohokam tradition spreading from the central Hohokam region in the Gila Basin up the river system.

In Breternitz's discussion summarized above it is apparent that there are variations in house structures, communal structures, house features, ceramic types, and other artifacts. This could certainly be a result of
local sequence manifestations and must be considered in terms of ceramic type "variety" components. In each case there are some aspects of the artifacts which are "normative" traits in comparison to the Snaketown data. Other aspects are related to the particular materials available to each locale or region. This statement must be kept in mind when investigating variations in house structures. The most notable variable in the Verde Region data as discussed by Breternitz are the structures. They indicate changes in plan, support features, floor surfacing, and floor features such as pits or bins. There is little comparison of floor features as found in the Verde Region with the Snaketown data. All these features represent regional variations from the Gila Basin.

SANTA CRUZ-RILLITO REGION

The last proposed subdivision of the Hohokam area is the Santa Cruz-Rillito Region. As with the Upper Salt-Verde Region, the Santa Cruz-Rillito Region appears to be marginally late to the Gila Basin. The evidence of the Hohokam occupation in this region begins about 800 to 900 A.D. This locale has its own local sequence of phase designations and variety of artifacts; however, there are many formal similarities in ceramics and structures with the Santa Cruz Region. Although there is a specific designation of this locale, Papagueria, the only available data come from a single site the Valshni Village site.

There are no complete and detailed summaries of the archeology of the Hohokam for the Santa Cruz-Rillito Region. As in similar situations the only logical solution has been to consolidate all the available resource data. As the Comparative Sequence Chart (Table 1) indicates,
there are comparable units in the temporal line with the Gila Basin. But, other aspects of cultural traditions are needed for a complete investigation of this problem.

The compilation of data for this summary is derived from several sites. Data for the Papagueria locale were taken from the Valshni Village site on the Papago Reservation (Withers, 1944). Data for the Santa Cruz-Rillito Drainage proper are taken from 1971 excavations at the Whiptail Site, Tanque Verde Ruins, and University Indian Ruins. Some additional remarks should also be made about some adjacent locales such as the Trincheras culture. This has a questionable relationship to the Santa Cruz Region as well as to the Hohokam; in general the Trincheras culture is located in Northern Sonora, Mexico.

In some of the resource materials which were consulted, many references were made which distinguished the Gila Basin Region called the "River Hohokam" and the Santa Cruz-Rillito Region called the "Desert Hohokam" (Johnson 1963: 174-86 and Haury 1950: 547). These designations were conceived in relation to their specific environmental adaptations. For this reason and for the objectives of this research other lines of evidence must be used. House structures could be used to further support this division of the Hohokam.

For reasons of clarification and simplification of this examination of the Santa Cruz-Rillito Region, the "Desert Sequences" will be used.
TABLE 2

DESSERT SEQUENCES

<table>
<thead>
<tr>
<th>Period</th>
<th>Gila Basin</th>
<th>Santa Cruz-Rillito</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic Period (1100-1450 A.D.)</td>
<td>Civano</td>
<td>Tucson</td>
</tr>
<tr>
<td></td>
<td>Soho</td>
<td>Tanque Verde</td>
</tr>
<tr>
<td>Sedentary Period (900-1100 A.D.)</td>
<td>Santan(?)</td>
<td>Rincon</td>
</tr>
<tr>
<td></td>
<td>Sacaton</td>
<td>Rillito</td>
</tr>
</tbody>
</table>

In the case of the correlation of the "Desert Sequence" of the Hohokam or the Santa Cruz-Rillito Drainages to the Papagueria locale southwest of Tucson, these will be the following sequence relationships:

TABLE 3

SANTA CRUZ-RILLITO DRAINAGE SEQUENCE

<table>
<thead>
<tr>
<th>Period</th>
<th>Santa Cruz-Rillito</th>
<th>Papagueria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic Period (1100-1450 A.D.)</td>
<td>Tucson</td>
<td>Sells</td>
</tr>
<tr>
<td></td>
<td>Tanque Verde</td>
<td>Topawa</td>
</tr>
<tr>
<td>Sedentary Period (800-1100 A.D.)</td>
<td>Rincon-Rillito</td>
<td>Vanori</td>
</tr>
</tbody>
</table>

Although there is a division of Hohokam into River Hohokam (from Gila Basin) and Desert Hohokam (from the Santa Cruz Region), they are presumed to be varieties of the same culture. Second, the environmental conditions of the latter vary slightly from those of the Gila Basin. Third, there is a temporal lag in the sequence from the Santa Cruz-Rillito Region when compared to that from the Gila Basin. A research study could be based on this assumption alone. Therefore, for this study the reasons for the later development of the Santa Cruz Region will be left
hypothetical. Their late sequence development is usually attributed to migrations from the Gila-Salt Basin (Haury, 1950; Zahniser, 1966; Molfese, 1970). Schroeder (1964 and 1967) indicates the Hohokam immigrated from Mexico. Lastly, a review of the data for this research assumes that there are aspects of the Desert Hohokam which are a result of their specific regional adaptation.

The core of data for the Santa Cruz-Rillito section has been taken from sites directly associated with these drainages (See Appendix A, specifically the River Systems). There are four recognized phases attributed to the Hohokam in this region; these are comparable, on a temporal basis, to the late phases in the Gila Basin sequence. The range of occupation of the sites in the Santa Cruz-Rillito drainages has been established from approximately 800 A. D. to A. D. 1400 (See Comparative Sequence Chart, Table 1). An "*" will be used to indicate a variation from the Gila Basin traditions.

The first two phases defined for this locale are the Rillito and the Rincon phases. The data for these phases are insufficient to warrant an elaborate discussion.

The basis for their establishment is ceramic in nature and is calculated in time by intrusive pottery types. The intrusive sherds are usually Red-On-Buff types of either Santa Cruz or Sacaton phases. The ceramic types that have been used to designate these phases are usually Red-On-Brown types. For the most part such Red-On-Brown types are varieties of Red-On-Buff type; varieties are determined primarily on
paste and slip characteristics of the ceramics. There is evidence of other pottery such as Red Ware, Corrugates, and Plain Wares. The diagnostic Red-On-Brown type was Rincon-Rillito Red-On-Brown (Hayden, 1957; Haury, 1932 and 1950; Zahniser 1966: 172).

Other artifact industries included lithic materials similar to those found in the Gila Basin. Bone and shell industries were in evidence; however, the craftsmanship appeared to be less impressive than those of the Gila Basin.

House architecture showed some unusual variations from those of the temporally comparable late Santa Cruz and Sacaton phases of the Gila Basin (River Hohokam). Whereas the late Santa Cruz phase house was rectangular with rounded corners having an entry vestibule and interior support, the house structures of the Rillito-Rincon phases showed two types of pit houses. "The Tanque Verde Site (23 miles east of Tucson) showed rectangular and contiguous square corner pit houses; the support of the house came from jacal-adobe* walls with limited interior support" (Haury 1932: 53). Haury (1932: 53) continues by saying "that these two types....pit houses conformed to the Colonial Period conception of houses (Gila-Salt Basin-author's note)...but contiguous rooms* were built over these pits and supported by 4 posts". The Rincon-Rillito phase structures had doorways* instead of entryways.

The Sacaton phase of the Gila Basin has an oval or oblong floor plan, pit house foundation, bulbous entrance, support by 3 poles along major axis, and rimmed foundation. These attributes are entirely lacking in the
Santa Cruz-Rillito Region; at no time has there been a number of these Sacaton house types found in the Santa Cruz Region.

As the Sacaton phase implied "the apex of cultural development of the Hohokam" (Gladwin 1937: 260-64) the Tanque Verde phase appeared to be the regional florescence of the Hohokam in this region. The Tanque Verde phase occupation is the only one about which there is sufficient information available based on survey and excavation. J. L. Zahniser (1966: 185-6) in his summary of the Tanque Verde phase gives a reasonably sound account of this phase.

Sites

Type Site: Tanque Verde Ruin (Haury 1927, 1928a, 1928b; Fraps 1935).

Excavated Sites


Surveyed Sites

Sabino Canyon Ruin (Douglass and Leonard 1920-1), Black Mountain Site (?) (Fontana, Greenleaf, and Cassidy, 1959), and many sites in the files of the Gila Pueblo and Arizona State Museum; individual surveys by F. Mitalsky, P. S. Frick (Frick, 1954), and J. L. Zahniser (1966).

Kinds of Sites

Large and small villages, rare Trincheras Sites* (an artificially made terrace), Collection sites sometimes with bedrock mortars, campsites, (?) small caves* and rockshelters,* petroglyph sites.

Area

Heaviest concentration in the Tucson Valley along Central Santa Cruz, Rillito, Lower Pantano, and Rincon Drainages, but extending in the north to the Tortolita Mountains, in
The east to Rincon Mountains, in the south to the vicinity of Tubac, Arizona and in the west to the western slopes of the Tucson Mountains.

**Time**

Approximately A.D. 1100-1300; phase equivalents are Soho phase (Gila Basin), late Topawa and early Sells phases (Papagueria).

**Village Plan**

Widely scattered, discrete houses, with a tendency late in the phase towards small compounds.

**Architecture**

True pithouses, early in phase, with a transition to contiguous* adobe-walled surface rooms* late in the phase; no communal structures or rooms.

**Subsistence**

Emphasis in cultivated foods and collected plant products, supplemented by limited hunting; flood water or dry farming, although location of villages suggests possibility of irrigation.

**Manufactures**

Pottery (Tanque Verde Red-On-Brown and its smudged, slipped, polished, and transitional varieties; Gila Plain (?), small amounts of red slipped and corrugated pottery); abundant chipped, pecked and ground stone work; limited amounts of bone, horn, and shell.

**Trade**

Principally with Gila Basin Hohokam and the Papagueria; occasionally with people of South, Southeast, and Eastern Arizona; perhaps with cultures of Northern Mexico.

**Burial Practices**

Except for small children who were at times inhumed,* dead were always cremated and ashes placed near or within village areas in shallow pits with or without containing urns; ceremonial offerings for dead uncommon,* but sometimes placed in separate caches (?); occasional ceremonial destruction of dwelling of deceased (?).

(Zahniser 1966: 185-6).
Cultural Derivations and Affinities

Derived from Gila Basin, Colonial Hohokam culture, with increased differentiation during Rillito, Rincon (which precedes Tanque Verde phase) and Tanque Verde phases as a result of contact with Mogollon and to a lesser extent Sonoran phases, until Tanque Verde phase is terminated by the appearance of Salado tradition (?) (Tucson phase) in Tucson Valley.

There appeared to be some marked differences during the Tucson phase (Frick 1954: 128). This phase should indicate many variations as do the other regions in number; Frick (1954: 128) indicates in his survey that only 10 Tucson phase sites were discovered in comparison with 15 Tanque Verde, 58 Rincon, and 67 Rillito phase sites.

(Zahniser 1966: 186).

If the Tucson phase is associated with the Salado peoples which is a speculative assumption, then certain Salado characteristics should appear in the archaeological data. Polychrome pottery, surface structures, contiguous rooms, compound enclosure, hunting associated artifacts, inhumation, and proposed "Great Houses". Some of these characteristics appear prior to the Tucson phase; the phase itself is ceramically defined by the Tucson Red-On-Brown.

Contiguous rooms, compound enclosures, inhumation, and polychromes were already in evidence. There is further speculation that the Salado influence did not contact the Tucson Valley; the characteristics, considered to be Salado, may have a eastern origin (implying Mogollon groups) rather than Northern Salado groups.

To complete and extend the present discussion of the Desert Hohokam in the Santa Cruz-Rillito Region an additional locale, adjacent to the Tucson Valley, known as Papagueria will give support to the regional
variation of the Santa Cruz Region as well as showing the formal relationship of the Papagueria locale and the Tucson Valley.

Valshni Village Site

The Papagueria locale is encompassed by the Papago Indian Reservation southwest of Tucson. The only reliable source of excavation data from this locale is the Valshni Village site which was excavated by A. M. Withers in the early 1940's. Wither's data (1944: 33-47) add some archeological material which has some similarity to the Santa Cruz Region as well as to the Gila Basin.

The Valshni Village site is a surface ruin which is fourteen miles southwest of Sells, Arizona. During the excavation of the site there was no indication of an irrigation system, but the Papago practice flood-water farming during the summer rainy season by controlling the water which is carried off by washes to the fields. This is a variation which was mentioned in place of irrigation canals. Natural drainage systems could be used for irrigation systems.

The three phases that have been used to designate the Papagueria locale are the Vamori phase (800-1100 A. D.), Topawa phase (1100-1250 A. D.), and Sells phase (1250-1400 A. D.). These correspond roughly to the late Santa Cruz phase of the Colonial period to the end of the Classic period (Withers 1944: 34). Haury's earlier excavations at Ventana Cave (Haury 1950: 58) give data for a proposed occupation in the Papagueria.

According to Withers (1944: 34), small scattered villages have, it
seems, always been characteristic of the locale, their size being limited by the amount of food and water available nearby. This reflects what E. W. Haury says concerning the distribution of southwestern sites; he, however, places more emphasis on the availability of water.

The additional and environmental data presented here indicate some variability from Gila Basin and Verde Valley. Although more closely related to the Gila Basin environment, subtle variations in rainfall, altitude, and natural resource availability show different potentials to which to adapt.

Increase of approximately 5 inches in rainfall, an increase of 500 to 750 feet in elevation, and a slight increase in the density of vegetation could afford a better environmental potential for a subsistence economy.

"There were 28 houses uncovered at Valshni Village, but only twelve had enough of the floor preserved to indicate original outline; those which were traced were heavily burned" (Withers 1944: 36). Heavily burned floor surface is a common characteristic found in most Hohokam houses. Reasons suggested are accidental fires, warfare, removal of out-moded structures, or ritual connected with disposal of the dead. This final reason is suggested by the ethnographic data (Gladwin, 1937; Castetter and Bell, 1943).

The houses attributed to the Vamori phase of the Papagueria were constructed on the old surface level or excavated only a few centimeters below the surface. The identification of the local sequence has been
designated by ceramics which were recovered from the floor level to 10 cm. above the floor. Withers (1944: 37) reports the following house features:

a) house shapes are roughly oval to rectangular with rounded corners.
b) length 6.0 m to 8.5 m; width 3.50 m to 5.50 m.
c) covered entrances were typically oval and resembled those of Sacaton phase.
d) one house, was rectangular with rounded corners, and had a short straight sided entry passage reminiscent of the Santa Cruz phase.
e) stepped entrance (similar to Sacaton phase).
f) fire pit, center line with entryway.

There were eighteen houses assigned to the Vamori phase. From these formal features the houses appear similar to the Santa Cruz-Rillito Region type with slight increase in physical dimensions.

The Topawa phase (1100-1250 A.D.) had seven houses assigned to it. "Some formal structural variations from the Vamori phase were the following: rectangular pit house foundation with rounded corners, lack of oval pit houses, and oval house entryways" (Withers 1944: 37). They are carry-overs from the Vamori phase; these "traditions" vary from the changes observed in the Soho phase (1100-1250 A.D.) in the Gila Basin. In this phase the Topawa phase house remained traditional by having oval covered entryways, remaining a pit house, and rectangular shape with rounded corners while Soho houses were above ground, no entry vestibule, square or
rectangular in plan, and in some cases contiguous.

There was no definite pattern of post holes. Major support were found near each corner; other supports were found near the center of larger houses. Secondary post holes indicating roof support were plentiful and scattered around the house (Withers 1944: 38). Roof covering was 10 cm. thick with brush entwined. Floors were usually made of a clay mixture (probably caliche).

Fire pits varied from a deep basin with steep sides and a raised and rounded edge (Vamori phase) to a shallower pit with gently sloping sides and a sharp upraised edge (Topawa phase).

The Sells phase (1250-1400 A. D.) of the Papagueria locale shows rectangular surface houses with no passage-way. This approximates in time the Civano phase of the Gila Basin Region.

Houses for the Papagueria locale were usually single unit structures, built on the surface with covered passage-way (on the long side), basin fire pit in direct line with entryway, and roof support and covering with saguaro or ocotillo ribs.

Two additional features that were associated with the Papagueria structural data were ramadas and communal structures. "Several places were found which suggested covered areas other than houses. Some were contiguous to dwellings while others seem to have been roofed units unto themselves" (Withers 1944: 38). These are suggestive of the ramadas used in the area today. The floor was thickly covered with broken jars.
"There is the possibility that the two larger structures assigned to the Topawa phase may have served as a meeting house of some sort" (Withers 1944: 38).

Withers (1944: 38) summarized the house types of the Papagueria locale saying,

Vamori phase houses appear like the Sacaton phase houses except for the lack of a groove or sill around the periphery, surface structures and some fire pits. Topawa phase (Soho phase in Gila Basin) houses appear more like the Vamori phase houses. Sells phase houses had no passage-way.

There is no archeological evidence to suggest any Salado influence such as polychrome pottery of multi-storied structures.

The ceramics from the Papagueria locale were used to define and designate the phases for this locale. Other artifact industries as lithics, bone, or shell show a close similarity to those of the Santa Cruz-Rillito Valley. Variations of those industries were considered to be insignificant; ceramics and structures were the most significant. The preliminary ceramic typology is as follows:

<table>
<thead>
<tr>
<th>Period</th>
<th>Phases</th>
<th>Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic</td>
<td>Sells (1250-1400 A. D.)</td>
<td>Sells Plain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sells Red</td>
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<tr>
<td></td>
<td></td>
<td>Tanque Verde</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Red-On-Brown</td>
</tr>
<tr>
<td></td>
<td>Topawa (1100-1250 A. D.)</td>
<td>Sells Plain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valshni Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Topawa Red-On-Brown</td>
</tr>
<tr>
<td>Sedentary</td>
<td>Vamori (800-1100 A. D.)</td>
<td>Sells Plain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valshni Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vamori Red-On-Brown</td>
</tr>
</tbody>
</table>

(Withers 1944: 41)
The majority of intrusive pot sherds are of Hohokam manufacture either locally made Red-On-Brown Wares from the Santa Cruz Region, from the Gila Basin (Red-On-Buff), or from the Trincheras Region (Trincheras Red-On-Purple). The actual use of the intrusives has been for cross-reference dating, but the lack of any other ceramic types indicates that there was a close association with the Hohokam. In addition to intrusives of Hohokam ceramics in the Papagueria locale, the locally made ceramics of the Papagueria are found in the Santa Cruz Region sites (Whiptail Site, 1971 Season).

To complete the assumption that the Papagueria locale and the Tucson Valley (Santa Cruz-Rillito Drainages) are indeed related and show earlier developments, some of the data should be compared. The ceramics and house structures will be given prime interest.

The Red-On-Brown Wares of the Papagueria locale as well as the Red Wares are almost indistinguishable from the Red-On-Brown and Red Wares of the Santa Cruz Region. The establishment of separate types for both locations is most likely "microscopic variations" rather than pronounced visual attributes. The Red-On-Brown Wares vary only in composition of paste; this is attributed to the available clays in the locale. Manufacture, form, and surface treatment are closely paralleled to the Santa Cruz-Rillito ceramics. The other wares (Red Ware, Corrugated, and Plain Ware) are the same for both; most variations are attributed to paste.

The structures also appear to be related in design, features, and size. Both the Papagueria house types and the Santa Cruz-Rillito types are
equal in time and both share attributes of Hohokam. Fire pit shape and location, rectangular plan, adobe-jacal construction, and subterranean foundation are a few of the formal relationships between the two.

In view of the similarity of artifacts such as pottery and lithics, the similarity in the environmental conditions and the same potentials for exploitation of the environment, and occupying the region at the same temporal interval, it could be interpreted that the similarity in formal features of the structures were produced by the same people, of the same culture, and at the same time.

The adaptation potentials would remain the same for both the Papagueria locale and the Santa Cruz-Rillito Drainages, since there are no environmental changes which could be observed. The only possible variation which may have been in evidence was the availability of water to the Papagueria locale. Explicit investigation of comparative natural environmental resources has not been done in this region. However, from the environmental data which was presented above, there is no appreciable variation which would lead to the assumption that the adaptations would have been significantly different.

A final note must be added concerning the two regions marginal to the Santa Cruz-Rillito Region. The Trincheras culture (Johnson 1963: 174-186) is not, for the purposes of this research, considered to be Hohokam. Nor, is the Octam culture as defined and described by C. Dipeso (1954 and 1957) considered at this time to be a complete Hohokam manifestation. The reasons are basic and elementary. The Trincheras culture lacks sufficient
detailed data such as ceramics, structures, lithics, site distribution, and number of excavated sites to warrant a comparison with the Hohokam in the Santa Cruz-Rillito Region and the Hohokam in general. The Ootam culture would not be considered in this investigation to be a "full manifestation of the Hohokam tradition", the Ootam culture does exhibit some characteristics attributed to the Hohokam tradition, but the majority of the artifact industries, site location and distribution, and structures appear to be under the influence of eastern traditions, possibly Mogollon. For these varied reasons the above two regions have not been included in this investigation.
CHAPTER IV.
ORGANIZATION AND ANALYSIS OF THE DATA

The previous chapters have attempted to establish some validity to the hypothetical regions which would subdivide the Hohokam area. The basis for such assumptions was indicated by the environmental variations of the area; after which artifact, burial customs, natural resource potentials, and structures were discussed. It is felt that from these many resources of data that there is some support to the assumption that the Hohokam could be divided into the three proposed regions. There are many instances from the archeological records which alluded to these regional sequence divisions (Breternitz, 1962; Withers, 1944; Hayden, 1940; Dipeso, 1956; and Schroeder, 1952). The principle site to which all these resource data have been referred is Snaketown; however, there have been more intensive investigations as of late into the local and regional sequence problems rather than in the overall areal comparisons.

There are many superficial references to the house structure variations from one region to the other. But, none of these investigations has strictly been concerned with the structures and their regional variations. Most data are in the form of specific artifact types and comparisons rather than ecological variations. However, the specific artifacts could be used in interpreting the non-artifactual data. For example, specific investigation of artifacts and their distribution, activity areas, could be used to answer the question of environmental exploitation. This concept reflects the technology used in the exploitation of the environment; certain sets of
artifacts such as manos, metate, and various types of grinding implements could be interpreted as being utilized in preparation of vegetal material such as corn or used in preparation of wild vegetal material as gathered wild acorns. An assemblage of hunting associated artifacts such as projectile points, scrapers, knives, and flake tools could be interpreted as being used for exploitation of the natural game resources available.

The increase in the frequency of these specific sets of artifacts and activities in one region as compared to another region, then this could be interpreted as varying regional adaptation. In turn, this would be related to other variations in such things as house structures as well as the distribution of the sites within that region.

The problem which is being presented can simply be stated as, "How do structures vary from region to region, and what regulating forces are controlling these apparent regional variations"? The ecological variations have been presented which should indicate and support the validity of these three regions. Artifact data of the local sequence designations and distribution of ceramic types and varieties show that there is a reasonable archæological support to these regions. In the Introduction, a preliminary problem was developed from the observations presented; it would be helpful to review these observations and statement.

OBSERVATIONS

a. Variations in architectural features could be dependent upon activity areas which in turn reflect the socio-cultural norms of the Hohokam culture. Changes or variations in these norms will affect the
architectural features of the structures involved.

b. Variations in architectural features could also be dependent upon ecological variations. The adaptation to various sub-regional potentials could account for the variations in architectural features of the Hohokam structures.

STATEMENT

Each observation indicates a possible explanation for the observed variations in the architectural features of the Hohokam structures. The assumption that these two determinants, activity areas and ecological adaptations, do affect architectural features leads to a series of testable hypotheses.

HYPOTHESES

A. If it can be shown that the distribution of activity areas (defined by artifact association) within the Hohokam structures are arranged in a non-random manner (i.e. cooking facilities in direct line with the entryway and food preparation in the vestibule), then it may be assumed that architectural features are correlated with the distribution of activity areas. Therefore, variations in the distribution of the activity areas would also indicate a corresponding variation in the architectural features of the Hohokam structures.

A. If it can be shown that there is a random distribution of the activity areas relative to architectural features, then it may be assumed that the socio-cultural norms which are regulating activities are not regulating architectural features. If this were the case, then we
must look for independent factors which influences architectural features.

B. If $A_2$ receives the strongest support, and if there are ecological variations in the Hohokam region which indicate that there are various subregional potentials to which to adapt, then it may be the case that these various potentials were the most powerful determinants of the subregional variation in Hohokam structures.

Deductions from these theoretical propositions could be logically supported by archeological data for the Hohokam. Regardless of the effect that methodological and theoretical commitments have had on the gathering of archeological data for the Hohokam, these are the only sources from which the data can be taken. Therefore, the available material has been consolidated into one resource collection. In treating the Hohokam area as a whole and considering the hypotheses as stated above, it is obvious that there should be regional variations. The most basic scientific probe in such investigations would stem from the apparent regional environmental variations within the Hohokam area, presumably the three regions as described above. To indicate that the variation in the environment does have specific effects on the Hohokam traditions, variations in regional exploitation which could be interpreted from clustering of artifacts and activity areas must be demonstrated. These interpretations would allow tentative proposals on what aspects of the regional environment were being exploited to be made, if variation in house structures is the major class of data investigated. It must be assumed that variation in environment and
activity areas would also indicate a probable variation in regional architecture.

The individual site reports, survey reports, and major monographs are the principle repositories of archeological data. From these excavations certain classes of data are needed to investigate these hypotheses. Activity areas (defined by artifact association) are needed; structural feature details are also needed. From these two classes of data the investigation could test the first hypothesis. The environmental data have already been presented, but the archeological record can supply additional information as to exactly what materials were actually being exploited from the various natural environments. This again depends on recovery of the non-artifactual material and the excavation methodology.

The most useful sources of data are the individual site reports. They contain the most detailed and reliable information. These supply the needed material on the classes of data which can be used to test the hypotheses. Some site reports have "special aims" in mind which if not actually associated with architectural features of the structures or the activity areas would affect the quality of the data. This is the misfortune of using the archeological data of others.

Most data from the site surveys refer to ceramic type designations which are used to suggest the phase designations and cultural relationships. Certain hypotheses could be made based on site distribution from the survey material. First, ceramic data could establish the distribution of a "type of pottery" and the extent of a particular phase of culture. Second,
survey data could establish the pattern of distribution of sites relative to the resources of the proposed regions of the area. The environmental data offer considerable information on the variations in the Hohokam area as well as establishing the potentials which were available to the Hohokam peoples. In conjunction with the site surveys, by use of ceramic types, there could be some reasonably sound data as to the distribution of sites, their time of habitation, and their extent within the different regional environments. This would help substantiate variability in Hohokam traditions in various ecological zones.

HOUSE TYPOLOGY AND WORK SHEETS

Finally, if the data are available, how can it be correlated and combined for use in this comparative research? After long debates on the quality and the quantity of the data, a rough work sheet was formulated to consolidate and compare the collected data. The work sheet was actually a "typology of houses" for the Hohokam in general and the regions specifically. In the house typology many aspects of house construction were taken into account. The most useful and the most consistent in the archeological resource material were the following: floor, roof, and wall features with the addition of other diagnostic variables such as the floor plan and entryway features. To give added dimension to these work sheets site reference, number of structures, phase, period, and diagnostic ceramic data were included in these sheets. To supply data for the possibility and interpretation of activity areas, if they could be defined, a section of the work sheet was reserved for these artifact associations. The artifacts are the following: lithics, ceramics, bone, shell, and wood industries found in each house.
Specific details of all subdivisions of the diagnostic traits are further explained according to their particular major diagnostic elements. Specific dimensional data are provided for, and a section for remarks about the structure is also provided (See Appendix C, Sample Work Sheets P.154-56).

To complete the organization of the data, all detailed site information whether complete or incomplete was transferred onto work sheets. Each site from which data were collected was prefaced by site maps, phase information and designation, and house plans. Then each site was entered onto a map of the Hohokam area; as the sites are placed on the map, the proposed regions become apparent as to their distribution. Fourteen sites which had sufficient detailed information produced the data for this research; there are 175 structures for which work sheets have been made (See Appendix C, Hohokam Area Map with Designated Regions P. 146).

However, the principle concern of this research is not only to show regional variations, but it is to show specific variations in the architecture of the Hohokam structures. In the analysis of the Hohokam data which indicates regional variations, house structures were diagnostic of specific regional forms of Hohokam manifestations as were ceramics.

According to the principle established in the problem of this research, it is proposed that these architectural variations in the Hohokam area can be attributed to either regional environmental differences or to specific activities which could be associated with architectural features. Some hypothetical comments could also be made on kinship units from Hohokam architecture.
Structural data are needed for the discussion of this problem. In Chapter III, some generalizations were made in respect to the structures attributed to each region. This chapter will attempt to present specific data in architectural variations as determined by either environment or activity areas.

The "house typology" which will be used to compare the Hohokam regions will be based on the following attributes:

1. layout-dimensions and shape
2. entryway-door or vestibule
3. location of fire pit
4. structural support-walls and roof
5. floor features-pits, post holes etc.
6. construction materials

The other factor which affects the architectural variations is the time element. Two of the three regions, Upper Salt-Verde Drainages and the Santa Cruz-Rillito Drainages, appear to be later developments of the Hohokam tradition which was centralized in the Gila Basin. Hohokam manifestations, usually ceramics and architecture, are found in both regions after 800 A. D. In addition, regional manufacture or varieties of Hohokam ceramics also begin after 800 A. D. With the number of houses reported being inconclusive, comparative statements are only hypothetical.

Based on the six classes of data listed above specific Hohokam regions can be defined and discussed in terms of house types. The definition of the "house type" will be explained according to these classes of data. The
comparison of "house types" for each region will be presented in reference to the specific archeological sequence for each region. The Hohokam structures of the Lower Salt-Gila Basin Region should be presented first in order to establish a "standard of comparison". The Upper Salt-Verde Region and Santa Cruz-Rillito Region should then follow. The following discussion will not only show the changes in structure by region but will also consider what causes these architectural variations (See Appendix C, Regional Structural Data by Period, Phase, and Region pp. 148 - 153).

LOWER SALT-GILA BASIN HOUSE TYPES


Pioneer Period: (300 B. C. to 500 A. D.)

Vahki Phase - squarish floor plan, subterranean foundation, dimensions (10-12 m); entryway by narrow lateral vestibule, ramp; fire pit on center line with entryway; major support by four large posts (exceeding 15 cm) located in each corner, secondary support by peripheral posts around foundation; roof support post and cross beams; no floor features, caliche floor covering; construction materials - brush, caliche, pine or pinon posts (3 houses of this type - Snaketown, 1A. S. U. U: 10:2).

Estrella Phase - squarish floor plan, subterranean foundation, dimensions (6-8 m); entryway by narrow lateral vestibule, ramp; fire pit center line of entryway; major support by rows of posts (exceeding 15 cm), secondary
support by peripheral posts around foundation; roof support by post and beam; no floor features, caliche floor; construction materials - same as Vahki phase (1 house of this type - Snaketown).

Sweetwater Phase - squarish floor plan, subterranean foundation, dimensions (5-7 m); entry by narrow lateral vestibule, ramp; fire pit center line with entryway, major support by 4 posts (exceeding 15 cm) in each corner, secondary support peripheral to foundation; roof support by beams and posts; no floor features, caliche floor; construction material same as Vahki phase (1 house of this type - Snaketown).

Snaketown Phase - rectangular floor plan, with slightly rounded corners, subterranean foundation, dimensions (4 m by 7 m); entry by narrow lateral vestibule, ramp; fire pit center line with entryway; major support by large posts along the major axis, secondary support peripheral to foundation; roof support by post and beam; no floor features, caliche floor; construction materials - same as Vahki phase (5 houses of this type - Snaketown).

Colonial Period: (500 to 900 A.D.)

Gila Butte and Santa Cruz Phases - rectangular floor plan with rounded corners, subterranean foundation, dimensions (3-4 m by 7-9 m); entry by long narrow lateral vestibule, ramp; fire pit in direct line with entryway; major support by 2 to 4 posts (exceeding 15 cm) along major axis, secondary support peripheral to foundation; roof support by beams and posts; no floor features, caliche floor; construction materials - same as Vahki phase (16 houses of this type - Snaketown, 2 Painted Rocks, 1 Arizona U: 13 :9).

These two phases are placed together because there are no significant
structural variations; ceramic types designate the phase separation.

Sedentary Period: (900 to 1100 A.D.)
Sacaton Phase - oval to oblong floor plan, subterranean foundation, dimensions (3 m by 6 m); entry by short bulbous vestibule step; fire pit in direct line with entryway; major support by 3 large posts (exceeding 15 cm) along major axis, secondary support by peripheral posts around foundation; roof support by posts and beams; rimmed floor feature, caliche floor covering; construction materials - same as in Vahki phase (13 houses of this type - 8 at Snaketown, 5 at Painted Rocks). The Santan phase of the Sedentary period will not be discussed because of its questionable place in the Hohokam sequence in the Gila Basin (Gladwin, 1948).

Classic Period: (1100 to 1400 A.D.)
Soho Phase - rectangular or square floor plans, square corners, surface foundation, some contiguous structures, dimensions vary (10-15 m to 7-5 m), some structure compounds enclosed; entry by doorway, door sill; fire pit in direct line with doorway; major support by jacal-adobe walls, reinforced walls; roof support by cross beams; if secondary support usually peripheral; floor pits-burials, caliche floor covering; construction materials - rock, caliche plaster, Saguaro or Arrow Weed ribs, thatched framework, brush, and piñon beams (45 structures of this type - 1 Painted Rocks, 2 Arizona U: 13: 9, 42 Los Muertos).

Civano Phase - rectangular or square floor plans, square corners, surface foundation, contiguous structures, variable dimensions, some compound enclosures, large multi-storied structures; entry by doorway, door sill; fire
pit in direct line with doorway; major support by jacal-adobe reinforced walls, secondary support peripheral; roof support by cross beams, concourse laid adobe on multi-storied structures; construction materials - same as the Soho phase (60 structures of this type - Casa Grande, Los Muertos).

UPPER SALT-VERDE REGION HOUSE TYPES


There are no specified periods in this region; there are only phase designations which could be equated with the Gila Basin sequence. First two phases were not placed in the Hohokam tradition.

Dry Creek Phase: (2000 B. C. to A. D. 1)

Dry Creek phase - shows no domesticate architecture; it could be assumed that other means of habitation as caves, non-recoverable "brush" houses would be used.

Squaw Peak Phase: (A. D. 1 to 700 A. D.)

Squaw Peak phase - round and rectangular with rounded ends floor plan, subterranean foundation, dimensions (5 m by 7 m); entry by doorway, step and ramp; fire pit in direct line with doorway; major support by one central post (exceeding 15 cm), secondary support by peripheral poles; floor featured bell shaped storage pits, plastered floor; construction materials - rock, brush, clay, pine posts (2 houses of this type). There appears to be no formal architectural similarity to Pioneer architecture in the Gila Basin.
Hackberry Phase: (700 to 800 A.D.)

Hackberry phase - rectangular floor plan, subterranean foundation (called a house in pit), dimensions (5 m by 8 m); entry by vestibule (1 house only), others undetermined; fire pits in direct line with entryway; major support by 2-4 posts (exceeding 15 cm) along major axis, secondary support by peripheral posts; roof support by post and cross beams; floor features slab-lined (Verde Valley), some prepared clay surfaces; construction material - same as early phase, addition of stone slabs (4 houses of this type).

Roosevelt 9:6 (Haury, 1932) indicates variability of house types for this site; the Roosevelt 9:6 site is classified in the Verde Region based on environmental situation, but house types show more affinity towards Gila Basin type, Santa Cruz phase (12 houses). House numbers 5, 7, 9, and 10 appear to have some attributes of Hackberry phase. Walnut Creek site has Anasazi structures in conjunction with it. The Hackberry phase through Tuzigoot phases will be considered the local sequence of the Hohokam in this region.

Cloverleaf Phase: (800 to 900 A.D.)

Cloverleaf phase - rectangular floor plan with rounded corners, some irregular oval plans; entry by short vestibule, ramp and step; fire pit directly in line with entryway; major support by post and cross beams; floor features include notched stone or wooden floor supports, subfloor storage pits, plastered floor; construction materials - same as earlier phases (4 houses of this type). Some indication of communal house (Breternitz 1962: 22); however data do not appreciably differ from domestic house type.
Camp Verde Phase: (900 A.D. to 1125 A.D.)

Camp Verde phase - rectangular floor plan, pit foundation, rounded corners, dimensions (3-4 m by 5-7 m); entry by bulbous entry vestibule, ramp and step; fire pit in direct line with center of doorway; major support by 4-6 posts located in each corner, secondary support by peripheral posts; roof support by post and cross beam; floor features include slab-lined pit, floor grooves and notches; construction materials - same as in early phases (8 houses for this phase). There are some references to communal structures.

Honanki Phase (1125 A.D. to 1300 A.D.) and Tuzigoot Phase: (1300 A.D. to 1425 A.D.)

Honanki and Tuzigoot phase - Colton (1939: 44-45) assigns these two phases to Sinagua; they may also be associated with the Salado peoples of the Tonto Region that migrated (?) into the other two Hohokam regions. House attributes are: rectangular to square floor plan, surface and cliff structures, dimension vary; entry by doorway; fire pit in line with center doorway; support by jacal reinforced walls, limited secondary support peripheral to plan, roof support by beams and cross beams; floor features are unknown; construction materials - same as in early phases (5 locations of these masonry cliff or village complexes.)

SANTA CRUZ-RILLITO REGION HOUSE TYPES

Site Data - Tanque Verde Ruins (Kelly, 1936), Whiptail Site (Molfese, 1971), Valshni Village Site (Withers, 1944), Indian Ruins Site (Hayden, 1957), and Arizona BB: 14:24 (Zahniser, 1966).

Rincon-Rillito Phases: (800 to 1100 A.D.) and Vamori Phase: (800 to 1100 A.D.)
- rectangular floor plans, square corners, subterranean foundation, dimensions (3-5 m to 5-6 m); entry by door with steps (2) in door; fire pit in direct line with doorway; major support by 4 posts (exceeding 15 cm) located in each corner, secondary support peripheral to foundation; roof support by post and beams, jacal reinforced walls; no special floor features; caliche covered floor, construction materials—caliche, brush, posts of pine or piñon, rock, and thatching materials (18 houses of this type from Vamori phase; houses of this type from Rincon-Rillito phases, 45 Rincon sites and 67 Rillito sites. It is assumed that these sites produced at least 1 house per site).

Tanque Verde Phase: (1100 to 1300 A. D.) and Topawa Phase: 1100 to 1250 A. D.)—rectangular to square floor plan, subterranean foundation, square corners, dimensions (5 m to 6-7 m), some contiguous structures; entry by doorway; steps in door; fire pit in direct line with doorway; major support from reinforced adobe walls, some major and secondary support from posts peripherally located; roof support by beams and cross beams, construction materials—same as earlier phases; floor features, pits for burials in some houses (7 houses of this type from Topawa phase, and 17 houses of this type from Tanque Verde phase. There are additional 45 Tanque Verde sites from which at least one house is assumed).

Tucson Phase: (1300 to 1450 A. D.) and Sells Phase: (1250 to 1400 A. D.)—rectangular or square floor plan, square corners, surface or subterranean foundation, contiguous or individual structures; entry by doorway, steps, fire pit in direct line with doorway; major support from reinforced walls (adobe or rock with thatched framework), secondary support from small posts;
roof support by beams and cross beams; caliche floor covering; construction material same as in early phases (3 houses of this type from Sells phase and 10 sites producing at least one Tucson phase structure).

COMPARATIVE FEATURE ANALYSIS

From the house structure data from each region, it appears that there are some similarities throughout the area and that there are regional differences. In analyzing the archeological data some generalized statements could be made according to the six classes of data used in constructing the house typology. These generalizations can specifically indicate the variations according to their region.

Construction Materials
All regions have used piñon, cottonwood, and pine posts for support; all have used various forms of brush, rock, and clays for plaster. Caliche was used in the Gila and Santa Cruz Regions while in the Verde Region pre-cut stone slabs were used for floor and pit wall covering. The Verde Region shows an increase in the use of wood materials while Gila and Santa Cruz show limited and re-used wood supplies. There is an obvious lack of wood in these two regions. Application of materials and engineering concepts of construction were universal within all regions. One late exception is Casa Grande where major support was by concourse laid caliche replacing large posts (See Appendix C, Comparative Wall Features).

Structural Support
Support was either by post and beams or reinforced jacal-adobe walls. All early phases in each region showed post and beam support (Gila Region specifically). Later phases showed a shift to reinforced jacal walls;
this provided major support. Post and beam distribution ranged from corner located, multi-row layout to major axis configuration in Gila Region; from centrally located post to corner located in Verde Region; and from 4 corner post to strictly wall support in Santa Cruz Region. All regions used peripheral support posts. Reinforced walls appear in all three regions; the Gila Region used concourse-laid caliche in later phases; the Santa Cruz and Verde used jacal reinforcing. Caliche clay is a natural resource available to Gila and Santa Cruz Regions; it is absent in the Verde Region. The roof was a series of small posts, thatched together, and covered with caliche. Support came from beams and cross beams (associated with reinforced walls) or post and beams (associated with non-reinforced walls). Increased use of woods in Verde Region indicates a greater exploitation of natural resources (See Appendix C, Comparative Roof and Wall Features).

Fire Pit Location
All regions indicated a preference for fire pits in direct line with center of doorway or entryway. There are some variations in shape of fire pit. Although these are indications that fire pit variations exist in both time and space insufficient data were available to formalize these variations.

Entryway
Entryways have no specific orientation. The Gila Region shows the first usage of a narrow lateral vestibule with ramp entry until the Sacaton phase when the entry is a bulbous vestibule with steps. The Santa Cruz Region uses only doorways with steps or ramp. The Verde Region used a narrow vestibule entry with ramp or steps, but it gradually disappeared. In Classic period any structure which had a pit foundation used step and door entry (See
Appendix C, Comparative Entryway Features).

Floor Features

Fire pit, post holes, and floor surfacing were found in each region.

The Gila Region showed no additional floor features except for "lip rim" during Sacaton phase. Santa Cruz Region showed only minor variations from those of the Gila Region; some subfloor burials have been found in Tanque Verde phase (Whiptail Site). Verde Region presented many exceptions: subfloor bell shaped storage pits, notched or grooved floor supports (masonry), and subfloor burials. Floors in some Verde Region houses used slabs of masonry instead of caliche plaster as in Gila and Santa Cruz Regions; this is an abundant natural resource (stone) in the Verde Region where it is absent in the other regions. The Santa Cruz shows a greater use of stone and jacal construction than the Gila Region (See Appendix C, Comparative Floor Features).

Plan

Gila Region floor plan varies from square to rectangular with rounded corners to oval or oblong. These were primarily subterranean foundation; classic structures were either square or rectangular with square corners.

There are multi-storied, contiguous, and above ground structures in the Classic period. The Santa Cruz Region developed later in time than the Gila Region. The floor plans were rectangular with square or slightly rounded corners proceeding to strictly square corners. Foundations were subterranean; yet, there were contiguous structures appearing earlier in the Santa Cruz Region than in the Gila or Verde Region. Tanque Verde phase in the Santa Cruz Region presented square or rectangular plans, square corners, and some
cases contiguous subterranean structures. The final phase provided above ground structures besides Tanque Verde phase subterranean structures. Verde Region presents similar floor plans as the Gila Region. Later phases of the Verde sequence reflect Gila region plan of rectangular, round corners, and subterranean foundation. There are few oblong or oval plans seen in Verde data; rectangular or square plans appear until the end of the 15th Century (See Table 5. p. 111).

EVALUATIONS OF THE HOUSE TYPES

To conclude and summarize the descriptive material above, the discussion should now turn to the evaluation of these data relative to the traditionally accepted "house types" for each Hohokam region. In describing Hohokam architecture, variations were not only noted by regions but were also noted within some regions. In some cases certain elements (structural features) used by Gladwin to differentiate phases in his region could not be substantiated by these data. For example, the division of the Colonial period into the Gila Butte and the Santa Cruz phases (Gila Basin Region) based on changes in architecture could not be supported while the same division based on ceramic types could be substantiated. Considering the difficulties of the problem of regional variation in architecture and the inconsistencies of some of the traditional architectural data, a house typology sequence will now be advanced presenting a "generalized" house for a particular phase as well as presenting the regional variety of it.

Pioneer Period

Since the presently available archeological data do not provide any Pioneer period structures outside of the Gila Basin, no generalized state-
<table>
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<tr>
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<th>SANTA CRUZ-RILLITO</th>
<th>UPPER SALT-VERDE</th>
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**TABLE 5. REGIONAL COMPARISON OF HOKAN HOUSE PLANS**

- SQUARE
- MULTI-STORIED
- ROUNDED CORNER
- CIRCULAR
- RECTANGULAR
- OVAL OR OBLONG
- CONTIGUOUS
ments on house typology can be evaluated other than what has already been defined at Snaketown (Gila Basin Region) by Gladwin. With the limited descriptive data of these early Hohokam phase structures, no significant architectural variations can be demonstrated within the Pioneer period phases. Some speculations, however, could be introduced for further discussion.

The Vahki phase as described on page 100, presents the descriptive definition of this phase. The two Vahki houses found at Snaketown correspond to what Gladwin has proposed for this phase; they are in actuality the "type houses" for the Vahki phase. The remaining Vahki phase structure from A. S. U. U: 10:2 does not correspond to Gladwin's definition. This structure was classified as belonging to the Vahki phase based on the ceramics found in association with it and not by its architecture. The floor plan of this last structure is rectangular rather than square and the post pattern is dispersed rather than arranged in the corners of the structure.

The same situation that was encountered in the Vahki phase exists in the following Estrella phase described on page 100. Of the two known Estrella phase structures only one is described in the Snaketown literature. The only variation that can be demonstrated is the apparent changes from the Vahki structures to the Estrella structures. For example, the surface area of the Estrella house is approximately half that of the Vahki house or 50 m²; the arrangement of the post pattern is different in the Estrella (parallel rows of posts) rather than corner distribution. The Sweetwater phase as described on page 101 is only represented by one structure which was excavated at Snaketown. This phase structure is less in surface area
than the Estrella phase structure and shows a variation in the post pattern from parallel rows to corner located posts.

The Snaketown phase, the last of the Pioneer period phases, provides more data than any of the previous phases. There are five structures of this type known from Snaketown. Since Gladwin’s definition (described on page 101) is based on these structures, two additional comments are needed for clarification. First, of the five structures assigned to this phase only three of them have rectangular floor plans while the remaining two structures have square floor plans. According to the definition, Snaketown phase floor plans are rectangular rather than square. The ratio of nearly one rectangular plan to one square plan makes this statement questionable. Second, the surface area is approximately the same for both floor plans. The surface area of the square floor plan ranges from 25 to 40 m$^2$ while the rectangular floor plan area ranges from 35 to 42 m$^2$.

The interjection of surface floor area and post pattern will be used to substantiate that there is no difference in the surface areas of the Snaketown phase structures to the structures found in both phases of the Colonial period. It is proposed that there is a continuum of the same type structure as found in the Snaketown, Gila Butte, and Santa Cruz phases. The following description of the Colonial period structures, at least for the Gila Basin Region, will be indistinguishable.

Colonial Period

In the Colonial period there is evidence that all three regions, as proposed in this investigation, are participating in the Hohokam tradition.
For this reason, there is not only an increase in the quantity of the structural data but also an increase in the regional variability when compared to that available for the Pioneer period. In the following discussion a generalized "house type" will be advance for the Colonial period which will then be followed by the regional type or "variety".

The Colonial period structure is defined by the following set of attributes: rectangular floor plan with rounded corners, dimensions range from 3-4 m to 7-8 m; subterranean foundation; lateral vestibule entryway; ramp or step; fire pit in direct line with entryway; major support by posts along major axis; secondary support, peripheral to the foundation; roof support by post and beam; and wattle-daub construction. The final attribute, floor surface, used as a comparative scale for all Colonial structures fell between 21 m² and 32 m² with the majority of houses having 25 m² in surface area.

The Gila Basin variety (Gila Butte-Santa Cruz phases) of this house type showed these variations: caliche floor covering and no floor features. Upper Salt-Verde variety (Hackberry to Cloverleaf phases) showed these variations: bell shaped storage pits in floor, clay surface or stone slab floor covering. Santa Cruz-Rillito variety (Vamori and Rincon-Rillito phases) showed these variations: square corners rather than rounded, no floor features, caliche floor covering, jacal construction, no vestibule, and door with step entryway.

In some of the regions described above there are little or no data available from an architectural point of view to support the division of the Colonial period into the above phases. Therefore, there is no Gila Butte
phase house nor is there any Santa Cruz phase house. They should be referred to as the Colonial period houses.

Sedentary Period

The Sedentary period structures are defined on these following attributes: floor plan varies from oblong to elliptical, dimensions ranging from 3-4 m to 6 m; subterranean foundation, caliche covering; short bulbous entry vestibule, step; fire pit in direct line with entryway; major support, posts along major axis; secondary support peripheral to foundation; roof support, post and beams; construction, wattle-daub. The floor surface area ranges from 16 m² to 35 m² with the majority of house floor area approaching 22 m².

The regional variations will be provided in addition to the general house data described above. The Gila Basin variety (Sacaton phase) showed these following variations; rim encircling the foundation of the pit house, ramp with step entryway, oblong rather than ellipse or rectangular with rounded corners. The Upper Salt-Verde variety (Camp Verde phase) showed these variations: rectangular floor plan with rounded corners, some elliptical, ramp with step, primary support by posts located in each corner, floor features of slab-lined pits, floor grooves and notched. The Santa Cruz-Rillito variety (late Vamori and late Rillito phases) showed these variations: rectangular or square floor plan, square corners, door and step, primary support by posts located in each corner, and jacal construction.

Classic Period

The Classic period structures for the Hohokam area are defined by these general attributes: square to rectangular floor plan, dimensions vary from
5-7 m to 10-15 m; both contiguous and individual structures; door entryway or possibly roof entryway; surface structures; fire pit in direct line with entryway; major support from reinforced walls; secondary support from dispersed posts; roof support from beams; construction usually jacal. The surface area of the floor shows a marked increase from the preceding Sedentary period. The area ranges from 50 m² to 105 m² in total surface area with the majority of the house floor area falling around 70 m².

As all three regions have two phases for the Classic period, the architectural variations between the two phases is insignificant based on the surface area scale. Therefore, the house type-variety for each region will be defined for both of the phases. These are the regional variations in addition to the "general" house data as described above. The Gila Basin variety (Soho and Civano phases) showed these regional variations; compound surrounded structures, door sills in doorway, caliche floor covering, floor pits for burials, some concourse construction (Civano), and some multi-level structures (Civano). The Upper Salt-Verde variety (Honanki and Tuzigoot phases) showed these regional variations: some cliff dwellings with structural variations for this type of construction, masonry construction materials, and use of wood reinforcing. The Santa Cruz-Rillito variety (Tanque Verde-Tucson phases and Topawa phase) showed the following variations: some subterranean foundations for structures along with surface structures, floor pits for burials, and stone reinforced wall support.

After describing and compiling the above architectural data for the various regions of the Hohokam area, one specific observation could be made to simplify the architectural sequence. The house structure sequence in-
dicated by phases should be replaced with a more uniform period designation with the range of variations rather than the present designations. For example, there should be three type designations such as the Colonial type, the Sedentary type, and the Classic type each with their regional variations. The Pioneer period, however, must be reviewed when more data becomes available to incorporate it into this type of classification, although it is felt that the Snaketown phase structures should be assigned to the Colonial type. Gladwin (1948: 123) attempts a similar revision of the architectural sequence for Snaketown, but he does not consider regional architecture.
CONCLUSIONS

The theoretical concepts which lead to this research investigation were based on two observations. These were formulated from observations of various Hohokam sites and from the data presented in the archeological record for the Hohokam. The first observation attempted to establish a functional correlation between activity areas (defined by artifact association) and architectural features. If this functional correlation could be supported, then it could be assumed that there are certain socio-cultural norms regulating their distribution in a structure. The second observation attempted to establish a correlation between the natural environment and the variation in architectural features. This was presented as an alternative observation to the first one. Both observations could be possible explanations for the variation in architectural features as found in the Hohokam area.

Each observation necessitated specific data to discuss more fully the inter-relationship of environment or activity areas to the variation in architectural features. Information on the natural environment of the Hohokam must contain the entire range of variations of climate, terrain, rivers, flora and fauna. Activity area data require specific resource material in artifact content, artifact types, distribution of artifacts, and artifact-architectural feature associations.

To present these observations in a more scientific manner, several
hypotheses were formulated to test the validity of these observations (See Introduction, p. 10-11). The first set of hypotheses ($A_1$ and $A_2$) were derived from the activity area-architectural feature observations. The last hypothesis ($B$) presented the natural environment-architectural feature observation. In order to test the validity of either, natural environment or activity areas, could be associated with variations in architectural features, then by means of statistical analysis these hypotheses could be tested for validity.

To substantiate the elementary supposition of variation in the Hohokam area, the area was subdivided into regions by natural environment, artifactual material, and house structures. Three regions were established from these data. This distribution of the various house types as proposed in this investigation could be associated with the three regions as described; each region exhibits a clustering of features which are specifically confined to their respective region.

This research has attempted to clarify several points and to establish the nature of regional variability from the scattered archeological data. The major points investigated in this research are:

1. The significance of regional variations of the natural environment in the Hohokam area and the establishment of the ecological zones to which the Hohokam could have adapted in each subregion.

2. Clarification of the variations in the types of irrigation that the Hohokam could have utilized.
3. Indications of the variations in burial customs, ceramic types, and other artifactual data as it pertains to each region.

4. Establishment of the house types found in each region, toward the end of establishing a comparative Hohokam house typology.

5. Comparison of specific architectural features among the three Hohokam regions, towards the end of clarifying regional variations in architectural features.

6. An attempt to establish associations between activity areas and architectural features, and an attempt to establish associations of the natural environmental variations and the distribution of architectural features.

The results of this research investigation have been partially successful. Sufficient data were available to clarify five of the six points mentioned above regarding the nature of regional variability of the Hohokam. The final point (No. 6) which was the theoretical counterpart of this investigation still remains scientifically unevaluated. It was proposed that activities relating to specific areas do indeed have an effect on the architecture of a structure. To scientifically investigate a problem of this nature, detailed archeological excavation is needed. This has not been the case in most Hohokam excavations. Actually, little artifactual material has been recovered from Hohokam structures. A number of reasons for this could be suggested. First, the activities were being performed somewhere else (at least outside of the structure proper); second, all artifactual data were removed at time of the abandonment of the structure for various reasons.
(death, migration, deliberate destruction); and third, the correct excavation methodology for this problem has not been tried as yet.

There have been some indications from the archeological record that certain activities were being performed outside the structure. In support of this there has been some data on earth ovens for baking and ramadas attached to the structure which would assume a variety of activities being performed there (Withers, 1944; Wasely, 1959; Haury, 1945b).

There are few indications of activities within the Hohokam structures. There has been no indication of weaving operations (loom holes) other than a few inconclusive perforated sherd discs, but they have no provenience in site details. Manufacture of ceramics (clays, storage pots, mano, metate, paints), of lithics (cores, chips, blanks, hammer stones, platforms, tools), or of bone artifacts has not been defined in most structures. Storage areas have been tentatively worked out in the Verde Region based on bell shaped pits which are randomly distributed within the structures. One "storage house" at Snaketown was so called on the collection of several smashed jars and a sealed fire pit. The Santa Cruz material has some data on storage similar to the Snaketown "storage house" and some on random distribution of storage vessels on the floor (Whiptail Site).

The most substantial information deals with food preparation and cooking facilities from the Verde Valley sites and the Whiptail site. In these cases there were a great number of pot sherds usually Plain Wares found in association with fire pits indicating storage or serving utensils for food. There is some inconclusive correlations of manos and metates with fire pits.
There is some indication of grinding preparations of food materials in the bulbous vestibules of some Verde Region sites (House No. 5, Honanki phase).

The solution is at present still subject to more discussion; any generalized statements of activity areas and architectural features could not be properly supported. The only specific activity area-architectural feature association is fire pit-food preparation which appears to some extent in all three regions. The data for the association of other activity area-architectural features are inconclusive.

Natural environment exploitation for the construction of houses could be associated with each region. The Verde Region indicated a more elaborate use of masonry and wood than in any other region; they, the Hohokam, in this Verde Region exploited their regional natural resources. Lack of masonry and wood can be seen in both Gila and Santa Cruz Regions; they did show an increase in other materials as caliche and stone in later construction. These associations of natural environment with architectural features show regional exploitation which would allow some features to be dependent on the natural environmental resources.

In a final review of this research investigation there are various assessments to be made from the archeological data. From the three classes of data environment, activity areas, and structures used in this investigation of regional variability of Hohokam architecture, the various adaptive potentials, implying a range of these variations of Hohokam traditions, could be presented. First, regional environmental variations could be used to infer a range of cultural adaptive potentials; this must be considered to be an affirmed evaluation based on the environmental data as presented in this research.
Second, architectural variations are evident from various regional Hohokam sites participating in Hohokam traditions. It could be supported that there is more than a random association between the regional environmental potentials and architectural variations as described in this research. Lastly, artifactual data did in some limited situations indicate variations in the regional exploitation; this is supported by the classes of artifacts found in conjunction with the Upper Salt-Verde Region structures were related to a hunter-gatherer economy rather than agricultural economy. To further support this assumption, the archeological record indicates this regional variability as shown by the use of "type-variety" concepts in ceramics. Burial customs could also be used to support the regional variability as described. Each subclass of data could possibly be used to substantiate the architectural variation.

On the one hand, regional variations in such cultural manifestations as architecture, ceramics, and lithics could indicate the range of regional potentials to which the Hohokam were adapting. On the other hand, certain manifestations such as the design and form of the ceramics, lithic tool kits indicating the same activities, and similarity of some architectural features, as fire pit alignment, could indicate Hohokam traditions. This research on Hohokam architectural variations leads to the conclusion that though certain traditions of Hohokam culture are evident in each region described, certain aspects of the regional potentials produce variations in these Hohokam traditions.
APPENDIX

A.

ENVIRONMENTAL DATA
THE SONORAN DESERT
(AFTER DUNBIER 1968)
ADJACENT UPLAND SOURCES
OF SONORAN DESERT STREAMS
(AFTER DUNBIER 1968: 85)
WATERSHEDS

• - • BOUNDARY

(AFTER DUNBIER 1968: 72)
SUMMER RAINFALL

UNDER 5 IN.  

5-10 IN.  

(AFTER DUNBIER 1968: 23)
ANNUAL NUMBER OF DAYS WITH RAINFALL EXCEEDING .01 IN.

10-20 IN.
20-30 IN.
30-40 IN.
OVER 40 IN.

(AFTER DUMBIER 1968: 27)
MEAN ANNUAL RAINFALL

(AFTER DUNBIER 1968: 19)
MEAN JULY TEMPERATURES

90-95
80-90
70-80
UNDER 70

(AFTER DUNBLIE 1968: 29)
MEAN JANUARY TEMPERATURES

- 60-70
- 50-60
- 40-50
- UNDER 40

(AFTER DUNBIER 1968: 31)
VEGETATIONAL SUBREGIONS

LOWER COLORADO DESERT

ARIZONA UPLAND

GULF COAST

PLAINS OF SONORA

(AFTER DUNBIER 1968: 47)
### APPENDIX A

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<th>Average Winter Rain (in)</th>
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(After Dunbier 1968: 396)

### APPENDIX B

**TEMPERATURE RANGES**

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(After Dunbier 1968: 398)
APPENDIX E

MONTHLY PERCENTAGE OF TOTAL FLOW FOR MAJOR SONORAN RIVERS

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(After Dunbier 1968: 399-400)
CONTEMPORARY INDIAN TRIBES

APACHE

PIMA

PAPAGO

(AFTER DUNBIER, 1968)
APPENDIX

B.

CERAMICS AND OTHER ARTIFACTS
## CERAMIC COMPONENTS OF ALL HOHOKAM PHASES

(After Gladwin 1937: 170)

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TOTALS

PIONEER

SILLA

SHELTON

SAGETON

COLONIAL

SEU.

PHASE

POTTERY AT SAGETON AS TO PHASE

OCCURRENCE OF INTERVALIVE POTTERY AT SAGETON AS TO PHASE

(EDGARTON 1937: 214)
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**Indigenous and Intrusive Pottery Types from the Verde Valley Sites**

*After Breternitz 1960: 10*
### POTTERY TYPES (PAPAGUERIA) OF SOUTHERN ARIZONA

(After Withers 1944: 41)

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<td>Valshni Red</td>
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<td>Intrusive</td>
<td>Topawa Red-On-Brown</td>
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<td>TOPAWA</td>
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<td>(1100-1250)</td>
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<td>Trincheras Purple-On-Red</td>
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### COMPARISON OF PIONEER AND COLONIAL PERIODS SUGGESTING LACK OF LOCAL DEVELOPMENT ON GILA DRAINAGE

<table>
<thead>
<tr>
<th>PIONEER PERIOD</th>
<th>COLONIAL PERIOD</th>
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<tr>
<td>Settlement near mountains and near streams.</td>
<td>X Settlements on river terraces along canals.</td>
</tr>
<tr>
<td>Inundation (floods) farming (assumed).</td>
<td>X Irrigation farming (canals and laterals).</td>
</tr>
<tr>
<td>Community lodge (enlarged house).</td>
<td>X Intercommunity lodge (ball court)</td>
</tr>
<tr>
<td></td>
<td>- Community lodge (?)</td>
</tr>
<tr>
<td>Gray-brown ware, unslipped, lightly polished, decorated in red rare, incised grooves.</td>
<td>X Buff ware, wash or light slip, variety of red decoration, incised decline.</td>
</tr>
<tr>
<td>Red ware</td>
<td>X No Red ware</td>
</tr>
<tr>
<td>Square 4-post jacal, flat roof</td>
<td>X Rectangular 2-post jacal with gabled roof</td>
</tr>
<tr>
<td>Sheet Trash</td>
<td>X Trashmound</td>
</tr>
<tr>
<td>Points rare and crude</td>
<td>X Points well chipped and common</td>
</tr>
<tr>
<td>Carved stone and shell rare (possibly trade)</td>
<td>- Carved stone and shell common</td>
</tr>
<tr>
<td>Incised stone vessels (trade)</td>
<td>? Incised stone vessels common</td>
</tr>
<tr>
<td>Whole or perforated shell</td>
<td>- Same plus cut, incised, and ground</td>
</tr>
<tr>
<td>Pit roasting (postulated by Schroeder 1957: 117)</td>
<td>X Same</td>
</tr>
<tr>
<td>Cremation trenches with sherds</td>
<td>- Cremation pits and offerings</td>
</tr>
<tr>
<td>X</td>
<td>X Cremation pits and offerings</td>
</tr>
<tr>
<td>Medicine stones and lava rings rare (trade)</td>
<td>? Medicine stones and lava rings more common</td>
</tr>
<tr>
<td>Plain stone palettes</td>
<td>X Same but predominance of carved and incised palettes</td>
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X -- No carry over between periods.
- -- Carry over between periods.

(After Schroeder 1967: 686)
## COMPARATIVE FEATURES: HOHOKAM AND SALADO
(After Schroeder 1953: 207)

<table>
<thead>
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<th>HOHOKAM</th>
<th>SALADO</th>
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<tr>
<td>Cremation, urn burial</td>
<td>Brachycephalic, deformed.</td>
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<tr>
<td>Extensive, controlled irrigation</td>
<td>Inhumation, extended, often below home floors</td>
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<tr>
<td>Dog</td>
<td>Dog, Turkey</td>
</tr>
<tr>
<td>Earthen walls with massive retaining walls, topped with flimsy structures; also unit-type shallowly excavated houses in open.</td>
<td>Multi-storied great houses and compact groupings of single-storied, adobe-walled (Gila Basin) and stone-walled (Globe-Roosevelt area) houses.</td>
</tr>
<tr>
<td>Paddle-and-anvil technique of finishing; Red-On-Buff; polished and smudged red ware; gray to brown plain ware.</td>
<td>Coil-scraped technique; polychrome in black, red, and white; corrugated; slipped corrugated red ware; smudging; brown plain ware.</td>
</tr>
<tr>
<td>Griddles; human figurines (rare), animal figurines; Mexican-type spindle whorls.</td>
<td>Animal figurines (rare), disc-type spindle whorls.</td>
</tr>
<tr>
<td>Rectangular, full-troughed metates well-shaped; mortar and pestle; hoes three-quarter grooved axe; carved stone vessels and slate palettes; stirrup crushers; rings and &quot;medicine&quot; stones; chisels; large-type arrow straightener.</td>
<td>Full-troughed metates not carefully shaped; three-quarter grooved axes, double-bitted axes, adzes; polishing stones; small-type arrow straightener.</td>
</tr>
<tr>
<td>Many species used; high skill in carving, some inlay and overlay.</td>
<td>Few species used; carving not specialized; turquoise overlay prevalent.</td>
</tr>
<tr>
<td>Wooden paddle-shaped tools, coarse twilled mats.</td>
<td>Painted coiled basketry, cane cigarettes, pahos, proto-katchinas.</td>
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</tbody>
</table>
APPENDIX

C.

STRUCTURAL DATA
Hohokam sites with available house type data

NORTH

Valle de la Vida sites

Painted Rocks sites

Phoenix

Los Muertos

ASU U: 10:2

Roosevelt 9:6

Snake Town

Ariz U: 13:9

Casa Grande

Indians

Whiptail

Tucson

Ariz BB: 14:24

Tanque Verde
<table>
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G- GILA BASIN S- SANTA CRUZ V- VERDE

House Data by Period, Phase, and Region
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| FORMATION       |      |        |       |
| PIT             |      |        |       |
| HOUSE IN PIT    |      |        |       |
| SURFACE         |      |        |       |

<p>| PLAN            |      |        |       |
| SQUARE          |      |        |       |
| RECTANGULAR     |      |        |       |
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| CIRCULAR        |      |        |       |</p>
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The thesis/dissertation submitted by John W. Molfese has been read and approved by members of the Department of Anthropology.

The final copies have been examined by the director of the thesis/dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis/dissertation is now given final approval with reference to content and form.

The thesis/dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

DATE
4-4-73

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