# PREHISTORIC ECOLOGY AT PATARATA 52, VERACRUZ, MEXICO: ADAPTATION TO THE MANGROVE SWAMP

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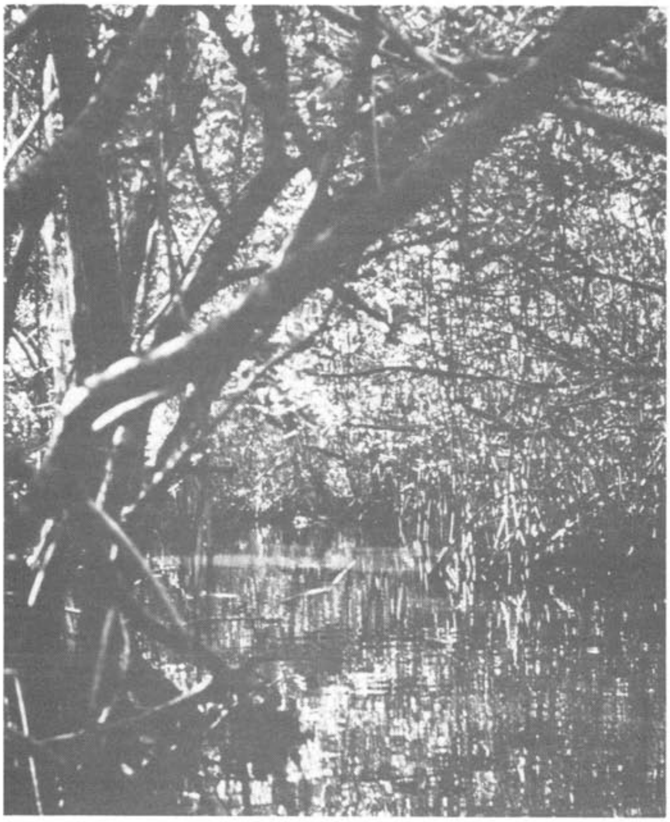
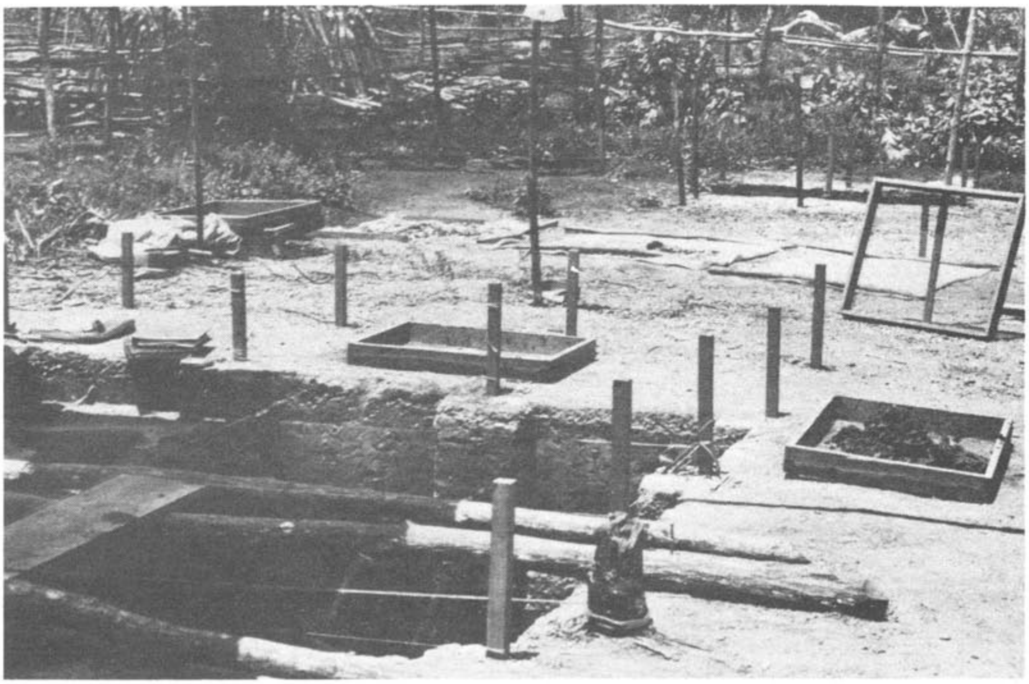
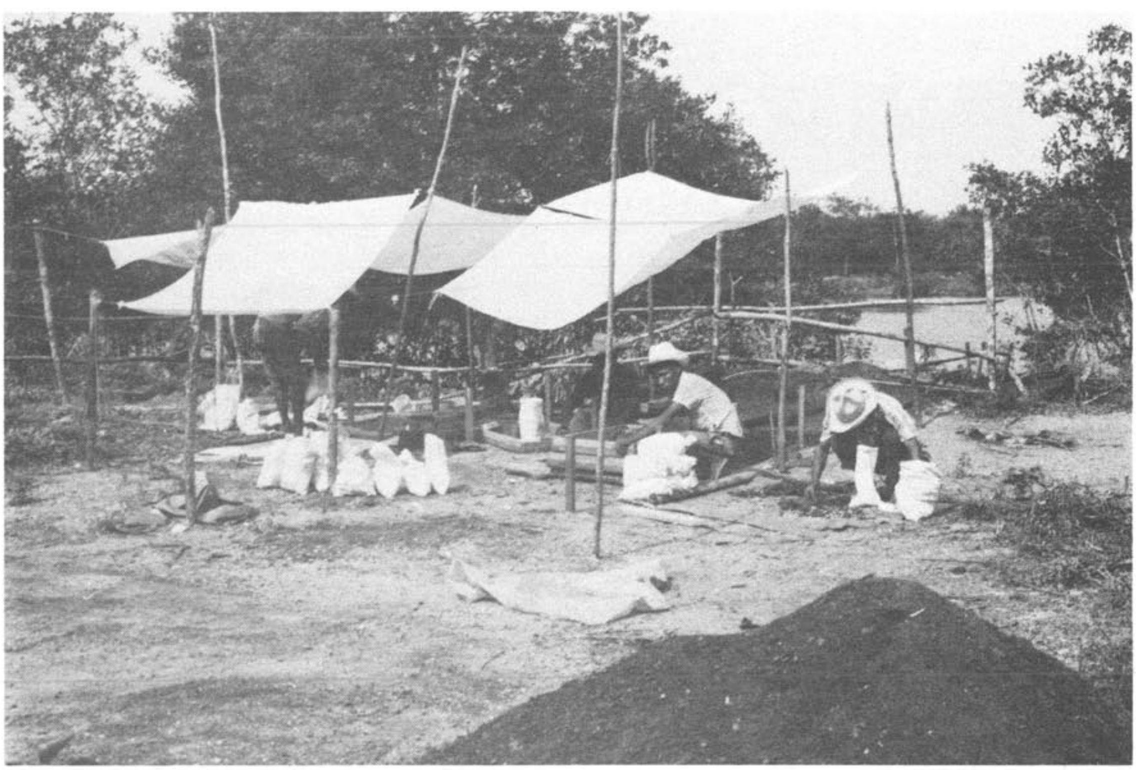


Left, Arroyo winding through canopy of Rhizophora mangrove swamp across from Alvarado, Veracruz, 1969

Below, house and shed on Patarata 52 in 1969



P52 main excavations. Preparations for charcoal making are visible in upper left. 1969



P52 main excavations in progress, 1969

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Permission for field work was granted by the Instituto Nacional de Antropologia e Historia of Mexico. Several staff members at the Instituto were very generous with their time and council. For this I am extremely grateful, and I wish to thank particularly Arqueologo Eduardo Matos M. and Arqueologo Jose Luis Lorenzo. I am also indebted to Professor Alfonso Medellin Z. for aid with research materials from the Museo de Antropologia in Jalapa. It was my fortune to be received kindly by many people living in the area where the field work was conducted. I wish to thank particularly Lic. Juan Barragan for his hospitality as well as the Veracruzanos of Tlacotalpan, Alvarado, and Acula, who made me feel at home. The field crew in my employ should be credited with perspicacious, reliable, hard work, for which I am grateful.

This paper is an outgrowth of my doctoral dissertation at Yale University (Stark 1974a). My advisor, Michael D. Coe, and a number of other anthropologists have made contributions to the progress of this research. None of them bears responsibility for its shortcomings, but they deserve acknowledgement for the various improvements due to their critical advice, assistance, and patience: Simon Bruder, K.C. Chang, G.A. Clark, Gordon Ekholm, Lawrence Feldman, K.V. Flannery, Frank Hole, Elinor Large, Richard S. MacNeish, Mary Marshall, Timothy O'Leary, Louise Paradis, Irving Rouse, James Schoenwetter, and Paul Tolstoy. I thank my family and friends who have encouraged and supported the research; they always come first to mind when I reflect on how this work was accomplished.

Without the cooperation of a number of specialists, this project would have suffered greatly. I am pleased once again to thank William Clench, Robert Cobean, Hugh Cutler, David Stansbery, Lou Fernandez, B.F. Kukachka, Elinor Lehto, Robert Sonin, Mr. and Mrs. Ian Sussex, Fred G. Thompson, J.W. Wells, and Elizabeth S. Wing.

The contributions of specialists have varied greatly. Some scholars described and analyzed part of the archeological collections, some identified specimens, some advised me on methods and procedures. Depending on the circumstances and the preference of the other investigators, in some cases the individual contributed a separately authored text, which appeared as an appendix in the dissertation. The original field project was not multi-disciplinary, but as analysis proceeded, it became increasingly a cooperative enterprise. Because of the origin and development of the research, I have responsibility for its theoretical perspective and

synthetic interpretations. However, it should be readily apparent that the value of the study would be greatly diminished were it not for the cooperation of those who lent their time and expertise to the final product. This monograph also includes three additional papers which report later, related research by Arizona State University graduate students.

Illustrations are by Susanna Berdecio, J. Simon Bruder, G.A. Clark, Valerie Clark, Teryl Schessler, and myself. The manuscript was typed by Linda Samson.

The study is dedicated to James Harold Stark.

*Manuscript submitted 1975*

# CHAPTER ONE

# INTRODUCTION

In 1968 I began survey in the estuarine area around Alvarado, Veracruz, Mexico in order to locate Early Preclassic sites that might contain preceramic levels. I intended to acquire information bearing on the hypothesis that the earliest permanent settlements in Mesoamerica occurred in coastal estuarine settings (Coe and Flannery 1964; 1967:104; MacNeish 1967:311). I was unsuccessful in locating such sites in the mangrove areas I surveyed. The data examined in this report result from excavation in a site in the mangrove swamp, Patarata 52, where I hoped to encounter underlying Preclassic material. Instead, the archeological sequence at the site is confined to the Classic Period (300-900 A.D.) The focus of this study is the prehistoric ecology of the Patarata 52 site. Within this subject subsistence and exchange will be principal topics because of the data available.

The current state of research on a topic affords considerable insight into what can be expected of a new investigation. Some archeological research builds on a well-developed data base and can test tightly defined hypotheses. Other studies represent initial forays which seem to raise more questions than they answer. The present case is much closer to the latter than the former, particularly in view of the limited extent of field work.

The Lower Papaloapan Basin in Veracruz includes a large, estuarine mangrove zone where the field project took place. No ecologically oriented archeology has been conducted there. Sites have been reported from the mangrove swamps (Medellin 1960b; Garcia 1971), and some sites have been excavated along the Lower Papaloapan (e.g. Medellin 1960a:189-190). However, the principal concern has been chronology and culture history. Moreover, much archeological work in Southern Veracruz has addressed problems in the Preclassic Period, particularly ones relating to the Olmecs (see Coe 1965a for an archeological synthesis). Therefore, the area I examined, the prehistoric period in question, and associated ecological topics constitute gaps in Mesoamerican studies.

Despite the scarcity of research conducted there, Southern Veracruz is a region of notable anthropological interest. Because the Preclassic Olmecs formed Mesoamerica's first civilization, it is a key arena for the investigation of the origins of complex societies. Southern Veracruz is also a relevant laboratory for understanding the maintenance of complex society in a tropical lowland setting. The present study contributes to analysis of the economic and ecological base of Classic Period society in Southern Veracruz and the tropical lowlands.

## ECOLOGICAL STUDY OF THE MESOAMERICAN LOWLANDS

Since I initiated this study, the context of economic and ecological research on lowland prehistory has changed substantially. New data and ideas reinforce the relevance of this study of a specialized environment.

The tropical lowlands and the highlands of Mesoamerica form two geographic zones generally considered to have had distinctive interactions of environmental and sociocultural systems (Sanders and Price 1968:9-10). However, there is a history of disagreement about the nature and effect of the interactions, particularly with respect to the tropical lowlands (e.g. Meggers 1954; Altschuler 1958; Coe 1961b; Dumond 1961; Sanders and Price 1968:128-134, 187). Agriculture has been the focus of much of the debate. For years the prevailing opinion has been that prehistoric lowland agriculture, like that of today, was based principally on swidden farming, a way of cultivation adapted to tropical soils, climate, and vegetation (Conklin 1954). Various opinions on how swidden affects sociocultural organization have been offered. Meggers (1954) argued for environmental and agricultural determinism, asserting that a tropical swidden system restricts the development of complex societies or inhibits their longevity.

Others (Altschuler 1958; Dumond 1961) have held that this is not characteristic of all tropical lowlands although they admit that swidden agriculture involves constraints which differ from those of other types of farming. In an example of this kind of reasoning, Coe (1961b) emphasized the comparatively low diversity in tropical products and the homogeneity in their timing; consequently, he argued that trade and economic specialization played a lesser role in lowland civilizations such as the Classic Maya.

It should be noted that this kind of debate is not limited to Mesoamerica. Similar differences of opinion prevail concerning the potential of the South American lowlands for supporting complex societies or of having contributed to the growth of Andean civilizations (Steward 1949:756-763; 1947; Rouse 1953; Meggers 1954; 1971:146; Meggers and Evans 1961:386, 388; Sanders and Price 1968:130; Lathrap 1968; 1970:45-47).

Eventually a number of Mesoamerican studies attempted to define the agricultural potential of lowland tropical areas (Ferdon 1959) or of parts of them (for the lowland Maya area, Dumond 1961; Cowgill 1962; 1971; Bronson 1966; Reina 1967; for the Olmec area, Drucker and Heizer 1960; Drucker 1961; Coe 1974). In particular, Coe (1974) described the variability of tropical agriculture along the Coatzacoalcos River in Veracruz.

Of late the governing assumption that swidden agriculture predominated has come under attack. Boserup (1965) challenged the presumption that an agricultural system is fixed by environmental conditions or technology. She argued that agriculture has a spectrum of possibilities ranging from long fallow, extensive systems to systems based on short fallow, and finally multi-cropping. She treats demographic pressure on land as an independent variable, while labor and agricultural intensification are linked, dependent variables. In accordance with this position, tropical agriculture might be expected to vary with demographic density (cf. Sanders 1972). Concomitantly, different strategies for use of specialized environments such as swamps could come into play, and subsistence might vary subtantially through time (cf. Puleston and Puleston 1971). Diverse agricultural practices might be in simultaneous use in areas of different demographic character (cf. Wilken 1971; Turner 1974). Whether or not under precolumbian conditions the Mesoamerican lowlands were susceptible to the full range of agricultural intensification outlined by Boserup is debatable, as Sanders (1972:147-149) has pointed out.

Recent evidence of prehistoric cultivation in flooded lowlands documents some areas of agricultural intensification (e.g. Parsons and Denevan 1967; Denevan 1970). Various types of artificially constructed, ridged fields have been discovered, principally in South America. Puleston and Puleston (1971:334) report that these also exist in the Maya lowlands along the Candelaria and Usumacinta Rivers, and Siemens and Puleston (1972) discuss ridged fields along the Candelaria in Southern Campeche (cf. Wilken 1971:438-441). The ridged fields demonstrate the flexible role of labor and technology in food production in a particular environment.

Some of the earlier generalizations about Mesoamerican tropical agriculture tend to treat the lowlands as a single environmental subdivision. As Coe (1974) and Sanders and Price (1968:128-129) point out, there are significant micro-environmental or biotope variations. As yet the sociocultural significance of such variation has been studied intensively only in restricted areas: the Pacific coast of Guatemala near La Victoria (Coe and Flannery 1967) and the San Lorenzo Tenochtitlan area in Veracruz (Coe 1974). In the latter case micro-environmental variation has important effects on present-day agricultural strategies.

Micro-environments also command attention because of their potential diversity in supplemental food resources (Coe and Flannery 1967). For example, Lange (1971; 1973) hypothesizes that subsistence in the Yucatecan Maya area benefited from symbiosis between areas rich in marine resources and those more suited to agriculture (but cf. Ball and Eaton 1972). Some ridged fields juxtapose aquatic and cultivable micro-environments, and aquatic resources should be emphasized in discussions of the field functions (Parsons and Denevan 1967:98-100; Denevan 1970:652; Thompson 1974). The San Lorenzo area is rich in riverine resources which supplement agriculture, particularly on a seasonal basis. Lathrap (1970:35-44) discusses similar factors with reference to supplementary protein in the Upper Amazon: there the active river floodplains and old alluvial deposits contrast in available fauna.

As Coe (1974) points out with reference to the San Lorenzo area, a variety of wild and agricultural resources are available, and consequently there are several possible economic strategies. This applies to many other lowlands as well. Moseley (1975) has made a strong argument for a precocious development on the Peruvian coast of centrally organized public enterprises sustained by a predominantly non-agricultural economy. Because of the enormously rich fauna supported by the Humboldt current, the Peruvian setting is not comparable to the Gulf coast. However, it is wise to temper our normal concern with agricultural subsistence with an appreciation of the potential of estuarine deltas with their plentiful aquatic resources. Broad generalizations about food and population potential demand an adequate assessment of a number of complex and interrelated factors. Concentration on a single form of agriculture no longer seems adequate. It is hoped that the present study of adaptation to an estuarine mangrove swamp will contribute a more accurate picture of variability in lowland subsistence and economic specializations.

The interrelationship of human groups and mangrove swamps has been a matter of dispute. Prior research can be classified according to three perspectives. (1) Some scholars treat mangrove swamps as a marginal environment with low population density, suited mainly to fishing and seasonal or specialized exploitation such as salt-making (Andrews 1943:12; 1971a; 1971b; Coe and Flannery 1967:91-92; Ruz 1969:29). (2) Another approach argues that coastal trade was an important specialization for some estuarine inhabitants (Scholes and Roys 1948; Chapman 1957; Craig 1966:28; Ruz 1969:29-30). The latter idea would imply a greater role for estuarine communities because of the significance that exchange is thought to have had for the growth and maintenance of civilization (Sanders 1956; Flannery 1968; Chapman 1971; Parsons and Price 1971; Tourtellot and Sabloff 1972). (3) Finally a point of view developed with reference to smaller Pacific coast swamps treats them as an adjunct micro-environment that may have played a critical role early in Mesoamerican prehistory. Coe and Flannery (1967:104) hypothesized that the faunal richness of estuaries, combined with close zoning of other micro-environments, may have permitted at least semi-sedentary settlement before farming made year-round habitation possible; estuarine oriented subsistence would promote a transition to full time farming as a way of life.

There is no reason to assume that human adaptation to this environment was stable (see Coe and Flannery 1967), nor that every estuarine locality was ecologically identical. On the contrary, this seems not to have been the case. Considered in isolation, mangrove swamps, which are themselves somewhat variable, could exhibit a number of possible successful subsistence patterns. Their variant geographical and sociocultural settings also could generate differences in human activities. Therefore, I expect that an archeological record from a mangrove swamp can represent a combination of factors internal to that environment with "external" ones, such as trade.

In view of the diversity of opinions about adaptation to mangrove swamps, it is remarkable that they have been little studied. Particularly on the Gulf coast, much of what we know has been claimed on the basis of survey or ethnohistoric reports (Andrews 1943; Scholes and Roys 1948; Drucker and Contreras 1953; Stirling 1957; Craig 1966; Ruz 1969; West, Psuty, and Thom 1969; Sisson 1970). Past survey methods do not guarantee a representative sample of prehistoric occupation (Matheny 1962; Stark 1974b; Bruder, Large, and Stark 1975). On the Gulf coast, published excavations in and near estuarine swamps have been concerned principally with other than ecological problems (e.g. Jakeman 1952; Berlin 1953; 1955; 1956; Medellin 1960a; Ruz 1969; Matheny 1970; Wilkerson 1972). Only on the Pacific coast have ecologically oriented studies been conducted in or adjacent to mangrove swamps (Coe 1961a; Feldman 1966; Coe and Flannery 1967; Shenkel 1971).

## A SYSTEMS PERSPECTIVE

The preceding discussion of lowland ecological and economic studies suggests that a particular site or even an archeological region there may provide a complex record in which multiple variables affect human behavior, which reciprocally structures and mediates environmental factors. These systemic interrelationships can be described as a sociocultural ecosystem. By this I mean sociocultural, physical environmental, and biotic phenomena, along with regular processes or relationships interlinking them, restricted in time and space, and affecting human behavior. Exchanges of matter, energy, and information may characterize systemic interactions. A systemic approach is oriented to analysis of multiple interdependent variables (in some cases sub-systems) to determine their effects on the system over time (cf. Hole and Heizer 1973:34, 456-457). Because human behavior is a central concern, only those features of the natural environment which interrelate with patterns of human behavior would be defined as part of the sociocultural ecosystem. In the present context a more extended discussion of the history and content of systems theory is unnecessary (Stark 1974a). It is used here, as in most anthropological applications, as a conceptual and heuristic device.

In addition to my assumption that multiple variables will be important in the prehistoric record, I have adopted an ecosystems perspective for two principal reasons. A single site is not necessarily representative of prehistoric behavior in an area. By attempting to relate site data to an ecosystemic model I can propose some patterns of behavior which later can be tested or supplemented. Causal factors underlying the prehistoric behaviors will not be addressed in detail, although some of my ideas based on comparative data will be discussed in the last chapter. I will adopt a descriptive approach in this initial formulation of a model.

Another reason I have concentrated on the ecosystem is the requirements of individuals and societies. People rely on their natural setting for raw materials and energy. However, this does not imply a causal primacy to natural settings, as environmental determinists would argue, nor does it imply that religion, political organization, and other factors cannot have a degree of independence. It simply recognizes the importance of matter and energy requirements for human populations. Consequently, I will emphasize subsistence, economy, and exchange in the ecosystem. But I will also consider some evidence concerning political and social relationships. The latter I expect to have played an important role in information exchanges, which in turn would help control the distribution of matter and energy resources.

With an ecological focus, a desirable program would be to define (1) relevant variability in a population's natural setting, (2) how people interacted with their setting to get food and other raw materials (e.g., which resources were actually chosen and what decisions were made in obtaining them), (3) what reciprocal effects the exploitive activities had on other aspects of the sociocultural ecosystem (e.g., how surpluses were produced and channelled, how social and political organization affected people's control of resources, including each other), (4) what the spatial boundaries of the ecosystem were and whether or not there was significant interchange between the ecosystem under consideration and neighboring ones, and (5) what period of time represents a significant unit for studying the ecosystem. The last point recognizes that a sociocultural ecosystem comprises regular processes subject to change on both a long-term and short-term basis. Temporal boundaries are as significant as spatial ones.

However, available data constrain the topics handled here. The first and second steps will be attempted. For the third step I lack adequate information. I will attempt to define spatial boundaries for the ecosystem; in the case of temporal boundaries I lack a sufficiently long sequence, but will make some observations about change. It should be readily apparent that any assertions about prehistoric behavior that generalize from the site investigated can be questioned because of the sample size. Therefore, the generalized model is best regarded as hypothetical, constructed to assist future research strategies. The weighting of factors affecting prehistoric behavior, such as subsistence, exchange, or political organization, and reasons for behavioral changes cannot be adequately handled with current data.

With archeological evidence, defining system boundaries is a particularly difficult problem, but important for the study of change and continuity in the prehistoric record. Although it can be argued that the definition of units and their boundaries is a matter of convenience for analysis, nevertheless, it is important to recognize the problem, particularly when one is concerned with empirical evidence in addition to general theory. Interchange between a system and its environment is a major challenge in understanding system boundaries. An open system is one in which exchanges of matter, energy, or information occur between the system and its environment (Miller 1965:203), and sociocultural systems, like biological ones, are open. Yet if we can detect consistent geographic or spatial boundaries in significant human interactions, we have an advantage in designing the scale of future research and in selecting target areas in which we can examine the nature of the interactions. There are a number of criteria which I feel can help define ecosystemic boundaries in a preliminary way.

To illustrate the problem of defining the spatial boundaries of ecosystems, it will be useful to consider as an example the concept of symbiotic regions (Sanders 1956). Sander's symbiotic regions involve separate, distinct, but interdependent areas linked by specializations and trade in various kinds of raw materials and finished goods. The extent of this interdependence in the Central Mexican highlands is argued to have been such that local production was dependent on and conditioned by other specializations. In these circumstances economic activities were interlocked to such an extent that an ecosystem could not be defined without consideration of the symbiosis.

In different circumstances the inhabitants of independent and distinct regions might import some commodities, but disruption of the importation would not have effects beyond a restricted process of substitution or accommodation to its lack. We might justifiably regard this as a process of interchange between neighboring ecosystems because the immediate effects of a change would not have far-reaching influence on the ecosystem as a whole (cf. Buckley 1967:79). Similarly, a local population might have a religious or ceremonial link to a center outside its area. Termination of the tie could have relatively minor effects on the ecosystem as a whole, or it could cause wide-spread disruption, not only of religious organization but also of political and social organization, producing significant changes in the ecosystem as a whole.

What I am suggesting is that the principle of systematization (Hall and Fagen 1956:22) be applied in determining the boundaries of an ecosystem, i.e. the degree to which change in a component of the system affects the system as a whole. For this assessment we need independent verification of the degree of systematization besides a correlation with widespread changes in the ecosystem. Given the inherent limitations of archeological evidence, one useful criterion for assessing indirectly how much systematization is implied by a particular relationship is the presence of parallel ones. For example, if we have evidence of trade between two regions in raw commodities as well as stylistic borrowing, we can argue that the two kinds of interchange parallel each other. This may imply more extensive, systematized relationships between the regions. Essentially I am assuming that redundancy tends to be characteristic of major sociocultural relationships.

We can also ask if changes in a particular kind of evidence in two areas are closely correlated. A correlation can be accounted for in several ways: (1) both areas may experience unrelated external influences, (2) there may be systemic relationships between the two, or (3) independent processes internal to each area may produce the changes. If we can establish evidence which rules out the first and last circumstances, it may be argued that the correlation reflects a systemic interaction between the two areas. For example, if a cluster of sites near an obsidian source shows increasing production without increase in local consumption, then some outlying sites should show a growth in obsidian importation from that source. To give another example, replication of ceramics and figurines in sequences at a group of sites could be viewed as evidence of enduring participation in a common trade and communication network. The durability of such a network through a long sequence may help define systemic patterns of interaction.

However, particular correlations and parallel linkages (or their lack) do not fully define the presence or absence of a significant system boundary. In the examples given above, one can also try to specify the importance of the traded commodity or the degree of stylistic similarity. In many such cases, ethnographic models will be one way to approach the archeological record.

Another useful criterion for determining ecosystem boundaries utilizes the propinquity of populations to each other, and/or resources. Spatial accessibility and barriers can play a significant role. This criterion involves both terrain and available means and costs of transportation and communication (as in the case of coastal people trading by water travel). Other things being equal, increasing distance involves greater cost of movement and communication. Hence local areas, especially if delimited by natural barriers, need careful examination for their effect on ecosystem boundaries.

This does not deny the existence or potential influence of sociocultural barriers, but these must be established differently and are frequently difficult to specify archeologically (cf. Barth 1969:14 on ethnic boundaries). Sociocultural barriers may be indicated with the archeological data traditionally used to set up social or cultural units, such as distributions of pottery or types of architecture. Binford (1968:18) has pointed out the implicit assumption in some archeological literature that interrupted distribution signifies a cultural boundary. In fact, as Barth (1969:14-16) has pointed out, even if a boundary is indicated, we still must decide on its significance. It is at this point that our interpretation of the overall pattern of systemic relationships becomes crucial. The empirical identification of significant boundaries relies on patterned correlations in a variety of lines of evidence. Deutsch (1967:279) has pointed out that to delimit boundaries, a multiplicity of tests may be more significant than a single one if the kinds of evidence considered are quite varied. Both statistical and categorical boundary definitions may prove useful in prehistoric studies (cf. Rappoport 1967), although only the latter approach will be feasible in my analysis.

## SUMMARY OF THE AIMS OF THE STUDY

As I noted before, this study of Patarata 52 can contribute to some ecological topics, but not all. A series of questions myst be resolved, both to understand prehistoric ecology and to develop some of the descriptive content of an ecosystemic model. The following questions will be addressed in the last chapter using data presented and analyzed in intervening chapters. What was the local paleoenvironment? I will discuss evidence indicating it was an estuarine mangrove swamp. What was the context of human activity at the site? I will summarize evidence for year-round habitations. What subsistence pattern is indicated? Estuary based subsistence will be emphasized, combined with planting on levees and sites and/or trade with inland farmers. Is there evidence for change in subsistence? There are some indications of change, and I will point out problems in explaining it. What were local products and were there imports from and exports to other areas. In this case, I will discuss some alternative answers. Indications of economic relationships with other localities open the question of spatial limitations for the hypothesized ecosystem. How systematized were relationships between estuarine inhabitants and groups elsewhere? I will look at the following kinds of evidence: transport and resource configurations which might have constrained or promoted interactions, settlement pattern evidence that the site inhabitants were subordinate to neighboring centers, and stylistic traits and sequences of stylistic changes shared with other sites, which could indicate intercommunications or continued participation in common supply networks. Although most of the indices for ecosystem boundaries suggest systemic interrelationships between people in nearby farmlands with those in the estuarine swamps of the Lower Papaloapan, there are indications of continued, fairly close relationships with Central Veracruz.

At this point, a model for some aspects of the content and extent of a prehistoric ecosystem will have been formulated for the Lower Papaloapan.

Issues concerning the generality of the model will be explored through comparisons with archeological evidence from other estuarine areas in Mesoamerica.

## ORGANIZATION OF PRESENTATION

This introduction has set forth an ecological focus, placed it in a context of related research, and indicated some criteria for establishing spatial boundaries for an ecosystemic model. The next chapter will deal with the modern natural setting, which is relevant to the archeological interpretations because I will argue for similarity with the paleoenvironment. It should be noted that Appendix 1 is a paper on photointerpretation and mapping which adds data on modern vegetation, hydrography, and geomorphology, as well as prehistoric settlement patterns. Chapter 3 deals with the site of Patarata 52 and the archeological context of the excavated material. Selected kinds of artifacts from P52 will be described and analyzed in the succeeding chapter on material culture. The emphasis will be on artifacts which yield information relevant to the ecological and systemic analysis. An analytic chapter follows dealing with flora and fauna. Two additional analytic papers, one dealing with burials and one with source analysis of ground stone, are placed in appendices. All appendices contribute information pertinant to the aims of the study, but have been put at the end of the text because they deal with somewhat more specialized topics which not all readers may wish to pursue in detail. The final chapter attempts to answer the questions posed in this introduction.

# CHAPTER TWO

# THE NATURAL SETTING

## INTRODUCTION

There are estuarine mangrove swamps at the mouth of the Papaloapan drainage on the Gulf coast near Alvarado, Veracruz. They form a specialized environment of considerable extent. For the Papaloapan they consist of more than an estuary fringe or scattered deltaic stands, which is characteristic of many smaller drainage mouths, especially on the Pacific coast. The Papaloapan is the second largest Mexican river in volume; it is joined by others, principally the San Juan, Tesechoacan (Playa Vicente), and the Blanco. At Alvarado water is discharged in the Gulf from the Sierra Madres, from the Tuxtlas, and from the rather extensive coastal plain itself, both from the west (Rio Blanco) and from the east (San Juan).

The excavated site on Patarata Island is in the midst of mangrove growth in the estuarine area (Maps 1-3, 6). Because the environment is quite specialized, understanding it is particularly important for interpreting prehistoric occupations. Many environmental factors remain poorly described and understood, and the present description can be considered only preliminary.

## GEOLOGY

Alluvial, shore, and estuarine geomorphological processes predominate in sculpturing the landscape and hydrography of the Lower Papaloapan Basin. The lower basin includes the courses of the Papaloapan, San Juan, Tesechoacan, San Agustin, Blanco, Camaron, and Acula rivers, as well as many lesser channels. These waterways feed into either the Papaloapan or the Alvarado Lagoon, which lies behind the dune ridge fronting the Gulf. Active and abandoned channels are knitted together in a complex pattern of historical relationships.

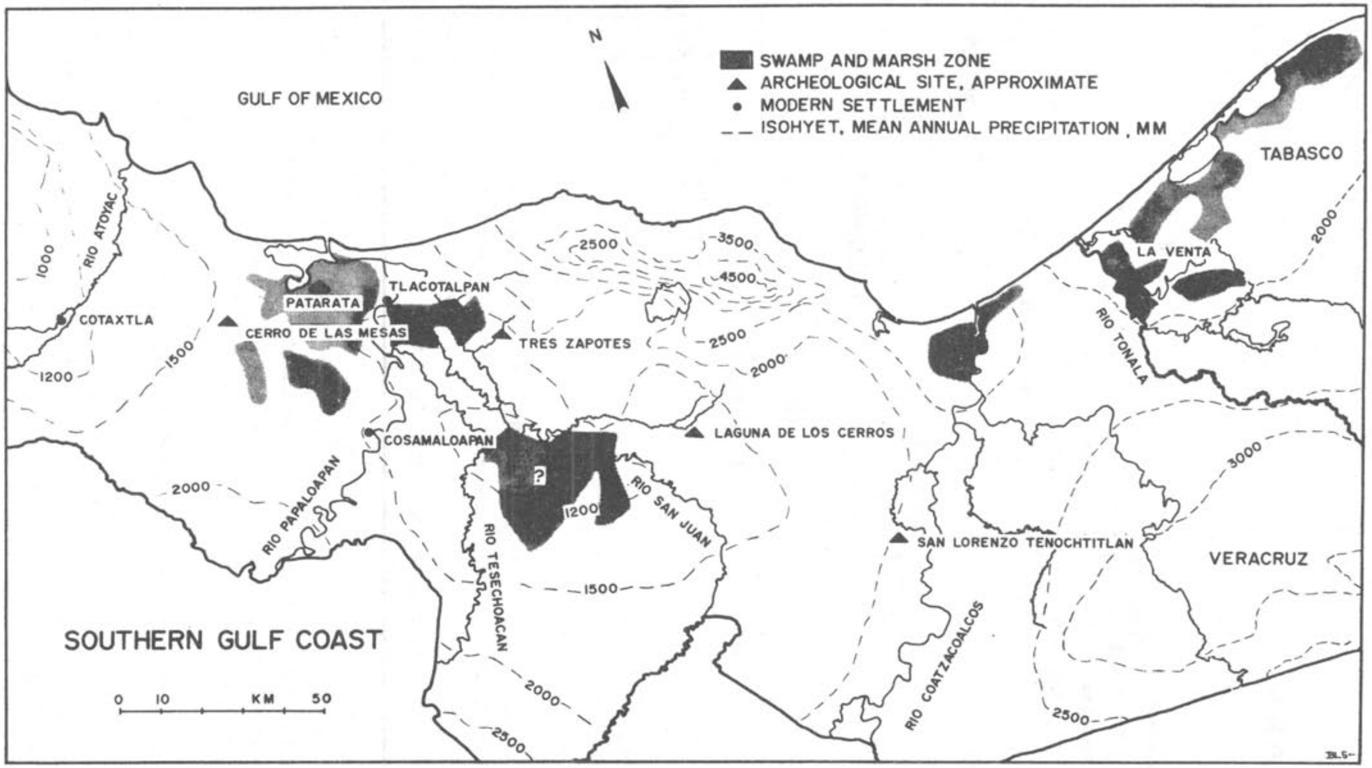
The Lower Papaloapan Basin is comprised almost exclusively of Quaternary alluvial sediments with some Tertiary marine sediments (Maldonado-Koerdell 1964:fig. 4). West (1964:58) describes the area as a tectonic "embayment...characterised by plains of recent alluvium bordered by low Pleistocene terraces." The Papaloapan Basin is protected from the sea by a high dune ridge which blocks drainage and helps form marshes and mangrove swamps inland (West 1964:60). Near the mouth of the basin, ingression of saline water occurs because of variation in river discharge, water density effects, and tidal and northerly storm action (Russell 1967). Mangroves are trees adapted to brackish water inundation, which is characteristic of much of the area near the mouth except during the rainy season. Interdistributary basins, channel abandonment and filling, and deltaic levee growth establish numerous low areas for estuarine mangrove swamp (Russell 1967).


MAP 1 MESOAMERICA

A precise definition of an estuary has not been agreed upon (Hedgpeth 1967:707; cf. Pritchard 1967; Caspers 1967); however, general definitions in current use do define much of the Lower Papaloapan as estuarine. Estuaries have been described as the "buffer zone between fresh water of the stream and salt water of the sea" (Reid 1961:69), the area where fresh and salt water mix and dilute each other. Many extensive estuaries represent river valleys drowned by post-Pleistocene rise in sea level. Most estuaries are subject to tidal action. Mangroves are particularly well adapted to shallow estuarine conditions and are thus a useful guide to their distribution.

There are no detailed maps of mangrove distribution comparable to those provided by Thom (1967) for Tabasco. The vegetation maps of the Comision Intersecretarial Coordinadora del Levantamiento de la Carta Geografica de la Republica Mexicana (1957:15Q-V; 14Q-VI) show the approximate distribution of large blocks of mangroves (Map 2). Some of the boundaries are questionable. Attolini (1950:9) gives 15,000 hectares as the mangrove area across from Alvarado. In Appendix 1 Elinor Large employs photo-interpretation to map mangrove and other vegetation areas.

Seasonal river flooding alluviates the channel banks, forming natural levees. Levees and beds are not permanent depositional and erosional features; river courses bend and meander across their floodplains. A number of subsidiary channels and ponds or lakes can be formed along


SWAMP AND MARSH ZONE
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MODERN SETTLEMENT
ISOHYET, MEAN ANNUAL PRECIPITATION, MM
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RIO PAPALOAPAN
RIO TESECHOACAN
RIO SAN JUAN
LAGUNA DE LOS CERROS
SAN LORENZO TENOCHTITLAN
RIO COATZACOALCOS
LA VENTA
RIO TONALA
1000
1200
1500
2000
2500
3000
3500
4500
?

Map 2

a river course--such as chutes, cutoffs, crevasses, various localized drainage patterns, and oxbow lakes (see Russell 1967). Deltaic deposits near the mouth of the river can exhibit even more complex hydrographic features because channel movements are combined with distributary formation and abandonment and tidal and storm action.

West (1964:58) points out that

> among the various landforms found within the Gulf lowlands probably none has been more significant for human occupation than the natural levees and stream-cut terraces that border the larger rivers in their lower courses. These features usually contain the most fertile and most easily worked soil of the lowlands; moreover, within the larger flood plains the natural levees form the highest ground in the vicinity and are thus the areas least subject to frequent floods.

Levees provide better elevated and drained, predominately silt and clay soils and occur along both active and relict channels. In time, sizable rivers bearing large sediment loads can form broad flanking levees. At their mouths, various deltaic formations depend in part on wind, current, and tidal conditions; alluvial deposits often build out from the mouth. Deltaic levees originate underwater and achieve scant elevation near the channel mouth, especially if marine action erodes the deposits (Russell 1967). Consequently, in the Papaloapan case levees are more elevated and broader toward the south. Near Alvarado, levee development is scant and well drained land is scarce apart from the dune ridge.

Within the Papaloapan mangrove zone there is one major topographic feature besides water, swamp, and levees: archeological sites. Scant as is the elevation of most of them, it is still greater than that of the swamp and many levees. Like the levees, sites are topographic "islands" in the predominantly swampy terrain. Both geomorphological and archeological maps based on photointerpretation appear in Appendix 1.

These slight differences in elevation in the mangrove zone are important for their influence on soil formation. The area as a whole is characterized by Stevens (1964:280) as an area of laterization-process soils. However, bsides this general leaching and forming of iron and aluminum compounds, some local processes are at work as well (cf. Stevens 1964: 282-283). Mangrove forests produce organic soils and peats (Thom 1967). Salinization of soil occurs as a result of salt water encroaching from the Gulf. Since flooding and water-logging characterize the area, gleization occurs as well, a characteristic of hydromorphic soils. Gleization results from alternate reduction and oxidation of iron compounds as soils are inundated and dried out. Finally, annual flooding deposits soil anew, forming rich silt and clay alluvium on levees.

These various soil formation processes are not mutually exclusive, but their operation is affected by differences in elevation, landforms, and vegetation. For example, gleization is evident in the profiles at the main excavations on Patarata Island, as is the lack of a humus zone on the surface of the site. These traits might not appear in a profile taken off the site. Variation in soils is an important factor in the mangrove zone, but it has not been analyzed on a fine enough scale to specify interactions of soil processes and how they are distributed. Thus it is difficult to reach conclusions about how soils would affect human occupation of the mangrove swamps. Soil variation is presumably similar to that described for Tabasco by Thom (1967).

Local soil variations are important because some of them involve limited cultivable land. Land elevated sufficiently above the water table bears natural vegetation distinct from the mangrove swamp. Such land is farmable. In view of reports from other areas of ridged fields (Denevan 1970; Siemens and Puleston 1972; Wilken 1969) and the presence of artificial mounds in the Lower Papaloapan, one wonders if land were ever reclaimed for farming. Aerial photographs taken by the National Aeronautics and Space Administration for the Comision del Espacio Exterior of Mexico in 1969 reveal two small areas of possible ridged fields near Tlacotalpan, but the constructions do not appear in mangrove forests. Deliberate field constructions would face the problem of soil salinity, and fields would not be suitable immediately for crops. However, many of the archeological sites can be farmed on a small scale. Most sites appear to be midden habitation sites and/or artifical mounds. Mound construction and midden growth, for whatever reasons, have undoubtedly been of cumulative value for human use of the area. Today site land is used for grazing, a small amount of farming, economic trees, and habitation.

Aside from land for farming, geologic resources are few. Obviously the reticulated waterways are ideal for canoe transport. Asphalt from natural oil seeps was probably available in the Lower Papaloapan Basin or nearby. Andrle (1964:12) reports asphalt cakes along the Gulf shore of the Tuxtlas. There is abundant evidence of its use in the sites on Patarata. Possibly it was washed up on the Gulf shores and then collected. It is intriguing that Sahagun (1963:12:61) remarks as follows on bitumen: "it falls out on the ocean shore; it falls out like mud." Clay is another local resource. The formation of clay plugs in some oxbow lakes is an example of particle sorting in an alluvial landscape which could create a localized clay deposit (Russell 1967:37). Today Tlacotalpan potters obtain clay from a locality on the east bank of the Papaloapan. A 16th century account notes prior pottery manufacture in Tlacotalpan (del Paso y Troncoso 1905:V:1-11).

## CLIMATE

According to the Koeppen system of climatic classification the Lower Papaloapan near the coast has an Aw climate (CETENAL 1970:15Q-V; cf. Vivo 1964:207, 213). This indicates that it is tropical, that average monthly temperatures never fall below 18° C, and that the climate is rainy, with 1500-2000 mm annually. The rain falls principally in the summer and fall with the late winter months forming a dry season.

Several stations in the Lower Papaloapan Basin record mean monthly temperatures between 20 and 30° C. Their rainfall shows a marked dry season December through May. During the rainy season, June through November, there are peaks in July and September. Mean annual rainfall at these stations is: Alvarado 1914.7 mm, Tlacotalpan 1874.3 mm, Acula 1750.3 mm, Amatlan 1504.9 mm, Cosamaloapan 1465.8 mm (CETENAL 1970:Carta de Climas 15Q-V). Data reflect at least ten years of observation in the interval 1921-1960.

The mangrove zone benefits from daily sea and land breezes that noticeably moderate the temperatures, particularly in the hot part of the dry season. During the winter months *nortes* strike the Gulf coast. These cold fronts bring heavy winds, cloudiness, and sometimes rain. The winds are strong and make navigation hazardous or impossible for small craft along the coast, on large lagoons, and on broad rivers. When *nortes* strike, the weather is most unpleasant: cold, windy, and damp. More rarely hot dry *sures* or southerly winds occur. Although these cause navigation problems as well, I did not observe any as strong as the usual *norte* winds.

## FLORA

Mangrove trees require some amount of saline inundation to flourish naturally and thus are an important component of tropical estuarine vegetation. There are four species of mangroves in Mexico, and they differ in their habitat preferences. Thom (1967) has analyzed flora in Tabasco mangrove swamps, and the following comments are based on his report, the study most nearly applicable to the Papaloapan.

*Rhizophora mangle* (locally *mangle colorado*) thrives under conditions of constant inundation or nearly saturated soils and manifests the most tolerance for saline water. It is particularly evident along the edges of lagoons, estuaries, and brackish ponds, and in the fill of abandoned channels, rising on a tangled network of stilted roots. *Avicennia germinans* (locally *mangle prieto*) is also found in low, saline soils, especially in interdistributary peats; it can occur in mixed stands with *R. mangle* but is not as tolerant of inundation.

*Conocarpus erectus* was rarely encountered by Thom in Tabasco, and its relative abundance is unknown in the Alvarado area. Thom found it most evident in thickets of mixed brackish water scrub. The scrub was located in inland interdistributary basins characterized by very low salinity, where it replaces mangrove swamp of *Rhizophora* and *Avicennia*. Scrub cover resembles that of levee thickets. However, very low levees, less than half a meter above low water, tend to be covered with *A. germinans*.

*Laguncularia racemosa* (locally *mangle blanco* or *amarillo*) was more variable in distribution than *Rhizophora* or *Avicennia*, sometimes mixed with the others and also occurring in brackish water scrub. All of these species may be found in other than their preferred habitats, but their growth may be stunted or their reproduction greatly circumscribed.

Thom (1967:333) mentions that today *L. racemosa* is preferred for charcoal and posts in Tabasco. Pennington and Sarukhan (1968:316, 320, 368) state that all of the other species are used for charcoal and for posts or other constructions, but they do not mention uses for *L. racemosa*. They state that the bark of *R. mangle* is used for curing hides because of its high tannin content. In the Alvarado area today the main uses of mangroves are for making charcoal and local constructions.

Thom provides an analysis of various habitats within the Tabasco mangrove area, and his categories are probably applicable in the Lower Papaloapan. Unfortunately, he avoided archeological sites or disturbed areas, which are of particular interest here. Two of the habitats deserve special mention: those where mangroves are mixed with other growth or where they are largely absent. Natural levees are one such habitat. Levees vary in height, and correspondingly there is variation in vegetation. Thom suggests that half a meter is the maximum levee elevation on which mangroves appear. _Sabal_ sp. palms are one of the components of non-mangrove levee thickets. According to Pennington and Sarukhan (1968:98) the leaves of _Sabal mexicana_ are used for house construction, mainly roofing, and the trunks also are employed for construction.

Thom (1967:321) states that "under conditions of active progradation, the levees are perennially saturated with fresh water." This is a function of the adjacent river carrying sufficient water to prevent saline penetration of the ground water. The cultivability of low levees in mangrove areas is therefore variable depending on the adjacent waterways. An accurate estimation of ancient farmland within the mangrove zone would have to take into account the past drainage pattern in the river deltas, especially variations in the activity of different distributaries. Lack of such knowledge for the Lower Papaloapan hinders the study of past subsistence and settlement patterns.

Beach sand ridges are discussed briefly by Thom (1967:331). There he found _guacimo_ (_Guazuma ulmifolia_) and _chicozapote_ (_Manilkara zapotilla_), both with edible fruits (Pennington and Sarukhan 1968:300;344). _Sabal_ sp. palms occurred, as did _Heliocarpus donnell-smithii_. The bark of the latter can be used for cordage (Pennington and Sarukhan 1968:280).

In order to establish the variety of floral resources in the Lower Papaloapan, careful attention must be paid to the higher levees and to sites in the swamp. A vegetational study has been conducted near Alvarado by J. Simon Bruder (see next section). Higher localities can support diverse wild economic species as well as farming and gardening. For example, on Patarata 52 grew a large _ciruela_, probably _Spondias mombin_, which produces an excellent fruit. Other than the site, the surrounding terrain is swamp to which the tree is unsuited. It is probable that most of the economic species distributed in the Lower Papaloapan could be grown on higher site land (see Pennington and Sarukhan 1968; Stark 1974a:52-53). Many of the sites I visited had been cleared at one time for _milpa_, and I found one small field in use in the course of survey. Since most of the mangrove and site land is now used for grazing, farming has been reduced. The local economy also has been altered by the fishing industry and cannery at Alvarado. Local inhabitants report that some years ago more farming was done on the sites, although it must always have been on a very small scale.

## FAUNA

There has been no study of fauna in the Alvarado mangrove zone or at any major mangrove location along the Southern Gulf Coast. It is difficult to state which species are definitely present and how abundant they are. Also, modern changes in economy, communications, and transport are sufficient to have affected modern faunal populations in comparison with aboriginal conditions. In discussing the fauna of the area, I will be limited to rather general observations.

Among mangrove fauna, fish, macro-invertebrates, and waterfowl are important for man because they are abundant. Fortunately there is some documentation of the kinds and amounts of these animals for the Alvarado area. Attolini (1950) provides estimates of the amounts of fish, shellfish, and turtles taken in several towns along the Papaloapan, including Alvarado and Tlacotalpan. Species identifications for the common names are not given. Some names cover several species; others may distinquish life cycle variations of the same species. In other cases we may be dealing with local terminology which cannot necessarily be equated with general Spanish usage (e.g., the Diccionario de Mejicanismos [Santamaria 1959:643] gives jolote as a synonym for bobo, a catfish, but Attolini mentions both jolote and bobo in the list of fish caught in Tuxtepec).

Attolini does not state how the catch figures were determined. The information was compiled before a cannery was established at Alvarado, so that cannot be the source. Attolini (1950:41) does mention that a tax was levied on catches, usually one peso per kilo of fish. These tax records are a possible source of the data. Another possibility is that fishing cooperatives and the fishermen's union provided the information from their accounts. If tax records were the source, one must keep in mind that poor fishermen whose daily catch was less than fifty kilos paid no tax at all. In either case, however, it is virtually certain that all local fishing does not appear in the figures.

Thirty-nine fish, shellfish, and turtles are listed in the Alvarado catch. Attolini's catch numbers for 1947 total 3,094,210 kilos. For Tlacotalpan there are twenty-five named fish, shellfish, and turtles, totaling 522,169 kilos. For Cosamaloapan he lists five names of fish, shellfish, and turtles, totaling 24,898 kilos. In Tuxtepec the catch total is given as 496 kilos of nine kinds of animals. San Andres Tuxtla is the other town he reports: 71,861 kilos with nine animals listed.

Leaving aside San Andres Tuxtla, it is obvious that the further one travels up the Papaloapan, the smaller is the catch. Furthermore only in Alvarado and Tlacotalpan are water resources sufficient to support an organized fishing industry. The preeminence of Alvarado in fishing is partly due to the exploitation of Gulf waters in addition to inland lagoons, rivers, and estuaries. The coastal fishing utilized some motorboats and larger craft than would have been available prehistorically. Differences in equipment and marketing techniques also assure the incomparability of total catch numbers per se to the situation in aboriginal times. What is clear, however, is that Tlacotalpan and Alvarado are in the "fishbasket" of the Papaloapan.

Alvarado apparently draws on the greatest diversity of aquatic habitats of any of the towns. The Alvarado catch includes seventeen fish or shellfish which are cited for no other town. Tlacotalpan would have access to both estuarine and fresh waters, but relatively more of the latter. Three fish are listed for Tlacotalpan which are not given for Alvarado. Cosamaloapan and Tuxtepec each have considerably fewer kinds of fish than Tlacotalpan, but this could partly reflect the restricted scope of fishing in them. Tuxtepec certainly and presumably Cosamaloapan would have only or mainly fresh water fish.

The largest kinds of catches in Alvarado were of crabs, shrimp, clams, oysters, mojarras (probably either Gerridae or Cichlasoma sp.), chucumite (?), and robalo (presumably snook, Centropomus sp.).

In Tlacotalpan the largest catches were of robalo, peje puerco (at San Lorenzo Tenochtitlan this is a term applied to suckers, Ictiobus sp., M. D. Coe, personal communication), chucumite, jolote (at San Lorenzo Tenochtitlan this is applied to a North American catfish, Ictalurus sp., M. D. Coe, personal communication), and shrimp. Attolini (1950:42) mentions that oysters are located near the sea and the mouths of the rivers and therefore were not exploited by Tlacotalpan. This confirms my supposition that Tlacotalpan fishing generally was not conducted in the Alvarado Lagoon and neighboring estuaries but rather in the Papaloapan and nearby accessible rivers.

Sanchez (1963:62) discusses fish that are characteristic of mangrove environments and gives scientific names for three of the common names listed by Attolini. Sanchez identifies lisa as Mugil cephalus. Pargo is applied to Lutianus novemfasciatus and huachinango to Lutianus blackfordi. Lisa, pargo, and huachinango are among the kinds of fish caught in smaller quantities in Alvarado. Pargo is among the minor catches in Tlacotalpan. Lisa and pargo are mentioned at San Andres Tuxtla. None of the three is given for Cosamaloapan, but lisa is cited at Tuxtepec.

In the Lower Papaloapan the peak seasons for fish and waterfowl are somewhat complementary. Attolini reports that the period of abundance of fish, etc., extended from February 21 to September 10. Most of the waterfowl are migratory and are in the area only during the winter months.

With regard to waterfowl there are quantitative estimates for the Alvarado Lagoon area. In 1952 A. S. Leopold (1959:131ff) flew with a survey crew engaged in a visual count of migratory and resident waterfowl in Mexico; his figures are low altitude, visual estimates with accuracy sufficient to gauge marked annual fluctuations in the numbers of many of the species. Animals habitually concealed in heavy growth during the day are underestimated.

In January 1952 they estimated 6,600 blue-winged and cinnamon teals (Anas sp.), 1,000 green-winged teal (Anas carolinensis), 2,300 pintail (Anas acuta), 100 baldpate (Mareca americana), 1,400 gadwall (Anas strepera), 100 redhead (Aythya americana), 1,100 ring-necked ducks (Aythya collaris), 6,600 lesser scaup (Aythya affinis), and 26,000 unclassified ducks, or 45,700 migratory ducks in all (Leopold 1959:table 4). At the same time, geese, resident ducks, and coots were estimated at: 900 snow geese (Chen hyperborea), 125 blue geese (Chen caerulescens), 2,000 white-fronted geese (Anser albifrons), totaling 3,025 geese, plus 500 fulvous tree ducks (Dendrocygna sp.), and 77,400 coots (Fulica americana).

The total is therefore 126,625 migratory ducks, geese, coots, and resident ducks. In the course of his discussion Leopold points out that migratory waterfowl are generally less numerous than in the past due to land reclamation, which affects nesting and feeding grounds, as well as to the scale of modern hunting.

Thus it is probable that during the winter months migratory waterfowl were plentiful along the Lower Papaloapan, providing a potential source of available food and feathers in pre-conquest times. The "Relacion de Tlacotalpan y su Partido" written in 1580 mentions that many kinds of birds grew up in the river: ducks, herons, and others (del Paso y Troncoso 1905:5:3).

It is more difficult to judge what quantities of other game would be available in the mangrove zone. Deer is hunted occasionally in the area today, and there are the inevitable stories of tigres although the number of jaguars or ocelots recently in the area must be very low or zero. From Leopold's descriptions of animals' habitats and food preferences, the following probably would have been relatively plentiful in the mangrove zone: collared anteater (Tamandua tetrodactyla), racoon (Procyon sp.), grison (Grison canaster), river otter (Lutra annectens), tapir (Tapirella bairdii), and perhaps also the jaguar (Felis onca), and ocelot (Felis pardalis). Collared anteater and racoon were collected by Coe and Flannery (1967:114f) near Salinas La Blanca in a mangrove environment on the Pacific Coast. They (1967:115f) also found the coati (Nagua narica) and the Mexican porcupine (Coendu mexicanus) in mangrove environs.

Levee thickets, brackish water scrub, and thickets growing on sites would provide a limited amount of habitat frequented by the more general kinds of Southern Gulf Coast tropical forest game, e.g., deer (Odocoileus virginianus and Mazama americana) and a variety of edible birds. I observed that iguanas frequent these areas.

## SUMMARY

Potential resources of the estuarine mangrove swamps are considerable. Aquatic fauna obviously represent the richest natural food source. However, a number of materials, plant foods, and land animals are also available. These, along with localities for small-scale farming or gardening, diversify the potential resources of the mangrove swamp.

# VEGETATION PATTERNING

J. Simon Bruder

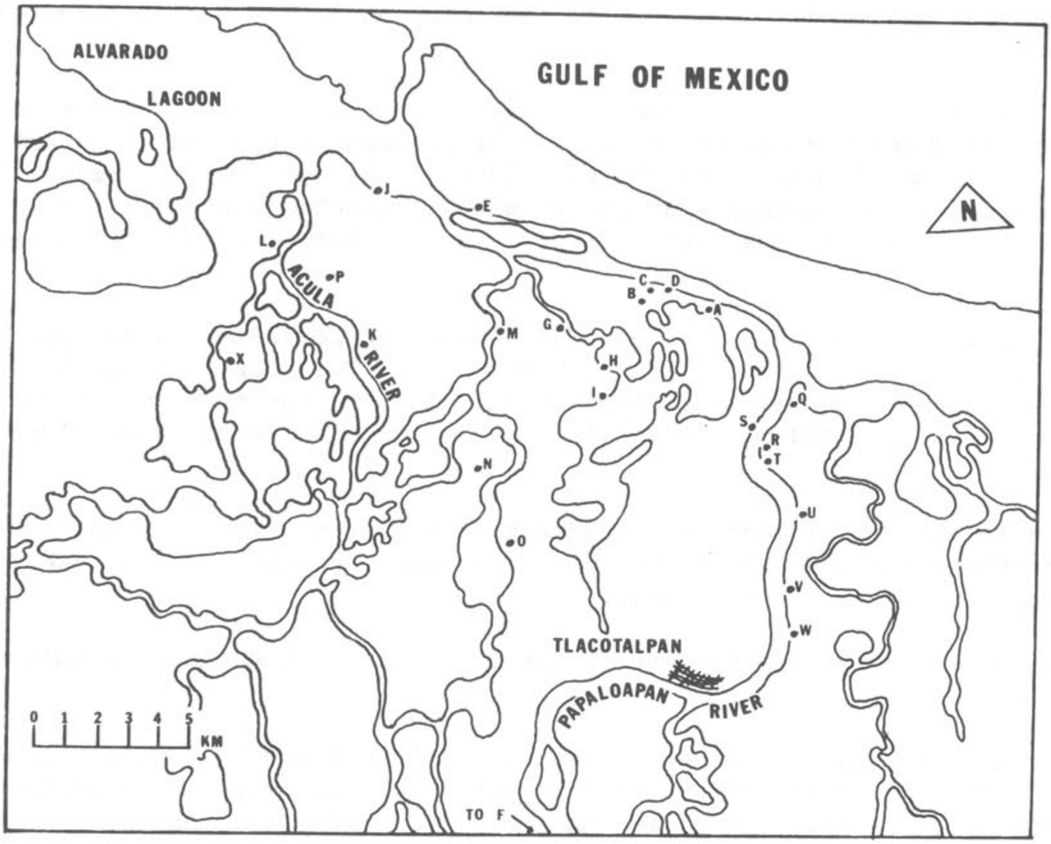
## INTRODUCTION

A preliminary survey of vegetation patterning in the Lower Papaloapan Basin was conducted with support from the Department of Anthropology, Arizona State University; Robert Gasser and Elinor Large assisted the project. Donald J. Pinkava of the Arizona State University, Department of Botany and Microbiology provided advice, equipment and a plant collection permit. In the survey it was hoped that an understanding of modern vegetation patterning would contribute to construction of a prehistoric settlement-subsistence model. Although deltaic habitats may shift frequently, it is reasonable to assume that many of the same kinds of landforms were present in the past. The estuarine zone is far from homogeneous, with a variety of landforms represented. These include partially submerged interdistributary basins, dune ridges, lagoon margins, and levees, which may be subdivided on the basis of their association with streams at various levels of activity. Levees may range from those adjacent to an active channel such as the Papaloapan, to those which border channels that exhibit diminished activity such as the Acula. Finally, the levees of completely abandoned channels continue to exist as ridges, slightly elevated above the surrounding swamp. Artificial topographic highs are also present in the form of the archeological sites themselves. Today sites exhibit elevations ranging from several centimeters to many meters above the surrounding terrain. This survey represents an attempt to gain a preliminary idea of the vegetation distinctions among landforms differing in substrate, elevation, and subjectivity to alluviation, saline inundation, and tidal action.

## DATA COLLECTION

Plant collections were made at a number of geomorphologically distinct landforms. Specimens from 24 localities were obtained during July and August of 1975. Each was assigned a number and photographed in the field, then pressed and dried in the field lab. Common names and local uses of plants were in most cases supplied by Antonio Valerio, a local hunting and fishing guide well acquainted with the estuarine zone.

A total of 124 specimens was collected and turned over to the Arizona State University Department of Botany and Microbiology, where 65 of them were identified by Elinor Lehto, the Herbarium Curator. These are listed in Table I, along with the localities (Map 3) at which they were collected and subsequently observed. Thirty-four of these plants are known to have some economic significance. This information is presented in Table II. Surface pollen samples were taken at 15 locations. James Schoenwetter, Anthropology Palynology Laboratory, Arizona State University, provided for pollen importation. Janifer W. Gish preliminarily analyzed the samples. She reports that all were high in pollen content, with 200 grain counts possible for each. This suggests the advisability of future palynological work in the area.




Map 3. The Lower Papaloapan Basin showing vegetation localities.

COLLECTION LOCALITIES

Collection points,described briefly below, were assigned letters, and their locations are indicated on Map 3. With one exception, all collection points are located within the estuarine zone. No work was done on the sand dunes due to lack of time.

A. A low area, this locality is transitional between the back levee of the Papaloapan and a lagoon shore; the surface is inundated to a depth of several centimeters. An archeological site situated here is approximately 1 m above the surrounding terrain, with a diameter of 25 m. Vegetation on the site surface is extremely varied, while on the surrounding mud flats, clumps of grass predominate.

B. The levee of a totally abandoned channel is represented at this locality. Grass clumps cover the area, with low shrubs and bushes sparsely scattered along the levee crest. Mangroves fill the old channel which runs alongside.

C. The abandoned channel adjacent to Locality B is mangrove filled and inundated in places to a depth of 30 cm. Where the mangroves have been cut back, grasses are found.

D. The natural levee of the active Papaloapan River is covered with a low tangle of levee thicket at this locality. Some disturbance of the natural situation has occurred as a result of the construction of a road paralleling the river.

E. This locality contains a number of large archeological mounds (up to 7 m high with an average diameter of 45 m). It presumably represents a back levee of the active Papaloapan, with the sand dunes lying just to the north. The area surrounding the mounds contains slightly inundated low grass used to pasture cattle. The mounds are tree covered, with a large number of species present.

F. The small village of San Antonio is located approximately 9 km upstream from Tlacolalpan on the levee of the Papaloapan. Road construction has modified the area to some extent. Impressionistically, the trees which dominate the area are larger and more plentiful than most of those observed closer to the Gulf.

G. This locality is immediately adjacent to a narrow, sinuous tidal channel which connects the Alvarado Lagoon with a smaller lagoon or oxbow lake. Rhizophora lines the channel edges.

H. Specimens were collected both in the water and on the shore of this small lagoon or lake.

I. This locality may represent either an old lagoon shore or spit. The area is extensively inundated (from several centimeters to over 1 m in depth with archeological sites providing the only dry surface. Grass clumps and aquatic plants grow between the sites. The archeological sites are covered with an unidentified species of palm, other trees, and a variety of smaller plants. They stand approximately 50 cm to 1 m above the surrounding water, with an average diameter of 50 m. Actual small channels cut through the landform at intervals.

J. The south shore of the Alvarado Lagoon at this locality is very low and much of it is inundated. Mangroves are the predominant form of vegetation with Rhizophora occupying the wettest locations.

K. This is the levee of a partially abandoned channel, the Acula River. Rhizophora stands occur in channel fill along some of its margins. Grass clumps form the predominant vegetation on the levee proper, with occasional groves of Avicennia and low growing succulents stretching along the crest. Scattered Pithecellobium also occurs. Archeological sites of approximately 30 m in diameter and ranging in height up to 75 cm may be covered with Pithecellobium, grass and low succulents, or a more varied array of plants.

L. The levee of a totally abandoned channel is represented here. Archeological sites are small (15 m in diameter and not over 20 cm high) and represent the only semi-dry land. Mangroves surround them and Laguncularia and Avicennia have begun to colonize several of them.

M. Several aquatic plants were collected in the still, shallow water near the bank of a partially abandoned channel at this locality. Little if any current was apparent.

N. This locality represents an opening in an otherwise mangrove-filled interdistributary basin. The clearing is inundated to a depth of approximately 40 cm and is covered with Eleocharis (a high 'grass'). Local informants indicate that the area dries out during April and May.

O. This is the levee of a completely abandoned and mangrove choked channel. The levee is grass covered and contains several archeological sites (approximately 30 m in diameter, 75 cm high) which support a varied array of vegetation.

P. The levee of an almost completely abandoned channel is represented at this locality. The channel is still open at scattered intervals, though very narrow. To the north, it is mangrove covered with the exception of the higher archeological sites. Here, to the south, it is largely grass covered with occasional low shrubs. Shallow inundation occurs at some points. The archeological sites contain numerous plant species and measure on an average 50 cm in height and 30 m in diameter.

The following seven areas are all located along the levee of the active Papalopan River. Levee thicket and scattered trees predominate in those sections which have not been cleared for pasture. Cleared areas are in low grass. Numerous plant species occur in and around the housemounds of present inhabitants.

Q. The levee edge at this locality is approximately 40 cm above the water. A silty mudbank precedes the shore. The back levee slopes into a shallow pond, with mangroves growing beyond it. A modern dwelling on a raised platform is present.

R. An extensive mudbank lies between navigable water and the very low shore. Some of the levee thicket has been cleared for grass.

S. A cut bank of well over 1 m must be scaled to reach this locality, which is the site of a modern dwelling. Encouraged and actively cultivated plants (including a field of sugar cane) surround the structure.

T. A mudbank followed by a wet tangle of grasses must be passed to reach the actual shore (1 m above the grass mat). Pithecollobium and grasses grow on the levee.

U. A 1.5 m cut bank must be ascended to reach this locality. Low grass with scattered trees mark the site of an abandoned modern dwelling.

V. A mudbank and numerous aquatic plants precedes the very low shore at this point. The levee surface exhibits numerous salt encrustations. Sparse, low grasses predominate.

W. A slight cut bank covered with heavy levee thicket was observed at this locality.

X. The final locality at which plant specimens were collected is a large (100 m diameter, several meters in height) archeological site, one of the east-west string which crosses Patarata Island. The type of landform on which it rests is not clear, possibly an abandoned lagoon margin. The site is covered with tall grass and bushes, with large trees growing in the center. A partially abandoned channel forms the eastern site margin, while mangroves flank it on the north and south.

## SUMMARY AND CONCLUSIONS

Seven of the localities visited represented the levees of channels in varying stages of abandonment. Ten points were along the active Papaloapan River. The Alvarado Lagoon margin was visited once, as was an interdistributary basin. Six sites were located near small lagoons or lakes, and one may represent an abandoned lagoon margin.

Modern land use, especially clearing and burning for pasture, makes it difficult to estimate the variety of species naturally represented on the various landforms present within the estuarine zone. However, locations adjacent to the active channel tend to display a more varied range of plant species, especially in the levee thickets.

When archeological sites were present, no matter what their location, they were consistently found to contain an appreciably larger variety of plant types than did the areas surrounding them. This is undoubtedly the result of their slightly higher elevations, but also appears to be caused by planting and encouragement of both indigenous and introduced species by present inhabitants of the region. Many sites exhibit a historic component, and it is presumed that their raised position continues to be of value no matter where they are located.

A number of the plants identified have economic significance. Species important in providing a variety of building materials and foodstuffs are present, as well as those which produce tannin, dye, incense, and fuel. Some are believed to have medicinal properties. Several of the aquatic species characterize habitats well suited to fish and waterfowl.

Although this brief survey of vegetation in the Lower Papaloapan Basin is far from complete, it does suggest that more intensive work may usefully be applied to prehistoric settlement-subsistence models. Some diversity is apparent between the vegetation characteristic of geomorphologically distinct landforms. The most striking disparity, however, is evident when raised archeological sites are compared to their surroundings. This suggests that any assumption that settlement will naturally follow channel shifts is much too simplistic, and that more complex behavior patterning may be expected with regard to floral resource exploitation.

Table 1. Identified Species

| FAMILY | GENUS/SPECIES | COMMON NAME | LOCALITY |
|---|---|---|---|
| Acanthaceae | Ruellia sp. | -- | V |
| Amaryllidaceae | Crinum sp. | lidio | G |
| Apocynaceae | Rhabdadenia paludosa | jugo de leche | K |
| Asclepiadaceae | Asclepias curassavica L. | flor de zapa | A,E,V |
| Bignoniaceae | Tabebuia chrysantha (Jacq.) Nicholson | roble | U |
| Bombacaceae | Pachira aquatica Aubl. | palo de apompo | C |
| Boraginaceae | Cordia dodecandra DC. | copite | K |
| Bromeliaceae | Tillandsia sp. | gallito | K |
| Burseraceae | Bursera sp. | mulato | E,K |
| Cactaceae | Hylocereus undates | pitaya | E,I |
| " | Nopalea cochenillifera | nopal | Q,S |
| " | Pachycereus marginatus | organo | E,I,X |
| Capparidaceae | Cleome spinosa L. | -- | D |
| " | Polanisia dodecandra | jarriodia | A |
| Caricaceae | Carica papaya L. | papaya | E,Q,S |
| Ceratophyllaceae | Ceratophyllum echinatum Gray | -- | H |
| Combretaceae | Laguncularia racemosa (L.) Gaertn. F. | mangle blanco | C,H,L,Q |
| " | Terminalia catappa L. | almendra | A,E,Q,S |
| Compositae | Borrichia frutescens (L.) DC. | racachichi | K,O,P,Q,X |
| " | Helenium sp. | tres lomas | E,K |
| " | Iva annua L. | jarral | W |
| Convolvulaceae | Ipomoea sp. | amole blanco | O |
| Cyperaceae | Eleocharis fistulosa (Poir.) Schult. | zacate turillo | N |
| Ebenaceae | Diospyros revoluta Poir. | zapote prieto | X |
| Elaeocarpaceae | Muntingia calabura L. | chapulin | F,S |
| Euphorbiaceae | Acalypha sp. | cola de ratoni | A |
| " | Phyllanthus sp. | -- | A,S |
| Flacourtiaceae | Casearia sp. | primentina | P |
| Gentianaceae | Nymphoides aquatica | oja de laguna | Q |
| Gramineae | Paspalum bosianum Flugge | -- | D |
| " | Stenotaphrum secundatum (Walt.) Kuntze | -- | I |
| Guttiferae | Mammea americana L. | zapote domingo | X |
| Leguminosae | Gliricidia sepium (Jacq.) Steud. | cocuite | K,S,X |
| " | Inga spuria H. & B. ex Willd. | acotope | S |
| " | Lonchocarpus cruentus Lundell | rosa morado | O |
| " | Mimosa pigra L. | zarsa | A,B,D,E,P |
| " | Piscidia americana | -- | B |
| " | Pithecellobium dulce (Roxb.) Benth. | muchite | E,I,K,P,Q,S |
| Leguminosae | Tamarindus indicus L. | tamarindo | S |
| Malvaceae | Malvaviscus grandiflorus | pan y queso | A,E,P |
| Myrtaceae | Psidium guajava L. | guayabo | A,Q,S |
| Najadaceae | Najas sp. | sargaso | R |
| Nymphiaceae | Nymphaea ampla (Salish.) DC. | flor de laguna | I |
| Palmae | Cocos nucifera L. | palma de coco | E,S |
| Polygonaceae | Coccoloba barbadensis (Jacq.) | uvera | O |
| Pontederiaceae | Eichhornia azurea (SW.) Kunth. | pantano | G,J,K,M,R,T |
| " | Herteranthera liebmannii Buch. | sargaso | R |
| " | Pontederia sp. | oja galapago | R |
| Rhizophoraceae | Rhizophora mangle L. | mangle colorado | C,G,L |
| Rubiaceae | Bouvardia latifolia Standl. | duele de noche | A,K,P |
| Ruppiaceae | Ruppia maritima L. | sargaso | J |
| Rutaceae | Citrus limon (L.) Burm. f. | limon | E,Q, |
| " | Citrus sinensis Osbeck | naranjo | K,Q,S |
| " | Zanthoxylum limoncello | limoncillo | A,P |
| Salviniaceae | Azolla sp. | nechuga | M |
| " | Salvinia sp. | -- | I |
| Sapotaceae | Manilkara zapota (L.) v. Royen | chico zapote | F |
| Scrophulariaceae | Bacopa monnieri L. | -- | E |
| Solanaceae | Capsicum sp. | chilpailla | D,E,O |
| " | Solanum sp. | pata de cocina | D,E,P |
| " | Solanum sp. | verajena | D,E,K,P |
| Tamaricaceae | Tamarix sp. | pino blanco | S |
| Theophorastaceae | Jacquinia axillaris Oerst. | rosalea | I,K,P |
| Verbenaceae | Avicennia germinans (L.) L. | mangle prieto | C,H,L |
| " | Phyla strigulosa | graycayga | V |

TABLE 2. Plants with Known Economic Significance

| GENUS/SPECIES | USES | SOURCE |
|---|---|---|
| Rhabdadenia paludosa | Contains a poisonous juice believed to have purgative properties. | S:1160 |
| Tabebuia chrysantha (Jacq.) Nicholson | Wood is extremely hard; local informants indicate use in boat oar manufacture. | P/S:380 S:1321 |
| Pachira aquatica Aubl. | Seeds can be roasted and eaten; leaves cooked and eaten as greens. | P/S:294 S:793 |
| Cordia dodecandra DC. | Hard wood used in furniture manufacture; fruit edible; leaves used as sandpaper for cleaning purposes; bark employed medicinally. | P/S:364 S:1221 |
| Bursera sp. | Local informants indicate bark used medicinally; resin of some species burned as incense and used as varnish or cement. | S:443 |
| Hybcereus undates | Fruit eaten and local informants say is used medicinally; stem juices are caustic and may be employed as a vermicide. | S:912 |
| Nopalea cochenilli-fera | Dye-producing cochineal insects are raised on these cacti; edible fruit and stems; also used as a poultice to relieve aches. | S:863 |
| Pachycereus marginatus | Planted as a living fence; flowers sold for honey; informants indicate that the fruit is edible. | S:896 |
| Carica papaya L. | Edible fruit; leaves aid digestion and serve to tenderize meat; used in home remedies. | L/W:374 S:851 |
| Laguncularia racemosa (L.) Gaertn. f. | Wood used in construction, for posts, fuel and charcoal; bark produces tannin; unspecified medicinal purposes. | L/W:392 P/S:322 S:1031 |
| Terminalia catappa L.* | Produces lumber, oily edible seeds, black ink and dye, and tannin; also used for posts and fuel. | L/W:394 S:1030 |
| Diospyros revoluta Poir. | Produces edible fruit according to local informants. | L/W:794 |
| Muntingia calabura L. | Edible fruit; bark contains fiber useful for rope manufacture; antispasmodic properties ascribed to flowers. | S:734 |
| Acalypha sp. | Informants indicate unspecified medicinal uses. | -- |
| Mammea americana L.* | Fruit eaten raw, also made into jam; liquor made from flowers; bark used to produce insecticide; wood employed for general construction, fence posts and fuel; seeds poisonous. | L/W:354 S:826 |
| Gliricidia sepium (Jacq.) Steud. | Leaves, roots, and bark poisonous to many mammals; one of the strongest woods known; home remedies made from leaves; flowers eaten; protects young cacao plants. | L/W:196 P/S:210 S:482 |
| Inga spuria H. & B. ex Willd. | Informants indicate that fruit is edible. | -- |
| Pithecellobium dulce (Roxb.) Benth. | Wood used for posts, fuel and general construction; bark produces tannin and dye; edible seed pulp; unspecified medicinal purposes. | L/W:162-3 P/S:182 S:393 |
| Tamarindus indicus L.* | Wood used for (gunpowder) charcoal; yellow dye made from leaves; seeds, leaves and flowers eaten; fruit eaten and juice used in beverages; fermented drink made from fruit; used in home remedies as a laxative. | L/W:186 S:411 |
| Malvaviscus grandi-florus | Decoction of flowers used as a sore throat gargle. | S:775 |
| Psidium guajava L. | Paste, jelly, and flavoring made from fruit (which is extremely rich in vitamin C); bark produces tannin; various unspecified medicinal uses. | L/W:416 P/S:328 S:1036 |
| Najas sp. | All species an important source of food for wild fowl; also good as provider of food and shelter for fish. | C/C:126 |
| Cocos nucifera L.* | Most important cultivated palm; fruit eaten raw, made into candy, or shredded; milky juice used as a drink; employed in production of soap and oil; sap an alcohol source; trunk used for posts, leaves for thatch. | L/W:38 S:82 |
| Herteranthera lieb-mannii Buch. Shinners | Seeds eaten by waterfowl. | C/C:604 |
| Pontederia sp. | Sometimes eaten by waterfowl and musk-rats. | C/C:601 |
| Rhizophora mangle L. | Wood used in dock and wharf construction as it is resistant to molluscan attack, also for posts, fuel, and charcoal; bark produces tannin; root extract used to protect fishing lines; various unspecified medicinal uses. | L/W:384 P/S:316 S:1027 |
| Ruppia maritima L. | Extremely important in providing food and cover for fish and food for water-fowl. | C/C:123 |
| Citrus limon (L.) Burm. f.* | Fruit used for juice and flavoring, also in home remedies. | L/W:222 S:524 |
| Citrus sinensis Osbeck* | Edible fruit and juice (high in vitamin C). | L/W:226 S:524 |
| Azolla sp. | All species provide shelter for fish and are incidentally eaten by birds and fish. | C/C:57 |
| Manilkara zapota (L.) v. Royen | Chicle made from latex, green fruit produces tannin; wood extremely decay resistant, used in general construction and tool manufacture; fruit edible (raw and in preserves and syrups). | L/W:446 P/S:344 S:1119 |
| Capsicum sp. | Informants indicate that this small chile is very hot and used for seasoning. | -- |
| Solanum sp. (pata de cocina) | Local informants state that this plant is used externally to heal cuts. | -- |
| Avicennia germinans (L.) L. | Wood used for posts, fuel, and charcoal; bark provides tannin; sprouting seeds edible when cooked; salt can be obtained from foliage. | L/W:476 P/S:368 S:1251 |

* believed not to be native to Mexico.
C/C: Correll and Correll 1972
L/W: Little and Wadsworth 1964
P/S: Pennington and Sarukhan 1968
S: Standley 1920-1926

# CHAPTER THREE

# ARCHEOLOGICAL CONTEXT

## SETTLEMENT AND THE ENVIRONMENT

Modern settlement in the Lower Papaloapan suggests patterns for ancient settlement as well as contrasts with it. Preliminary to their comparison, it should be noted that each seems closely related to alluviation and hydrography. The activity of waterways, the growth of their levees, and the filling of abandoned channels change landscape patterns and partially structure settlement. The development of site land adds another variable. Eventually some reconstruction of hydrographic history will be necessary to interpret the settlement record. Nevertheless some preliminary comparisons of modern settlement and survey data are useful.

River activity affects landforms and hence current settlement. The main channel of the Papaloapan is distinct in this regard from smaller rivers entering the Alvarado Lagoon, such as the Rio Acula. The high coastal dunes and the alluviation of the Papaloapan combine to make most of its lower course suitable for habitation; nevertheless, its lower levees are scarcely above the river during much of the rainy season and are readily susceptible to flooding. Today houses on the low levee often are constructed on packed earth platforms less than a foot high, but some have elevated concrete floors. Usually house walls are made with poles, but sometimes concrete blocks are used. The seasonal rise of the river is a regular event which can transform a house into an island and occasionally inundates it. Where highways parallel the river, houses tend to be strung out intermittently along the two.

The channels of the Rio Acula and associated waterways are less active. Upstream along the Rio Acula, one must penetrate the mangrove zone about three kilometers before scattered homes appear along the banks of the river. Some of these are located on archeological sites, and others are on the scant river levee. Between these homes and the lagoon the shores are used only intermittently as temporary camps by fishermen and loggers in the dry season. This is due to their low elevation and susceptibility to flooding. Where homes occur, they vary from single residences to clusters of up to fifteen dwellings. Pole walls are customary along with raised, earth floors. In the area I have surveyed, habitation is strictly limited to the banks of relatively large channels and does not occur along narrow, overgrown arroyos.

In contrast, archeological sites occur both along the banks and in the swamp interior. The interior sites can be reached either by "site-hopping" or by following shallow, winding arroyos overgrown by mangroves. Most, perhaps all, interior sites are located along these arroyos, apparently on ancient levees. Even assuming that settlement along minor arroyos occurred when they were larger, the occupation span indicated by the surface remains does not seem to be sufficient to allow for all of the sites having been along major waterways, as is the case today. In part this settlement pattern discrepancy may reflect a current tendency of rural families to move to town locations for job and other opportunities. It may be that only the most favorable levee areas continue to be occupied.

Sites in the mangrove zone are numerous. The initial survey yielded over a hundred surface collections. Several of these represent clustered mounds not separated from each other by tracts of swamp. Further reconnaissance in 1973 and 1974 on later projects by J. Simon Bruder, Elinor Large and me has located half again as many sites (cf. Bruder, Large, and Stark 1975).

Among the kinds of sites visited several seem to represent public centers because of their large, artificial mounds. An example of a large site is Cerro de la Piedra, from which Medellin (1960b) rescued a carved stela. This site is located in the mangrove swamp between the Rio Acula and the Rio Martin Prieto across from Alvarado. It can be reached by a shallow arroyo system containing some minor lagoons. Cerro de la Piedra consists of approximately thirteen artificial mounds.

In summary, patterns of site distribution and modern habitation suggest similarities and differences. Obviously levee land is a major guide to the location of both. However, it seems probable that some interior locations along the banks of minor waterways were inhabited prehistorically. Besides geomorphological factors, the accessibility of such locations depends on (1) the amount of use of arroyos, which can help clear the passages of mangroves, and (2) the kinds of boats used. Mangrove trees can speed up the silting of some estuarine waterways. An actively used arroyo is cut back and kept open. We were often forced to cut our way into passages reported to have been once open and in use. A modern shift in fishing practices has affected this. Instead of individual fishermen in small boats or dugouts which they pole, paddle, or sail, there is increased co-operative fishing using larger motor boats.

There is another significant difference between ancient and modern settlement. Today there are mainly scattered occurrences of one or two residences with occasional larger clusters. There is no modern equivalent of the small, presumably public centers such as Cerro de la Piedra -- if we assume that some of the centers were built within the swamp. Modern centers are outside the mangrove swamps _per se_, although they do lie on its borders.

There are problems that affect settlement in the estuarine mangrove zone. Modern settlement on the Rio Acula indicates one of the difficulties: that of colonization. Unless houses were on stilts, permanent habitation would be restricted to higher locations until site deposition or artificial earthen construction created elevations.

Coe and Flannery (1967:102-103) have discussed coastal mangrove areas in relation to the development of early settlements. They suggest that coastal settings, such as around Salinas La Blanca on the Pacific coast of Guatemala, were attractive for early settlement because they had a variety of useful and easily accessible micro-environments. One of the problems in applying their ideas to the Lower Papaloapan is that the mangrove swamp is much larger, and the coastal gradient is scant. It would be more difficult to utilize the mangrove swamp in addition to other micro-environments. One must travel some distance to get to elevated, broad levee land. Early settlements relying on estuarine collection as well as farming would have to be located far enough upriver that estuarine exploitation would not be so near and easy as on the Pacific coast. Proceeding inland from the coast at Alvarado, one can travel the fifteen kilometers of Coe and Flannery's transect, one which crossed eight micro-environments, and still be in the midst of mangroves.

It seems reasonable to hypothesize that in the Papaloapan Basin, mangrove areas became increasingly valuable as occupation and artificial mound construction developed sites. Habitation on sites could be more secure, and people could cultivate garden plots or desirable trees.

Another environmental problem is fresh drinking water. How was fresh water obtained during the dry season when saline water penetrates the estuaries and rivers? Today people either drill deep wells or bring fresh water by motor boat from elsewhere. When possible rain water is collected. However, stock and domestic animals shift for themselves, making do with the brackish water. I suspect that the ancient inhabitants sometimes did the same. In 1609 the Bishop of Tlaxcala commented on having to drink saline water in Tlalixcoyan (Mota y Escobar 1945:211). This was probably the "solution" to this problem, although it could have been mitigated by construction of reservoir ponds, use of juicy fruits, and trips to fresh water sources (such as major rivers which carry fresh water even during the dry season).

## PATARATA ISLAND

Patarata Island is located in the midst of the estuarine zone (Maps 4 and 6). It lies about 45 minutes from Alvarado by small motor boat, but in direct distance about 7 km. The island fronts a large lagoon to the south called variously Popuyeca, Ensenada, and Pajarillos, and borders the Rio Nacaste on the west and the Rio Santa Catarina on the east.

The island is actually mangrove swamp with the exception of archeological sites. These provide dry habitable land on which there are a handful of homes today. Besides the homes there is sufficient additional "site" land for small-scale cultivation, but none is now being done. Pigs and cows graze this land, and there are a few scattered coconut and fruit trees. The mangrove swamp is intermittently logged for making charcoal. The surrounding waters are fished, and there is occasional hunting for game. The island is about 1.3 km across and 2.25 km long, north to south.

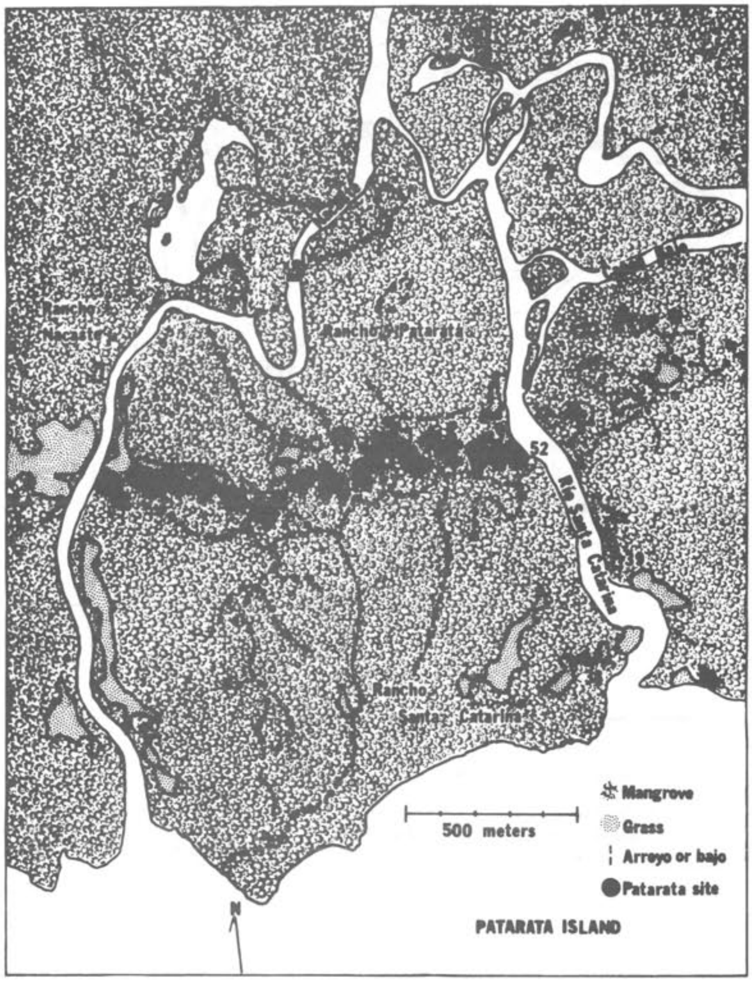
Several of the archeological sites on Patarata are distributed along a roughly east-west line crossing the island about midway. Most of these sequent sites are low, broad mounds rising only one or two meters above the swamp. In the line of sites a few range as high as four meters and are steep sided. There are six of the steep mounds out of twenty altogether. None of the former was excavated because of the probability of artificial construction which would not provide stratified refuse. Their function is therefore unknown. Two possibilities suggest themselves. They may represent temple or public building supports on a small, local scale--particularly since not all of them necessarily were constructed or used at the same time. However, in an area subject to seasonal flooding, some higher mounds could have been house platforms. Artificial platforms of this elevation would remain above the water in all but the most severe floods. Because of the implied labor input and functional differences with lower habitation sites, such house mounds could represent status differentiation.

At the southern end of the island at the juncture of the lagoon and the Rio Santa Catarina, there is a complex group of artificial mounds, Santa Catarina site 38, which represents a small center. In the southwest quadrant of the island some other sites were reported to me but not visited.

The line of sites crossing Patarata may be located along a nearly extinct waterway. Patarata 52, on the shore of the Santa Catarina, lies between an arroyo to the south and an area of grass to the north. The arroyo goes inland along the sites for a short distance and then swings southward. Except during the rainy season it is largely impassible. It, or one of its branches, crosses between the sites in the middle of the island. If this were once a more active waterway, the sites may have been located along a natural levee. Grass areas cross the island roughly following the line of sites, which tends to support this reconstruction. They could represent a levee backslope. However, there is no parallel formation on the other side of the arroyo. Another possible interpretation suggested to me by E. Large and J. S. Bruder is that an old lagoon shore may be indicated. However, this does not explain the presence of the arroyo.

In summary, Patarata Island enjoys a location close to a large, relatively deep lagoon and to numerous, shallow river waterways. It is protected from the full impact of Gulf storms, but is well within the tidal zone. The area is subject to annual flooding which occasionally inundates the low sites on Patarata and modern settlements such as Tlacotalpan. Such inundations are a major agent of soil building. It is at this time, too, that fresh water flows through most of the mangrove swamp. During the dry season the waters surrounding Patarata are brackish.

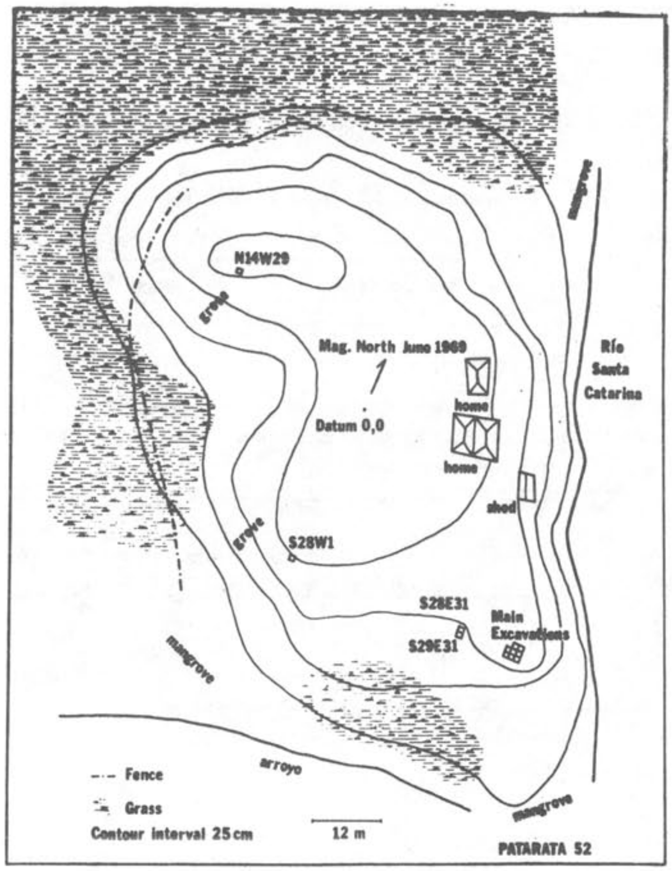
The site of the main excavations is the low, broad, hummocky mound numbered Patarata 52 (P52; Map 5). It stands slightly over one meter above the water level during the dry season. Two homes and a shed stood on the site at the time of excavation, and scattered trees and brush covered parts of it. During the dry season a low but passible area connects it to the low mound on the west. To the north and northwest adjoining the site is an expanse of grass clumps and barren ground (in the dry season). To the south, the site dips into the mangrove swamp and the arroyo leading into the interior of the island (Maps 4 and 5). On the east side the site borders the Rio Santa Catarina. P52 is approximately 100 meters north to south and 94 meters across in the dry season.




Map 4

## EXCAVATION METHODS

Sites on Patarata Island were selected for testing from over a hundred surveyed sites. Test squares of one or two square meters were dug on seven of the Patarata line of sites. The main purpose of the test squares was to determine the kind of cultural deposits and their potential for providing appropriate stratified refuse deposits. The squares were dug principally in ten centimeter levels except when it was possible to detect clear strata, e.g., shell floors, colored clay deposits. In practice several stratigraphic changes were not detected in time for proper excavation because I had to oversee several widely dispersed tests at once. At the height of the dry season all the tests reached the present water table before encountering sterile soil. It was not practical to continue excavation of the tests below the water table because of pumping problems. It seems probable that subsidence and compaction, characteristic of deltaic areas, are largely responsible for the presence of cultural deposits below the present water table.




Map 5

Except in a few instances screens were not used in the test excavations. Excavation was by trowel. In the damp clayey soil this resulted in astonishing oversights even by the most careful workmen, particularly in the recovery of faunal material. In summary, the tests were put down as rapidly as possible with a primary purpose of deciding at which site more careful, extended excavations would be conducted.

A shore location on P52 was selected for more intensive work from among three test locations on that site. The test S28E42 near the shore was used as a sump for adjacent squares. One reason for selecting the location was the proximity of water for washing dirt out of the screens. Most of the soil excavated on Patarata was wet and would not pass through even a large gauge screen without being dried. Once dried it would have had to have been broken up forcibly, with ample chance for destruction of small bones. Window screen (approximately 1.5 mm aperture) was used in order to take advantage of the opportunity for more complete recovery, particularly of faunal remains.

All of the P52 shore excavations with the exception of the first meter of S28E42 (the original test square) were screened in window screen. Excavation was by trowel, according to one meter squares, using natural strata. When possible the natural strata were sub-divided by ten centimeter levels.

Thus, only S28E42, the sump square, was excavated by arbitrary ten centimeter levels throughout. An attempt was made to use the alternate square technique of excavation, but the results were disastrous. Before it was isolated on one side, the alternate square collapsed into the sump. Because of the danger and frequency of collapses, excavation had to be speeded up at times, and natural strata were not always subdivided by ten centimeter levels. A total of eight square meters was excavated to a depth of approximately 2.1 meters.

Most of the excavation was conducted below the water table, which usually was located about one meter below surface at the height of the dry season. Therefore, this part of the excavation posed some unusual difficulties. Since most archeologists are unfamiliar with these conditions, I would like to point out some of the effects on information retrieval.

The excavation of wet soil through which water seeps under pressure diminishes the accuracy of one's observation of soil changes and subtle features. It is almost impossible to clear a surface without removing more soil than one wishes, and surfaces must be cleared frequently since they muddy rapidly. Depending on the consistency of the soil, the excavator can, by simply standing and moving minimally in the square, wallow thin strata around until they are mixed together hopelessly. Certainly earth floors would be an example of the kind of feature that cannot be located and investigated under these conditions. The clearing of burials is quite difficult to achieve satisfactorily. Excavation at P52 was fortunate in that many of these problems did not have a major impact. The lowest strata, the ones potentially most susceptible to these problems, were relatively thick and were visually quite distinct.

One common misconception about excavation below the water table is that it involves work in soft mud. This is dependent upon the nature of the soil. At Patarata the soil was compact and firm, water-logged rather than muddy. Mud could be formed only on a surface exposed for some time where the lack of overburden permitted more water to mix with the soil, a process greatly accelerated by excavation activity.

The problems involved in excavation below the water table directly affected the research in another important way. Limited time and money together with the delays imposed by the excavation conditions meant a curtailment of the area that was dug and a reduced sample size. Indeed, except for the abundance of refuse, the small area excavated would have been quite insufficient in sample size.

## STRATIGRAPHY AND DEPOSITION AT P52

The sump square, S28E42, was taken down much deeper than the other squares. It was lowered to a depth of 3.1 m in a fruitless effort to locate sterile soil. However, artifacts recovered at that depth were few. At this point the excavation had reached a quite fine, light grey sand. The sand offered little resistance to the water pressure at that depth, and the wall of the square began to flood out, making further excavation impossible.

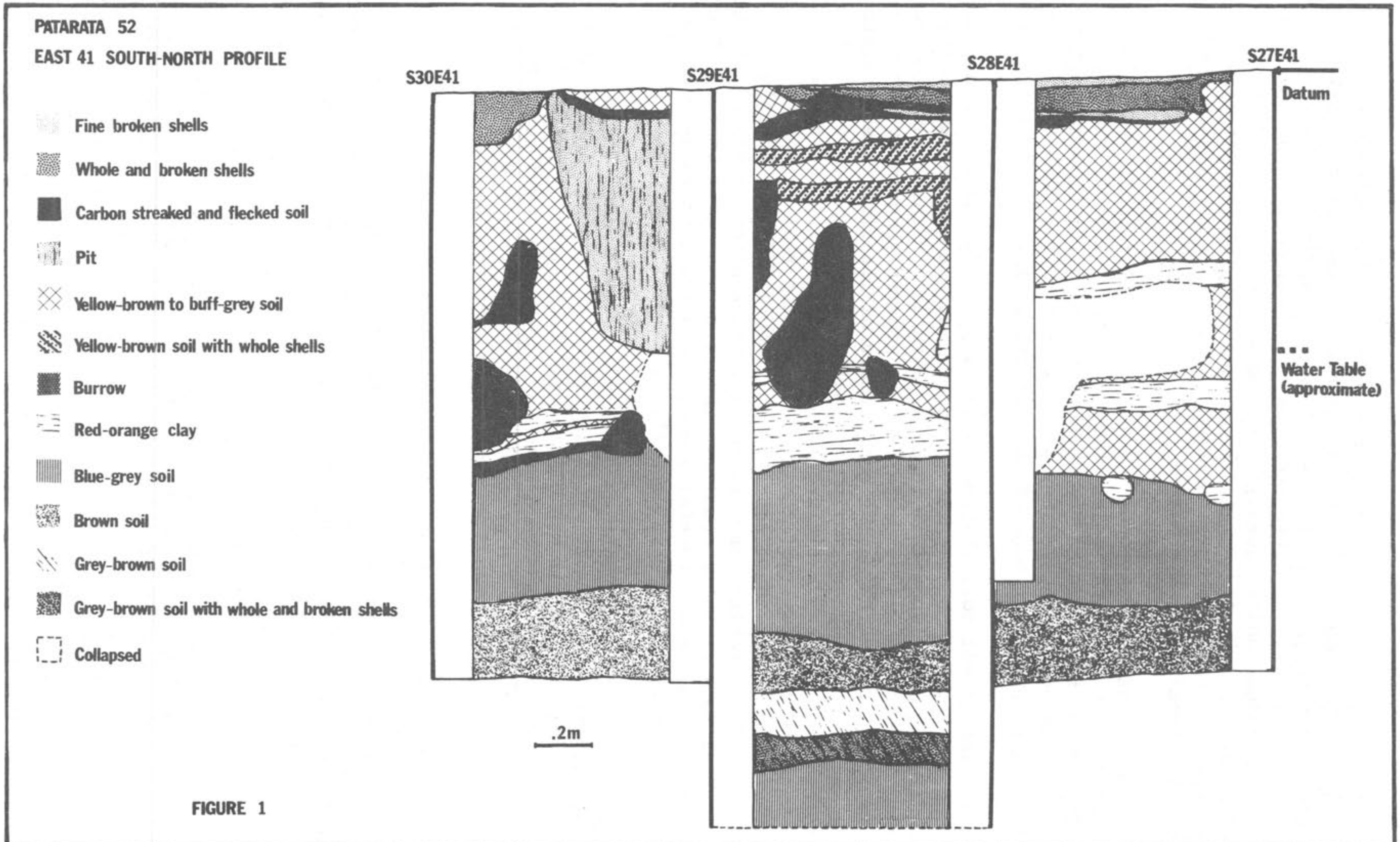

PATARATA 52
EAST 41 SOUTH-NORTH PROFILE
Fine broken shells
Whole and broken shells
Carbon streaked and flecked soil
Pit
Yellow-brown to buff-grey soil
Yellow-brown soil with whole shells
Burrow
Red-orange clay
Blue-grey soil
Brown soil
Grey-brown soil
Grey-brown soil with whole and broken shells
Collapsed
S30E41
S29E41
S28E41
S27E41
Datum
Water Table (approximate)
.2m

FIGURE 1

A clearly marked brown stratum packed nearly solid with sherds was selected as the arbitrary lower cut-off point for the excavation. It forms the bottom excavated stratum for the rest of the squares. The sump was refilled to stabilize at a depth below this stratum so that it would drain the excavation. Fig. 1 shows the sump strata down to the stabilization point. This discussion will henceforth concern only the deposits down to and including the brown stratum.

## Brown Stratum

The bottom excavated stratum appears in all eight squares (Fig. 1). It consisted of brown soil (apparently clay and silt) with a purplish tinge, packed solid with sherds and other refuse, such as scattered shells and flecks of carbon. It appears to have been deposited in open water, judging from the frequent barnacle marks and barnacles on the sherds. The soil appeared to have a high content of organic matter; bits of twigs and roots were preserved in it. The stratum was probably formed near the shore, and leaves and twigs dropped into the shallow water's edge. The piling of refuse in the water would account for the primary nature of the cultural deposits--there were large sherds and sections of vessels in the stratum. It would also permit the packing of sherds so closely that it was nearly impossible to insert a trowel into the stratum. Apparently the inhabitants were throwing refuse directly into the water.

## Blue-grey Stratum

Above the brown stratum lay a thicker layer of blue-grey soil, apparently clay and silt (Fig. 1). It does not seem to have been deposited in open water, for there are no barnacle marks on the sherds with the exception of two sherds, which could result from excavation mixture. It seems likely that the soil was water-lain by annual flooding and/or sedimentation in an area of declining hydraulic activity. Because the soil seemed to contain little organic material, it is tempting to think of it as having been a low grass area, flooded annually, bearing sparse vegetation in the dry season, and located near a living area from which refuse was thrown or swept. It is possible the main living area was on a nearby natural levee. The stratum contained large-sized sherds, scattered shells, and flecks of carbon. Cultural debris was more abundant in the lower part of the stratum, and in some squares the soil just above the brown stratum was packed quite densely with sherds. This indicates a continuity in cultural deposition substantiated by similarities in the cultural remains from the two strata.

In one square the top part of this stratum contained a thin layer of red-orange clays. Some of the clay formed hardened lumps which appeared to be the remains of construction material, clay daubed over pole walls. This verifies that some kind of structure was located in the immediate vicinity before the stratum was completely laid down.

One disturbed burial, F28, was found in this stratum. There was no indication of a pit nor of the cause of the disturbance.

## Buff-grey to Yellow-brown Soil

Above the blue-grey stratum lay buff-grey soil (apparently clay and silt) with reddish-brown mottling and occasional reddish-brown concretions. The buff-grey soil changed gradually upward into a yellow-brown soil with the same reddish-brown mottling; finally, in the upper part of the yellow-brown soil the mottling was absent (Fig. 1). In most cases the transition from buff-grey to yellow-brown was so gradual that it could not be distinguished precisely in the course of the excavation. It is likely that this change is an effect of gleization of the soil with a fluctuating water table.

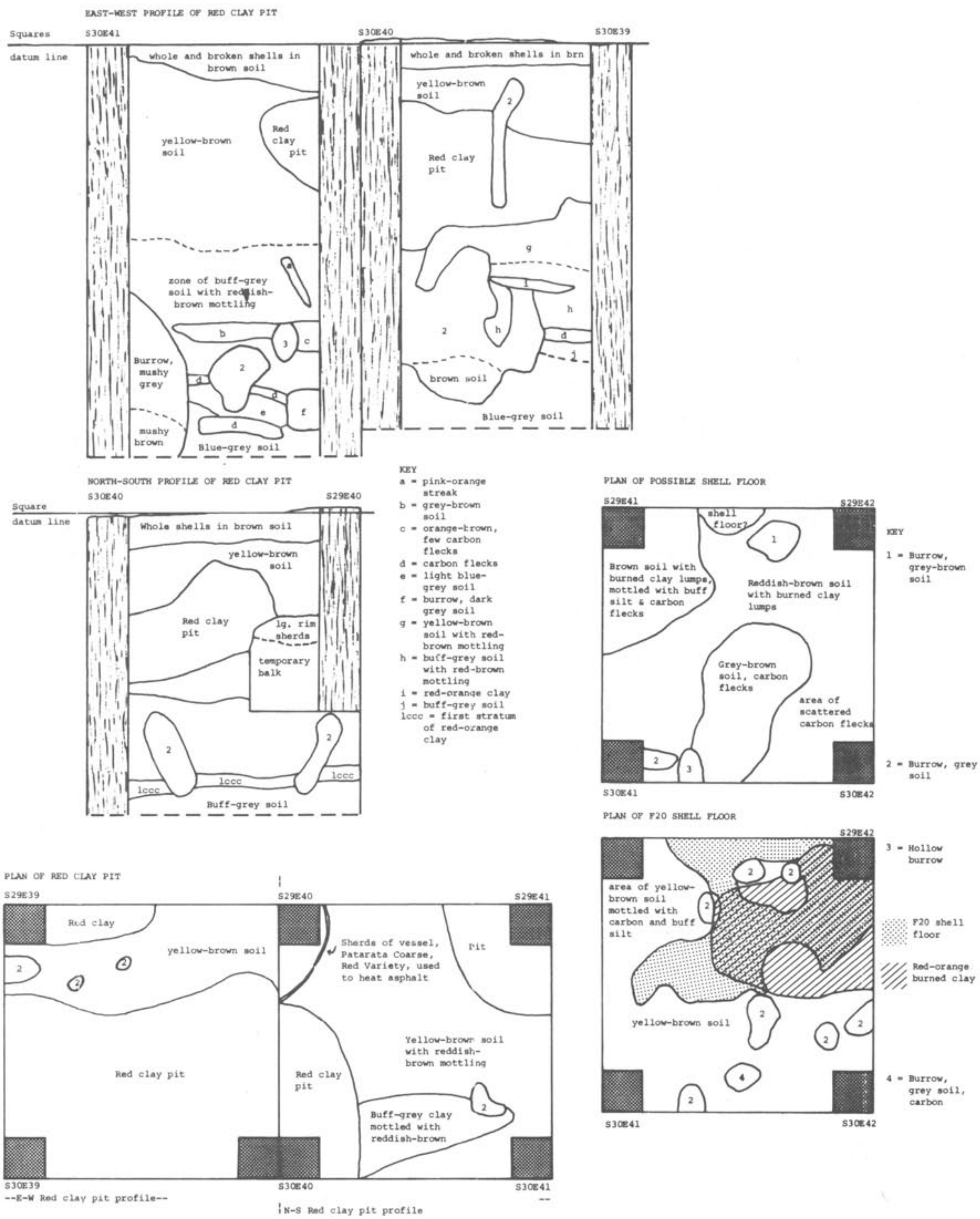
## Clay Strata

Cross-cutting the buff-grey to yellow-brown soil were one or two relatively thin strata of red-orange clay; occasionally parts of the clays had a pink or salmon color. The second, deeper stratum appeared in all squares, but the first was present only in half of them. Actually the description of two strata is a generalization of a somewhat more complicated situation. In most of the squares my previous characterization is correct. But two squares had additional thin clay layers close to the second clay stratum. These seem to be part of the same collapse process that produced the second clay stratum, and therefore I include them with it. The colored clay (abbreviated ccc) contained both soft clay and hardened clay lumps. The lumps consisted principally of wall material, but there is one possible chunk of flooring. The strata appear to be the remains of clay daubed over pole walls. Although no *in situ* evidence of a structure was found, such as post molds, it is likely that one or more structures were nearby on at least two occasions. Since the clay strata often had carbon flecks mixed in, the structure(s) may have burned and collapsed.

## Upper Sherd Concentration and Associated Features

### Shell Floors (Fig. 2)

Above the red-orange clay strata were several features in the yellow-brown soil. Their depositional order is not entirely clear. The lowest seems to be a partial shell floor, F20. The floor occurred at approximately 30 cm below the present surface and apparently sloped downward slightly to the west. This shell floor, and others like it encountered elsewhere in the test excavations, are distinguishable as such by their more or less planar orientation and by the orientation of the shells themselves, which for the most part are fixed into the dirt with their convex side up. This distributes weight on them and keeps sharp edges down. Their use as paving for living surfaces is analogous to the way bottle tops are stamped into dirt floors today, which is particularly servicable in a region that receives heavy rains. Mainly large-shelled bivalves were selected for the floor. It consisted principally of clam shells of *Rangia flexuosa* and *Polymesoda triangula*, with some *Rangia cuneata*. Unfortunately very little else can be said about this particular floor. It seems to have been present in three squares, one of which fell in, and another of which was the original test square. In the latter the



EAST-WEST PROFILE OF RED CLAY PIT
Squares
S30E41
S30E40
S30E39
datum line
whole and broken shells in brown soil
whole and broken shells in brn
yellow-brown soil
Red clay pit
yellow-brown soil
Red clay pit
zone of buff-grey soil with reddish-brown mottling
Burrow, mushy grey
mushy brown
Blue-grey soil
brown soil
Blue-grey soil
NORTH-SOUTH PROFILE OF RED CLAY PIT
Square
S30E40
S29E40
datum line
Whole shells in brown soil
yellow-brown soil
Red clay pit
lg. rim sherds
temporary balk
lccc
Buff-grey soil
KEY
a = pink-orange streak
b = grey-brown soil
c = orange-brown, few carbon flecks
d = carbon flecks
e = light blue-grey soil
f = burrow, dark grey soil
g = yellow-brown soil with red-brown mottling
h = buff-grey soil with red-brown mottling
i = red-orange clay
j = buff-grey soil
lccc = first stratum of red-orange clay
PLAN OF POSSIBLE SHELL FLOOR
S29E41
S29E42
shell floor?
Brown soil with burned clay lumps, mottled with buff silt & carbon flecks
Reddish-brown soil with burned clay lumps
Grey-brown soil, carbon flecks
area of scattered carbon flecks
S30E41
S30E42
KEY
1 = Burrow, grey-brown soil
2 = Burrow, grey soil
3 = Hollow burrow
F20 shell floor
Red-orange burned clay
4 = Burrow, grey soil, carbon
PLAN OF F20 SHELL FLOOR
S29E42
area of yellow-brown soil mottled with carbon and buff silt
yellow-brown soil
S30E41
S30E42
PLAN OF RED CLAY PIT
S29E39
S29E40
S29E41
Red clay
yellow-brown soil
Sherds of vessel, Patarata Coarse, Red Variety, used to heat asphalt
Pit
Red clay pit
Red clay pit
Yellow-brown soil with reddish-brown mottling
Buff-grey clay mottled with reddish-brown
S30E39
S30E40
S30E41
--E-W Red clay pit profile--
N-S Red clay pit profile


Fig. 2

workman went through the floor without noticing it. In the remaining square the floor was cut by a later burial and by an intrusive pit so that little of it remained.

Above the shell floor the soil contained lumps of red-orange clay, charcoal flecks, sherds, etc. Therefore the floor was closely associated with a structure either as an outdoor work area or as an interior floor.

E. R. Littman (1967) has pointed out that in the Huasteca and in the Maya area floor construction often utilized a layer of shells or burned clay or earth. The superposition of burned clay chunks above F20 might represent a process of floor prepapration rather than a floor capped by fallen wall debris, as I would propose. However, the chunky nature of the red-orange clay above F20 suggests the collapse of walling material rather than the spreading of a burned clay layer. The two colored clay caps deeper in the site demonstrate that walling material did collaspe and that it can occur without any accompanying shell layer. Test excavations at other locations on Patarata Island (not reported here) revealed many shell floors without any associated burned clay. They could conceivably have been placed as a foundation for a packed dirt floor, but no such packing or surface was ever observed, even in strata above the water table. Further, in one test excavation, a shell floor was associated with a hearth ring, which provides clear evidence that shell floors were used. Therefore we can be fairly confidant that the F20 shell floor was itself a living surface and not a base layer for the deposit of burned clay lumps intermixed with earth which overlay it.

Ten centimeters above the F20 shell floor was a very small section of what was probably another shell floor. It barely extended into the square where it was observed, and it, too, was ignored in the excavation of the test square. Judging from the profile, I believe it also extended into the square that collapsed (Fig. 1, yellow-brown soil with whole shells). Therefore I have even less data on it than on F20. It seems to have been less than two square meters in extent.

Red Clay Deposit (Fig. 2)

An artificial deposit of red clay was encountered, partly in a pit. Judging from the depth of the red clay and assuming that P52 has always been fairly level as it is today, the red clay pit may have been roughly contemporaneous with the F20 shell floor although it could not be associated with the floor directly. The lower part of the red clay deposit was in an irregular pit. The upper portion may have been simply piled up above the old land surface, for the upper boundaries were less distinct and more irregular. This clay did not contain the hardened lumps indicative of architectural debris. In view of the use of colored clay for wattle and daub construction at the site, it is possible that the deposit of red clay was brought in for such purpose. To my knowledge there are no natural sources in the near vicinity. An alternate possibility, for which there is no evidence, is that the clay was used for making pottery.

Pit

Cutting through the lower F20 shell floor was a pit. Its purpose is unknown. It appeared to contain much of the same soil that was excavated out of it. It was identifiable only as a mottled area containing a mixture of carbon flecks, grey soil, and brown soil. It originated very close to the modern surface (Fig. 1, Pit).

Burials (Fig. 48)

Probably later than both of the shell floors and cutting through at least the lower F20 shell floor was an extended adult burial, F22. No evidence of a burial pit was found other than the intrusion through the F20 shell floor. Slightly below this burial there appeared to be another, upon which the excavation barely touched. If it was indeed a burial, it was probably flexed. It did not appear to be disturbed by F22. Neither burial was exposed sufficiently by the excavation to be removed.

Another adult burial, F26, originated close to the modern surface. In this case the burial pit was identifiable because it cut through the strata of red-orange clays, bits of which showed up along with yellow-brown, buff-grey, and grey mottled soil. The burial was placed seated, squatting, in the bottom of a cone-shaped pit. In no case were grave goods associated with the burials.

F25, an infant burial at the top of Camaron 3 deposits, could have originated in Limon or historic times.

Sherd Concentration

In the soil above the shell floors, where they occurred, and in the corresponding upper yellow-brown soil of the rest of the excavation, there was a sherd concentration unmarked by any soil change. In several squares this could be identified only by the sudden increase in the number of sherds in the artificial levels. Subsequent ceramic analysis revealed this change to be culturally significant.

## Shell Deposit

The uppermost deposit on the site was historic. It consisted principally of shells which were associated with some kind of structure (Fig. 1). A single line of three bricks flanked one long side of an area approximately one by two meters. In this area carbon lenses surmounted by compact, fine, broken shell alternated with strata of whole and broken shells in a brown soil matrix. One post mold stood outside the line of bricks. Outside of this layered, rectangular shell deposit, most of the excavation area had a top stratum consisting simply of whole and broken shells in a brown dirt matrix. The abundance of these shells, their often broken condition, and the demarked area with carbon layers suggest that the shells may be debris from lime-making process. Both modern and prehistoric sherds and other artifacts were mixed with the shells. Since the upper part of the yellow-brown soil had a sherd concentration (otherwise unmarked in the stratigraphy), it is quite possible that many of the old sherds in the shell strata were raked up in the course of setting the bricks and moving shell. No orientation of shells or surface packing was present that would indicate any kind of flooring in these shell deposits.

Artificial shell mounds exist at Santa Catarina 38 on Patarata; there are also a few other sites in the area which are low midden-like accumulations, principally of shell. Therefore localities would have been available from which lime-makers could readily obtain shell. However, this does not explain the effort to bring it to P52.

## Natural Disturbance

A discussion of stratigraphy at the site would not be complete without considering the abundance of burrows. There are a variety of burrowing animals in the area, but the most ubiquitous are crabs. Many are sizable animals and create large burrows. On some occasions in the test excavations a thin stratum was encountered which had been almost completely riddled and obliterated by burrows. As an example of the achievements of the crabs, at a depth of approximately 1.2 m below the present surface, we removed a section of a cut pole 15 cm long, a few scraps of wood, and half the bottom of a broken medicine bottle, all of modern origin. They were in the mushy dirt of a relatively fresh crab burrow. This churning of soil and artifacts must be taken into account in the interpretation of cultural remains at the site.

Of all the strata excavated, the brown stratum appears to have been the most immune to this activity. In the first place, its sherd density makes it a formidable barrier even to the industrious crabs. Secondly, only two sherds with barnacle marks were discovered in the blue-grey stratum. Since many of the brown stratum sherds were marked by barnacles, we can be confident that upward mixture of debris from the brown stratum has been slight. The distribution of modern glazed sherds, iron, etc., is a useful index of mixture in the site (Table 3).

Table 3. Distribution of Historic Artifacts

| | PROVENIENCE | | | | | |
|---|---|---|---|---|---|---|
| ARTIFACT | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Total |
| Modern Sherds<br>Glazed, Brown, Beige, or White Background with Painted Designs or, Glazed White Surface | 1 | 6 | 22 | 24 | 116 | 170 |
| Miscellaneous | | | | | | |
| Concrete Fragment | | | | | 1 | 1 |
| Glass Fragment | | | 4 | 1 | 8 | 13 |
| Wood Button | | | | 1 | 1 | 2 |
| Brick | | 1 | | | 5 | 6 |
| Plastic Fragment | | | | | 1 | 1 |
| Head of Hat Pin | | | | 2 | 1 | 3 |
| Copper Snap | | | | | 1 | 1 |
| Nail, Copper | | | | 2 | 2 | 4 |
| Nail, Iron | | | | 1 | 28 | 29 |
| Iron Fragment | | 1 | 5 | 7 | 101 | 114 |
| Lead Bullet | | | 1 | | | 1 |
| Lead Fragment | | | | 1 | | 1 |
| Staple | | | | | 1 | 1 |
| TOTAL | 1 | 8 | 32 | 39 | 267 | 347 |

## SUMMARY

In summary, deposition from the brown stratum upward demonstrates significant patterning. The strata suggest one of the succession patterns in the estuarine area. Shallow open water (brown stratum) along the edge of a stream channel was gradually silted in--and at P52 the process was materially aided by debris from human occupations. The resulting silted area may have become a grass or low levee zone (blue-grey stratum). Eventually deposition elevated the area enough to permit direct habitation (buff-grey to yellow-brown soil). Soil deposition then continued in a uniform manner up to the modern surface.

However, it is in this upper portion of the site that the stratigraphic history is the most complex. Pits, burials, floors, and structures are rather densely concentrated. In view of the scarcity of dry land in the area this is understandable. One would expect that the more elevated a site becomes through natural and human agency, the less would be the annual deposition of soil and the more reworked would be the accumulated refuse material. This conforms with the change in the condition of sherds from the lower to the upper part of the site. Sherds in the yellow-brown soil are mostly small and rather battered in contrast to the large sherds and nearly whole vessels from the bottom of the site.

## CORRELATION OF PROVENIENCE UNITS WITH THE CULTURAL SEQUENCE

### Introduction

As stated before, the excavation utilized natural strata whenever possible but sub-divided thick strata by ten centimeter levels whenever appropriate. Analysis of the contents of strata and levels revealed that only some of the arbitrary levels involved significant cultural differences. Hence it is possible to combine some of the provenience levels for more economical reporting. Strata and features will be distinguished as provenience units except in a very few instances where little or no material was encountered in the stratum or feature and where analysis clearly links it culturally to another unit. Two phases are proposed, the earliest of which, Camaron, is sub-divided into three parts.

#### Camaron 1

The bottom brown stratum differs from the overlying blue-grey stratum in cultural content, particularly ceramics. The small sample of material that came from below the brown stratum in the sump square seems to be culturally the same as the brown stratum. The underlying material will be grouped together and identified as "sub-brown" in provenience. Together the sub-brown and brown strata correspond to the Camaron 1 subphase.

#### Camaron 2

The blue-grey stratum and the thin layer of red-orange clays within it in one square (S27E42) correspond to the Camaron 2 sub-phase. The layer of colored clays will not be distinguished in reporting provenience in tables, and will be included with the blue-grey stratum.

Camaron 3

The assemblages above the blue-grey stratum differ from it. Camaron 3 material was found in a variety of strata and levels overlying the blue-grey stratum and presents a complicated stratigraphic picture. Essentially it comprises most of the overlying buff-grey to yellow-brown soil and the cross-cutting colored clay strata. Every square contained the second stratum of red-orange clays; however, not all included the first cap of colored clays (abbreviated 1ccc). Camaron 3 therefore includes the soil from the second colored clay cap (abbreviated 2ccc) to the blue-grey stratum, 2ccc, 1ccc to 2ccc where applicable, and 1ccc where applicable.

In the upper part of the soil above the colored clay caps there was a culturally distinct sherd concentration. Unfortunately the sherd concentration was not marked by a visible soil change. Therefore its isolation is only an approximate one except where the F20 shell floor was evident; in the latter case it lies above F20. For this reason the Camarón 3 levels above the colored clay caps will be reported in the following two groups: sherd concentration (or F20) to 50 cm and 50 cm to a colored clay stratum (1ccc or 2ccc, depending on which is applicable). Both of these units belong to Camaron 3, but with a cut-off at 50 cm, the uppermost levels just below the sherd concentration can be isolated--these of course would be the levels most likely to have admixture of the overlying, later cultural material.

Limon

The Limon phase material was found on and above the F20 shell floor in the yellow-brown soil. Burned clay lumps helped mark off an overlying stratum above F20, and this stratum contained a sherd concentration. Limón also includes the possible shell floor above F20, which was very fragmentary. In most squares, however, the uppermost levels of yellow-brown soil contained a sherd concentration that was otherwise unmarked; these levels I have grouped into a "sherd concentration" provenience unit. A few other features, the Red Clay Pit, F26 burial pit, F22 burial, and the Pit are also part of the Limon phase.

Shell Deposit

The top-most shell-bearing layers of the site will be reported separately because the few artifacts they contained are a mixture of historic and ancient material, the latter likely Limon. Prehistoric remains from the shell deposit can be used with caution to supplement the Limon sample.

## Comment

Differences and similarities in pottery, both absolute and relative, are mainly responsible for my correlations of strata and levels with a cultural sequence. It is principally in pottery that the Patarata sample size is sufficient for reliable conclusions about chronological cultural differences. Differences in other kinds of artifacts and in food remains are much less clear-cut in demonstrating culture change and correlations in the sequence.

A further detailed reporting of pottery from the site will refer to the above provenience units, and illustrations will identify specimens with reference to them. However, for the sake of brevity in reporting artifact provenience in tables, I will list them by phase or sub-phase.

## CHRONOLOGY

Calendric approximations for the Patarata phases pose problems. Some of these are due to difficulties with the radiocarbon assays. Compounding the matter are chronic problems in cross-dating with better documented sequences. Undoubtedly the most discreet course of action would be to let the sequence float in the Classic Period, 300-900 A.D., to which it appears to pertain. However, I have opted for suggesting reasonable time segments for each cultural unit. These spans are based on a combination of radiocarbon and ceramic evidence. Not all of the supporting data for my decisions will be given here because I will provide only a synopsis of the pottery sequence. Ceramic chronology will be treated in more detail in a subsequent study analyzing both the main and test excavations, the latter involving other sites. Research in progress at the Instituto de Antropologia in Jalapa, Mexico, especially that dealing with the nearby center of El Zapotal, eventually will provide additional comparative data clarifying some of the chronology.

Three charcoal samples from the Patarata 52 site were submitted to Teledyne Isotopes for radiocarbon age determinations. All of the samples were collected from charcoal flecks scattered through a clearly bounded soil stratum. Collection followed normal procedures for avoiding sample contamination.

It is necessary to convert these age determinations to calendric years. In doing so, I follow the procedures described by Damon, Ferguson, Long, and Wallick (1974):

Table 4. Radiocarbon Assays

| SAMPLE | PROVENIENCE | RADIOCARBON AGE (5568 year half life) |
|---|---|---|
| I-5640 | P52, S28E40, brown stratum (Camaron 1 sub-phase) | 2090 ± 95 |
| I-5641 | P52, S28E40, 170 cm to brown stratum (Camaron 2 sub-phase) | 12600 ± 170 |
| I-5791 | P52, S28E42, 180 cm to brown stratum (Camaron 2 sub-phase) | 1600 ± 95 |

Table 4. (continued)

| SAMPLE | CORRECTED DATE (interpolated) | CORRECTED ONE SIGMA $\sigma_c = \pm\sqrt{(\sigma_{250})^2 + (\sigma_s)^2 + 120^2}$ | SPAN |
|---|---|---|---|
| I-5640 | 172 B.C. | $\pm$ 181 | 353 B.C. - 9 A.D. |
| I-5641 | too early | --- | --- |
| I-5791 | 366 A.D. | $\pm$ 155 | 211 A.D. - 521 A.D. |

A sample (I-5640), pertaining to the Camarón 1 sub-phase, gave the result 353 B.C. to 9 A.D. Comparative cultural dating suggests this is too early and that the Camaron 1 sub-phase should date closer to 300 A.D. The late end of a two sigma span would be more acceptable.

A first effort to date the Camaron 2 sub-phase (I-5641) produced a date much too old. This date from a sample in stratigraphic superposition to the Camaron 1 date obviously involves some kind of contamination, but its source remains unknown. James Buckley of Teledyne Isotopes (personal communication) reports that laboratory experiments were unsuccessful in revealing the nature of the contaminant. Asphalt contamination would be a logical candidate since it occurs scattered in the site, but laboratory tests with petroleum ether extraction were negative, and the contaminant was apparently not asphalt (cf. Berger, Graham, and Heizer 1967: Appendix III).

A second effort to date the Camaron 2 sub-phase (I-5791) indicated 211-521 A.D. This date includes the Early Classic period and agrees with relative dating using cultural criteria.

More radiocarbon dates were prohibited by lack of funds. The I-5791 date for Camaron 2 is the only one sigma determination which is supported by cross-dating. The date for Camaron 1 is dubious except for its two sigma range.

On present evidence I would suggest the following approximate spans for the Patarata sequence:

| | | |
|---|---|---|
| Limon | 600-900 A.D. | Late Classic |
| Camaron 3 | 450-550 A.D. | Early Classic |
| Camaron 2 | 350-450 A.D. | Early Classic |
| Camaron 1 | 250-350 A.D. | Early Classic |

Limon appears to be Late Classic, but I am unable to offer a more specific span at present.

# CHAPTER FOUR

# MATERIAL CULTURE

## INTRODUCTION

The following report on artifacts from the P52 main excavations is not intended to be a complete site report; rather, it is an examination of evidence helpful for reconstructing (1) paleoenvironment, (2) occupancy at the site, particularly the kinds of activities represented, (3) adaptation to and exploitation of the environment, (4) relationships with neighboring areas, particularly in Veracruz itself. Specifically, the nature of the present study has led me to compress the pottery analysis to a brief summary; the pottery is particularly useful for historical and chronological problems rather than the ecological focus I have selected. A subsequent pottery study will combine evidence from the main excavations with the test squares and surface collections. Because of space limitations here, provenience details for illustrated artifacts will be found in figure captions in Stark (1974a).

## PATARATA 52 POTTERY SEQUENCE SUMMARY

The following summary notes characteristic pottery types for each phase or sub-phase, indicating several chronological changes in types and/or modes. The ceramic types are constructed with two purposes: to reflect clustering of modes, and to be useful for identifying chronological changes. In general, the former purpose produced types which were chronologically significant in Patarata stratigraphy. Despite the importance of the chronological function of the typology, the purpose here is to examine relationships between Patarata and neighboring sites. Incensarios and some minor pottery types are not discussed.

### Camaron 1

Patarata Coarse, Red, Black, and Plain Varieties (Fig. 3)

Vessel walls in this utilitarian pottery are usually thick, and the paste contains plentiful, coarse sand temper. Forms include large, flaring-necked ollas, tecomates, and deep, flat-bottomed basins with straight to flaring sides. In the Red Variety ollas tend to have the red slip confined to the exterior body and lower neck. Some tecomates have exterior rim bands of red paint and/or brushed areas. The Black Variety is scarce. Several basins in all varieties exhibit pattern burnishing; interior vertical lines are a common pattern. Patarata Coarse pottery is numerically predominate in all Camaron sub-phases.

Armas Unpainted, Brownish-black Variety (Fig. 3, 4)

The paste contains a moderate to light amount of fine sand temper. Flat-bottomed bowls with straight to outflaring or convex sides are the main forms. Small ollas, beaker-like jars, and composite silhouettes are less frequent. Some flat and curved bases have small, solid, nubbin supports. Large, hollow, quadrangular and conical tripod supports are associated with flat bottoms and straight to outflaring-sided bowls. There are some instances of labial and basal ridges on bowls. Many surfaces retain a moderate polish. Other decoration is not frequent, usually broad-line incising of one or two horizontal lines or of uncomplicated curvilinear patterns.

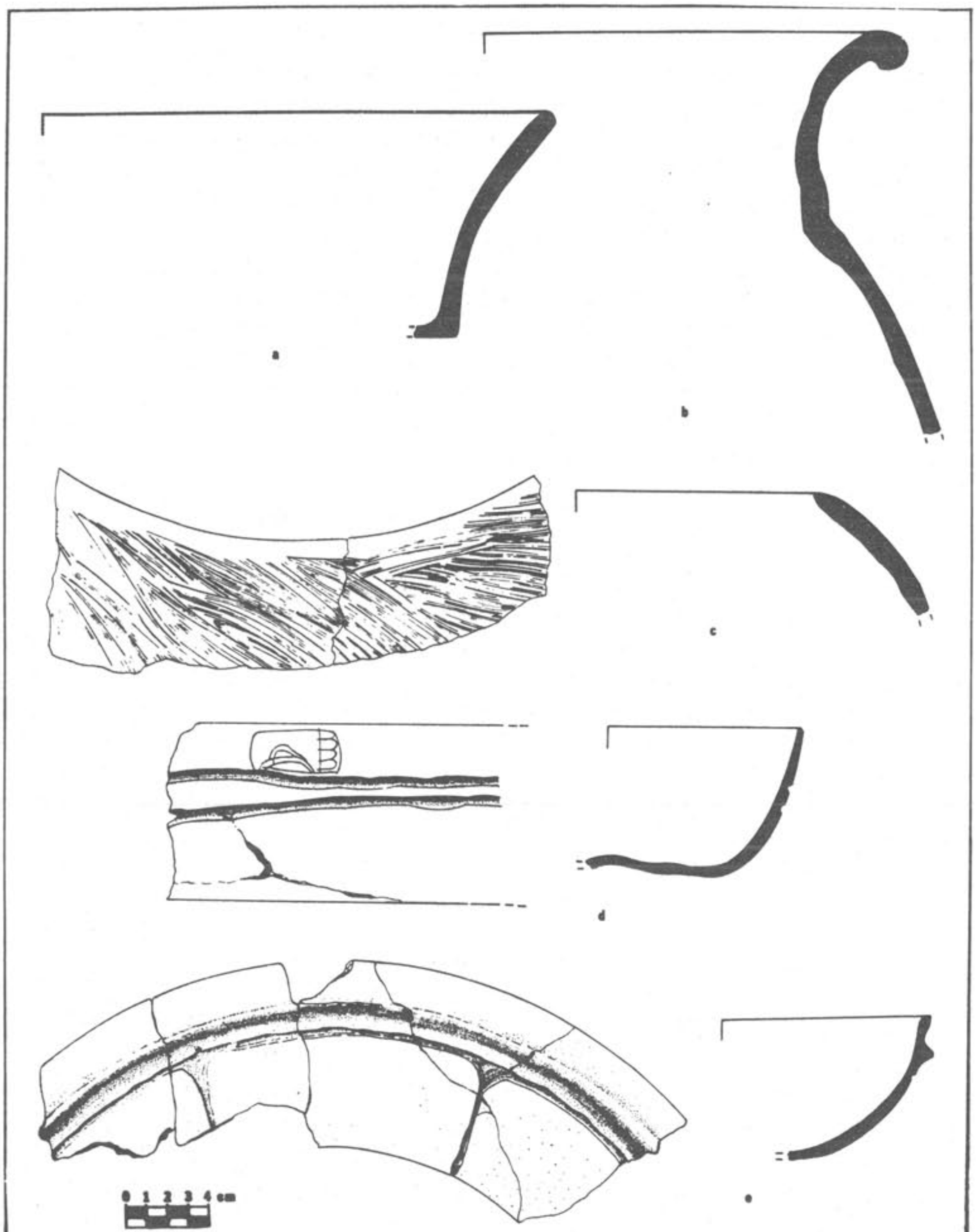


Fig. 3 Patarata Coarse, Plain Variety: (a),(c) Camaron 1; Patarata Coarse, Red Variety: (b) red slip on shoulder only, Camaron 1; Armas Unpainted, Brownish-black Variety: (d),(e) Camaron 1.

Caliapan Resist, Orange, White, Red, and Brown-and-light Varieties (Fig. 4, 5)

Paste tends to be slightly coarser than Armas Unpainted. In many cases the vessels are low bowls with straight to outflaring sides and flat bottoms, sometimes with hollow, quadrangular, tripod supports which are occasionally perforated. The varieties diverge in the color of the slip or surface to which negative resist smudging was applied. The Brown-and-light Variety is not slipped differently from its paste. Spirals, wavy lines, parallel lines, vertical lines, and dotted shapes are common designs. Designs are often complex, but fluidly executed, generally non-representational as far as can be determined.

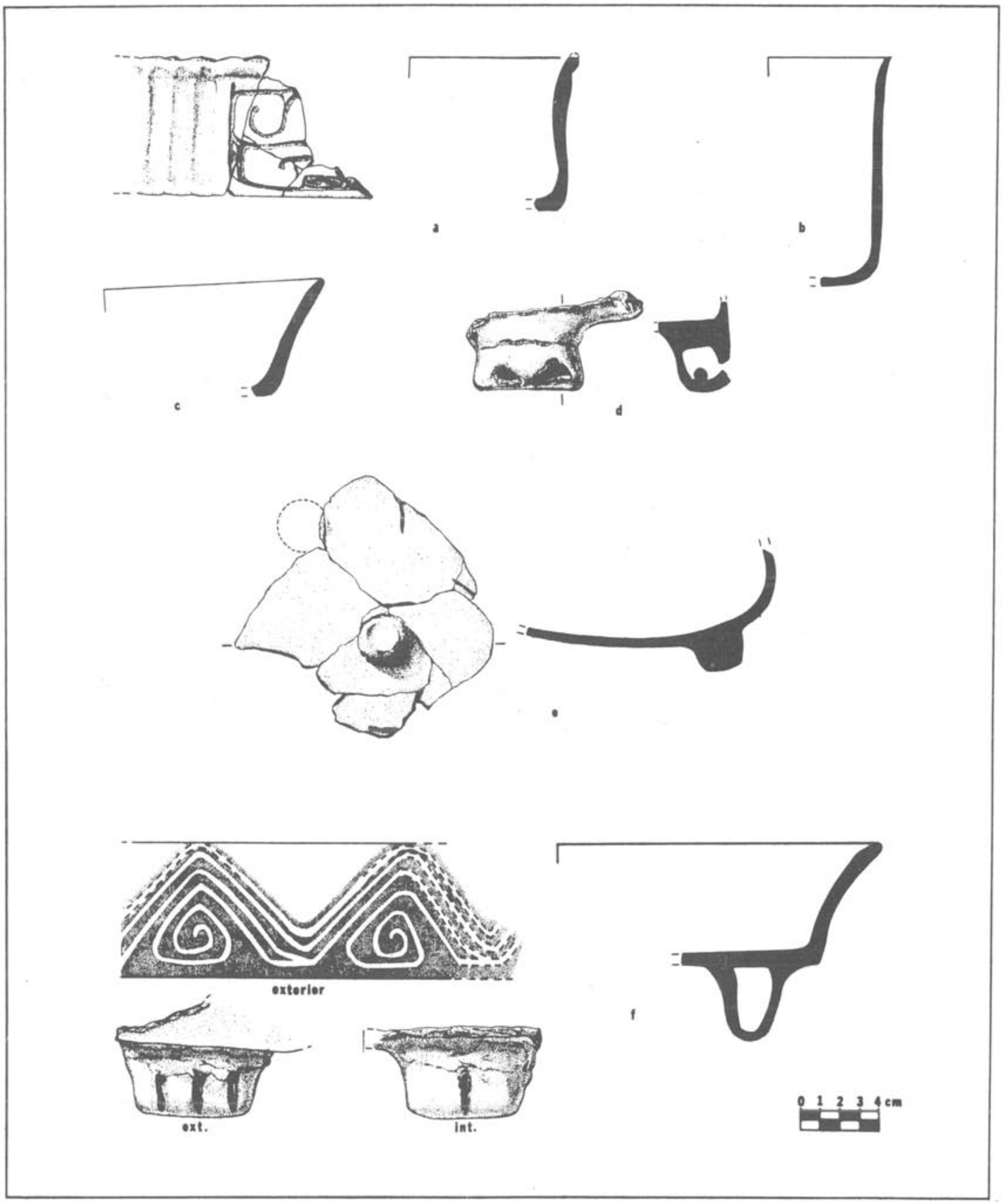



Fig. 4 Armas Unpainted, Brownish-black Variety: (a)-(e) Camaron 1; Caliapan Resist, White Variety: (f) Camaron 1.

Caliapan Resist, Alvarado Variety (Fig. 5)

This is a minor variety, possibly finer in paste and with thinner vessel walls than the rest of Caliapan Resist. Only small, convex-sided bowls are represented; they have all interior and exterior surfaces decorated, in contrast to other varieties, but the range of surface colors may be the same.

Roja Red, variety unspecified

Paste is generally similar to Armas Unpainted and Caliapan Resist. Forms are predominantly flat-bottomed bowls with straight to outflaring sides. Surfaces have a monochrome red slip.

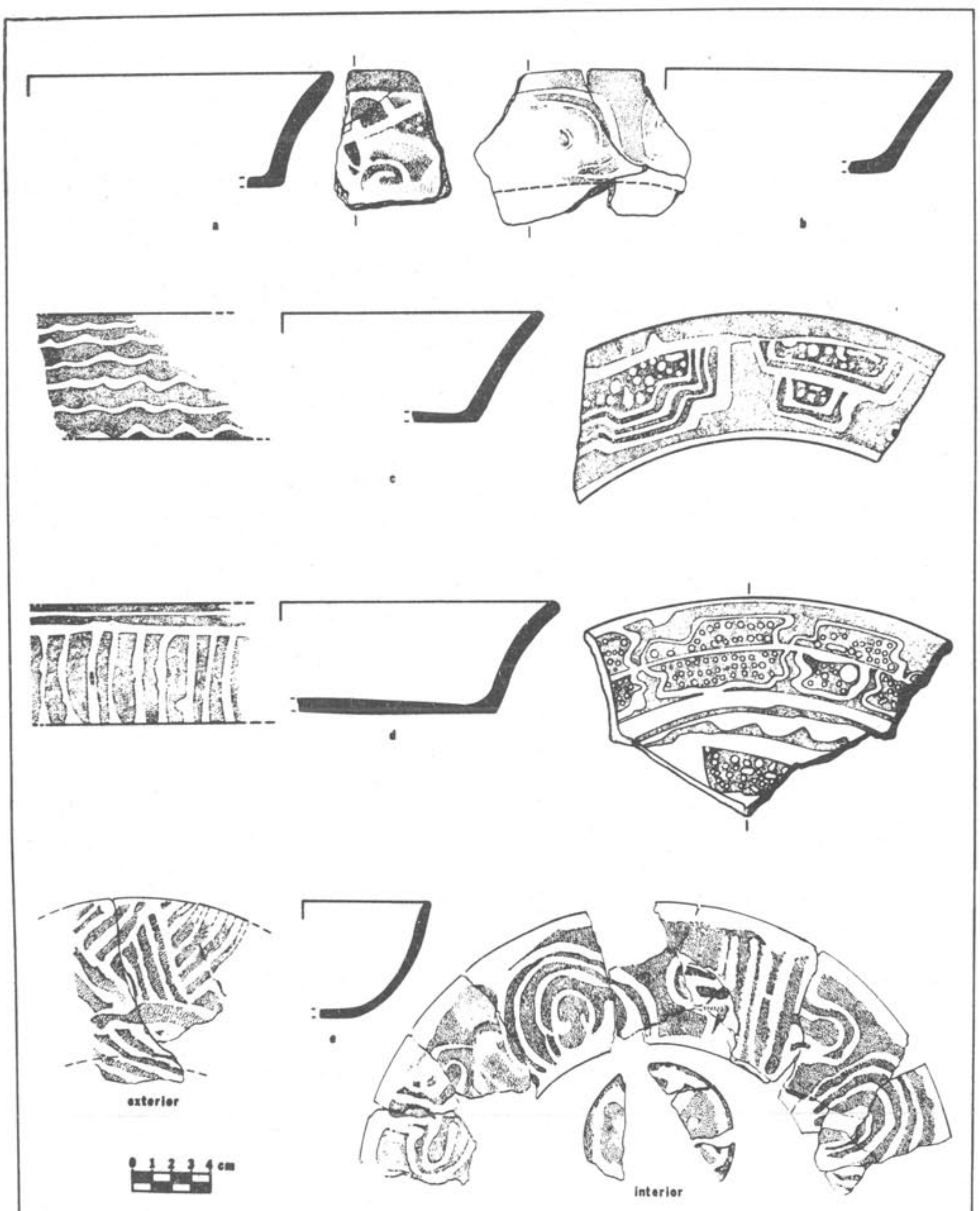



Fig. 5 Caliapan Resist, Orange Variety: (a) Camaron 1; Caliapan Resist, White Variety: (b)-(d) Camaron 1; Caliapan Resist, Alvarado Variety: (e) Camaron 1.

Acula Red-orange, Monochrome Variety

Paste is similar to Roja Red. Bowl forms seem to be represented in Camaron 1, but the sample is small. The scarcity of this variety in Camaron 1 may be due partly to lack of preservation of the slip in the brown stratum.

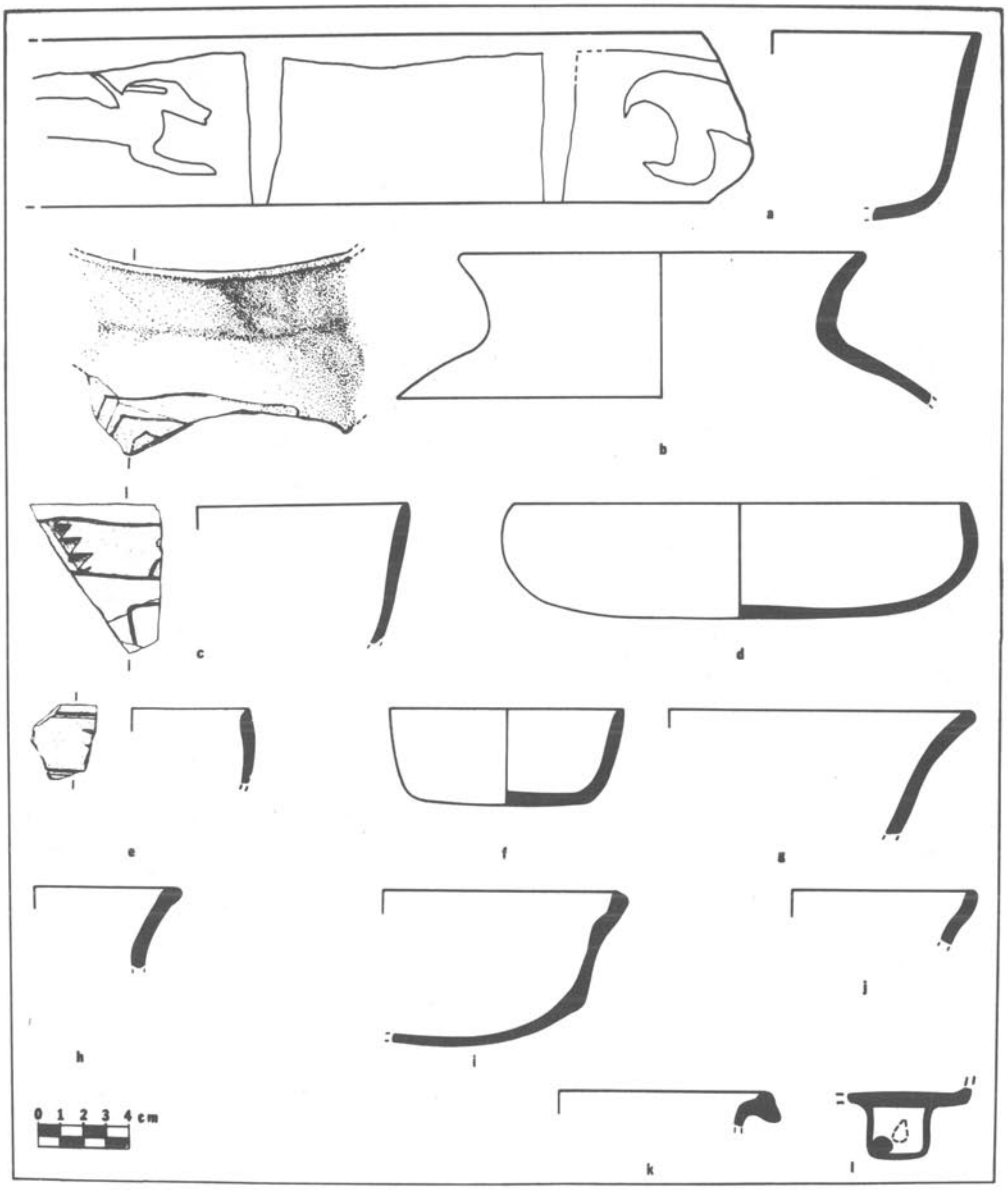



Fig. 6 Acula Red-orange, Engraved Variety: (a)-(c) Camaron 1, (c) red interior, exterior eroded (?) with incised and fugitive red painted areas; Mojarra Orange-grey, variety unspecified: (d)-(l) Camaron 1, (d) interior black slip, (e) incised design, (j) exterior cream slip.

Acula Red-orange, Engraved Variety (Fig. 6)

Paste is like that of the Monochrome Variety. Straight-sided, flat-bottomed bowls are decorated with red painting and engraving on the red-orange slip. Infrequently small ollas occur. The bowls usually feature exterior panels marked off by painted rim and vertical bands. Inside the panels are freely executed, running animals. Almost all painted areas are roughly outlined by engraved lines.

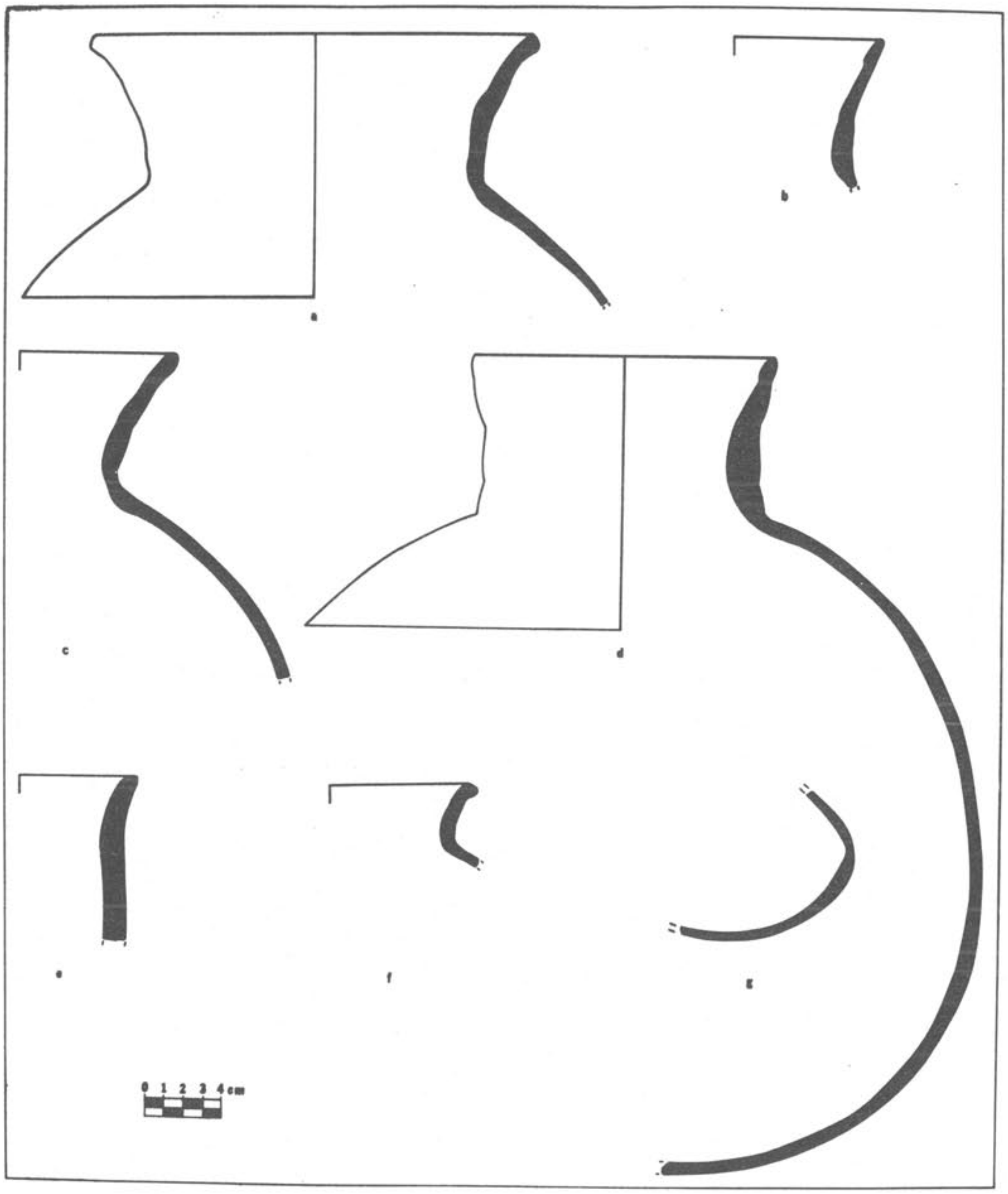


Fig. 7 Mojarra Orange-grey, variety unspecified: (a)-(g) Camaron 1, (a), (c), (d) cream slip exterior continuing over interior of neck, (f) cream slip exterior, (g) exterior cream slip, bottom fire-blackened.

Papaloapan Plain, variety unspecified

Paste is similar to Caliapan Resist and Armas Unpainted. Forms include bowls and jars, the latter sometimes with spouts which are apparently unbridged. This type, especially in Camaron 1, suffers from being a residual category for sherds of similar paste from which slip, paint, or resist decoration have disappeared. Thus it could include sherds from

Roja Red, Caliapan Resist, Acula Red-orange, and Armas Unpainted. Paste does not necessarily distinguish the sherds because each type has a range of temper and paste qualities which overlaps the others. Particularly in the Camaron 1 sub-phase soil conditions have made slip preservation of Acula Red-orange problematic. Nevertheless, it seems unlikely that Papaloapan Plain can be ascribed entirely to preservation factors because it continues when preservation of slips is not particularly in question.

Mojarra Orange-grey, variety unspecified (Fig. 6, 7)

This pottery contains little to no temper and is a possible antecedent to later fine orange pottery. In Camaron 1, Mojarra Orange-grey sherds are usually fired hard, usually orange in surface color, ranging to buff and rarely a mottled light grey. The dominant form is a large elliptical bodied olla with a relatively restricted neck. Low convex-sided bowls and composite silhouettes also occur, along with small squat-bodied jars. Some of the large ollas bear a fugitive thick cream slip. Rarely there are traces of painted designs over the slip; some examples show a thin orange slip or wash covering the white slip, with brown painted designs added. Rarely there is a black slip.

Prieto Grey-black, variety unspecified

Paste is like that of Mojarra Orange-grey, but is consistently fired to an even, grey to black color. In Camaron 1 Prieto Grey-black is a minor type, not encompassing the same repertoire of forms as Mojarra Orange-grey.

Escolleras Chalk, variety unspecified

Paste is untempered, distinctly laminated. Surfaces are usually fired grey. This is a minor pottery type, and the forms are not evident.

## Camaron 2

Camaron 2 is marked by clear changes in pottery, but they are generally of a minor kind. Patarata Coarse appears to have more use of pattern burnishing, but to some extent this may be due to better preservation of the surfaces. Caliapan Resist has an increase in the relative amount of the Orange Variety and a decline in the use of white and natural surfaces. In this type there is now a greater variety of shapes, with convex-sided bowls appearing more frequently. The Alvarado Variety still occurs in small amounts. Acula Red-orange increases in relative amount, particularly the Monochrome Variety. The Engraved Variety continues; a new variety appears, Acula Variety (very few sherds occurred in Camaron 1). A new variety of Armas Unpainted appears, Armas Variety.

Acula Red-orange, Acula Variety (Fig. 8)

This variety encompasses various kinds of decoration, such as red or black rim bands and incised lines on the red-orange slip. It also has some distinct forms. Exterior bulges on the lips of convex-sided to straight-sided bowls are common.

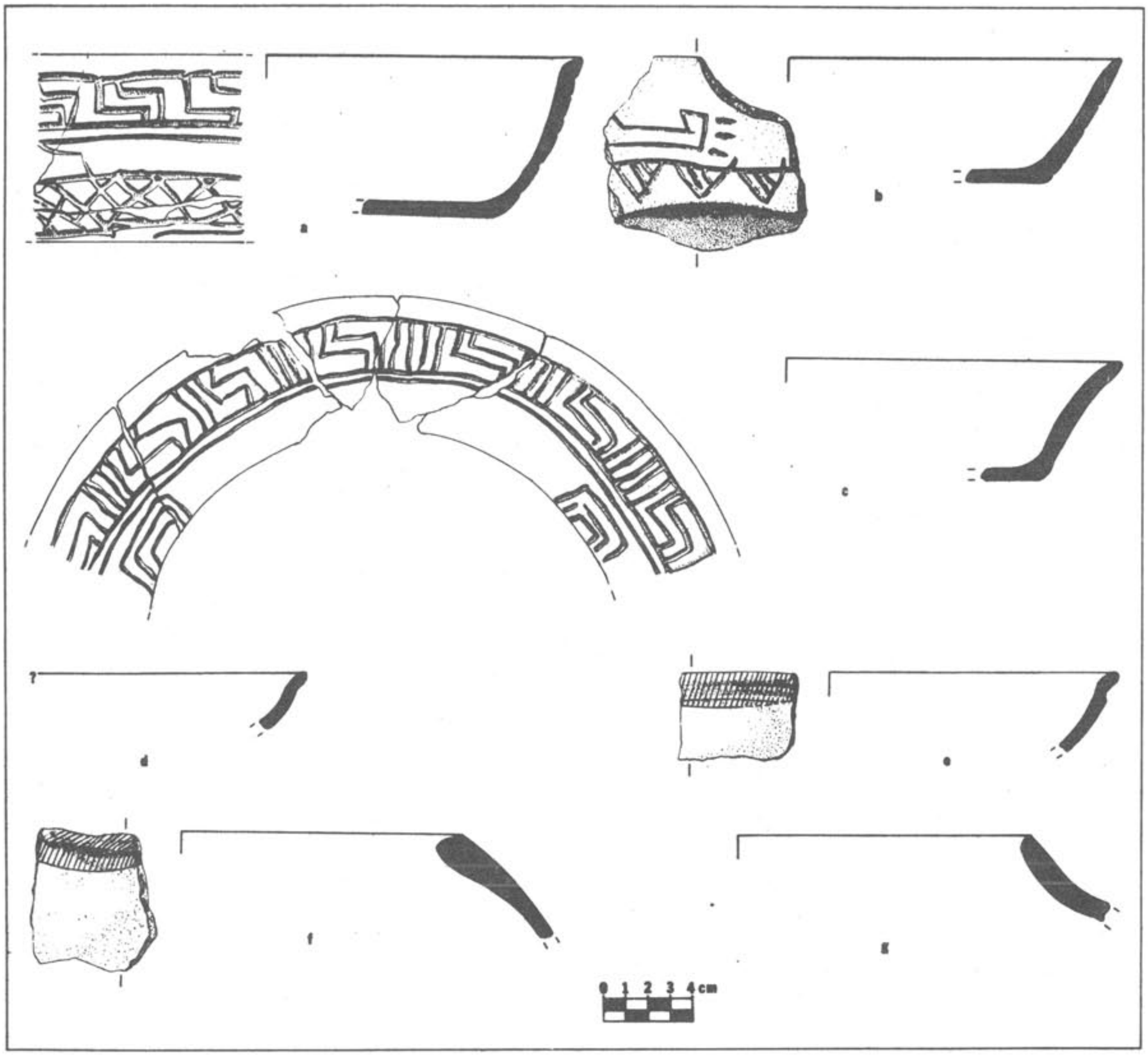


Fig. 8 Armas Unpainted, Armas Variety: (a), (b) Camaron 2, (a) lower band of incisions filled with red pigment, (b) paw or foot motif filled with red pigment, (c) Camaron 3, upper band of incisions filled with white pigment, lower band, with red pigment; Acula Red-orange, Acula Variety: (d), (e) Camaron 2, (d) red band on interior lip, (e) red band exterior and interior of lip (hachure); Patarata Coarse, variety unspecified: (f), (g) Limon, (f) red band on exterior (hachure).

Armas Unpainted, Armas Variety (Fig. 8)

Paste is like that of the Brownish-black Variety. Slightly convex-sided, flat-bottomed bowls are a main form, along with straight-sided bowls. In some cases there are hollow, rectangular, tripod supports. Brown tones and fire clouding are more characteristic of the Armas Variety than of the Brownish-black Variety. The Armas Variety is distinguished by geometric, rectilinear designs incised on the exterior, occasionally with the incised areas filled with red or white pigment. Accompanying the appearance of the Armas Variety, there is an impoverishment of the Brownish-black Variety, particularly in the repertoire of shapes and decorations. Low, straight to outflaring-sided and convex sided bowls are the main forms. Orange and brown fire clouds are slightly more frequent.

### Camaron 3

Caliapan Resist pottery is much diminished in frequency; Alvarado Variety is not represented in the sample, nor is the Red Variety. Armas Unpainted, Armas Variety, becomes almost as frequent as the Brownish-black Variety. Roja Red and Acula Red-orange continue into Camaron 3. The Engraved Variety of the latter becomes more variable in designs, but the paneled designs with running animals continue; the Monochrome Variety is much more frequent than the other two. In Mojarra Orange-grey, the previously predominant olla form drops markedly in frequency and vessel walls become thinner; some forms appear which are prominent in the Limon phase---thin, convex-sided bowls with thin, tapering lips, and others with out-turned, flattened lips. Prieto Grey-black becomes more frequent in Camaron 3, also exhibiting thinner walls. Escolleras Chalk and Papaloapan Plain continue to be represented, as is Patarata Coarse.

### Limon

Definition of Limon pottery suffers from two problems, (1) admixture with earlier deposits, and (2) a rather small sample of small sherds. Earlier I pointed out that Limon material is not segregated by soil strata and occurs principally in an unmarked sherd concentration near the top of the site; in the upper part of the site, sherds are smaller and more worn. Therefore, it is difficult to make categorical statements about the Limon phase. Provisionally, Limon is characterized principally by change in Mojarra Orange-grey and Prieto Grey-black, with some changes in Patarata Coarse.

Mojarra Orange-grey and Prieto Grey-black increase in relative frequency, especially the latter. Thinner vessel walls are characteristic of both. In Mojarra Orange-grey sharply inturned, bolstered rims appear on convex bowls; convex and straight-sided bowls with thin, tapering lips are more common; straight-sided bowls with sharply out-turned, flattened lips are frequent (Fig. 9). The large olla form scarcely appears. Many Mojarra Orange-grey sherds have a thick cream slip with fragments of painted designs in red or black. In Prieto Grey-black straight-sided bowls with sharply out-turned, flattened lips occur, as in Mojarra Orange-grey, but generally with smaller lips, and thin, tapering lips are characteristic of convex-sided bowls. Both of these pottery types have small, solid, nubbin supports (more diminutive than any Camaron 1 examples in Armas Unpainted pottery). In both types paste is softer and more chalky than previously. In Acula Red-orange, finer paste, slightly thinner vessel walls, and tapering lips on convex-sided bowls become more characteristic. In Patarata Coarse some new forms appear, pattern burnishing is scarce, and paste tends to be fired to lighter colors (Fig. 8). Other earlier types are represented, but so infrequent that they might be due to admixture.

### Comment on Vessel Functions

Patarata Coarse is primarily a type devoted to food preparation. Many of the large tecomate and olla forms have a film of whitish lime on the interior, undoubtedly due to their use in preparing corn soaked in lime. The exteriors of these vessels often are blackened, presumably from sitting over open fires. They also may have served for food storage in view of their large size.

The large ollas of Mojarra Orange-grey could also have functioned for food storage. They do not seem to have been used in cooking. Their compact paste and rather restricted necks would have made them useful as dry season water jugs.

Other forms of Mojarra Orange-grey and other types appear to have been used mainly for serving food or perhaps in some cases for food storage. The vessels are generally lower, smaller, thinner, and seldom blackened on their exteriors. More care was spent on finishing the vessel surfaces and in decorating them.

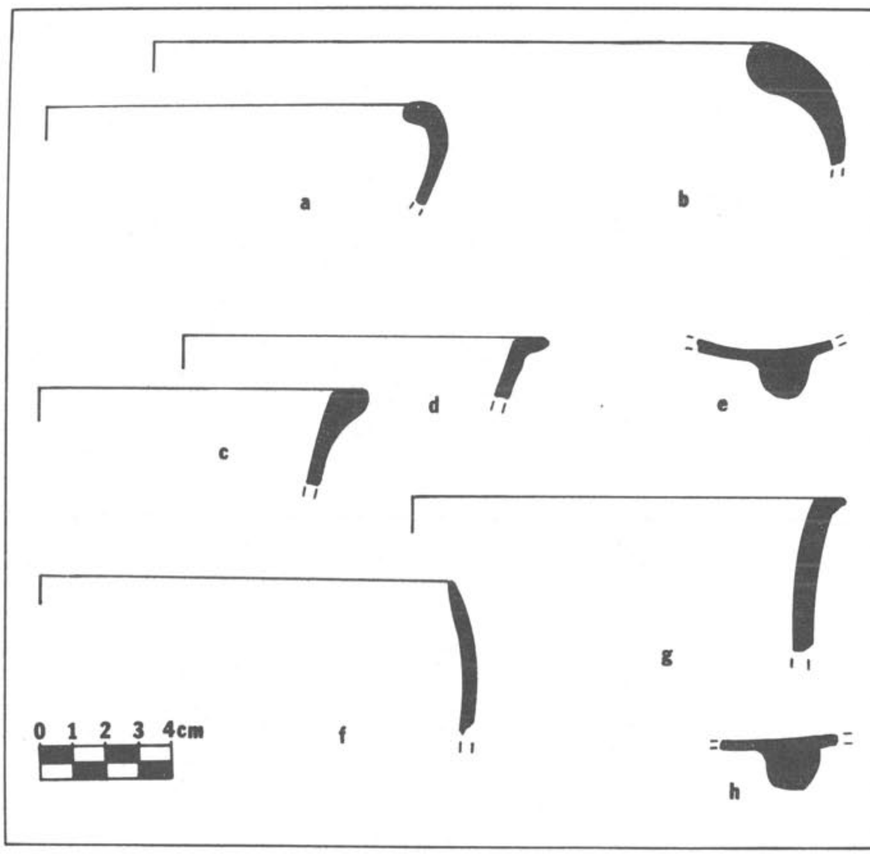



Fig. 9 Mojarra Orange-Grey, variety unspecified: (a)-(e) Limon, exterior and interior cream slip; Prieto Grey-black, variety unspecified: (f)-(h) Limon.

## Discussion of Pottery Relationships

The pottery types and sequence outlined for Patarata are probably representative of the Lower Papaloapan Basin and of the sites of Cerro de las

Mesas and Tres Zapotes nearby. However, I have not adopted previously published types and phases. Insofar as I can determine, some Patarata pottery appears at Cerro de las Mesas and Tres Zapotes, but the stratigraphy, relative chronology, and ceramic descriptions at Patarata are on a finer scale. The following brief comparisons will consider other sites and areas in the following order: Tres Zapotes, Cerro de las Mesas, Centrel Veracruz, El Tajin, and Southern Veracruz. A summary of phase correlations is presented in Fig. 9.

Ceramics at Tres Zapotes have been analyzed by both Drucker (1943b) and Weiant (1943). Resemblances to Patarata are most evident in the Camaron phase, particularly with respect to Weiant's material. Both Weiant's and Drucker's Classic phases require cautious evaluation because they seem to contain some admixture with older and younger material (cf. Coe 1965a, who reworked Southern Veracruz chronologies). Weiant's Upper Tres Zapotes has the most resemblance to the Camaron phase, but some Middle B material is also similar. An enumeration of Camaron correspondences with Upper Tres Zapotes follows. Dubonnet Red and Orange (Weiant 1943:30) seems to correspond closely to Acula Red-orange, Engraved Variety. The Yellow and Pink wares (Weiant 1943:24) resemble Mojarra Orange-grey in paste; however, some aspects of form (short conical supports, possibly everted rims) are more consonant with the Limon phase. Stick-polished Ware (Weiant 1943: 55-56, a decorative variation of Rough Yellow and/or Rust Red Rough Ware), may be the same as some Patarata Coarse, Red and Plain Varieties. Finally, Black Ware (Weiant 1943:27) probably corresponds to Armas Unpainted, particularly the Armas Variety, including traits such as rectilinear incised decorations, sometimes filled with red pigment, and straight to outflaring-sided, flat-bottomed bowls with rectangular tripod feet. However, with the exception of the tripod supports, these traits also occur earlier in Middle B (Weiant 1943:21). The fact that some Middle B figurines are Classic types (Teotihuacan and Xipe types, Weiant 1943:123), confirms the presence of some later admixture in what is otherwise predominantly a Late Preclassic assemblage. Finally, another pottery trait may be shared between Tres Zapotes and the Camaron phase--negative resist decoration. Drucker (1943b: 36) states "Lost-color ware, known from the 1939 excavations unfortunately did not occur (in a recognizable state of preservation at least) in the 1940 stratitests." Weiant, however, makes no mention of it in his report on the 1939 work. One can speculate that the Lost-color ware corresponds to Caliapan Resist at Patarata.

In Drucker's (1943b) report on Tres Zapotes there is confirmation of the presence of Camaron phase pottery, which can be seen in Weiant's work. The chief resemblances between Drucker's pottery and the Camaron and Limon phases involve his Upper and Middle phases. Black Ware and Coarse Paste Brown Ware (Drucker 1943b:48, 49, 53, 60, 64, 69) may correspond in part to Armas Unpainted. Some forms are shared, such as flat-based, straight to outflaring-sided bowls; these bowls sometimes have rectangular tripod feet, basal or lip ridges, and incised designs with red pigment rubbed in (the pigment corresponding to the Armas Variety only, the ridges, to the Brownish-black Variety only). However, many forms in the Black and Brown Wares are not shared with Armas Unpainted; moreover, Drucker (1943b:57-58) lumps red, white, and bichrome slipped and painted pottery under these categories. Drucker's (1943b:36-37, 40, 45, 46) Polychrome Ware, although also a mixed category in which not all sherds are polychrome or have the

| | TRES ZAPOTES | | | PATARATA | CERRO DE LAS MESAS | | CENT. VERACRUZ | EL TAJIN | | UAXACTUN | VALLEY OF MEXICO |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | COE 1965a | WEIANT 1943 | DRUCKER 1943b | | DRUCKER 1943a | COE 1965a | MEDELLIN 1960a | DU SOLIER 1945 | KROTSER 1970 | SMITH 1955 | MÜLLER 1966; PARSONS 1968; TOLSTOY & PARADIS 1970; COOK DE L. 1971 |
| 1200 AD – 900 AD | TRES ZAPOTES V | UPPER | SONCAUTLA COMPLEX | | SOME UPPER II ? | | TOLTEC HORIZON OR TOTONACO RENACENTISTA | | | | AZTEC I, MAZAPAN |
| 900 AD – 600 AD | TRES ZAPOTES IV | | UPPER SOME MIDDLE ? | ? ▲ LIMON ▼ ? | UPPER I | CERRO DE LAS MESAS III | REMOJADAS UPPER II | LATE MIDDLE EARLY | LATE CLASSIC MIDDLE CLASSIC EARLY CLASSIC | TEPEU | COYOTLATELCO PROTOCOYOTLATELCO TEOTIHUACAN IV |
| 600 AD – 300 AD | TRES ZAPOTES III | UPPER, SOME MIDDLE B | UPPER AND MIDDLE | CAMARON 3 CAMARON 2 CAMARON 1 | UPPER I AND LOWER II | CERRO DE LAS MESAS II | REMOJADAS UPPER I, II | | | TZAKOL | TEOTIHUACAN III |
| 300 AD – 0 | TRES ZAPOTES II | MIDDLE B | MIDDLE AND LOWER | | LOWER II AND LOWER I | CERRO DE LAS MESAS I | ? ↑ REMOJADAS LOWER I ↓ ? | | | MATZANEL | TEOTIHUACAN II TEOTIHUACAN I |
| 0 – 300 BC | TRES ZAPOTES I | | | | | | | | | CHICANEL | TICOMAN |
| 300 BC – 600 BC | "OLMEC" PHASE | MIDDLE A | LOWER | | LOWER I | | | | | MAMON | ZACATENCO |

Fig. 10. Selected phase correlations.

same slips, etc., probably overlaps Mojarra Orange-grey and Prieto Grey-black. The paste description is very similar. Forms include a greater variety than at Patarata; some forms, such as the ollas (Drucker 1943b:41, fig. 16d,f; 44, fig. 19a) correspond to Camaron; others (Drucker 1943b:39, fig. 14a, c ,h; 40, fig. 15b,d; 42 fig. 17j) are like Limon forms.

At the site of Cerro de las Mesas, Camaron pottery seems to be represented in Drucker's (1943a) collections, again mixed with earlier and later material. Red-on-Orange Incised ware (Drucker 1943a:54) probably corresponds to Acula Red-orange, Engraved Variety; however, at Cerro de las Mesas common motifs are circles and spirals. Upper I and Lower II are the Cerro de las Mesas phases with these sherds. Drucker's (1943a:27) Untempered ware probably corresponds in part to Mojarra Orange-grey and Prieto Grey-black. Untempered ware has the same chronological distribution as Red-on-Orange Incised. In addition to these two pottery types, Black ware and Brown ware may include sherds like Armas Unpainted, Brownish-black and Armas Varieties. Because of its variation in firing, the Armas Variety could fall into Drucker's Brown or Black ware. Both the latter categories share some shapes with the corresponding Patarata pottery; in addition, both have geometric incising filled with colored pigment. However, Drucker's types, particularly the Black ware, run the gamut from at least Protoclassic to Postclassic pottery, judging from diagnostic forms. Each ranges from Lower I to Upper I on his distribution charts.

Central Veracruz also poses problems for pottery correlations with Patarata. Medellin (1960a:176-202) has conducted excavations at a number of sites in Central Veracruz. Remojadas is a key site for his chronologies (Medellin 1960a:177). Although the sequence outlined for Central Veracruz (Medellin 1960a:11-175) seems to be characteristic of most sites, it is difficult to ascertain which types occur in what quantities at a particular site or details about the types. I will treat Central Veracruz as having a single sequence (the only cited exception possibly being the Tierra Blanca area, Medellin 1960a:195). In Central Veracruz Remojadas Upper I probably temporally overlaps the Camaron phase along with some of Remojadas Upper II. However, the validity of the Patarata phases and sub-phases in Central Veracruz is open to question because pottery similarities seem limited. The main correspondence would appear to be between Medellin's (1960a:61-64) temperless orange (which apparently includes temperless grey as well) and Mojarra Orange-grey and Prieto Grey-black because of the similar paste and color descriptions. Confirming this is the fact that Medellin links this type to Weiant's Yellow and Pink Ware and to Drucker's Untempered ware. If this type is indeed the same or quite similar to the Patarata types, the sharing is mainly limited to the Rio Blanco-Papaloapan area of Central Veracruz, that is, its southern edge. Medellin (1960a:62) states that temperless orange is only important in this southern area. Other pottery types prominent in Central Veracruz, e.g., Red-on-white (Medellin 1960a: 55-58), are not characteristic of the Patarata sequence. In view of Medellin's (1960a:118, 182) comment that the negative technique occurs in Low Remojadas along with Teotihuacan-like supports, the transition between Lower and Upper Remojadas will need further research. The first Camaron sub-phase and perhaps the second may fall into a transitional period. In sum, available data indicate fewer Classic Period similarities between most of Central Veracruz and Patarata than is true for either Cerro de las Mesas or Tres Zapotes.

In Northern Veracruz ceramic information from El Tajin concerns mainly the Late Classic rather than the Early Classic (DuSolier 1945; Krotser 1970; Krotser and Krotser 1973). DuSolier (1945:148-149, 182-183) remarks on the importance of black pottery throughout the sequence; some of its forms are generally similar to Armas Unpainted, Brownish-black Variety. A less frequent type, Ceramica bayo-negra (DuSolier 1945:151-152), often received negative resist decoration. Undulating lines and vertical or horizontal parallel lines are decorative techniques shared with Caliapan Resist. One illustrated vessel (DuSolier 1945:lamina IX, 2) is markedly similar to Patarata specimens except that the base exterior is decorated.

Material from the Krotsers' (1973) excavations pertains mainly to the Late Classic. Scattered traits of form and decoration have resemblances to Patarata, such as negative decoration in several types, orange slips over white slips (in naranja sobre laca grabado), and tecomates (which seem to be early, perhaps pertaining to the Early Classic, Krotser and Krotser 1973: 202). However, these shared traits do not argue for close similarity, and the El Tajin area of Northern Veracruz shows closer resemblances to Central Veracruz.

I will confine my discussion of eastern pottery relationships to the immediately neighboring Tuxtlas area, where Matacapan raises the question of Teotihuacan relationships. San Lorenzo Tenochtitlan farther east lacks a Classic occupation (Coe 1970). Teotihuacan ceramic influence appears at El Tajin, in Central Veracruz, at Cerro de las Mesas, Tres Zapotes, and, in an attenuated form, at Patarata. Nowhere, however, does it show up as clearly as at the site of Matacapan in the Tuxtla Mountains (Valenzuela 1945a, b). Architecture, pottery, figurines, and other artifacts argue for a strong Teotihuacan presence there, perhaps analogous to the Kaminaljuyu situation (Coe 1965a:704-705). Therefore, we know that in the Early Classic Teotihuacanos had active contacts near Patarata. Minimally Teotihuacanos at Matacapan and/or Teotihuacan had contacts with Cerro de las Mesas and Tres Zapotes sufficient to prompt imitations of vessel forms such as tripod cylindrical vases with rectangular supports. Actually, some of these vessels and other Teotihuacanoid artifacts may have been imported.

Even if Teotihuacan in some sense controlled the two Veracruz sites, we might not find more ceramic evidence than Drucker (1943a, b) and Weiant (1943) note. There is no evidence, ceramic or otherwise, of any major displacement of Central and Southern Gulf Coast people in the Early Classic except possibly at Matacapan. Therefore continuities in local ceramic traditions would be expected. However, on the basis of sculptural evidence (see Wood Artifacts), it is unlikely that Cerro de las Mesas was directly controlled by Teotihuacan in the Early Classic. This leaves open the question of alliances or trade.

In keeping with the indications of continuity in the Papaloapan area, Patarata pottery is predominantly local. However, I interpret the Camaron phase low bowls with hollow, rectangular, tripod supports, sometimes perforated, as possibly reflecting a degree of Teotihuacan stylistic influence. Cylinder tripods were not recovered at Patarata, but the rather ubiquitous, local, flat-bottomed bowls were occasionally made with quadrangular supports in Armas Unpainted, Roja Red, and Caliapan Resist. This seems to be a local reinterpretation of a predominantly Teotihuacan form.

The chronology of Teotihuacan relationships is perplexing. Medellin (1960a: 118, 182) remarks on Teotihuacan traits in Lower Remojadas. Pendergast (1971) discusses Teotihuacan influence at the Maya site of Altun Ha in Belize as early as the Miccaotli phase. We must therefore grant the possibility that some of the "foreign" or long-distance activity of Teotihuacanos extends over several hundred years, including all of the Early Classic. As yet we have scant means of discriminating the timing of this activity and changes in it.

## Pottery Summary

The Patarata pottery sequence, although incompletely analyzed, does not suggest any wholesale disruption or replacement of the ceramic tradition. Black, red, orange, red on orange, negative resist decorated, fine paste grey, fine paste orange, and coarse, heavy utilitarian pottery are the principal components of the ceramic assemblages. From a functional point of view, the pottery appears to be predominantly domestic in nature, used for cooking, storing, and serving. Lime films on the interiors of some utilitarian vessels suggest the preparation of corn. Stylistic affiliations of the ceramic phases are strongest with the nearby excavated sites of Cerro de las Mesas and Tres Zapotes, both located in the Lower Papaloapan drainage, but outside the estuarine zone. Westward, Central Veracruz manifests distinctive ceramic traits, such as red on white pottery, although at localities near the Papaloapan, fine paste pottery is a shared trait with Patarata. Stylistic resemblances are therefore concentrated in the Lower Papaloapan drainage, but are not limited to the estuarine zone itself.

# FIGURINES

Figurines are all fragmentary, and a typology cannot be based on whole figurines. Therefore I have grouped them first according to the area of the body represented. Next they have been subdivided according to their paste. I have made paste a basic part of the classification in order (1) to make the descriptions intelligible in terms of the pottery classification, and (2) because pastes vary and include fine orange and grey paste, which is of particular interest for its temporal and spatial distribution. Paste has likewise been noted for other ceramic artifacts. Finally, formal types categorize the fragments into different groups. Number of specimens is placed to the right of each heading.

## Figurine Faces 16

### Papaloapan Variety 14

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are well smoothed but not polished.

#### Face 1 2 (Fig. 11,13)

*Form.* Eyes are sub-rectangular, trough-like incisions with clay ridges ringing the troughs. The more intact face has prominent brow ridges. On the latter figurine the mouth is opened and consists of a slightly down-turning, trough-like incision. The lips curl away from the mouth in an encircling ridge. Only upper teeth appear, and apparently teeth other than the front incisors have been filed. The two figurines differ in headdress and head form. One has a circular headdress and probably was not a closed hollow form. The other has a projecting headdress and was hollow, closed on the back by a flat, featureless piece of clay. Both were meant to be seen from the front only.

*Decoration.* Both bear asphalt and resin paint on their mouths, on parts of their headdresses, and in one case on the cheek scar appliques. The feathers (?) of the dircular headdress bear traces of thick white paint.

*Chronology.* Camaron 1 and 2 (Table 5).

*Comment.* Both figurines were mold-made. Details on the circular headdress seem to have been incised by hand. The figurines may represent Tlazolteotl (M.D. Coe, personal communication).

*Comparative.* Mold-made figurines closely resembling these have not been published. The use of asphalt and resin paint for decoration is common on both Preclassic and Classic Veracruz figurines (e.g. Medellin 1960a:37, lam. 20; Ethnic Arts Council of Los Angeles 1971:numbers 2-12, 34, 43, 47, 112). Possible scar appliques, of a different form, occur on other Classic Veracruz figurines (Ethnic Arts Council of Los Angeles 1971: numbers 67, 68; Paz and Medellin 1962:numbers 8, 20).

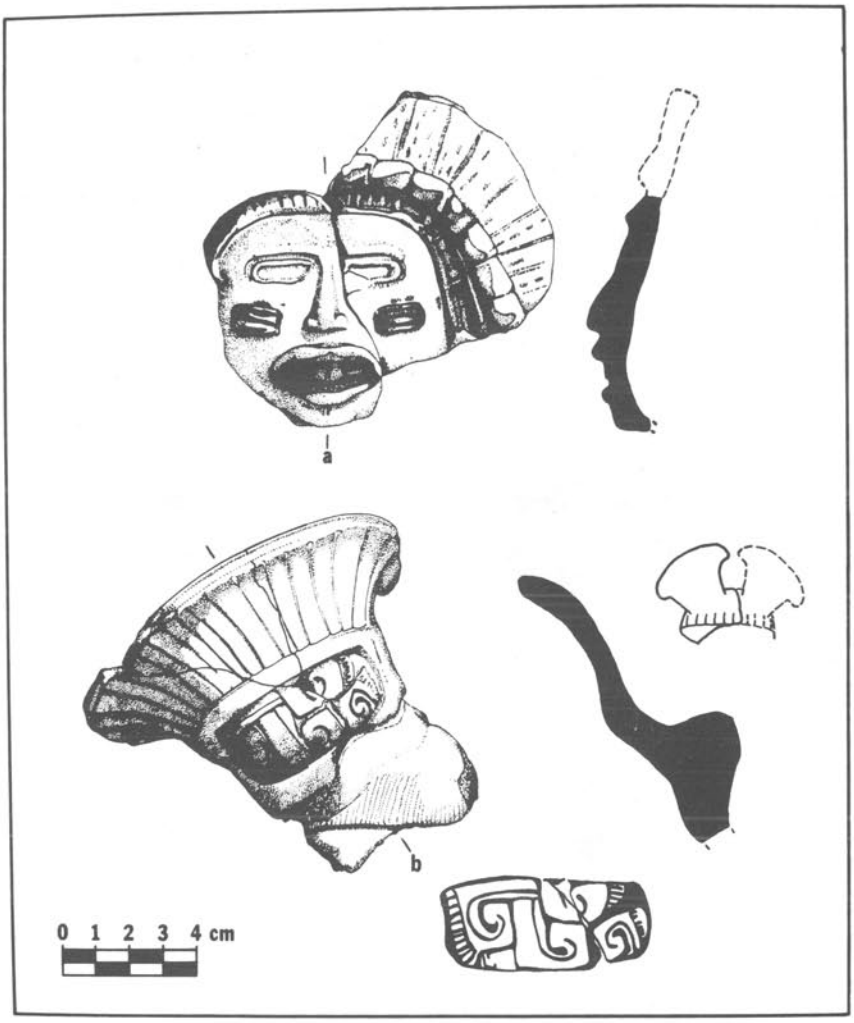



Fig. 11 Figurine Face, Papaloapan Variety, Face 1: (a) Camaron 1, asphalt and resin paint; Figurine Head, Papaloapan Variety, Head 2, Variable Bifurcate Headdress: (b) Camaron 1. (a) and (b) lighted from lower right.

Face 2 5 (Fig. 12)

*Form.* Only the lower parts of the faces remain. They are uniformly smaller than Face 1. Most mouths are straight to down-turning, but one example has an oval incision. Except for the oval mouth, which has no teeth indicated, the mouths have an undifferentiated bar representing the upper teeth. One example shows part of the eyes, indicated by shallow depressions, either oval or sub-rectangular, lacking any encircling clay ridge. This more complete face also has a circular ear plug and part of a necklace ridge.

*Decoration.* Three have traces of thick white paint.

*Chronology.* Camaron 2 and 3 (Table 5).

*Comment*. The faces are mold-made.

*Comparative*. Among published materials from Veracruz, the illustrations most resembling Face 2 are those from Cerro de las Mesas which Drucker (1943a: 65; plate 42c, d, e, h, i, k, m) classifies as Type VIII-B and describes as small variants of the classic Laughing Face figurines, an appellation which seems dubious. Among his illustrated specimens, the cited examples show a resemblance to Face 2 in the treatment of the mouth, and "e" shows resemblance in the eye as well. Scale is comparable to the Patarata examples. No paste description is provided by Drucker. The majority of these Cerro de las Mesas figurines fall into Drucker's Lower II phase.

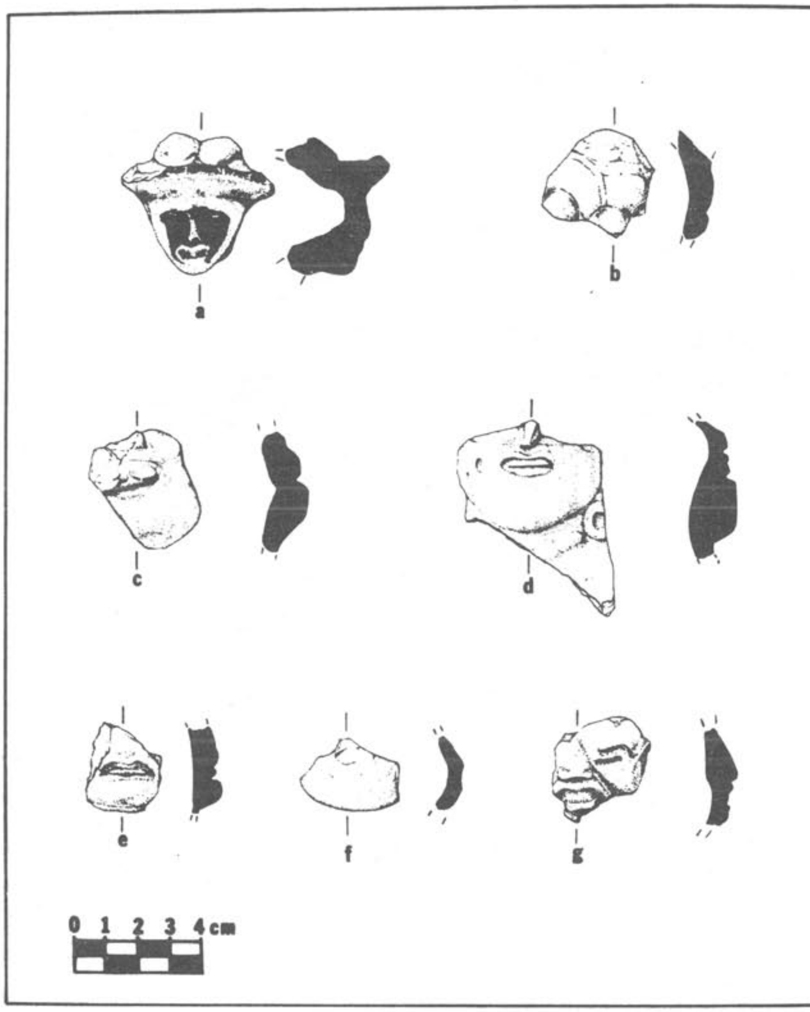



Fig. 12 Figurine Faces, Papaloapan Variety, Face 7: (a) Camaron 2, asphalt and resin paint; Face 5, Grotesque Face: (b) Camaron 1; Face 2: (c)-(f) Camaron 2; Face 8: (g) Camaron 3.

<u>Face 3, Old Man</u> 2 (Fig. 13)

*Form*. Both examples apparently had hollow heads, but differed in size. The larger, more complete specimen has a three-part applique beard (one part is missing). The other has only an applique goatee. Both had protruding tongues, but the tongue is broken off from the smaller head. Wrinkles are indicated by stylized concentric lines.

*Decoration.* The larger specimen has traces of thick white paint; the smaller one has traces of red pigment.

*Chronology.* Camaron 1 and 2 (Table 5).

*Comment.* Incisions on the beard appliques and the appliques themselves were hand made and added to a mold-made face. The figurines may represent Huehueteotl (M. D. Coe, personal communication).

*Comparative.* Wrinkled faces, often with sunken cheeks, occur widely among Classic Period figurines in Veracruz (Ethnic Arts Council of Los Angeles 1971:numbers 43-47, 79; Drucker 1943a:plate 8e, plate 45d; Medellin 1960a:93, lam. 54; Weiant 1943:plate 39, 4, 6, 11; plate 40, 2; Drucker 1943b:plate 56a, e, f; plate 58b; plate 60a, d, e; plate 61a; plate 62f; Spratling 1960:29; number 64; Weyerstall 1932:plate IX, d); Edward H. Merrin gallery 1970:42). In some instances the old man carries a brazier on his head (Ethnic Arts Council of Los Angeles 1971:numbers 43, 46; Drucker 1943a:plate 8e). Two of the brazier figures also have goatees and a protruding tongue, and the Patarata examples closely resemble them facially. The Patarata faces are much smaller than Drucker's Cerro de las Mesas Type X, large free-modeled idols, which include the old man faces; likewise they are generally smaller than Drucker's Tres Zapotes examples and most of those illustrated by the Ethnic Arts Council of Los Angeles. According to Drucker (1943a:66; 1943b:83) the Monumental Ware Idols at Cerro de las Mesas and the Lirios figurines, which include many of the old faces at Tres Zapotes, are hand modeled, in contrast to the Patarata figurines. At Cerro de las Mesas Drucker's Monumental Ware Idols occur in Lower II through Upper II deposits. Weiant's figurines are from his Upper Tres Zapotes phase. Drucker's (1943b:109) Tres Zapotes examples seem to fall into his Upper Tres Zapotes. Old men seated under braziers first appear in the Central Mexican highlands at Cuicuilco (Cummings 1923:210) and continue on into the Classic Period. Weiant (1943:103) has interpreted representations of an old man at Tres Zapotes as "the Old God in full-fledged Teotihuacan style," a somewhat precipitous statement in view of the diversity among the Veracruz old man and old woman figurines and the highly variable Gulf Coast figurine tradition.

<u>Face 4, Long Face</u> 1 (Fig. 14)

*Form.* The mouth is open, with prominent lips. A short hair fringe and cap are shown. A round applique forms the ear plug and a strip forms the ear. A flat, lateral headdress flange bearing an incised design composed of punctations and lines protrudes. The head was apparently hollow, but the headdress was a solid projection, meant to be seen only from the front.

*Surface.* Traces of thick white paint and reddish-orange paint remain.

*Chronology.* Camaron 2 (Table 5).

*Comment*. The head and headdress were mold-made. The headdress was separately formed and then attached to the head. Hand modeled appliques were added for the ear and ear plug.

*Comparative*. Closely similar figurines from Veracruz have not been published.

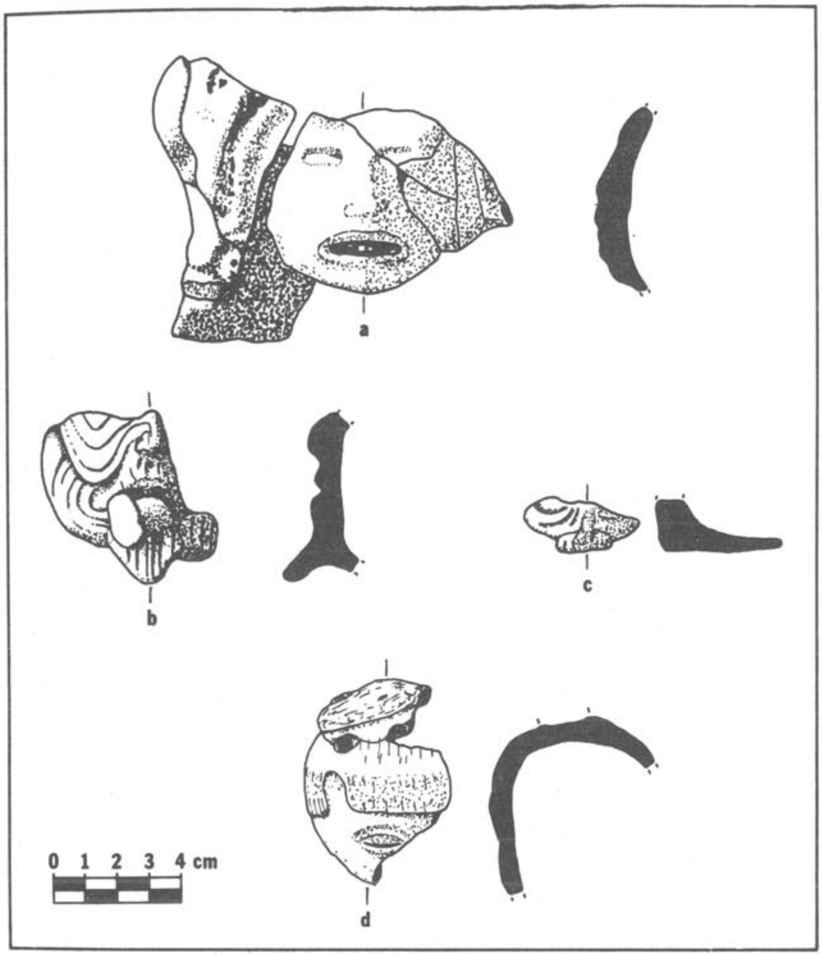



Fig. 13 Figurine Faces, Papaloapan Variety, Face 1: (a) Camaron 2, asphalt and resin paint; Face 3, Old Man: (b) Camaron 1, traces of white paint, (c) Camaron 2, traces of red pigment; Face 6, Closed Eye, Realistic: (d) Camaron 1.

Face 5, Grotesque Face 1 (Fig. 12)

*Form*. Only the forehead and eyes remain. The eye is convex and rounded. The nose, or what remains of it, is stubby and rounded. Faint, incised lines arch above the eyes. The head may have been hollow. On the top is a mark where an applique may have rested.

*Decoration*. The surface is plain, unslipped.

*Chronology*. Camaron 1 (Table 5).

*Comment.* The face was mold-made.

*Comparative.* No published grotesque or animal faces from Veracruz closely resemble this fragment.

Face 6, Closed Eye, Realistic 1 (Fig. 13)

*Form.* The head is hollow. The closed eye bulges, with an incised line between the lids. Closely cropped hair or a cap is shown. Two holes on top of the head were possibly to facilitate firing or else for the insertion of plumage or other headdress decoration (cf. Medellin and Peterson 1954:163). To one side, farther back on the head, is the mark where an oval applique rested, possibly part of a bifurcate headdress.

*Decoration.* The surface is plain, unslipped.

*Chronology.* Camaron 1 (Table 5).

*Comment.* The head is mold-made, but the incised lines on the hair (or cap) apparently were added by hand.

*Comparative.* Face 6 does not closely resemble published figurines, although there are other examples of closed eye figurines. For example, Drucker (1943a:plate 33) pictures "Xipe" figurines from Cerro de las Mesas similar to Face 6 in dimensions, but not otherwise. Drucker's examples range from Lower II to Upper II in time.

Face 7 1 (Fig. 12)

*Form.* The head is small and probably was partially open on the back. Eyes are shown with longitudinal incisions that delimit a raised eyeball strip. The mouth area is slightly raised. Two round punctations at the corners create a bar representing the front incisors. A brimmed hat is shown with two round appliques on top.

*Decoration.* Asphalt and resin paint covers the face and headdress brim. The brim also has shallow incised lines. Round punctations decorate the hat appliques.

*Chronology.* Camaron 3 (Table 5).

*Comment.* The face is mold-made, but the hat brim and round hat ornaments are hand modeled appliques.

*Comparative.* Face 7 does not closely resemble other published Veracruz figurines.

Face 8 1 (Fig. 12)

*Form.* The nose is broad and flat. The eye is shown by two incised lines that leave a raised eyeball ridge. An incised line runs from the nose to the mouth, which is open, with the lips drawn back forming raised ridges. Two central upper incisors are shown.

*Decoration.* The surface is plain, unslipped.

*Chronology.* Camaron 3 (Table 5).

*Comment.* The fragment is mold-made.

*Comparative.* No published examples compare closely.

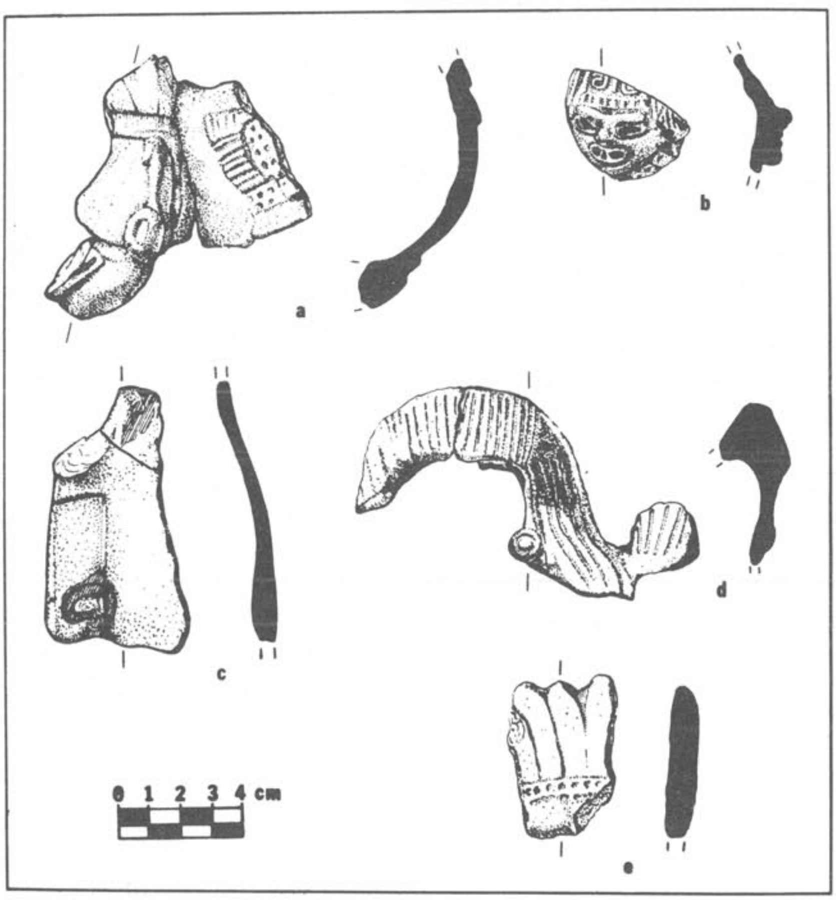



Fig. 14 Figurine Face, Papaloapan Variety, Face 4, Long Face: (a) Camaron 2, traces of white and red-orange paint; Figurine Face, Prieto Variety, Face 1, Punctate Smiling Face: (b) Limon, traces of red paint; Figurine Head, Papaloapan Variety, Head 1: (c) Camaron 1, brown on white paint (brown in hachure); Figurine Head, Mojarra Orange-grey Variety, Head 1: (d) Camaron 2, traces of white paint; Figurine Headdress, Papaloapan Variety, Plume Form: (e) shell deposit.

Acula Variety 1

*Material.* Paste is like Acula Red-orange, Monochrome Variety.

*Surface.* The exterior is well smoothed and even, not polished.

Face 1 1 (Fig. 15)

*Form.* The face is relatively small. Eyes are shallow, sub-rectangular depressions. The open mouth is formed by a shallow depression encircled by lip ridges.

*Decoration.* Asphalt and resin paint was carelessly daubed over the eyes. Traces of Acula Red-orange, Monochrome Variety, slip remain. The mouth interior was painted red.

*Chronology.* Camaron 2 (Table 5).

*Comment.* The face is mold-made.

*Comparative.* This face resembles a figurine from Cerro de las Mesas (Drucker 1943a:plate 42g) which Drucker includes in his Type VIII-B, small variants of the classic Laughing Face figurines. The Cerro de las Mesas figurine has a similar downturned mouth and is of comparable size. Type VIII-B ranges in time from Drucker's Lower II to Upper I. Similar figurines are illustrated by Medellin (1960a:178, lam. 108; 193, lam. 111) from Remojadas and Los Cerros. Both have downturned mouths. The Remojadas example has a similar treatment of the eye, but the other has a more elaborate eye. According to Medellin both date to the Early Classic or Remojadas Superior I. Spratling (1960:11, 12) illustrates a head and mouths.

Prieto Variety 1

*Material.* The paste is like that of Prieto Grey-black, variety unspecified.

*Surface.* The exterior surface is well-smoothed but not polished.

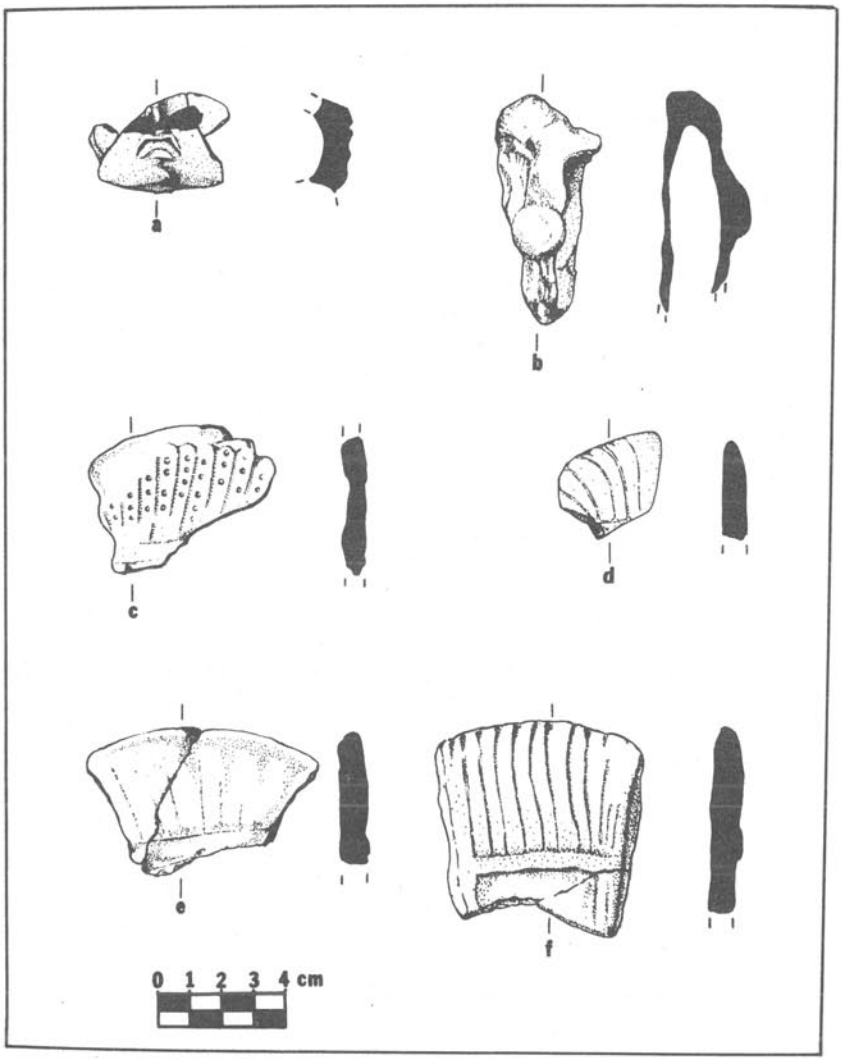



Fig. 15 Figurine Face, Acula Variety, Face 1: (a) Camaron 2, asphalt and resin paint on red-orange slip, possible red paint over mouth; Figurine Head, Tanare White Variety, Head 1: (b) Camaron 1; Figurine Headdress, Papaloapan Variety, Plume Form: (c) and (e) Camaron 1, (d) Camaron 2, traces of white paint, (f) Camaron 3, traces of white paint.

Face 1, Punctate Smiling Face 1 (Fig. 14)

*Form*. The small face has a prominent, bulbous nose, with two punctations for nostrils. Eyes slant upward, with a surrounding incised depression. Within the incised lines the eye is marked successively by an encircling ridge, an internal depression, and a pupil punctation that perforates the face. The mouth, too, has an encircling incised depression, lip ridges, and three deep punctations which leave two central ridges representing incisors. The ear is shown with a punctation. Headdress decorations, hair, and necklace are in shallow relief.

*Decoration.* Traces of red paint remain on the surface.

*Chronology.* Limon (Table 5).

*Comment.* The face was mold-made with punctations added by hand.

*Comparative.* This figurine belongs to the distinctive Upper Papaloapan Similing Figurines, a category which McBride (1971:29) has identified as a rare type limited to the Papaloapan area in the Late Classic. Published occurrences are few (Ethnic Arts Council of Los Angeles 1971: number 65; Batres 1908:lam. 50; Paz and Medellin 1962:plate 3). The Patarata specimen suggests that although this type may be restricted to the Papaloapan area, it is not limited to the Upper Papaloapan.

Figurine Heads 10

<u>Papaloapan Variety</u> 8

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

<u>Head 1</u> 1 (Fig. 14)

*Form.* The ear is a straight flange ending in a scroll at the ear lobe. The cheek contour suggests a Papaloapan Variety, Face 4, Long Face.

*Decoration.* The figurine was slipped white. Brown paint emphasizes the line of the ear lobe scroll. A brown stripe of paint follows the edge of the forehead.

*Chronology.* Camaron 1 (Table 5).

*Comment.* The head was mold-made.

*Comparative.* There is little remaining of Head 1 for comparison. The appliqued, long, flange-like ear is not unusual for Classic Period Veracruz figurines (Ethnic Arts Council of Los Angeles 1971:e.g., numbers 29, 68, 109). Published examples do not reveal lobes shown with a scroll; rather, some kind of ear plug ordinarily appears.

<u>Head 2, Variable Bifurcate Headdress</u> 5 (Fig. 11, 16)

*Form*. All show at least one headdress stalk or the mark where one was broken off. Two also have incised appliques as part of the headdress. One head has a brimmed headdress. A third has a punctate headdress band. Hair appears in two cases, a close-cropped, incised fringe. The three most intact headdresses indicate that the figurines were only meant to be seen frontally. The figurine with the punctate head band also suggests this because it is almost flat and would have had a flat headdress stalk. Among these figurines the one intact headdress stalk shows a incised scroll panel topped by a spray of plumes. The panel contains an abstract scroll design, with the scrolls emphasized by an incised line following their curve; flanking the scrolls are rows of feathers (?). See also Figurine Headdress, Papaloapan Variety, Scroll and Plume Form.

*Decoration*. All surfaces are plain, unslipped.

*Chronology*. Camaron 1 (Table 5).

*Comment*. All the heads are mold-made with some additions of small hand modeled, applique pieces to the headdresses. In only one case are both stalk attachments preserved. The others I presume to be bifurcate because there is no conclusive evidence of single, asymmetrical stalks on headdresses at the site.

*Comparative*. There are no published examples of bifurcate headdresses with scroll panels like the Patarata head which still has half of its headdress intact (see discussion of Patarata Scroll Style). The headdress style on the other, more broken heads is unknown (see Headdresses). However, a number of published examples may be comparable. A figurine with a single plume stalk is illustrated in <u>Ancient Art of Veracruz</u> (Ethnic Arts Council of Los Angeles 1971:frontispiece). The same publication (1971:numbers 81, 54 [latter's reconstructed center element of headdress is doubtful according to Harold McBride, personal communication], 25) also shows some bifurcate Late Classic headdress stalks (I exclude those with projecting elements that are part of some other composition, such as dragons' heads in number 97). It is noteworthy that number 54 shows a figure holding a shield with scrolls in low-relief and has a lower body that is similar to some from the Camaron phase (see Figurine Legs-feet, Papaloapan Variety, Form 1, Comparative).

Drucker (1943a:plate 50a, top left) illustrates a figurine from Cerro de las Mesas which has projecting, plain, bifurcate headdress elements. Provenience for this figurine is either Lower II or Upper I (Drucker 1943a: 77). At Tres Zapotes Weiant (1943:plate 43, 6) illustrates a mold-made fragment that is a stalk of plumes, apparently broken off at the base. He (1943:106) labels this as an ornament of a large mold-made Mayoid figurine, made from Upper Tres Zapotes Yellow and Pink Ware, a different paste from that of the Papaloapan Variety figurines. In 50 Figures from a Site in Veracruz (Edward H. Merrin Gallery 1970:7; 37) two Mayoid figurines are illustrated which have bifurcate plume stalks. Medellin (1960a:34, lam. 34; 37, lam. 20) illustrates Preclassic figurines which have small, double applique pieces as a headdress. These appliques have incised lines like the appliques added to two of the Head 2 forms from Patarata. However, the Patarata cases, the incised appliques are in addition to presumed bifurcate stalks.

Preclassic Remojadas I figurines initiate bifurcate headdresses in Veracruz, generally by showing the stylized wings and tail of a diving bird. Sometimes the bird's head is suppressed (see McBride 1971:24; Medellin 1960a: 35-36, 68). Because the Patarata specimens are fragmentary and the sample is small, it cannot be determined if they bear any relationship to Preclassic antecedents.

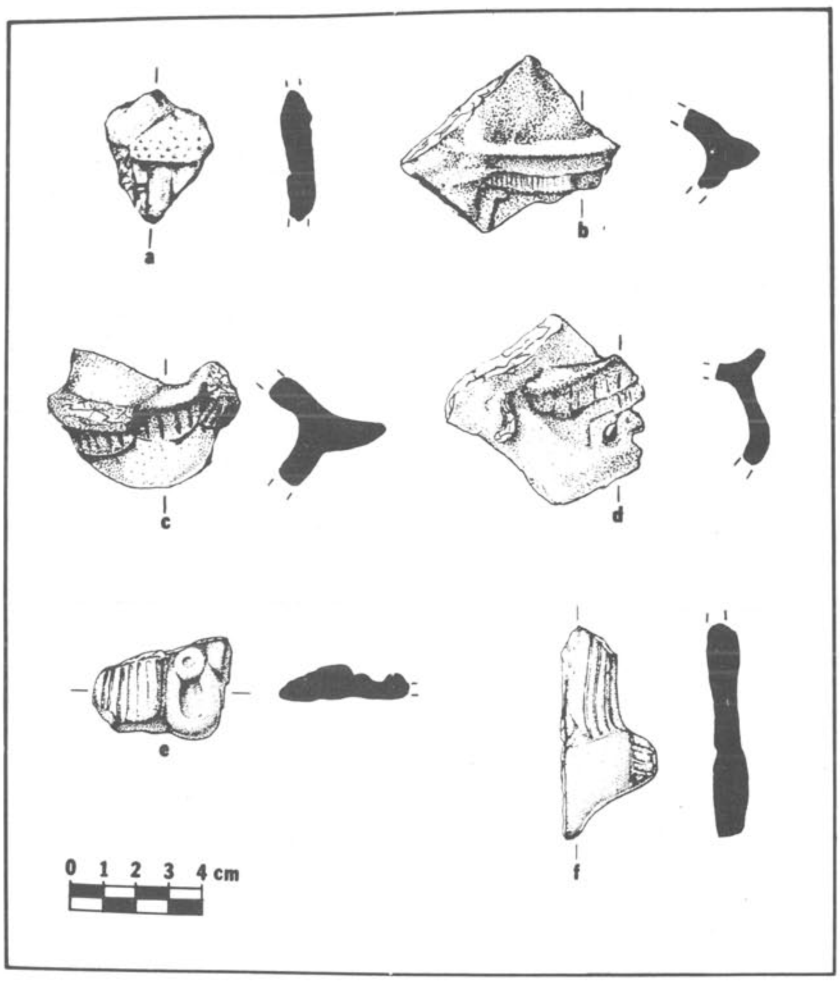



Fig. 16 Figurine Heads, Papaloapan Variety, Head 2, Variable Bifurcate Headdress: (a)-(d) Camaron 1, (c) traces of white paint; Head 3, Miscellaneous: (e) and (f) Camaron 2, traces of white paint.

Head 3, Miscellaneous 2 (Fig. 16)

*Form.* Both pieces are fragmentary. Each has long, straight hair indicated with incised lines. One has a looped braid or hair decoration. A short, rudimentary arm sticks straight out on the other fragment.

*Decoration.* The figure with the arm was covered by a thick white slip.

*Chronology.* Camaron 2 (Table 5).

*Comment.* The fragments are mold-made.

*Comparative.* These pieces are so fragmentary that it is difficult to derive useful comparisons. At Tres Zapotes Weiant (1943:plate 41, 5; plate 42, 2, 7) illustrates a number of figurines with long, "incised" hair often with arms upraised or outstretched. Often, the arms and/or hands are indicated rudimentarily. He categorizes these figurines as mold-made Mayoid types of pink or cream colored clay like his Yellow and Pink Ware (Weiant 1943:106); they pertain to Upper Tres Zapotes. Mojarra Orange-grey Variety, Head 1 would be a more pertinant comparison with Weiant's material in terms of paste.

Medellin (1960a:94, lam. 55) illustrates a figurine from Los Cerros which has long hair but lacks upraised arms. Ancient Art of Veracruz (Ethnic Arts Council of Los Angeles 1971:numbers 59, 61, 62, 69, 72, 77, color plate 4) illustrates figurines with long hair, often with arms upraised. These belong to McBride's (1971:28-30) Nopiloa tradition Late Classic figurines and in some cases to the Postclassic Isla de Sacrificios category (also part of the Nopiloa tradition). Paz and Medellin (1962:numbers 29, color plate between 36 and 37, 37, 38, 39) illustrate several Late Classic Smiling Face figurines which have long hair and, in some cases, upraised arms; however, none manifests rudimentary arms.

To summarize, long incised hair and upraised arms are traits that seem to span the Classic and Postclassic periods. It is possible that within the Nopiloa tradition other stylistic features may eventually prove useful for chronological determinations, for example, the flatness of the figurine or whether or not limbs are rudimentary or realistic.

Mojarra Orange-grey Variety 1

*Material.* The paste is like that of Mojarra Orange-grey, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

Head 1 1 (Fig. 14)

*Form.* This was a hollow figurine with a flat, featureless back. It has long straight hair shown by incised lines. At least one arm was upraised with the hand opened beside the head. The hand is stylized with incised lines marking the fingers. There is a round ear plug.

*Decoration.* There are traces of a thick white slip.

*Chronology.* Camaron 2 (Table 5).

*Comment.* The figurine is mold-made.

*Comparative.* See Papaloapan Variety, Head 3. According to McBride (1971:28-29), his Late Classic Nopiloa II:Nopiloa Mayoid figurines, made with fine paste lacking temper, would more closely resemble Head 1 than the other examples from Ancient Art of Veracruz because of paste similarities in addition to the long hair and (occasionally) outstretched arms. However, the rather rudimentary hand on the Patarata example resembles the figurines from Tres Zapotes (Weiant 1943:106; plate 41, 5; plate 42, 2, 7) which are also similar in paste. Weiant's material is from Upper Tres Zapotes.

Tanare White Variety 1

*Material.* The paste has a grey core, fired white at the surface, with some grey mottling.

*Surface.* Surfaces are smoothed but not polished.

Head 1 1 (Fig. 15)

*Form.* The piece is fragmentary. A round ear plug is evident. Apparently the head was hollow, with a flat, closed back. The headdress seems to have had a laterally projecting element. The proportions and shape of the head closely resemble those of the Papaloapan Variety, Face 1, which also has a laterally projecting headdress.

*Decoration.* The surface is plain, unslipped.

*Chronology.* Camaron 1 (Table 5).

*Comment.* The figurine was mold-made.

*Comparative.* The fragment is insufficient for useful comparisons.

Figurine Headdresses 10

Papaloapan Variety 10

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

Scroll and Plume Form 2 (Fig. 17)

*Form.* It is clear from the figurine heads (see Papaloapan Variety, Head 2) that bifurcate headdresses occurred on figurines. In one instance this takes the form of a stalk decorated with an abstract scroll panel and ending in plumes. I interpret the fragments labeled here as figurine headdresses to be stalks of probably bifurcate headdresses. All are broken off somewhere before the attachment; all terminate in plumes. In addition, the two in this category have an abstract scroll panel. One is flat with a smoothed but otherwise unmodified back surface. The other is convex but also has an unfinished back.

*Decoration*. Plumes are shown by parallel incised lines. In one case, a double band of very short feathers seems to be represented; below the two feather bands is a third strip with round punctations. The scroll panels have non-interlocked scrolls, usually with an incised line following the interior scroll contour for added emphasis. Occasionally small rectangular shapes occur in the designs, possibly representing feathers (cf. Figurine Heads, Papaloapan Variety, Head 2). The convex headdress bears remnants of thick white paint.

*Chronology*. See Table 5. Scroll and plume headdresses are documented only for Camaron 1, as is true of their occurence on figurine heads.

*Comment*. Both headdresses were mold-made. Although I interpret these as headdress fragments, they could be adornos or appliques from something else. However, nothing else is suggested by the Patarata collection.

*Comparative*. See Figurine Heads, Papaloapan Variety, Head 2, and discussion of Patarata Scroll Style.

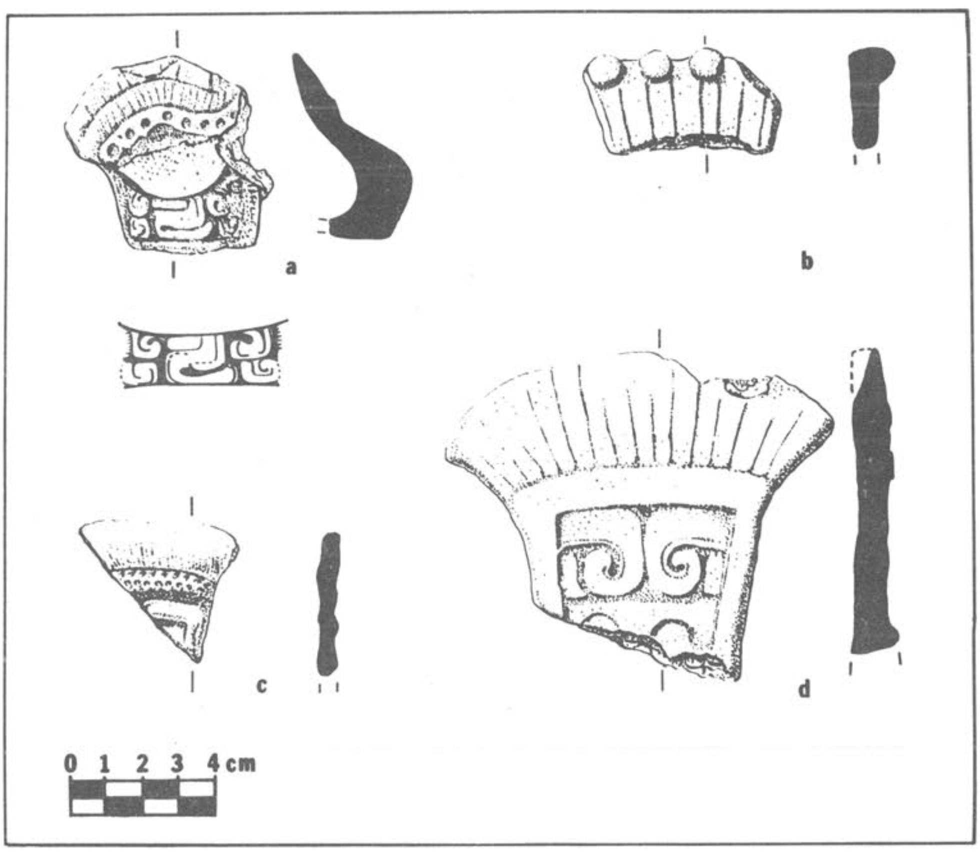



Fig. 17 Figurine Headdress, Papaloapan Variety, Scroll and Plume Form: (a) Camaron 1, traces of white paint; Plume Form: (b) Camaron 3, traces of white paint, (c) shell deposit, (d) Camaron 1.

Plume Form 8 (Fig. 14, 15, 17, 18)

*Form*. See initial comments under Scroll and Plume Form. Subsumed under this category are various plume stalks which are either quite fragmentary or which do not have a scroll panel. The terminal plumes vary in length, and the size of the stalks varies, too. One small stalk has a decorated convex panel below the plumes. All the headdresses were meant to be seen from the front only.

*Decoration*. The one panel example is decorated with incised lines, possibly representing a face (?). Two fragments have a punctated band below the spray of feathers. In another case the feathers have a row of punctations down their midline. One example has round applique pellets at the end of the feathers. In three cases there are remnants of thick white paint.

*Chronology*. Camaron 1 to 3; one is from the shell deposit (Table 5). It is possible that bifurcate feather stalks are restricted to the Camaron phase; the top shell deposit is a disturbed, mixed stratum.

*Comment*. The headdresses were mold-made; one case also has appliqued pellets. See Scroll and Plume Form, Comment.

*Comparative*. See Scroll and Plume Form, Comparative.

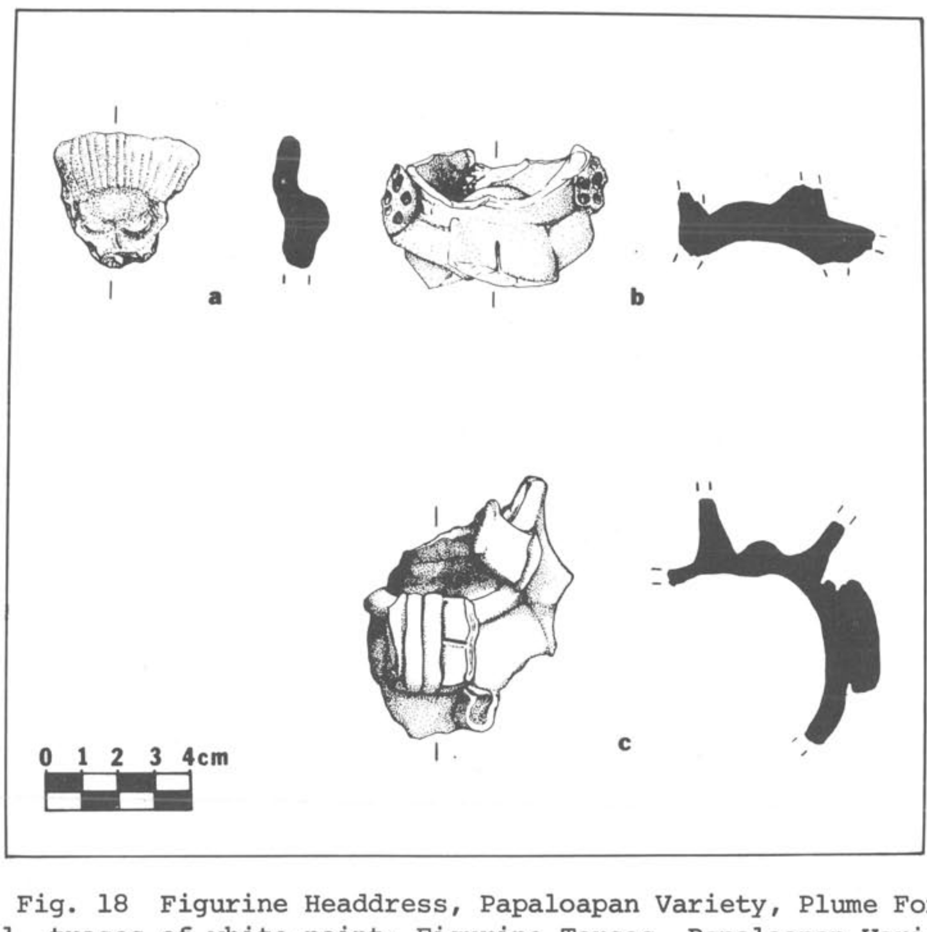



Fig. 18 Figurine Headdress, Papaloapan Variety, Plume Form: (a) Camaron 1, traces of white paint; Figurine Torsos, Papaloapan Variety, Form 1, Globular Hollow Torsos: (b) Camaron 2, (c) Camaron 1.

Figurine Torsos 7

Papaloapan Variety 7

*Material.* Paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

Form 1, Globular Hollow Torsos 2 (Fig. 18)

*Form.* Each fragment seems to be the waist of a globular, hollow torso. The chest and hip chambers were separate and sealed off from each other. The body cavities could have formed whistles. The figurines may have been constructed to be viewed from all sides, but it is doubtful because in both cases the waist cords do not extend around the figurines' back. Each torso has appliqued clothing elements.

*Decoration.* Both are now plain and unslipped. The waists are decorated with cord-like ties and, in one case, with an apron-like piece. One fragment has punctated waist rosettes on either side.

*Chronology.* Camaron 1 and 2 (Table 5).

*Comment.* The bodies seem to be hand made, but some pieces of applique may have been formed in molds.

*Comparative.* There are many published Veracruz figurines with extensive use of appliques to show body ornamentation, but they do not ordinarily have globular bodies. There is a globular bodied figurine illustrated in Ancient Art of Veracruz (Ethnic Arts Council of Los Angeles 1971:number 96) which is a seated "Fat God" in the form of a whistle with a mold-made face and hand modeled body. The whistle is suggested to date from 300-450 A.D.

Form 2, Partly Hollow Torsos 3 (Fig. 19)

*Form.* These fragments are variable. All have a solid, slightly convex front with part of a chamber attached on the reverse side near or at the waist. One probably shows the chest area with a necklace and pendant. The other two show waistbands, one with a crude hand resting on the waist.

*Decoration.* All bear traces of exterior thick white paint.

*Chronology.* Camaron 1 and 2 (Table 5).

*Comment.* All were mold-made. The attached chambers might have been either whistles or some kind of standing support for the figurine.

*Comparative.* Because these torsos are fragmentary, it is difficult to compare them to published material. No pieces have been illustrated which resemble them closely.

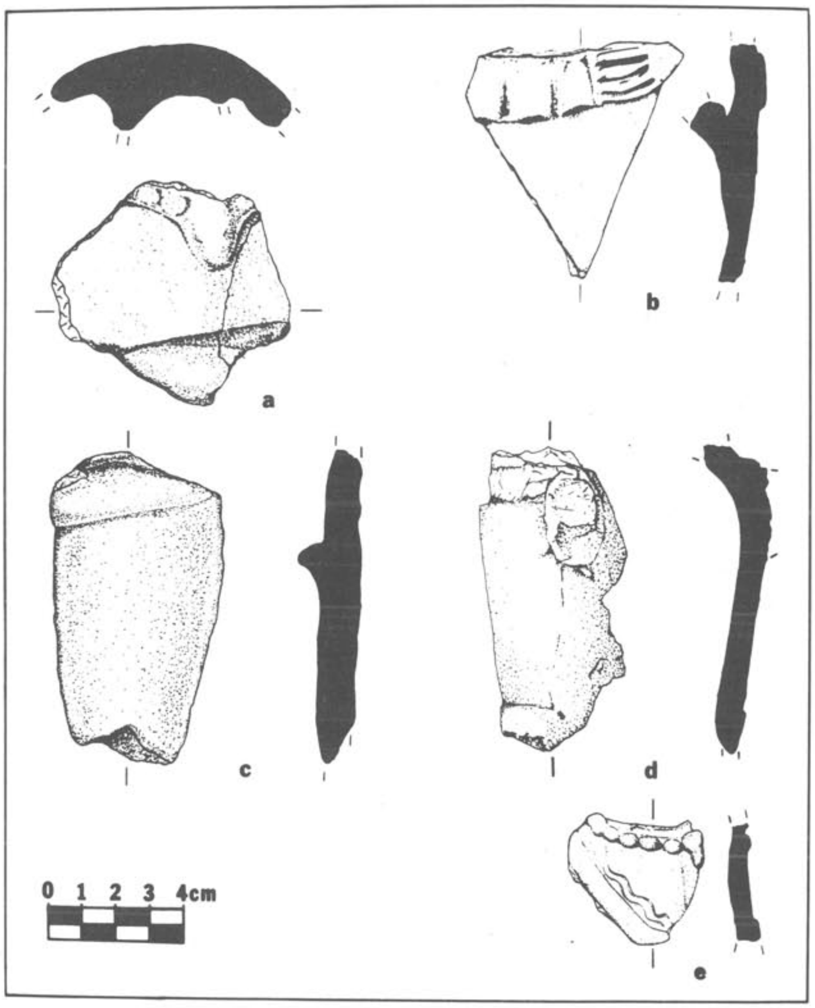



Fig. 19 Figurine Torsos, Papaloapan Variety, Form 2, Partly Hollow Torsos: (a) Camaron 1, traces of thick white paint, (b) and (c) Camaron 2, traces of thick white paint; Form 3, Miscellaneous; (d) Camaron 1, (e) Camaron 3.

Form 3, Miscellaneous 2 (Fig. 19)

*Form.* Both show shoulder areas. One may have had a solid arm attached to it and an applique strip (necklace?) around the neck. This fragment is convex; it may have been hollow. The other fragment is almost flat, with a necklace and decorated shirt.

*Decoration.* Both are now plain and unslipped.

*Chronology.* Camaron 1 and 3 (Table 5).

*Comment.* Both are mold-made.

*Comparative.* Because these are fragmentary, it is difficult to compare them to published material. No pieces have been illustrated which are notably similar.

Figurine Legs-feet 31

Papaloapan Variety 29

*Material.* Paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

Form 1, Projecting Foot 19 (Fig. 20, 21, 22)

*Form.* Most of the foot and leg segments clearly show a long skirt. The foot itself projects downward and, frequently, slightly forward from the hem of the skirt. The foot is either rectangular or oval. Several examples have shallow parallel incisions to indicate the toes. Commonly the bottom of the foot is slightly flattened where it would rest on the ground. Four examples show dress decorations hanging on the front of the skirt or on an "apron" hanging between the legs (breechcloth?). Two of the skirts have round discs on them, one with a trailing volute. The fragments range from flat to frontally convex; all are designed to be viewed only from the front. In some instances chambers or appliqued pieces were attached to the backs of the bodies in the midsection.

*Decoration.* One specimen has a front "apron" decorated with low relief parrallel lines and scroll forms. Six have remnants of a thick white slip on the front surface. One has traces of an Acula Red-orange, Monochrome Variety, slip, also on the front.

*Chronology.* Most of these pieces are from Camaron 1 and 2, but they also occur in Camaron 3 and Limon (Table 5).

*Comment.* All the fragments were mold-made, as were dress decorations with the exception of one applique strip representing a waistband. Some incised lines, such as those representing toes, may have been added by hand. The distinction between Form 1 and Form 2 is a minor one. More complete examples may prove that flat versus projecting feet is not useful distinction.

*Comparative.* The Patarata examples with rectangular feet and roughly incised parallel lines for toes resemble a figurine foot illustrated by Drucker (1943a:plate 54b) from Cerro de las Mesas. This foot is ascribed by him (1943a:64) to Type III figurines, which are large, flat, and mold-made with tall bifurcated headdresses; the Trench 42 examples date from Upper I (Drucker 1943a:75). However, his (1943:plate 39) illustrations of Type III figurines themselves reveal that they are unlike the Patarata legs-feet with respect to the associated bodies and that none of their faces and headdresses are represented at Patarata.

Closer similarities exist with two figurines illustrated in Ancient Art of Veracruz (Ethnic Arts Council of Los Angeles 1971:numbers 54, 99). Both are Nopiloa III, Los Cerros Detailed Applique Dancers according to McBride's (1971:30) classification and are dated between 750 and 900 A.D. He (1971:30) says the Los Cerros figurines are as follows:

a very rare type which occurs in the lower Rio Blanco-Papaloapan and Tuxtlas regions and at Jonuta, Tabasco. It is characterized by a mold-made head with unusually delicate features and realistic proportions, a well made hand-modeled or mold-made torso, hand made arms and legs and additional mold-made appliques representing clothes and headdress. The appliques feature an unusual wealth of low relief detail to indicate feathers and textile designs.

It is questionable if the Patarata figurines would have had hand modeled arms. Number 54 has clothing which is very similar to some of the Patarata Form 1 examples, except that the foot is flat like Patarata Form 2. Number 54 I have previously discussed with reference to the scroll design on the figurine's shield (see Figurine Heads, Papaloapan Variety, Head 2). Number 99 with respect to its legs, projecting foot, and low-relief decorated loin cloth is similar to some of the Patarata Form 1 and Form 2 legs-feet.

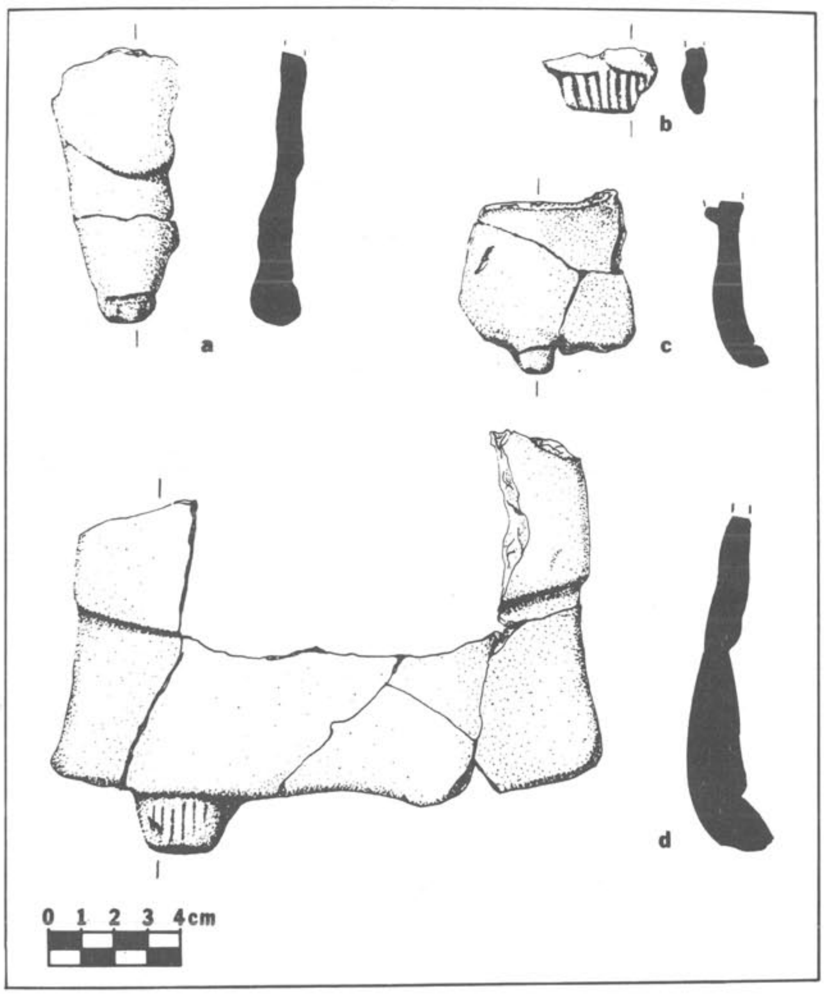



Fig. 20 Figurine Legs-feet, Papaloapan Variety, Form 1, Projecting Foot: (a)-(d) Camaron 1, (b) traces of white paint.

Form 2, Flat Foot 5 (Fig. 23)

*Form.* The majority of these fragments are small and consist of little more than the foot. Three seem to show a skirt. The feet project forward as flat tabs. The larger, thicker Limon examples have incised lines indicating toes. Only one specimen shows dress decorations, an "apron" hanging between the legs (breechcloth?); this slightly convex figurine was meant to be seen from the front only. The other fragments are too small to indicate clearly their body shape. The one from Camaron 3 may have been hollow.

*Decoration.* The decorated "apron" has a panel with very shallow incised lines indicating a single scroll, double-ended scrolls and a set of parallel lines. The fragment has traces of a thick white slip. The possibly hollow foot from Camaron 3 bears a Roja Red slip.

*Chronology.* Camaron 2, 3, and Limon (Table 5).

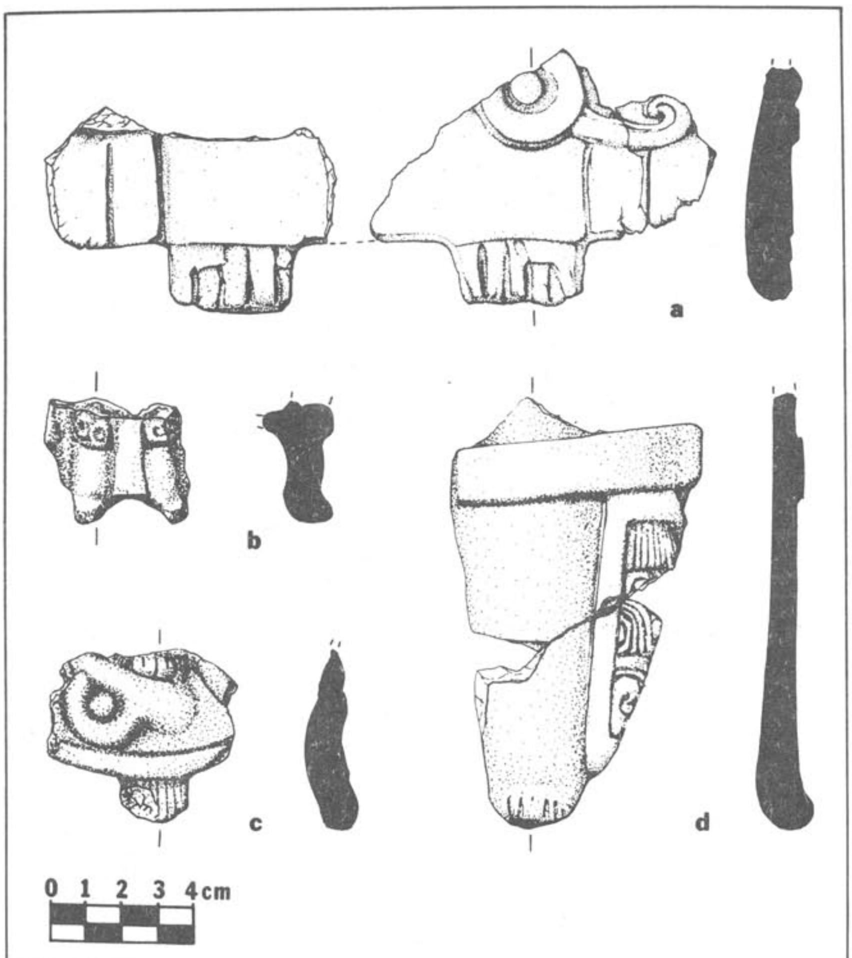



Fig. 21 Figurine Legs-feet, Papaloapan Variety, Form 1, Projecting Foot: (a) Camaron 1, (b) Camaron 3, traces of white paint, (c) Camaron 1, traces of white paint, (d) Camaron 1.

*Comment.* See Form 1, Comment. Except for toe incisions, all the fragments were executed with a mold. The Camaron 2 apron decorated with scrolls is unusual because most scroll designs are from Camaron 1. It is atypical of the Camaron 1 examples because it is executed with shallow incisions rather than low-relief forms enhanced by shallow incised lines (the illustrations do not show the difference well). Double-ended scrolls are also not represented in Camaron 1.

*Comparative.* See Form 1, Comparative.

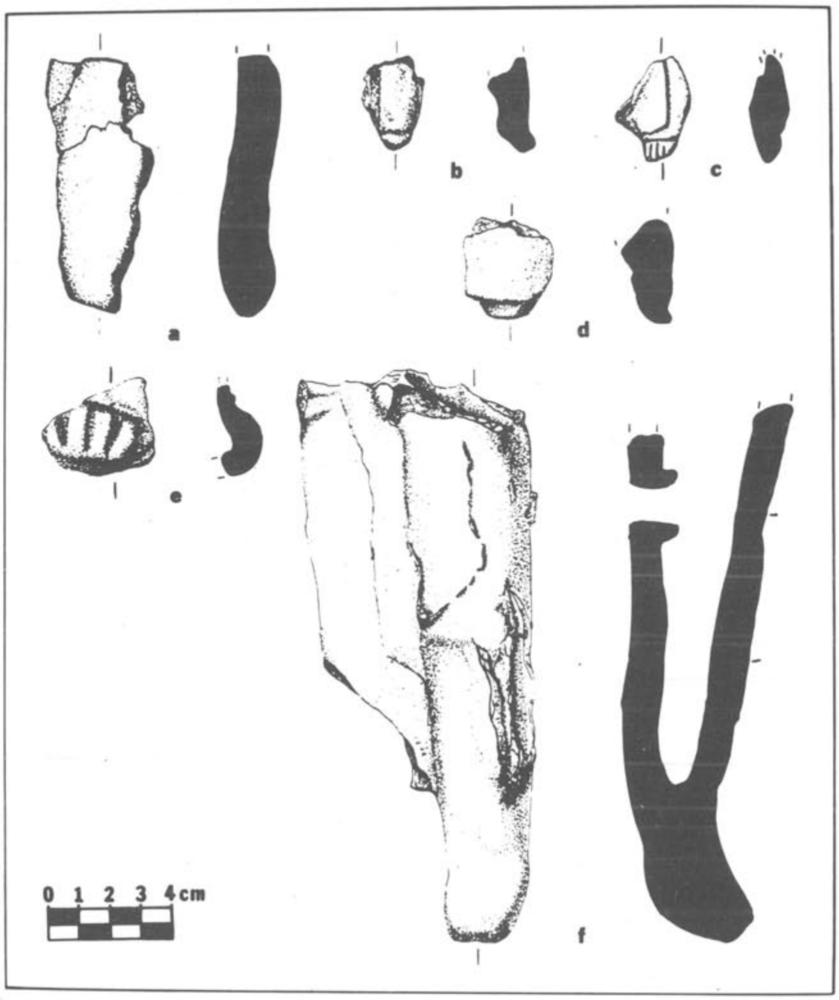



Fig. 22 Figurine Legs-feet, Papaloapan Variety, Form 1, Projecting Foot: (a) Camaron 3, (b) Camaron 1, traces of white paint, (c) Limon, traces of red-orange paint, (d) and (e) Camaron 2, traces of white paint; Figurine Legs-feet, Papaloapan Variety, Form 3, Hollow Leg: (f) Camaron 1, traces of white paint.

<u>Form 3, Hollow Leg</u> 1 (Fig. 22)

*Form.* A hollow tube with slight indications of anatomical contours forms the leg. A firing hole perforates the back side. The rectangular projecting foot is flattened on the bottom; resting the foot on the ground tilts the leg back at about a 50° angle. A flat flange, probably some kind of dress decoration, runs down the outside of the leg.

*Decoration.* There are traces of a thick white slip.

*Chronology.* Camaron 1 (Table 5).

*Comment.* The leg was mold-made, with the flange added.

*Comparative.* Large, hollow, mold-made figurines are not uncommon in the Classic Period in Veracruz (e.g. Ethnic Arts Council of Los Angeles 1971:numbers 111, 112), but no illustrated examples have a leg flange.

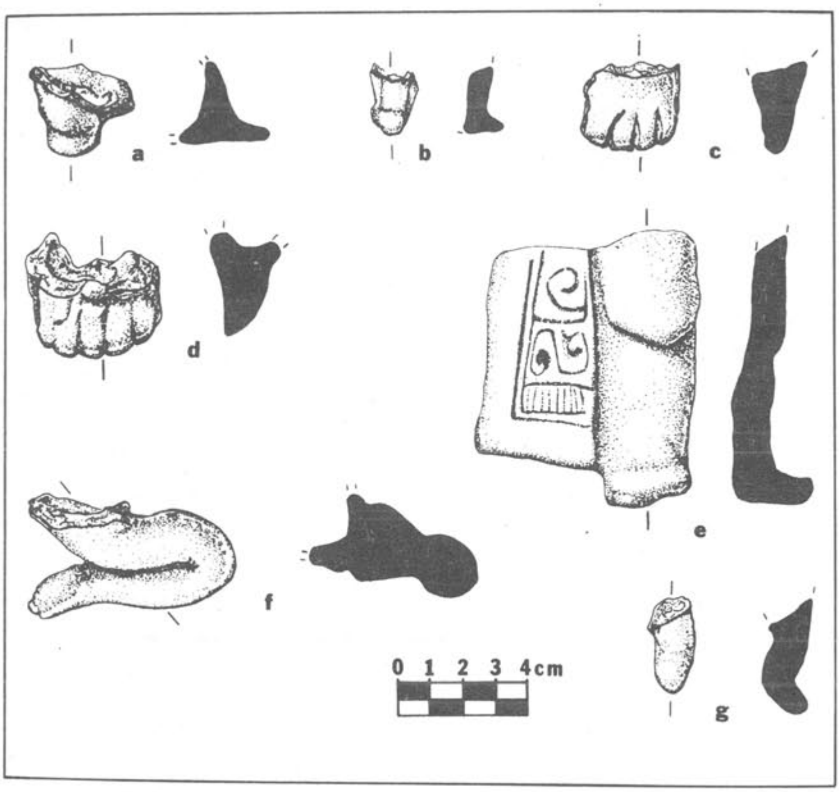



Fig. 23 Figurine Legs-feet, Papaloapan Variety, Form 2, Flat Foot: (a) Camaron 3, red-orange slip, (b)-(d) Limon, (e) Camaron 2, traces of thick white paint; Figurine Legs-feet, Papaloapan Variety, Form 4, Solid Leg: (f) and (g) Camaron 3, (f) traces of thick white paint. (a) section turned 90° right, then 90° up.

Form 4, Solid Leg 4 (Fig. 23)

*Form.* Three examples have stubby, cylindrical legs with a projecting, slightly flattened foot. A fourth example has realistic leg proportions and a seated posture; the solid leg was apparently attached to a hollow body. None of the fragments show dress.

*Decoration.* The seated figurine has traces of thick white paint.

*Chronology.* Camaron 3 and Limon (Table 5).

*Comment.* The squat legs were separately modeled and then attached to a body. The seated figurine was hand modeled.

*Comparative.* Most of the Patarata examples are too fragmentary for useful comparisons. The seated, solid leg is positioned like the frontispiece illustration in Ancient Art of Veracruz (Ethnic Arts Council of Los Angeles 1971) which shows a Los Cerros Detailed Applique Dancer (McBride 1971:30) dated to the Late Classic.

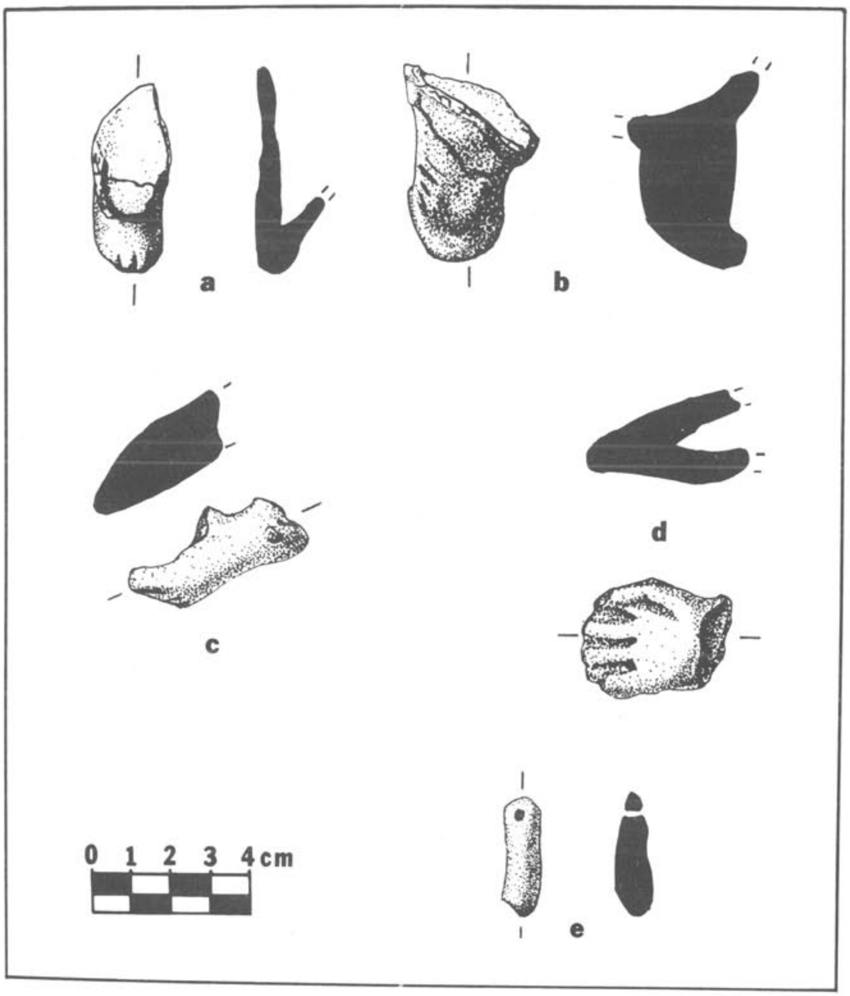



Fig. 24 Figurine Legs-feet, Mojarra Orange-grey Variety: (a) Limon, (b) shell deposit, traces of reddish-brown over white paint; Figurine Arms-hands, Papaloapan Variety, Form 1, Solid Arm: (c) Camaron 2; Form 2, Hollow Arm: (d) Camaron 3; Figurine Arms-hands, Mojarra Orange-grey Variety, Form 1, Solid Movable Arm: (e) Limon.

Mojarra Orange-grey Variety    2 (Fig. 24)

*Material.* The paste is like that of Mojarra Orange-grey, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

*Form.* One fragment resembles the Papaloapan Variety, Form 2, Flat Foot. However, in this case the flat base continues back, indicating a hollow figurine. There are faint, rudimentary toe incisions. The other fragment, apparently also part of a hollow figurine, has a stubby solid leg with a flat protruding foot.

*Decoration.* The stubby leg fragment has traces of a white slip with a reddish-brown painted design over it.

*Chronology.* Limon and the shell deposit (Table 5).

*Comment.* The foot fragment was mold-made, but the stubby leg-foot was probably hand modeled. Because these are few and fragmentary, I have not sub-divided this category by form on Table 5 but rather by surface decoration.

Figurine Arms-hands    7

Papaloapan Variety    4

*Material.* Paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

Form 1, Solid Arm    1 (Fig. 24)

*Form.* The arm is a solid clay cylinder with a stylized, rather rudimentary hand. Fingers are shown by three shallow incised lines. The hand was once attached to a curved surface.

*Decoration.* Traces remain of an Acula Red-orange, Monochrome Variety, slip.

*Chronology.* Camaron 2 (Table 5).

*Comparative.* I did not find comparable material.

Form 2, Hollow Arms    3 (Fig. 24, 25)

*Form.* The hands are opened out, palms forward with only the front side made to be viewed. One hand is rudimentary, and its fingers are shown by incised lines. The other two examples have somewhat more realistic fingers and thumbs and each bears a bracelet.

*Decoration.* All are plain, unslipped.

*Chronology.* Camaron 3 (Table 5).

*Comment.* These were mold-made.

*Comparative.* The more rudimentary example is similar to the upraised hand on a Tres Zapotes figurine illustrated by Weiant (1943:105; plate 41, 5), which he described as a mold-made Mayoid type. He mentions that the clay is pink or cream colored, a description which diverges from the Papaloapan Variety; he dates the figurine to Upper Tres Zapotes. Another similar example occurs in Ancient Art of Veracruz (Ethnic Arts Council of Los Angeles 1971:number 69) on a figurine with one upraised hand; the figurine belongs to the Nopiloa III Mayoid type according to McBride's (1971:29-30) classification, dating to 750-900 A.D.

The more realistic Patarata Form 2 examples, which have mold-made bracelets, are closely resembled only by some Nopiloa II Mayoid figurines in Ancient Art of Veracruz (Ethnic Arts Council of Los Angeles 1971:numbers 76, 77) which, however, do not have the upraised arm posture. These figurines are interpreted as dating 600-750 A.D.

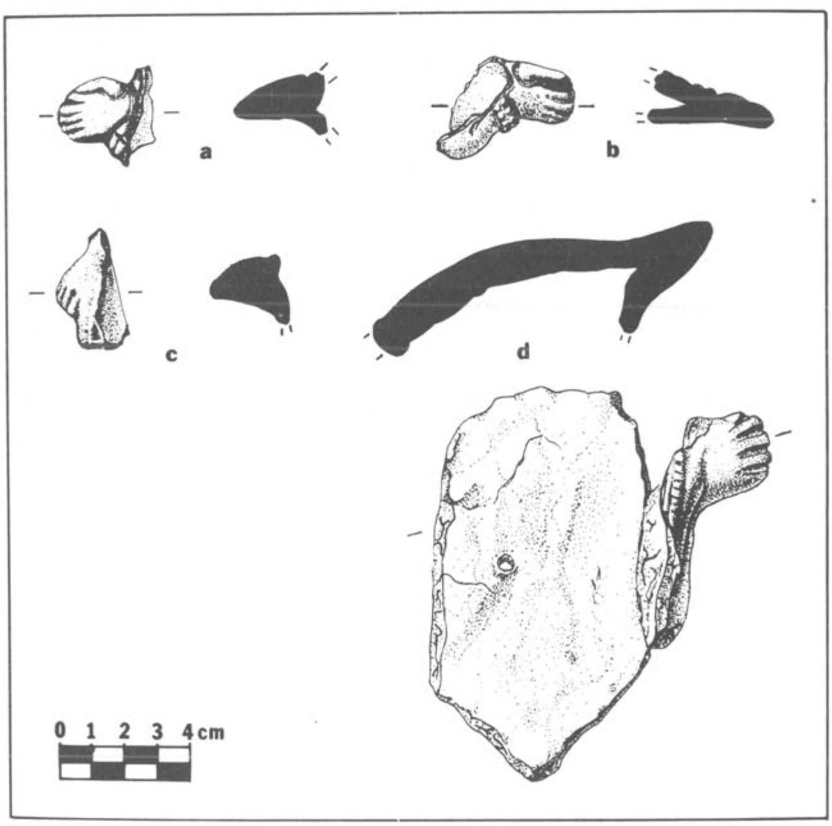



Fig. 25 Figurine Arms-hands, Papaloapan Variety, Form 2, Hollow Arms: (a) and (b) Camaron 3; Figurine Arms-hands, Mojarra Orange-grey Variety, Form 2, Miscellaneous: (c) Limon; Figurine Arms-hands, Mojarra Coarse Variety: (d) Camaron 1. (d) section turned 90° down.

Mojarra Orange-grey Variety 2

*Material.* The paste is like that of Mojarra Orange-grey, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

Form 1, Solid Movable Arm 1 (Fig. 24)

*Form.* A solid clay cylinder was perforated at the shoulder to create a movable arm.

*Decoration.* The surface is plain, unslipped.

*Chronology.* Limon (Table 5).

*Comment.* The arm appears to have been hand modeled.

*Comparative.* Solid jointed arms occurred at Tres Zapotes (Weiant 1943: 116; plate 61, top row), but appropriate torsos were not encountered. Weiant (1943:116) interpreted these limbs as Teotihuacan figurine fragments from Upper Tres Zapotes. However, jointed figurines dated to the Late Classic occur among distinctly Veracruz figurine types also (e.g. Ethnic Arts Council of Los Angeles 1971:numbers 64, 67, 68). Drucker (1943b: 82; 132; plate 41, w; plate 47, L) also illustrates jointed limbs from Tres Zapotes. He classifies these as belonging to his San Marcos mold-made type, pertaining to Upper Tres Zapotes. Valenzuela (1945a:fig. 5; 1945b:fig. 15) illustrates solid jointed arms from the Tuxtlas. Medellin and Peterson (1954:fig. 54, J) picture an articulated arm; Similing Head figurines from Los Cerros II, Late Classic deposits have jointed arms (Medellín and Peterson 1954:166).

Form 2, Miscellaneous 1 (Fig. 25)

*Form.* What was probably a hollow figurine has a hand along its side. The hand is somewhat rudimentary, with four short incisions marking the fingers. The figurine was meant to be seen from the front only.

*Decoration.* The surface is plain, unslipped.

*Chronology.* Limon (Table 5).

*Comment.* The fragment was mold-made. Incisions may have been added by hand.

*Comparative.* The specimen is too fragmentary for useful comparisons.

Mojarra Coarse Variety 1

*Material.* The paste is like Mojarra Orange-grey, Coarse Variety.

*Surface.* Surfaces are smoothed but not polished on the exterior. The exterior of the back side has an irregular, lumpy surface. The interior, especially of the back side, is not smoothed and is extremely irregular and lumpy.

Form 1, 1 (Fig. 25)

*Form.* A short solid appendage juts out at right angles to the hollow body. The back of the figurine has a small hole pushed through while the clay was wet, presumably to facilitate firing. The back side is slightly convex on the exterior. The fragment was meant to be viewed only from the front.

*Decoration.* Surfaces are plain, unslipped.

*Chronology.* Camaron 1 (Table 5).

*Comment.* I interpret this as a figurine arm only because the back side is convex. Otherwise, the limb represented could be an animal limb from a creature stretched out ventrally. Also, the hand is like other rudimentary, stylized, human hands and feet from Patarata.

*Comparative.* See Papaloapan Variety, Form 2, Comparative, especially the discussion of the rudimentary hand.

Zoomorphs 5

Papaloapan Variety 4 (Fig. 26)

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

*Form.* Form is variable. All the fragments are solid. One is a bird head, possibly attached to a vessel. Another fragment is a duck head meant to be viewed from one side only. One is an owl (?) applique. there is a small feathered (?) snake.

*Decoration.* The "owl" bears traces of thick white paint.

*Chronology.* Camaron and Limon phases (Table 5).

*Comment.* All except the duck head, which is mold-made, are hand modeled.

*Comparative.* Zoomorphs are not uncommon at Tres Zapotes (Weiant 1943: plate 54; plate 60; Drucker 1943b:81-82; plates 47, 49, 50, 62). Drucker's examples are mainly San Marcos figurines from Upper Tres Zapotes which he says include a wide variety of animal and grotesque forms. Zoomorphs also appear at Cerro de las Mesas (Drucker 1943a:plates 35, 36, 38, 41); most of these examples were classified as Type II figurines, dating from his Upper I phase. The Patarata examples are not identical to these published specimens.

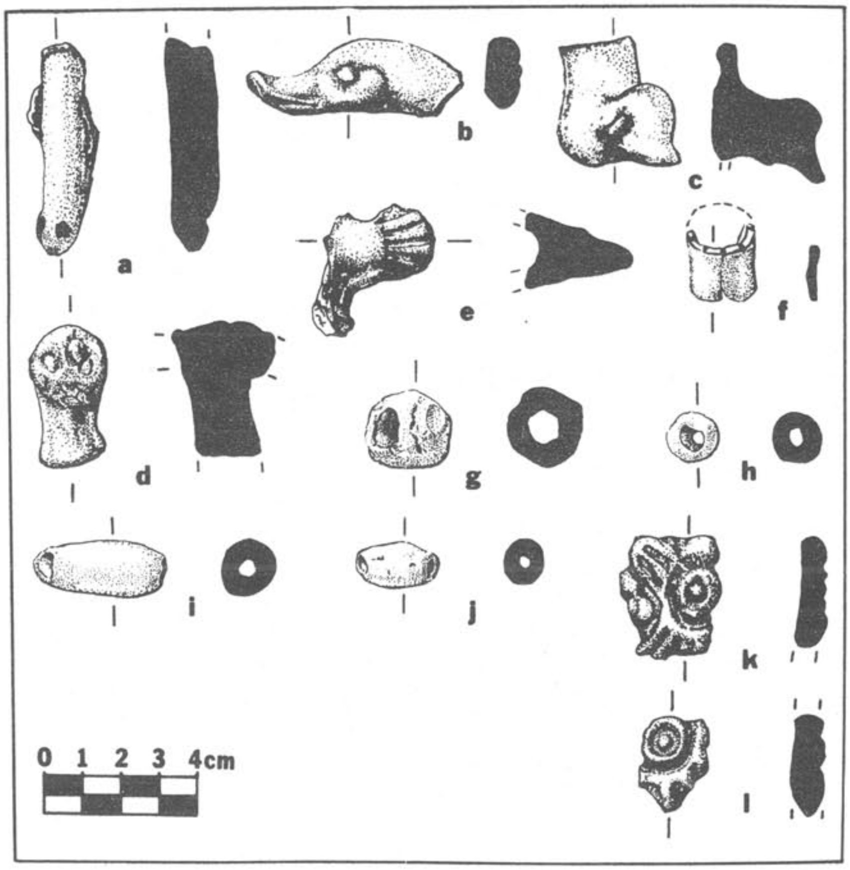



Fig. 26 Zoomorph, Papaloapan Variety: (a) Camaron 1, (b) Limon, (c) Camaron 3, (d) Camaron 2, traces of white paint; Zoomorph, Mojarra Orange-grey Variety: (e) Limon; Ear Plug: (f) Camaron 1; Bead, spherical: (g) and (h) Camaron 2; Bead, cylindrical: (i) and (j) Camaron 2; Roller Stamp: (k) and (l) Camaron 3. (g) section turned slightly right, (h) section not turned.

Mojarra Orange-grey Variety 1 (Fig. 26)

*Material.* The paste is like that of Mojarra Orange-grey, variety unspecified.

*Surface.* Surfaces are smoothed, but not polished.

*Form.* A short limb is stretched out from the hollow body, flattened on the underside.

*Decoration.* The surface is plain, unslipped.

*Chronology.* Limon (Table 5).

*Comment.* This animal limb also could be a rudimentary arm on a figurine.

*Comparative.* The specimen is too fragmentary.

Table 5. Figurines

| ARTIFACT | PROVENIENCE: Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell | Total |
|---|---|---|---|---|---|---|
| Figurine Faces | | | | | | |
| Papaloapan Variety | | | | | | |
| Face 1 | | | | | | |
| Circular Headdress | 1 | | | | | 1 |
| Projecting Headdress | | 1 | | | | 1 |
| Face 2 | | 4 | 1 | | | 5 |
| Face 3, Old Man | 1 | 1 | | | | 2 |
| Face 4, Long Face | | 1 | | | | 1 |
| Face 5, Grotesque Face | 1 | | | | | 1 |
| Face 6, Closed Eye, Realistic | 1 | | | | | 1 |
| Face 7 | | | 1 | | | 1 |
| Face 8 | | | 1 | | | 1 |
| Acula Variety | | | | | | |
| Face 1 | | 1 | | | | 1 |
| Prieto Variety | | | | | | |
| Face 1, Punctate Smiling Face | | | | 1 | | 1 |
| TOTAL | 4 | 8 | 3 | 1 | | 16 |
| Figurine Heads | | | | | | |
| Papaloapan Variety | | | | | | |
| Head 1 | 1 | | | | | 1 |
| Head 2, Variable Bifurcate Headdress | 5 | | | | | 5 |
| Head 3, Miscellaneous | | 2 | | | | 2 |
| Mojarra Orange-grey Variety | | | | | | |
| Head 1 | | 1 | | | | 1 |
| Tanare White Variety | | | | | | |
| Head 1 | 1 | | | | | 1 |
| TOTAL | 7 | 3 | | | | 10 |
| Figurine Headdresses | | | | | | |
| Papaloapan Variety | | | | | | |
| Scroll and Plume Form | 2 | | | | | 2 |
| Plume Form | 4 | 1 | 2 | | 1 | 8 |
| TOTAL | 6 | 1 | 2 | | 1 | 10 |
| Figurine Torsos | | | | | | |
| Papaloapan Variety | | | | | | |
| Form 1, Globular Hollow Torsos | 1 | 1 | | | | 2 |
| Form 2, Partly Hollow Torsos | 1 | 2 | | | | 3 |
| Form 3, Miscellaneous | 1 | | 1 | | | 2 |
| TOTAL | 3 | 3 | 1 | | | 7 |
| Figurine Legs-feet | | | | | | |
| Papaloapan Variety | | | | | | |
| Form 1, Projecting Foot | | | | | | |
| Plain | 9 | 4 | 1 | 1 | | 15 |
| Dress Decoration | 3 | | 1 | | | 4 |
| Form 2, Flat Foot | | | | | | |
| Plain | | | 1 | 3 | | 4 |
| Dress Decoration | | 1 | | | | 1 |
| Form 3, Hollow Leg | | | | | | |
| Dress Decoration | 1 | | | | | 1 |
| Form 4, Solid Leg | | | | | | |
| Stubby | | | 2 | 1 | | 1 |
| Seated | | | 1 | | | 1 |
| Mojarra Orange-grey Variety | | | | | | |
| Plain | | | | 1 | | 1 |
| Red on White | | | | | 1 | 1 |
| TOTAL | 13 | 5 | 6 | 6 | 1 | 31 |
| Figurine Arms-hands | | | | | | |
| Papaloapan Variety | | | | | | |
| Form 1, Solid Arm | | 1 | | | | 1 |
| Form 2, Hollow Arm | | | 3 | | | 3 |
| Mojarra Orange-grey Variety | | | | | | |
| Form 1, Solid Movable Arm | | | | 1 | | 1 |
| Form 2, Miscellaneous | | | | 1 | | 1 |
| Mojarra Coarse Variety | | | | | | |
| Form 1 | 1 | | | | | 1 |
| TOTAL | 1 | 1 | 3 | 2 | | 7 |
| Zoomorphs | | | | | | |
| Papaloapan Variety | 1 | 1 | 1 | 1 | | 4 |
| Mojarra Orange-grey Variety | | | | 1 | | 1 |
| TOTAL | 1 | 1 | 1 | 2 | | 5 |

## Discussion of Figurine Relationships

A perusal of the various comparative comments will indicate one of the points to be made in this discussion: Patarata figurines show clear similarities and relationships to some of those from nearby sites with Classic Period occupations, such as Remojadas, Nopiloa, Cerro de las Mesas, and Tres Zapotes. Both with respect to what loosely might be called Veracruz Mayoid figurines and with respect to various other categories such as old man figurines, large hollow figurines, smiling face variants, etc., the Patarata collection fits into the diverse but distinctive Classic Veracruz figurine tradition. One could not consider Patarata to be isolated from stylistic developments elsewhere in Veracruz nor impoverished in its figurine inventory. Nevertheless the Patarata collection does not entirely duplicate other published collections, and it contains figurines and fragments which are not known from other sites, for example the Papaloapan Variety, Face 1 and Head 2 with bifurcate headdresses, and the Scroll and Plume Form headdresses. Although the Patarata sample of figurines is quite small and there are many difficulties in comparing them with those from other sites, we have some indications that at least in the Camaron phase the Lower Papaloapan Basin may have had stylistic traits distinct from Remojadas in Central Veracruz and Matacapan in the Tuxtlas, which falls under considerable Teotihuacan influence. These stylistic traits could indicate separately organized sociocultural units, or at least zones of more intensive and consistent trade and/or communication.

Stylistic differences documented at Patarata tend to support observations made by McBride (1971). McBride distinguishes a Remojadas figurine tradition from a Nopiloa tradition, the former characterizing much of Central Veracruz and the latter distinctive of the Papaloapan-Tuxtla area. One of the aspects of the Nopiloa tradition is its greater emphasis on the use of molds for rendering all of the figurines: bodies, heads, dress, etc. In this respect Patarata echoes the distinction in the two traditions. The Punctate Smiling Face in the Limon phase supports McBride's idea that this type of figurine is assignable to the Papaloapan area.

As is true of pottery sequences in the Classic Period in Veracruz, published figurine data is not necessarily chronologically reliable nor precise in terms of its assemblage affiliations. Although the sections with comparative comments noted the phase affiliations of material from other sites, the chronological data, particularly from the sites of Cerro de las Mesas and Tres Zapotes, need reanalysis, as Coe (1965a:686) has demonstrated. Therefore it is understandable that Patarata has both Early and Late Classic affiliations.

McBride (1971) has attempted the most comprehensive analysis of chronological and regional stylistic traits for Veracruz figurines, but his temporal placement of figurines most closely resembling those from Patarata does not always agree with my chronological interpretations for Patarata. It must be kept in mind that most of the specimens which McBride dates are without provenience. His Los Cerros Detailed Applique Dancers, pertaining to Nopiloa III with a suggested Late Classic to Epiclassic date (Ethnic Arts Council of Los Angeles 1971:41, phase concordance chart), show resemblances to Camaron figurines which I interpret as Early Classic in date. Similarly, most of McBride's Mayoid-related Nopiloa figurine styles he interprets as Late Classic, whereas "Mayoid"-related Patarata figurines fall into the Camaron phase which I date in the Early Classic.

McBride (1971:28-29) refers to Coe in discussing Mayoid traits in Late Classic Nopiloa figurines: Coe (1965a:705) argues that subsequent to the disappearance of Teotihuacan influence in Southern Veracruz, the area manifests a new cultural alignment, both more regional and more Mayoid at the same time:

> Its salient traits are: (1) fine-paste figurines completely mold made and often polychromed in blue, white, and other colors, with many Maya iconographic features, (2) fine-paste polychrome pottery, and (3) clay flutes, ocarinas, Panpipes, and other musical instruments.

However, Patarata pottery and radiocarbon dating argue that the Camaron phase is Early Classic in date. Therefore, I conclude that some of the "Mayoid" and "Los Cerros Detailed Applique Dancer" traits in figurines should be considered to extend back into the Early Classic. It should be noted that the preponderance of these figurines at Patarata are not of fine paste, which, however, does become characteristic in the Late Classic Limon phase. Just as these supposed Late Classic figurine traits appear in the Patarata Early Classic, so does fine-paste pottery, e.g., Mojarra Orange-grey and Prieto Grey-black, which contains little or no temper; however, the Early Classic the fine-paste pottery is not generally characterized by the soft, chalky, surface texture that is typical of the Limon phase.

It is curious that McBride's Nopiloa figurine tradition is not as diverse in the Early Classic as in the Late Classic. He defines one Early Classic type and seven Late Classic types. Possibly previous chronological and typological confusions of Early and Late Classic material (a problem to which McBride (1971:26, 28 refers; see also Coe 1965a:686) have effectively obscured the nature and diversity of Early Classic figurines in Southern Veracruz. Without denying the validity of McBride's figurine classification and the Late Classic date of many Nopiloa figurines, I would argue that his Early Classic types may underrepresent figurines at that time. The Patarata Limon phase, for example, does support the Late Classic date for McBride's (1971:29) Upper Papaloapan Smiling Face category.

Despite the viability of Coe's (1965a:700-705) argument for strong Teotihuacan influence in Southern Veracruz in the Early Classic, it is clear, as he (1965:701) points out, that a distinctive regional tradition is evident. This is true through the Late Classic Mayoid influence as well. Therefore, it would not be unexpected to discover that certain Late Classic figurine categories have local antecedents in the Early Classic, which is essentially what I am proposing. In summary, although the categories proposed for the Late Classic by McBride may be correct, they also may extend back to or have antecedents in the Early Classic.

There are some other stylistic aspects to the proposed dating of Camaron materials that warrant comment. Remojadas Lower I Preclassic figurines are often characterized by flat bodies and an emphasis on frontal presentation (Ethnic Arts Council of Los Angeles 1971:numbers 2-5, 9-18). Later, as McBride (1971:25) points out, a mold is used to execute Remojadas faces while the rest of the body is still modeled. Within the Remojadas tradition Medellin (1960a:68) traces an evolution from Late Preclassic Remojadas figurines to the Classic type which McBride (1971:25) calls the Upper Remojadas

I, El Tejar Triangular Headdress type. For the Nopiloa tradition the evolution of figurines from Preclassic to Classic times and particularly the Early Classic forms cannot be traced. The Camaron material suggests some possibilities for the evolution. Camaron 1 figurines demonstrate employment of molds for all aspects of figurine construction, but the emphasis on planar and frontal figurines may reflect Preclassic traditions, and the bifurcate headdresses may represent an elaboration or modification of diving bird headdresses which first appear in the Late Preclassic.

## Figurine Summary

The 86 Patarata figurine fragments generally conform to the Nopiloa mold-made figurine tradition characteristic of the Lower Papaloapan area. Unfortunately the fragmentary nature of the sample does not permit conclusive judgments about whole figurines. The Patarata emphasis is on relatively large, mold-made figurines which are flat to slightly convex. They are usually made to be seen from the front only. Headdresses often have laterally projecting elements. Quite rare are large hollow figurines, apparently represented at Patarata only by one leg-foot fragment. In some cases figurines represent deities. Figurines are made from pastes used for pottery. A number of characteristics of the figurine collection are not yet duplicated in other published material. One example is Camaron 1 fragments decorated with scroll designs; these are stylistically consistent with a wooden bowl carving and some of the miscellaneous ceramic fragments. All of these together form the basis for a definition of a Patarata scroll style which will be discussed after analysis of the wood carving. It will suffice here to note that although this style is not revealed by previous excavations, it does fall within sculptural traditions in Southern Veracruz. Therefore, Patarata figurines are at once stylistically local and conformant with the Southern Veracruz area as a whole. In part this constitutes a gradient of communication and contacts which, along with the pottery relationships, will prove to be one line of evidence for identification of a hypothetical ecosystem in the Lower Papaloapan area. The greatest similarities are within the Lower Papaloapan area, but not limited to the estuarine zone itself.

## MISCELLANEOUS CERAMICS

### Ear Plugs 9 (Fig. 26)

*Material.* Most paste is like that of Prieto Grey-black, variety unspecified, with surface color varying from light grey to black. One example is like Mojarra Orange-grey, variety unspecified, fired to a buff color. A single case is mottled, ranging from pink to grey, possibly misfired Prieto Grey-black.

*Surface.* Surfaces are well smoothed; two examples have remnants of a polished surface.

*Form.* The ear plugs have a "napkin ring" form, and the more complete examples flare more at one end than at the other. Length ranges between 1.1 cm and 1.6 cm. Maximum diameters are approximately 1.5 to 2 cm.

*Decoration.* One example has small incisions or nicks on the edge of the flaring end. Two specimens have traces of brownish-black paint: the interior of one bears a patch of brownish-black paint, and the other has two stripes of the paint around its circumference.

*Chronology.* Throughout the sequence (Table 7).

*Comment.* The form is like that of the Patarata bone ear plugs.

### Beads 73 (Fig. 26)

*Material.* Untempered, poorly worked paste that varies in its color and consistency, ranging from buff through grey colors, rarely orange.

*Surface.* The beads are irregular and lumpy.

*Form.* Most of the beads have spherical shape, but a few are cylindrical or tubular in shape. Most of the spherical beads are large, about 2 cm in length and diameter, but they range down to .5 cm long and .6 cm wide. The tubular beads range between 3.5 and 1 cm in length, and 1.3 to .8 cm in diameter.

*Decoration.* Most of the beads now lack any traces of surface decoration. Two spherical beads had traces of red on white paint and another had remnants of white paint. A single spherical bead had seven longitudinal grooves from suspension hole to suspension hole.

*Chronology.* All decorated beads were from the Camaron phase. All of the cyclindrical beads were from the Camaron phase except for one example from Limon. The majority of all beads was also from Camaron (Table 7).

*Comment.* The beads may have been ornamental, but the suspension holes are large enough for them to have served as net weights (Elinor Large, personal communication).

### Roller Stamps 2 (Fig. 26)

*Material.* Paste is like that of Mojarra Orange-grey, Coarse Variety.

*Surface.* Surfaces are smoothed but not polished.

*Form.* Both have a cylindrical form. The more intact example has a diameter of approximately 3 cm. It is probable that both are fragments of the same stamp. The exterior design is in deeply incised relief.

*Decoration.* The incised designs show circles, a lobed element, and sets of incised lines.

*Chronology.* Camaron 3 (Table 7).

### Worked Sherds 5

*Material.* One is made from a sherd of Mojarra Orange-grey, variety unspecified, one from Prieto Grey-black, variety unspecified, two from Acula Red-orange, Monochrome Variety, and one from Roja Red, variety unspecified.

*Surface.* The sherds are well smoothed, not polished.

*Form.* The Mojarra Orange-grey sherd has been worked on two opposite edges, creating a small tapering sherd. The Prieto Grey-black sherd has been worked along two edges and around their mutual corner, creating a rounded, sub-rectangular form. One straight edge was worked in two other cases, one Acula Red-orange, the other Roja Red. The second Acula Red-orange sherd is worked on two opposite, roughly parallel edges.

*Decoration.* Both sherds are plain, unslipped.

*Chronology.* All deposits except Limon (Table 7).

### Spindle Whorls 9

<u>Papaloapan Variety</u> 4 (Fig. 27)

*Material.* Paste is like Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

*Form.* See Table 6. Shape typology is adapted from Parsons (1972:48-49).

*Decoration.* One bears traces of an Acula Red-orange, Monochrome Variety, slip. Another is covered by asphalt and resin paint. One spindle whorl is unslipped, but has a mold-made design on its flat side.

*Chronology.* Camaron 2, 3, Limon, and the shell deposit (Table 7).

*Comment.* See Mojarra Orange-grey Variety, Comment.

Table 6. Spindle Whorl Observations

| PROVENIENCE | PASTE | WEIGHT grams | HOLE DIAM. mm | WHORL DIAM. mm | THICK. mm | SHAPE | SURFACE | ILLUS. |
|---|---|---|---|---|---|---|---|---|
| Camaron 2 | Papal. | 26.4 e | -- | > 46 | 8 | cyl. | plain | |
| Limon | Papal. | -- | 4 | 40 | 7 | flat.-hemis. | mold design | 27 (a) |
| Shell | Papal. | 4.7 | 4.5 | 27.5 | 7 | hemis. | asphalt-resin slip | |
| Camaron 2 | M.O-g. | 5.4 | 5 | 26 | 6 | flat.-hemis. | orange slip | 27 (e) |
| Camaron 3 | Papal. | -- | 6 | 22 e | 9 | -- | plain | |
| Limon | M.O-g. | 4.7 | 4 | 23 | 8 | hemis. | red slip, asphalt - resin band | 27 (b) |
| Limon | M.O-g. | 3.7 | 3.5 | 19.5 | 8 | cyl. and hemis. | red slip, asphalt-resin band | 27 (d) |
| Limon | M.O-g. | -- | 3-4e | 26.5e | 7 | hemis. | asphalt-resin slip | 27 (f) |
| Limon | M.O-g. | 4.7 | 5 | 23 | 10 | conical | red slip | 27 (c) |

Abbreviations: e = estimated
cyl. = cylindrical
hemis. = hemispherical
flat. = flattened
Papal. = Papaloapan Variety
M.O-g. = Mojarra Orange-grey Variety

Mojarra Orange-grey Variety 5 (Fig. 27)

*Material.* The paste is like that of Mojarra Orange-grey, variety unspecified.

*Surface.* Surfaces are well smoothed, but not polished.

*Form.* All the examples are plano-convex, although the one from Camaron 2 is almost flat on both sides (classified as flattened-hemispherical in a modification of Parsons 1972:48-49 typology).

*Decoration.* Three examples have a Roja Red slip, two of which are additionally decorated with an asphalt and resin painted band on the convex side. A fourth example is covered entirely with asphalt and resin.

*Chronology.* Camaron 2 and Limon (Table 7).

*Comment*. A series of measurements have been taken following the procedures of Parsons (1972). The first and second whorls in Table 6 fall within the distributions of Parsons' proposed maguey fiber whorls (Types I and II) on the basis of whorl diameter and weight; they fall within the distribution of the proposed cotton fiber whorls (Type III) in hole diameter. The remaining Patarata whorls fall within her cotton whorl distributions on hole diameter, whorl diameter, and weight. These distinctions suggest the spinning of principally cotton but also maguey thread at the site.

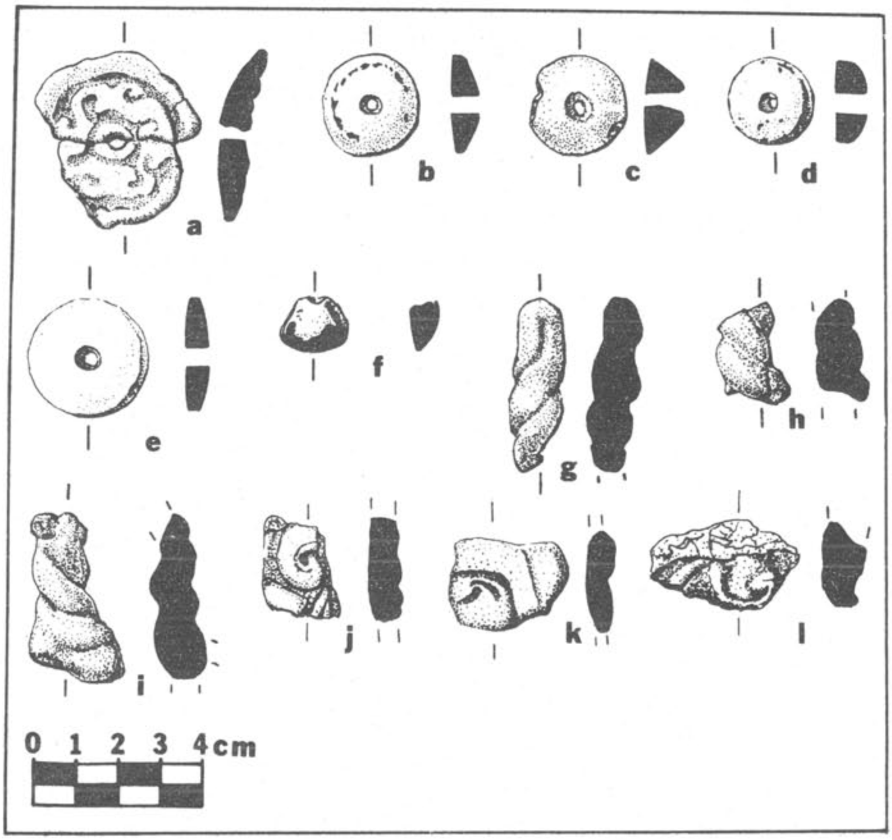



Fig. 27 Spindle Whorls, Papaloapan Variety: (a); Mojarra Orange-grey Variety: (b)-(f); Misc. Possible Figurine or Whistle Parts, Rope-like Forms: (g) Camaron 1, traces of white paint, (h) Camaron 3, (i) Limon; Pieces with Low-relief Scrolls: (j)-(l) Camaron 1, (l) traces of white paint.

Miscellaneous Possible Figurine or Whistle Parts 70

Rope-like Forms 3 (Fig. 27)

*Material*. The paste is like that of Papaloapan Plain, variety unspecified.

*Surface*. Surfaces are smoothed but not polished.

*Form*. These were probably appliqued elements. They are constructed of two strands of clay intertwined or of one strand wound around itself. One of the double stranded forms seems to sub-divide and go in two different directions at one end.

*Decoration.* One fragment bears traces of a thick white slip.

*Chronology.* Camaron 1, Camaron 3, and Limon (Table 7).

*Comment.* These are hand modeled.

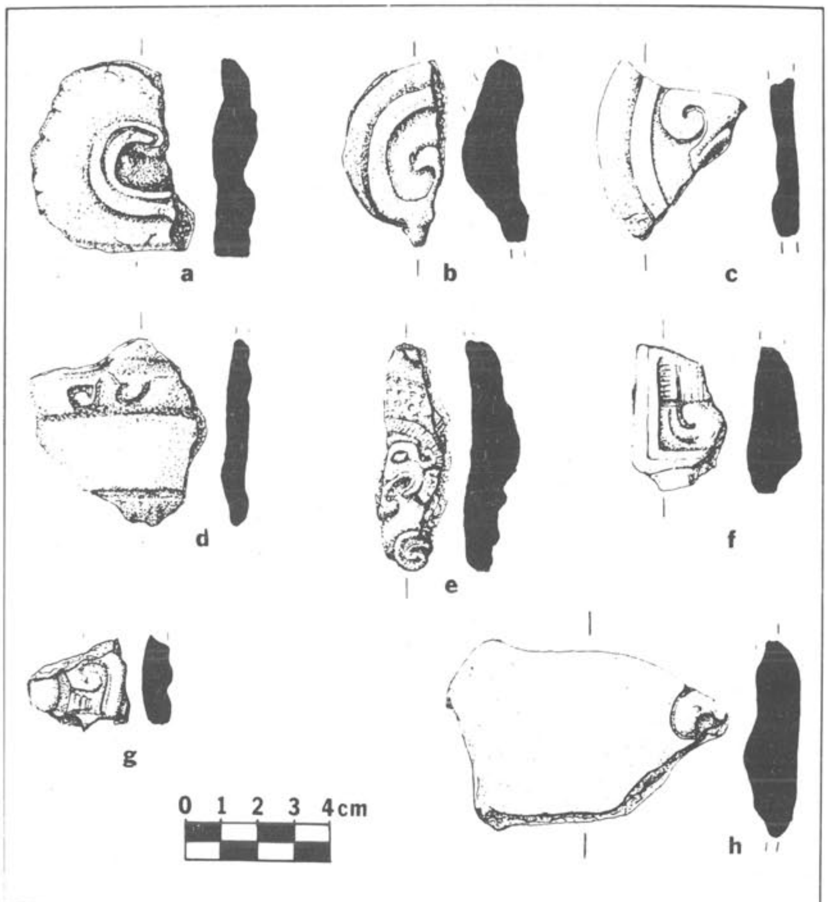



Fig. 28 Miscellaneous Possible Figurine or Whistle Parts, Pieces with Low-relief Scrolls: (a)-(h) Camaron 1, (a) and (b) traces of thick white paint.

<u>Pieces with Low-relief Scrolls</u> 11 (Fig. 27, 28)

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* On the decorated sides, surfaces are smoothed but not polished; the obverse sides are poorly smoothed.

*Form.* The fragments are variable. Some seem to be scroll decorations on waist bands or clothing. Others are apparently part of applique pieces, perhaps a disk in one instance. All were to be seen from one side only.

*Decoration.* Scrolls are in low relief, sometimes with one or two incised lines following the scroll contour. Two instances also have sets of parallel incised lines.

*Chronology.* Camaron 1 (Table 7).

*Comment.* These scroll designs fit in the Patarata scroll style.

<u>Pieces with Parallel Incised Lines</u> 8 (Fig. 29)

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

*Form.* All are flat, solid flanges, apparently attached at their bases. Ends are sub-rectangular or oval with two exceptions: one terminates in prongs, another, in two out-curving ends. The pieces are meant to be seen from one side only.

*Decoration.* Three bear traces of thick white paint.

*Chronology.* Camaron 1 and 2 (Table 7).

*Comment.* All were mold-made, with incised lines added by hand in some cases. Some may represent plume stalks, possibly parts of headdresses. One or two of the small specimens could be figurine feet, with incisions marking the toes.

<u>Pieces with Incised Lines</u> 13

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

*Form.* Form is variable. The pieces are meant to be seen from one side only.

*Decoration.* Five specimens have remnants of thick white paint, in one case combined with reddish-brown paint. One fragment has traces of Acula Red-orange colored paint.

*Chronology.* Camaron 1, 2, and 3 (Table 7).

*Comment.* All were mold-made. In two instances appliques were added, a small piece of clay in one case and a clay strip in another.

Round Applique Pieces    5

*Material.* Paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but rather irregular, not polished.

*Form.* Form is variable. The pieces are meant to be seen from one side only.

*Decoration.* Punctations and incisions decorate some specimens. Two have remnants of thick white paint.

*Chronology.* Camaron 2, 3, and Limon (Table 7).

*Comment.* The pieces seem to be hand modeled. Two could be ear plugs from figurines.

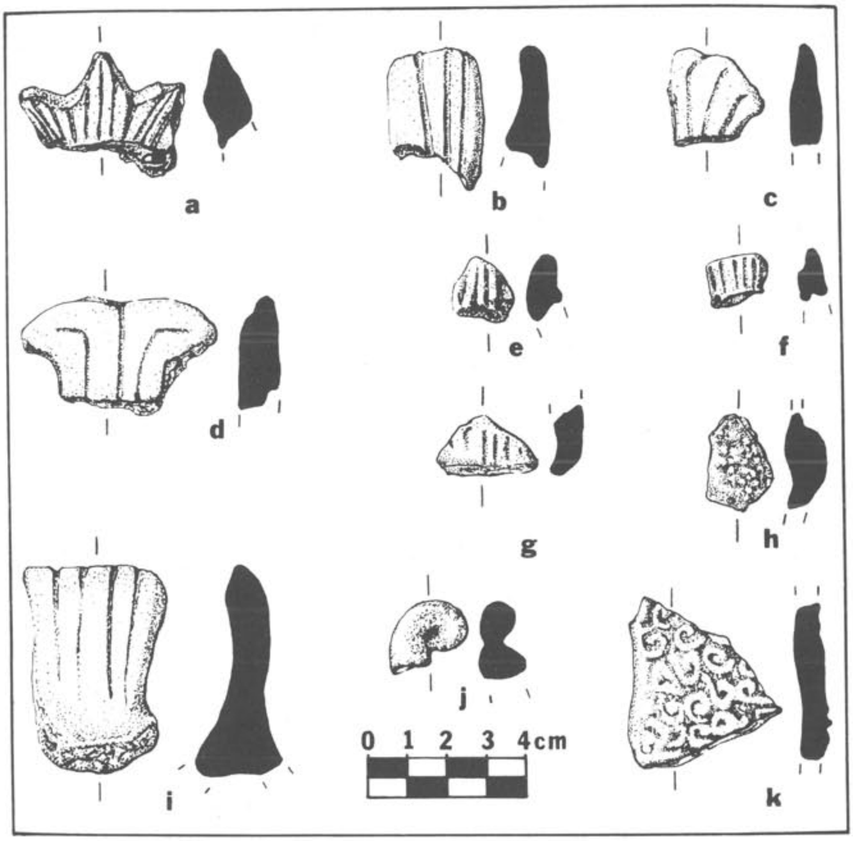



Fig. 29 Miscellaneous Possible Figurine or Whistle Parts, Pieces with Parallel Incised Lines: (a) Camaron 1, traces of thick white paint, (b) Camaron 2, (c) Camaron 1, (d) Camaron 1, traces of thick white paint, (e) Camaron 1, (f) Camaron 2, traces of thick white paint, (g) Camaron 1; Miscellaneous Possible Figurine or Whistle Parts, Miscellaneous, Prieto Variety: (h) shell deposit, (i) Camaron 2, (j) shell deposit, (k) Camaron 3.

Fragments with Holes 9

*Material.* Paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed, not polished, often irregular and lumpy.

*Form.* All the fragments have a small hole (approximately .5 cm in diameter pushed through them while the clay was wet.

*Decoration.* All the pieces are now plain, unslipped.

*Chronology.* Camaron 1, 2, and 3 (Table 7).

*Comment.* These pieces seem to have been hand-shaped. They are probably parts of hollow ceramic figurines which have perforations in the body to facilitate successful firing.

Miscellaneous 21

Papaloapan Variety 13 (Fig. 30)

*Material.* The paste is like Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished.

*Form.* One example could be part of a hollow figurine head. Another may represent a waistband. However, these determinations are not secure enough to place the fragments in those categories. There are two perforated pottery loops. Otherwise, forms are highly variable. Aside from the loops, the pieces are meant to be seen from one side only.

*Decoration.* Seven pieces have remnants of thick white paint. One also has remnants of Acula Red-orange colored paint over the white.

*Chronology.* Camaron 2, 3, and Limon (Table 7).

*Comment.* The thicker pottery loop, the trident shaped, solid cylinder, and the set of three parallel solid clay strips appear to be hand modeled. The rest are mold-made.

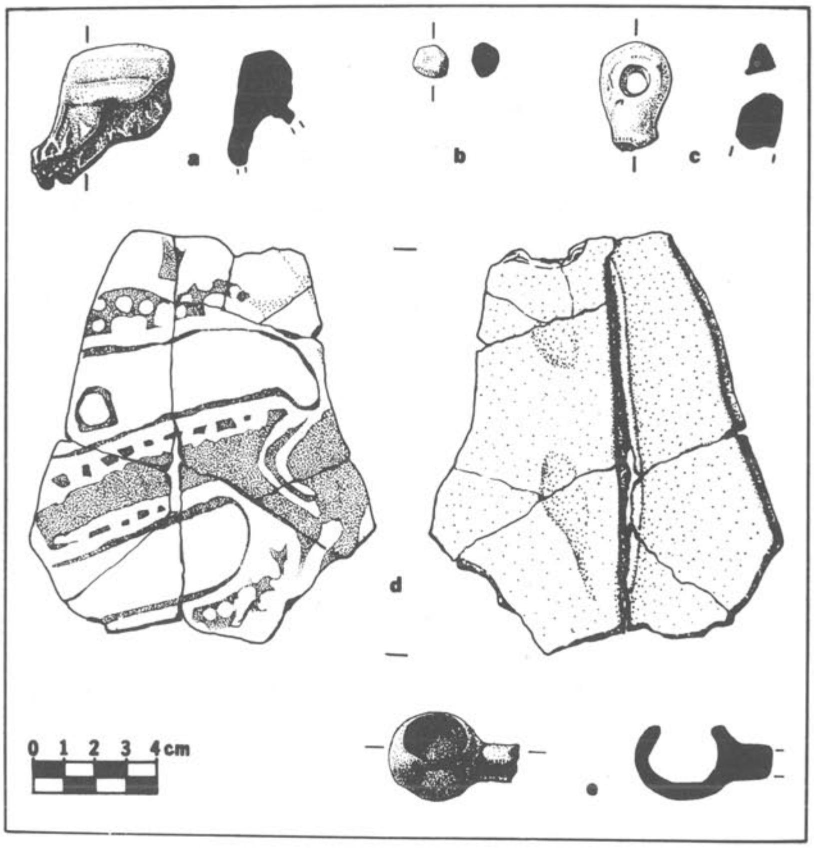



Fig. 30 Miscellaneous Possible Figurine or Whistle Parts, Miscellaneous, Papaloapan Variety: (a) Camaron 3, traces of thick white paint, (c) Camaron 3; Clay Pellet, Papaloapan Variety: (b) Camaron 3; Sherd Abrader (Caliapan Resist, Brown-and-Light Variety): (d) Camaron 1; Dipper (?): (e) Limon.

Prieto Variety 4 (Fig. 29)

*Material*. The paste is like Prieto Grey-black, variety unspecified.

*Surface*. Surfaces are smoothed, but not polished.

*Form*. Form is variable. Three pieces have low-relief patterns, two of closely spaced bumps, one with raised tendrils arranged randomly in circular, hooked, and scroll forms. A fourth piece is a solid curled tail (?).

*Decoration.* Surfaces are plain, unslipped.

*Chronology.* Camaron 2, 3 and the shell deposit (Table 7).

*Comment.* All but the "tail" are mold-made, meant to be seen from one side only. Except for the "tail", they could be parts of hollow figurines.

*Comparative.* The fragment with low-relief curvilinear forms is possibly part of a Papaloapan Punctate Smiling Figurine (see Figurine Heads, Prieto Variety, Face 1).

<u>Mojarra Orange-grey Variety</u> 3

*Material.* The paste is like that of Mojarra Orange-grey, variety unspecified.

*Surface.* Surfaces are smoothed, not polished.

*Form.* Form is variable. Low-relief patterns are located on one side only; the obverses appear to be the interiors of hollow figurines (?).

*Decoration.* All three bear traces of thick white paint.

*Chronology.* Camaron 2 and Limon (Table 7).

*Comment.* All are mold-made.

<u>Tanare White Variety</u> 1

*Material.* The paste is like Tanare White, variety unspecified.

*Surface.* The surface is smoothed but not polished.

*Form.* The solid fragment looks like a small mushroom; it may be an applique piece since it was either attached or broken on the bottom.

*Decoration.* The surface is now plain, unslipped.

*Chronology.* Limon (Table 7).

*Comment.* The piece is hand modeled.

## Clay Pellets 28

<u>Papaloapan Variety</u> 26 (Fig. 30)

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but irregular, not polished.

*Form.* The pellets range from .8 to 1.5 cm in diameter. They are irregularly spherical.

*Decoration.* Surfaces are plain, unslipped.

*Chronology.* Camaron 2, 3, Limon, and the shell deposit. The majority are from Camaron 3 (Table 7).

*Comment.* The pellets are hand modeled. They were probably rattles in hollow vessel supports, which are documented in the Patarata collection. Alternatively they could have been parts of simple rattles, which are not documented for Patarata.

Mojarra Orange-grey Variety 2

*Material.* The paste is like that of Mojarra Orange-grey, variety unspecified.

*Surface.* Surfaces are smoothed but irregular, not polished.

*Form.* See Papaloapan Variety.

*Decoration.* See Papaloapan Variety.

*Chronology.* Limon (Table 7).

*Comment.* See Papaloapan Variety.

Sherd Abrader 1 (Fig. 30)

*Material.* The paste is like that of Caliapan Resist, Brown and Light Variety.

*Surface.* The interior surface is well smoothed, not polished. The exterior is more irregular.

*Form.* The sherd was a flat basal sherd, decorated on the interior. The exterior of the base was enriched in temper on its surface, as if the vessel had been set in sand while the clay was wet. Three edges of the sherd were ground and smoothed. The other edge is now broken. The base exterior was used as an abrader. There is one long, deep channel that nearly cuts through the sherd. Two other areas have shallow, broader, irregular depressions.

*Decoration.* The interior surface has an abstract dotted and banded design, in keeping with Caliapan Resist decorations.

*Chronology.* Camaron 1 (Table 7).

*Comment.* The abrading channel could have been used on bone tools like awls.

| Table 7. Miscellaneous Ceramic Artifacts | PROVENIENCE | | | | | |
|---|---|---|---|---|---|---|
| ARTIFACT | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Total |
| Ear Plugs | | | | | | |
| Plain | | 4 | 2 | | | 6 |
| Incised | 1 | | | | | 1 |
| Painted | | 1 | | 1 | | 2 |
| TOTAL | 1 | 5 | 2 | 1 | | 9 |
| Beads | | | | | | |
| Spherical | | | | | | |
| Plain | 22 | 25 | 12 | 1 | | 60 |
| Red on White | 1 | 1 | | | | 2 |
| White | | | 1 | | | 1 |
| Grooved | 1 | | 1 | | | 2 |
| Cylindrical | | | | | | |
| Plain | | 6 | | 2 | | 8 |
| TOTAL | 24 | 32 | 14 | 2 | 1 | 73 |
| Roller Stamps TOTAL | | | 2 | | | 2 |
| Worked Sherds | | | | | | |
| Mojarra Orange-grey, var. unspec. | 1 | | | | | 1 |
| Prieto Grey-black, var. unspec. | | | 1 | | | 1 |
| Acula, Red-orange, Monochrome Var. | | 2 | | | | 2 |
| Roja Red, var. unspec. | | | | | 1 | 1 |
| TOTAL | 1 | 2 | 1 | | 1 | 5 |
| Spindle Whorls | | | | | | |
| Papaloapan Variety | | | | | | |
| Flat | | | | | | |
| Plain | | 1 | | | | 1 |
| Plano-convex | | | | | | |
| Acula Red-orange | | | 1 | | | 1 |
| Asphalt and Resin | | | | | 1 | 1 |
| Relief Design | | | | 1 | | 1 |
| Mojarra Orange-grey Variety | | | | | | |
| Plano-convex | | | | | | |
| Plain | | 1 | | | | 1 |
| Roja Red | | | | 3 | | 3 |
| Asphalt and Resin | | | | 1 | | 1 |
| Miscellaneous Possible Figurine or Whistle Parts | | | | | | |
| Rope-like Forms | 1 | | 1 | 1 | | 3 |
| Pieces with Low-relief Scrolls | 11 | | | | | 11 |
| Pieces with Parallel Incised Lines | 5 | 3 | | | | 8 |
| Pieces with Incised Lines | 4 | 7 | 2 | | | 13 |
| Round Applique Pieces | | 3 | 1 | 1 | | 5 |
| Fragments with Holes | 3 | 3 | 3 | | | 9 |
| Miscellaneous | | | | | | |
| Papaloapan Variety | | 1 | 9 | 3 | | 13 |
| Prieto Variety | | 1 | 1 | | 2 | 4 |
| Mojarra Orange-grey Variety | | 1 | | 2 | | 3 |
| Tanare White Variety | | | | 1 | | 1 |
| TOTAL | 24 | 19 | 17 | 8 | 2 | 70 |
| Clay Pellets | | | | | | |
| Papaloapan Variety | | 1 | 17 | 6 | 2 | 26 |
| Mojarra Orange-grey Variety | | | | 2 | | 2 |
| TOTAL | | 1 | 17 | 8 | 2 | 28 |
| Sherd Abrader TOTAL | 1 | | | | | 1 |
| Dipper TOTAL | | | | 1 | | 1 |

## Dipper(?) 1 (Fig. 30)

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are well-smoothed, not polished.

*Form.* This appears to be a small dipper with a slightly constricted mouth and a straight, solid handle.

*Decoration.* The surface is plain, unslipped.

*Chronology.* Limon (Table 7).

*Comment.* The dipper is hand modeled.

## Summary of Miscellaneous Ceramics

Miscellaneous ceramics are made from the same pastes as Patarata pottery. Varied functions are indicated by these 198 artifacts. Ear plugs were presumably decorative. I doubt that ceramic ear plugs were particularly costly, and therefore probably are not indicative of special rank or wealth. Ceramic beads may have been decorative, but also could have served as net weights. Roller stamps probably served to paint designs on skin or cloth. The function of the worked sherds is unknown. Seven spindle whorls are appropriately sized for cotton fiber, and two, for maguey. Although spinning at the site could have used cotton produced on levees or site land in the estuarine area, it seems likely that some of it was imported from farmlands better suited to more extensive cropping. A number of ceramic fragments are probably small pieces from figurines, whistles, or perhaps incensarios. Clay pellets probably came from hollow vessel supports, some of which still had clay balls inside; rattles could be another source of pellets, but no rattles are definitely known from Patarata. A sherd abrader from the site may have been used in smoothing bone tools. One small ceramic dipper (?) was recovered.

The miscellaneous ceramics give three kinds of evidence to the ecological study: (1) some fragments, possibly derived from figurines or whistles, have scroll designs consistent with the Patarata scroll style, (2) perishable fiber spinning is documented and the question of fiber importation is raised, and (3) local manufacture of bone tools is suggested (this will be augmented with data on bone artifacts themselves). This evidence for local activities, exchanges, and communications will be discussed in the final chapter.

## WHISTLES AND FLUTES

### Whistles 23

Globular-bodied Whistles 8, 1 possible

Papaloapan Variety 6 (Fig. 31)

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces have been smoothed but not polished; they are rather uneven and lumpy.

*Form.* Except in one case, the bodies are incomplete but appear to have had a globular form. The mouthpiece is preserved in four cases and takes the shape of a tubular shaft. The air outlet is located on the top side of the whistle. The two most intact examples have a solid cylindrical projection extending down from the body of the whistle; this cylindrical tube probably formed a handle.

*Decoration.* Three cases show an applique strip (or the marks where one was located) running horizontally around the whistle body. One whistle bears remnants of an Acula Red-orange, Monochrome Variety, slip on the surface.

*Chronology.* No whistles of this variety that definitely have a globular form occur later than Camaron 2(Table 8). Nevertheless, some of the indeterminate whistle mouthpieces from later deposits could have been part of a globular-bodied whistles. (See Tubular Whistle Mouthpieces, Papaloapan Variety.)

*Comment.* All of the whistles were modeled by hand.

*Comparative.* No whistles closely resembling these have been reported from Veracruz. Drucker (1943b:plate 41, l,n,o,p) illustrates plain, globular-bodied whistles of San Marcos mold-made ware from a purchase collection, presumably relating to his Upper Tres Zapotes phase. The "n" specimen is in the size range of the Patarata examples. Less similar globular-bodied whistles occur also. Weiant (1943:plate 48, 2) illustrates a globular-bodied bird effigy whistle from Tres Zapotes. Drucker (1943a:plate 57, top row; 75) illustrates a double globular whistle from Lower II deposits at Cerro de las Mesas. At Tres Zapotes a whistle of a different paste (Weiant 1943:plate 47, 1; 108) has a tear drop shape and is made from cream, pink or orange colored clay, which may be comparable to the Mojarra Orange-grey Variety globular whistles at Patarata. Batres (1908:lam.40, fig. 1) illustrates a globular bird effigy whistle which resembles some of the Patarata examples in its applique attachments; however, it does not have a tubular mouthpiece.

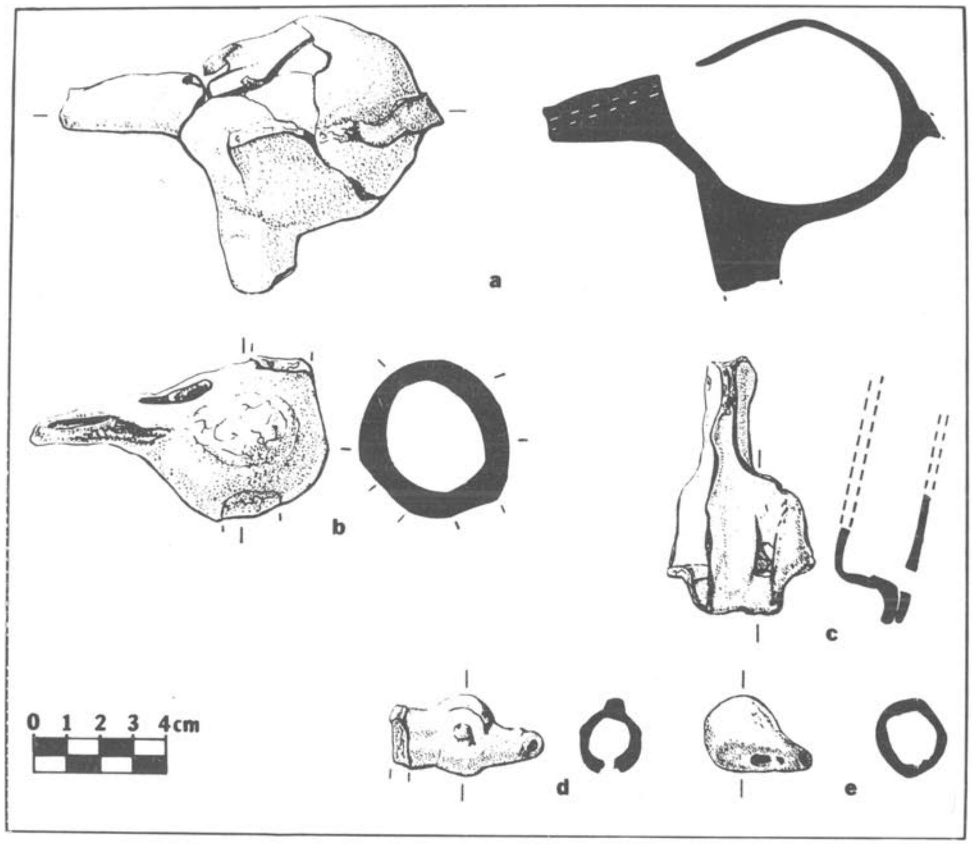



Fig. 31 Globular-bodied Whistle, Papaloapan Variety: (a) Camaron 1; Mojarra Coarse Variety: (b) Camaron 1, possible bird effigy; Mojarra Orange-grey Variety: (e) Limon; Multiple Recorder Flute: (c) Camaron 3; Zoomorphic Whistle, Papaloapan Variety: (d) Camaron 3.

Mojarra Coarse Variety 1, 1 possible (Fig. 31)

*Material*. The paste is like that of Mojarra Orange-grey, Coarse Variety. Both whistles have thick black cores and vary from buff to grey in surface color.

*Surface*. Surfaces are like those for the Papaloapan Variety of Globular-bodied Whistles, although temper is larger and more protuberant on the surface.

*Form*. The nearly complete example is smaller than the Papaloapan Variety whistles (Fig. 31, b). The mouthpiece is a flat sub-rectangular flange. The applique marks on this whistle could be interpreted as representing a bird, i.e., head, wings, and feet attachments.

*Decoration*. The whistle is plain and unslipped.

*Chronology.* Limon (Table 8).

*Comment.* The whistle was hand modeled.

*Comparative.* See Papaloapan Variety, Comparative.

Zoomorphic Whistle 1

Papaloapan Variety 1 (Fig. 31)

*Material.* The paste is like that for Papaloapan Plain, variety unspecified.

*Surface.* The whistle is well-smoothed, not polished.

*Form.* It has a tubular mouthpiece representing a bird's beak; the whistle chamber is a bird's head with the air outlet on the underside. The whistle is attached to a small rim sherd with a slightly concave interior surface.

*Decoration.* Clay appliques mark the eyes, nose, and crest of the bird. Dabs of asphalt and resin paint were placed near each eye and at either end of the crest.

*Chronology.* Camaron 3 (Table 8).

*Comment.* The whistle was hand modeled.

*Comparative.* A somewhat similar bird-effigy whistle is illustrated by Weiant (1943:plate 48, 7) for Tres Zapotes.

Tubular Whistle Mouthpieces 10

Papaloapan Variety 8

*Material.* The paste is like that of Papaloapan Plain, variety unspecified.

*Surface.* Surfaces are smoothed but not polished. They tend to be slightly uneven.

*Form.* Five of the mouthpieces are tubular in form, and lack any of the attached whistle body. Three others vary in the nature of the attached fragmentary bodies. One specimen has a small whistle chamber attached to a flat clay surface. Another mouthpiece attaches to a whistle chamber that extends downward nearly at right angles to the whistle. A third case has a fragmentary, small, curved, whistle chamber. On the latter chamber there is a mark where either a circular applique rested or a solid tubular attachment could have broken off.

*Decoration* One mouthpiece was slipped like Acula Red-orange, Monochrome Variety. Another has remnants of a thick white slip. The remainder are plain and unslipped.

*Chronology.* Camaron 2, 3 and Limon (Table 8).

*Comment*. The whistles are hand modeled.

Mojarra Coarse Variety 1

*Material*. The paste is like that of Mojarra Orange-grey, Coarse Variety. The core is black with the exterior fired to a buff color.

*Surface*. The surface is smoothed, not polished, slightly lumpy.

*Form*. The mouthpiece is tubular, broken off from the whistle body.

*Chronology*. Camaron 3 (Table 8).

*Comment*. The mouthpiece was hand modeled.

Mojarra Orange-grey Variety 1

*Material*. The paste is like that of Mojarra Orange-grey variety unspecified.

*Surface*. The surface is smoothed, not polished, rather uneven and lumpy.

*Form*. The mouthpiece consists of a solid shaft overlain by a small piece of clay. The airhole runs between the shaft and the overlaying piece of clay. The solid shaft flares at the end where it has a small, raised square on the end.

*Decoration*. Encircling the raised square on the end of the mouthpiece are remnants of asphalt and resin paint.

*Chronology*. Limon (Table 8).

*Comment*. The mouthpiece was hand modeled.

### Miscellaneous Fragmentary Whistles 3

Papaloapan Variety 2

*Material*. The paste is like that of Papaloapan Plain, variety unspecified.

*Surface*. Surfaces are smoothed but not polished.

*Form*. Form is variable. One example may be part of a mold-made figurine. The whistle mouthpiece may represent an arm, with part of the shoulder and necklace remaining on the whistle chamber. A second mouthpiece and whistle chamber are too fragmentary to reveal the whistle form. Part of a low-relief mold-made design remains on the front of the whistle; the back is plain and relatively flat.

*Decoration*. Traces of red pigment remain near a low-relief, curling shape on the front of the latter whistle. Otherwise surfaces on both of the fragments are now plain and unslipped.

*Chronology.* Camaron 3 and Limon (Table 8).

*Comment.* Both whistles were mold-made.

Acula Variety 1

*Material.* The paste is like that of Acula Red-orange, Monochrome Variety.

*Surface.* Surfaces are well-smoothed but not polished.

*Form.* The form is indeterminate. It contains both hollow and solid tubular parts.

*Decoration.* The surface bears an Acula Red-orange, Monochrome Variety, slip.

*Chronology.* Camaron 2 (Table 8).

*Comment.* The "front" part of the whistle seems to have been mold-made. A solid tubular piece on the back could be a hand modeled addition.

Multiple Recorder Flute 1 possible (Fig. 31)

Mojarra Orange-grey Variety 1 possible

*Material.* The paste is like that of Mojarra Orange-grey, variety unspecified.

*Surface.* Surfaces are well smoothed but not polished.

*Form.* The instrument had at least two air chambers, probably belonging to recorder type flutes, although no holes show on the intact part of the air chambers. Each flute had a separate, ducted mouthpiece.

*Decoration.* Traces of a thick white slip remain.

*Chronology.* Limon (Table 8).

*Comment.* The striations on the interiors of the air chambers suggest they may have been formed around peeled sticks or that sticks were used to make the interiors even.

*Comparative.* Franco (1971:19) discusses recorder flutes and multiple flutes in Veracruz. Weiant (1943:plate 53, 13) illustrates a panpipe from Tres Zapotes made from Pink and Yellow Ware (Weiant 1943:110) which is characteristic of Upper Tres Zapotes. He (1943:plate 53, 14) also illustrates a single recorder flute.

Table 8. Whistles and Flutes

| ARTIFACTS | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Total |
|---|---|---|---|---|---|
| | PROVENIENCE | | | | |
| Globular-bodied Whistles | | | | | |
| Papaloapan Variety | | | | | |
| Plain | 5 | | | | 5 |
| Acula Red-orange | | 1 | | | 1 |
| Mojarra Coarse Variety | | | | | |
| Plain | 1 | | | | 1 |
| Acula Red-orange | | 1P | | | 1P |
| Mojarra Orange-grey Variety | | | | | |
| Plain | | | | 1 | 1 |
| Zoomorphic Whistle | | | | | |
| Papaloapan Variety | | | | | |
| Acula Red-orange | | | 1 | | 1 |
| Tubular Whistle Mouthpieces | | | | | |
| Papaloapan Variety | | | | | |
| Plain | | 1 | 2 | 3 | 6 |
| Acula Red-orange | | | 1 | | 1 |
| White | | | | 1 | 1 |
| Mojarra Coarse Variety | | | | | |
| Plain | | | 1 | | 1 |
| Mojarra Orange-grey Variety | | | | | |
| Plain | | | | 1 | 1 |
| Miscellaneous Fragmentary Whistles | | | | | |
| Papaloapan Variety | | | | | |
| Plain | | | 1 | 1 | 2 |
| Acula Variety | | | | | |
| Acula Red-orange | | 1 | | | 1 |
| Multiple Recorder Flute | | | | | |
| Mojarra Orange-grey Variety | | | | | |
| White | | | | 1 | 1 |
| TOTAL | 6 | 3,1P | 6 | 8 | 23,1P |

# CHIPPED STONE ARTIFACTS

## Introduction

Lithic tools from the site will be discussed in some detail because of their value for understanding subsistence activities. For example, stone grinding tools can indicate the use of plant foods such as corn even if flora is not preserved. Potentially, changes in stone tools can be used to establish chronology, but the Patarata sequence is not sub-divided as well by lithic changes as by pottery.

Most of the stone artifacts from the excavation were fine obsidian blades (664), some of which either were retouched or were made into tool types. A small number of obsidian flakes (35) and one chert blade tool were recovered. These artifacts will be discussed in the following categories: (a) obsidian blades: unretouched, retouched, blade core and ridge blades, notched blades, burins, graver-perforators, truncated blades, scraper, projectile points, denticulates, combination tools, and miscellaneous, (b) chert blade: endscraper, and (c) obsidian flakes: unretouched, retouched, scraper, and notched.

Distribution Tables 11 and 12 and Figure 34 include the occurrence of stone tools in the collapsed material and in the shell deposit. As previously explained, the shell deposit probably contains a mixture of Limon and modern material. The collapsed material is mainly from the upper part of the sequence, including the shell deposit, Limon, and Camaron 3, with a small amount of material from Camaron 2. The inclusion of the shell deposit is particularly helpful in supplementing the Limon sample, and the collapsed material helps to supplement the upper part of the sequence. With larger samples, these problematic provenience units could be excluded, but I feel they are useful in the present circumstance.

Beside each artifact heading I will give a total plus a separate total for possible examples, the latter being specimens which appear to belong in the category but are sufficiently fragmentary or aberrant to raise some doubt about the assignment. Next will be the number of these two combined that included a bulb of percussion. The bulbar number will be labeled B on tables; P is the label for a possible occurrence of a category. In some instances blade or flake fragments occurred and will be so indicated. Instances of a tool type which occur in combination with other tools will also be noted, but combination tools will be considered as a category in their own right, and their chronological placement will be noted separately.

## Comment on Typology

I have tried to make this typology consistent with that used by R.S. MacNeish _et al._ (1967) in their treatment of stone artifacts from the Tehuacan _Valley_. The categories used here are basically formal, but I have also paid attention to wear patterns in establishing and modifying the typology. The principle divergence in my typology is due to elaboration of categories of blades and blade tools.

My blade typology can be coordinated in many instances with another recent one, based on material from Central Mexico (Tolstoy 1971). Tolstoy (1971:275-276) divides blades into the sub-divisions of blades, macro-blades (exceeding 2.5 cm in width), truncated blades, blades with a convex retouched end, pointed blades, pointed macro-blades, burins on blades, and other. The Patarata sequence contains no macro-blades. A brief comparison of the other categories follows.

Tolstoy's unmodified blades correspond to my category of unretouched blades. Patarata blades with one or two retouched edges would overlap Tolstoy's categories of straight and of broadly concave edge retouch; the latter is extremely rare in the Patarata collection. There are no Amantla blades from Patarata. My notched blades correspond to Tolstoy's notched blades and to his truncated blades with a concave end. Patarata denticulates would overlap Tolstoy's scalloped blades and Chiconautla blades. Tolstoy (1971:287, Fig. 4) also discusses a single denticulate, but I infer that it is not made on a blade. Truncated blades in the Patarata sequence probably correspond to Tolstoy's truncated blades with square retouched ends, possibly to some truncated blades with diagonal retouched ends (but some of the latter could correspond to my diagonally backed blades), or to blades with a convex retouched end. Both Tolstoy's crude, end-of-blade scrapers and the well-made end-of-blade scrapers are, as illustrated, much larger than the fine blades in the Patarata collection. Possibly they are made on macro-blades or on thick, crude blades. It is unlikely that the scraper categories are comparable to any of the Patarata truncated blades or scrapers except the chert blade scraper. Tula points at Patarata may correspond to some of Tolstoy's blades with perforator ends made with two retouched edges or with alternate beveling. The Tula points appear to less closely resemble Tolstoy's (1971:281) uniface stemmed and short uniface points made on blades. Patarata burins compare with Tolstoy's burins on blades. The Patarata graver-perforator category is difficult to compare with Tolstoy's typology. Very likely it would compare to some of Tolstoy's end retouched blades, such as truncated blades with diagonally retouched end, and his gravers.

As the analysis of Patarata obsidians progressed, it became apparent that a critical source of functional information, the wear patterns, did not correlate well with formal types--although denticulates, for example, did tend to have distinctive wear. The variable placement and types of striation wear, the variability in retouch modes and tool "types," and the presence of additional variables such as blade size, platform type, and provenience, makes a statistical attribute study of the collection a more desirable approach than the formal typology employed here. Therefore the present analysis is offered as an interim statement until reanalysis of the collection can attempt a different and hopefully more informative classification. Because blade analysis is underdeveloped in Mesoamerican studies, it is hoped that the preliminary Patarata results will stimulate additional interest.

## Terminology

I will use the following definitions with reference to the chipped stone tools:

flake: a piece of rock chipped off from another, exhibiting a bulb of percussion and a platform

blade: a flake that is twice as long from bulbar end to distal end as it is wide; a segment of such a flake which has its two edges intact

flake fragment: a small piece of a flake

blade fragment: a section of a blade which lacks two longitudinal edges

edge: one of the two longitudinal thin perimeters of a blade; any thin border of a flake, flake fragment, or blade fragment;

end: an edge transecting the longitudinal axis of a blade or flake

snapped end: the end of a blade or flake that is produced by breaking it across the longitudinal axis

distal end: the end of a blade or flake that is opposite the bulb of percussion

original distal end: the usually rounded distal end produced in blade manufacture; the distal end produced in flake manufacture

simple prepared blade platform: a flat surface at the bulbar end at approximately right angles to the length of the blade, extending across the end of the blade

pointed blade platform: as above, except the blade end tapers to a restricted area to form the platform; that is, the blade end comes to a flattened point to form the platform

ground blade platform: similar to a simple platform except the platform surface has been abraded or crushed, giving a grainy texture; my examples did not suggest how the ground surface was achieved; no grinding striations were evident

wear: alteration of the surface of a blade or flake probably due to use

retouch: very small flake scars on an edge or end of a blade or flake, adjoining each other along a section of that edge or end; they are of a regular size; very fine retouch could be deliberate or incidental to use which involved appropriate steady pressure producing regular flakes

use flaking: very small flake scars on an edge or end of a blade or flake or other stone tool, seldom adjoining each other, and of variable size

backing: steep, nearly vertical retouch that blunts a blade or flake edge .

## Blade and Flake Sizes

The obsidian blades have the following size range: width, .3 to 1.8 cm, length, up to 10.4 cm, and thickness, .1 to .4 cm. Smaller blades are more characteristic later in the sequence (see Unretouched Blades, Form, Table 9). Most of the obsidian blades had been snapped, possibly deliberately, so that no meaningful maximum for length could be determined. The chert blade was thicker than the obsidian blades, .75 cm. Its original length could not be determined. It had been retouched along both edges, and therefore its original width was greater than 1.8 cm. The dimensions of the flakes will be discussed under their respective categories because they are quite variable.

## Platforms

Platforms on the bulbar ends of blades and flakes were intact in all but 17 of the 171 cases of bulbar ends. 109 and 1 possible case were simple prepared blade platforms (called unprepared platforms by MacNeish _et al._ 1967; here I am following Hester, Jack, and Heizer 1971:74, 87), 12 were simple prepared flake platforms, 11 and 1 possible were pointed blade platforms, 11 and 1 possible were ground blade platforms, and 2 were indeterminable platforms, comprising one flake and one blade.

Of the kinds of platforms, only one suggested temporal patterning. Two of the pointed platforms occurred in Camaron 2, 1 in Camaron 3, 6 in Limon, and 2, 1 possible were among the collapsed material; therefore, they may be more characteristic of late Camaron and especially the Limon phase. Otherwise there is no temporal patterning for the kinds of platforms in the Patarata sequence. Ground platforms are generally considered particularly characteristic of the Postclassic (MacNeish _et al._ 1967:18; Tolstoy 1971:274), but they also occur in the Classic as is evident at Patarata.

## Striation Wear on Obsidian Blades

I have observed three major kinds of striation wear patterns on the obsidian blades:

scraper wear: consists of very short striations occurring on the ventral side at the blade end; these striations are more or less aligned with the long axis of the blade; dulling at the edge of the blade often accompanies the striations

saw wear: is located along the edges of blades on the dorsal and/or ventral sides; the striations are relatively long, aligned parallel to the long axis of the blade

slicing wear: is also located along edges, either ventrally or dorsally; the striations have a variety of angles to the blade edge, but all lie on lines intersecting it; I have considered slicing striations to be only those which intersect the edge or are located near it; similar striations located on the dorsal ridges of the blade or occurring on the ventral midline of the blade have been disregarded

> because of the greater possibility that they were caused by ground wear after the blade was discarded or by bag wear after the blade was collected.

Other more specific kinds of wear striations will be discussed in conjunction with their associated tool type. These wear striations are all distinct from fracture shear lines or lateral fissures produced on the blades when they are struck off (Sheets 1973). Except for scraper wear, the striations are not limited to 1-2 mm of the edge, which would otherwise suggest edge blunting or strengthening as a manufacturing technique. Moreover, the striation patterns can occur independently of retouched edges. Saw wear in particular extends into flake scars, indicating that it occurred subsequent to retouch. The striations are not associated with biface manufacture, and there is no indication that they are a product of manufacturing techniques as opposed to use (cf. Sheets 1973).

## Obsidian Blades

Unretouched Blades    369 (93 bulbar), 21 fragments (1 bulbar)

*Surface.* Most of the unretouched blades show possible use flaking along the edges and often on the original distal end, but less frequently on snapped ends. Scraper wear occurred on 15 of the unretouched blades. However, saw wear was the most common kind of wear striation, with 93 instances; 79 cases of slicing wear occurred. 47 blades had various combinations of saw, slicing, or scraper striations, indicating that many of the blades were used in a variety of ways. Nevertheless, most blades had no use striations; 208 were noted.

*Form.* In general, the upper part of the sequence has a relative increase in the number of smaller blades. The definition of microblades as those between .3 and .5 cm in width is an arbitrary means of showing this size shift. 11 unretouched microblades occurred (Table 9). Their function is not clear. Only one shows wear striations, a slight amount of saw wear.

Table 9. Microblades

| | PROVENIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| ARTIFACT | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
| Microblades | | | 5(1B) | 4 | | 2 | 11(1B) |
| Microblade with 1 retouched edge | | | 1 | | | 1 | 2 |
| TOTAL | | | 6(1B) | 4 | | 3 | 13(1B) |

*Chronology.* The relative frequency of unretouched blades is fairly constant throughout the sequence. As noted under "Form", blades tend to become smaller later in the sequence (Tables 9, 10, 11). There is a slight decline in scraper wear on the unretouched blades between the Camaron and Limon phases, which is paralleled by a drop in the number of truncated blades as special tools (many truncated blades have scraper wear). In the Camaron 1 phase, scraper wear striations do not appear on unretouched blades; in Camaron 2 they appear on 10 percent; in Camaron 3, on 7 percent; in Limon, on 1 percent; in the shell deposit, on none of the unretouched blades; and in the collapsed material, on 4 percent.

*Comment*. Among the blades with saw wear there are seven which have heavy saw wear. Heavy saw wear is characteristic of denticulates, and its occurrence on a few unretouched blades suggests that the formal typology is not a thorough guide to actual tool use. It is reasonable to encounter this in the case of obsidian blades, which are versatile tools even without retouch.

Retouched Blades 125 (28 bulbar), 3 fragments (Fig. 32)

*Surface*. Striation wear on the edges of the retouched blades included 69 instances of saw wear, 49 of slicing wear, and 8 of scraper wear; there were 38 without wear striations. Some blades had more than one kind of wear striation. As with unretouched blades, saw wear was the most common. Also paralleling the pattern in unretouched blades, most cases of scraper wear occurred in the Camaron phase. Among retouched blades only 30 percent showed no wear striations; the retouched blades were therefore more heavily utilized even though the retouch modes did not greatly alter the functional nature of the blade. Most of the retouch is very fine, and in some cases it may be caused by a regular pattern of blade use.

*Form*. This category includes some blades like those of MacNeish et al. (1967) called "fine snapped blades, two edges worked or retouched," along with additional sub-divisions. There are several modes of retouch among the blades, which will be discussed under sub-headings below. These retouch modes occurred on other tool types as well. Two microblades (see definition under Unretouched Blades, Form) occurred among the retouched blades, both retouched ventrally on one edge, with slight saw wear on the retouched edge.

Edge Retouch

The most common mode of retouch is along one or two edges of the blade. Retouched edges are relatively straight in most cases, sometimes with slight projections. Rarely do they have a slight concavity. Only one of the edge retouch blades had marked concavity of its edges (Camaron 3); this particular blade had broadly concave dorsal retouch on two edges, each retouched area extending only to the mid-point of the blade from opposite ends. Another aberrant case was a blade with one edge retouched and an unusual snap fracture which yielded a sharp hinge on the end (listed as "one edge and cutting end" in Table 12); this end was retouched or trimmed just as a cutting edge might be. With blades retouched on one edge, dorsal retouch occurred twice as often as ventral retouch; there was also a single case of dorsal and ventral bifacial retouch. Among blades retouched on two edges there were three instances where one edge had dorsal and ventral retouch, two alternating and one bifacial; the majority of the cases were dorsally retouched (18) on both edges but several had one edge dorsally retouched and the other ventrally retouched (11).

### Corner Edge Retouch

In these cases retouch is located only at the corner (i.e, near the end) of the blade edge. This retouch noticeably indents the edge of the blade at the corner. This indentation, along with the location of the retouch, distinguishes this mode of retouch from simple edge retouch. Corner edge retouch was done both dorsally and ventrally, and in one case with alternating dorsal and ventral retouch. However, dorsal retouch on the whole is more than twice as frequent as ventral retouch.

### Backing

Another mode of retouch was backing, a steep retouch that blunts the blade edge. Backing occurs either lengthwise along the blade or angling across the blade at one end. On backed blades retouch was located dorsally in six cases, ventrally, in two.

### Hinge Trim

On some blades snap hinges were trimmed by retouch.

*Chronology*. The frequency of retouched blades does not vary greatly throughout the sequence (Tables 11, 12).

*Comment*. I presume that backing retouch served to blunt the blade edge so that it could be grasped and pressed or perhaps hafted. It seems possible that corner edge retouch could facilitate hafting. Hinge trim retouch was probably to made the end of the blade even. MacNeish et al. (1967:23-25) point out that their "fine snapped blades, two edges worked or retouched" may have functioned as side blades hafted in composite blade clubs. They have lumped blades with one retouched edge with those retouched on two edges, reporting that each represented approximately half the sample. In the Tehuacan Valley these fine snapped blades with retouch occurred in greater frequencies later in the sequence. The Classic Palo Blanco phase has the maximum frequency of these tools, closely followed by the Postclassic Venta Salada phase. The main pattern is one of increase between the Preclassic Santa Maria phase on the one hand and the later Palo Blanco and Venta Salada phases on the other.

It seems a reasonable hypothesis that blades with one retouched edge would be more likely as candidates for club side blades than those retouched on two edges, assuming that it is the retouched edge that is hafted. At any rate, I separately computed relative frequencies for each in the Patarata sequence (Table 10). Along with blades retouched on one edge I have also counted blades with other kinds of retouch (one edge and cutting end, one edge backed, one edge and corner edge, one edge and double corner edge, one edge and hinge trim, and ridge blade with one retouched edge) which would not alter the possibility that they served as club side blades. Included with blades with two retouched edges are others that have additional retouch modes (two edges and hinge trim, one edge retouched and one edge backed, two edges and double corner edge). At Patarata increasing percentages are more characteristic of blades retouched on one edge than of those retouched on two edges; frequencies of the latter do not increase as much through the sequence. The pattern at Patarata is similar to that in the Tehuacan Valley: one of increasing occurrence, but with the increase evident within the Classic Period.

Table 10. Blades Retouched on One and Two Edges

(No combination tools included)

% to nearest whole percent

| | PROVENIENCE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Camaron 1 | | Camaron 2 | | Camaron 3 | | Limon | | Shell Deposit | | Collapse | |
| ARTIFACT | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Blades with one edge retouched | 1 | 2 | 6 | 5 | 12 | 8 | 20 | 8 | 8 | 16 | 11 | 11 |
| Blades with two edges retouched | 3 | 7 | 6 | 5 | 8 | 5 | 10 | 4 | 2 | 4 | 3 | 3 |
| TOTAL unit samples | 42 | | 116 | | 160 | | 236 | | 51 | | 96 | |

Blade Core and Ridge Blades   1 core, 3 ridge blades (Fig. 32)

*Surface*. On the core there are scratches running longitudinally on two blade scars indicating that the core was used for another purpose after blades could no longer be struck off.

*Form*. The single core from the site was a bitapered, fine blade core, 5.7 cm long, maximum 2.1 cm thick. Both platforms on the core were simple prepared surfaces with battered edges, but one of the platforms was only slightly used. Most negative bulbs were weakly marked but a few were well-marked.

The three ridge blades are fragmentary, but they appear to be from blade cores. One is a primary ridge blade (see Hester, Jack, and Heizer 1971: 81 for a definition of primary ridge flakes; their illustrated "flakes" are actually blades). The other two are ridge blades with only one faceted dorsal surface. One of the ridge blades was retouched on one edge.

*Chronology*. The core is from Camaron 2. Ridge blades are from Limon, the shell deposit, and collapsed material (Table 12).

*Comment*. The presence of ridge blades as well as one flake bearing a section of cortex indicates that obsidian knapping was done locally, perhaps at the site itself. The retouched ridge blade as well as the utilized core and some odd-shaped retouched flakes, suggest that very little of the obsidian imported to the area was not put to use. Hester, Jack, and Heizer (1971:82) point out that ridge blades have been interpreted as a rejuvenation technique on blade cores.

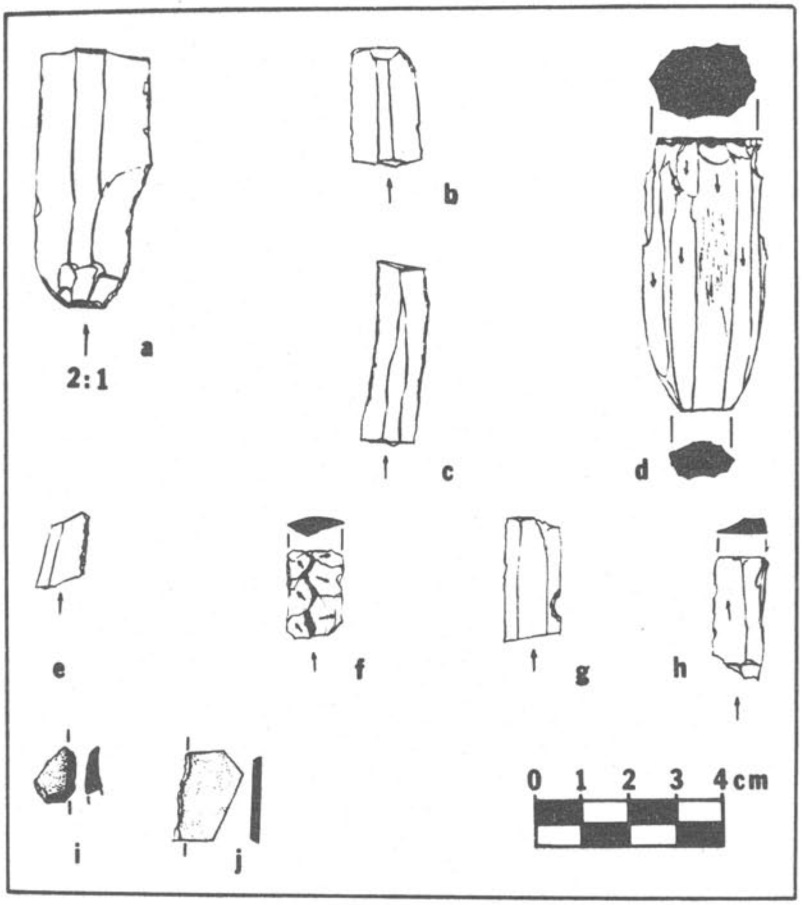



Fig. 32 Retouched Obsidian Blades: (a) corner edge and hinge trim retouch, Camaron 1; (b) corner edge retouch, Camaron 2; (c) two edges retouched, Limon; (e) backed edge, shell deposit; Bitapered Core: (d) wear striations, Camaron 2; Ridge Blade: (f) Limon; Notched Blade: (g) Camaron 3; Burin on Break: (h) Camaron 3; Polished Fragment: (i) collapsed material; Mosaic Mirror Fragment: (j) Limon.

Notched Blades 39, 1 possible (14 bulbar) 5 in combination (Fig. 32)

*Surface.* No distinctive wear pattern was associated with the notches.

*Form.* Notches were placed on the edges of blades for the most part, although in a few cases they occurred on the ends. The notches vary in size from .2 to .7 cm in length, and some have a rather irregular edge. Some notched blades also had edge, corner edge, backing or hinge trim retouch. Both multiple and single notches occurred on blades, but the latter are more than twice as common. There were 36 instances of dorsally retouched notches, 25 ventrally, and 1 with dorsal and ventral retouch (total include notches occurring in combination with other tool types). (Notches occurred in combination with graver-perforators, with truncated blades, and with a burin.)

*Chronology.* Notched blades occur throughout the sequence if we take into account their occurrence with combination tools as well (Tables

11, 12). However, notches are slightly more frequent later in the sequence.

Burins 8 (2 bulbar) 2 in combination (Fig. 32, 33)

*Surface.* One of the larger burins and two smaller ones, both single burins, show longitudinal scratches on the burin face. These striations are on the half of the face near the bulbar end of the burin. The largest of these burins also has a few striations at right angles to the burin face on one of the adjoining blade facets at the tip of the burin.

*Form.* Burins occur often on the snapped ends of blades, but four were on straight truncations. In three cases there is only one burin blow. The others are multiple, either with more than one burin blow on a locus or with more than one locus on the blade where a burin(s) was struck off. Three of the burin scars are relatively wide, .2 to .3 cm, and range from 1 cm to 3.6 cm in length of the scar. The others are smaller, .1 cm or less in width and from .6 to 1 cm long. (A burin occurred in combination with a notched blade; a multiple burin occurred with a double denticulate.)

*Chronology.* Camaron 2, 3, Limon, and the collapsed material (Table 11, 12).

*Comment.* It is possible that some of the burins were made to blunt edges, but wear patterns suggest that this was not always true, and support the interpretation that some burins may have served as graving or wood-working tools. But since there are only a few instances of wear striations, it seems likely that many of the burins represent a blunting technique.

Graver-Perforators 6, 2 possible 2 in combination (Fig. 33)

Lateral Variety 4, 2 possible 1 in combination

*Surface.* Five have either piercing striations (longitudinal striations leading away from the tip), dulling of the ventral side of the tip, or of the dorsal side of the tip, or some combination of these. One possible example is included in this category rather than that of backed blades because the tip is blunt rather than sharp and bears a couple of tiny flake scars. The other possible case has an only slightly retouched tip with ventral and dorsal dulling, and wear striations indicate that the lateral edge was the main functional part, used with a slicing motion.

*Form.* This variety was made not on the midline of the blade but toward one edge on an angled blade end, either a snapped end or an original distal end. The tip was made by retouching the angled end of the blade to make a point at the edge of the blade. In some cases the entire end of the blade was retouched, but in others only the tip was so treated. One instance each of edge retouch and corner edge retouch occurred on these tools. As noted above, one possible example of this category has a relatively blunt tip rather than a sharp one. With this one exception the other lateral graver-perforators have thin, sharp tips because they are formed essentially by three planes joining at the tip: the dorsal and ventral sides of the blade and the blade end. The single exception (Camaron 2) was extensively enough retouched that a flat-based projecting tip was formed, and it cups down, in contrast to the others. (A lateral graver-perforator occurred in combination with a notched blade.)

*Chronology*. Camaron 1, 2, 3, Limon, and the collapsed material (Table 12).

*Comment*. There is a problem in determining the function of these tools and of the other varieties described below. In part, the nature of striation wear and dulling have helped separate the lateral graver-perforators from blades with angled backing. So too, does the presence of retouch along the edge of the blade at the tip in two cases; the retouch suggests that the tip of the tool was functionally important. The sharp-tipped lateral variety might appear to be better suited to piercing than graving, and only two of the lateral tools lack some possible piercing use striations, i.e., dorsal striations. But only three lack some dulling or wear on the ventral side of the tip, such as might be caused by graving use. In the case of the aberrant lateral tool with the flat-based, downward cupping tip, wear patterns are slight and do not provide conclusive evidence about whether the tool functioned more as a graver than as a perforator, as its form suggests.

Medial Variety 1, 1 in combination

*Surface*. Neither shows wear.

*Form*. The medial tips are positioned more on the midline of the blade, and are blunt, flat-tipped, and curve slightly to one side, cupping downward. On both edges of the tip there is ventral retouch, but dorsal retouch occurs only on one edge. (One graver-perforator occurred in combination with a notched blade.)

*Chronology*. Limon (Table 12).

Double Medial Variety 1

*Surface*. One tip shows ventral dulling.

*Form*. The tips are located medially, with very short, non-cupping ends. Retouch was ventral along one edge, and dorsal along the other, forming medial tips at either end of the tool.

*Chronology*. Camaron 3 (Table 12).

Thumbnail Scraper 1 (1 bulbar) (Fig. 33)

*Surface*. There is scraper wear on the ventral snapped end.

*Form.* The thumbnail scraper was made by dorsal retouch on a snapped end.

*Chronology.* Camaron 2 (Table 12).

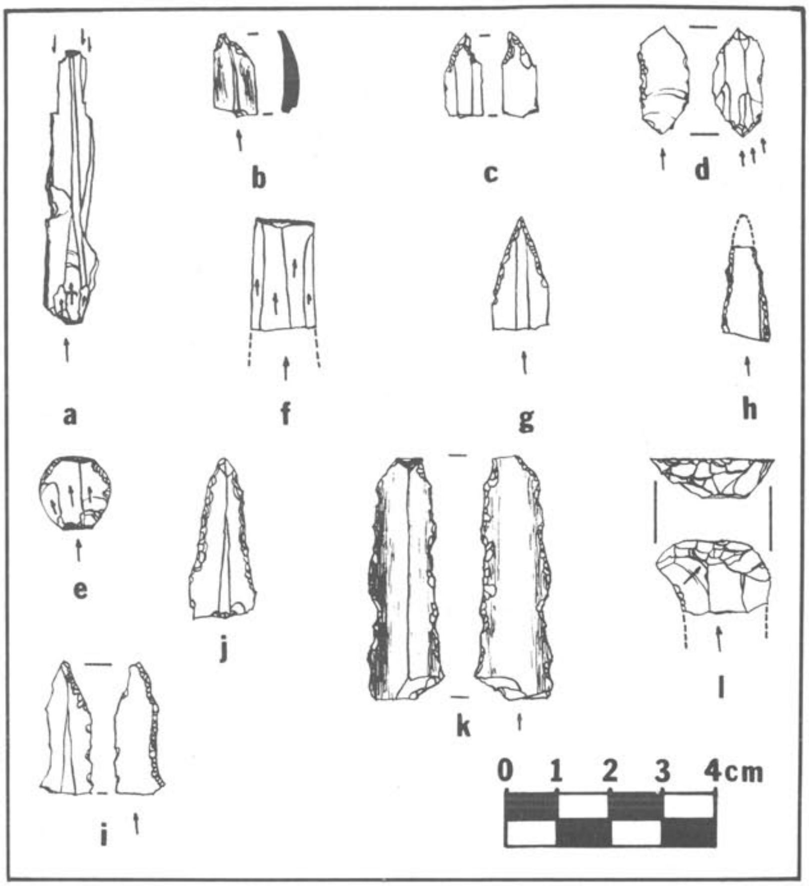



Fig. 33 Obsidian Blades, Burins on Truncation: (a) collapsed material; Graver-perforator, Lateral Variety: (b) Camaron 2; Medial Variety: (c) Limon; Double Medial Variety: (d) Camaron 3; Thumbnail Scraper: (e) Camaron 2; Truncated Blade: (f) Camaron 3; Projectile Point, Tula Variety: (g) Camaron 3; Tula Barbed Variety: (h) Limon; Tula Side-barbed Variety: (i) collapsed material; Stun Variety (?): (j) Limon; Double Denticulate: (k) wear striations shown, shell deposit; Chert Blade, Endscraper: (l) Camaron 3 .

<u>Truncated Blades</u> 42, 2 possible (4 bulbar) 3 in combination (Fig. 33)

*Surface.* Of the dorsally retouched, truncated blades, 19 and 1 possible out of 36 and 1 possible show scraper wear striations. Among these there are also eight instances of slicing striations along the edges, and there are seven instances of sawing striations along the edges. Of the four ventrally retouched truncated blades, none shows scraper wear striations or dulling; one has slicing striations and one has sawing edge striations. Of four cases and one possible case of dorsally and ventrally retouched ends, two actually show scraper wear.

*Form.* Truncated blades were made by retouching either the original distal end or a snapped end. Most cases (36 and 1 possible) are on original distal ends; a few examples (10) are on snapped ends. The blade ends resulting from the retouch are truncated with a rectangular outline in most instances. A few of the truncated blades had other modes of retouch as well, including retouched edges, hinge trim, backing, and corner edge retouch. In one of the seven cases of corner edge retouch on the scraper end, it is likely that the retouch was to regularize the original end rather than to serve for hafting (one of the possible interpretations of corner edge retouch); the truncated end shows scraper wear. Other truncated blades with corner edge retouch show no wear striations, but in some instances a few possible use-flakes came off the retouched end.

Frank Hole (personal communication) has pointed out that fine retouch on distal blade ends can occur naturally in the process of blade manufacture because of pressure on the bottom of the core as the blade springs free. I have not been able to factor out natural from human retouch on distal ends. Only the presence of scraper wear on some of these retouched distal ends would indicate that regardless of the source of the retouch, the ends were utilized.

The majority of the truncated blades had dorsal retouch (36, 1 possible). However, there are four cases of ventral retouch, one of them with accompanying ventral edge and corner edge retouch. It is possible that the ventral retouch is indicative of a different function than is dorsal retouch. One of the four cases is apparently an effort to somewhat straighten the cupping of the original distal end. As noted above, none of these four shows scraper wear striations or dulling; one has slicing edge striations and one has sawing edge striations. Possibly these four cases should be placed in a separate category (1 in Camaron 1, 2 in Camaron 2, 1 in Camaron 3). The same question arises with four cases and one possible example which have both ventral and dorsal retouch on the end. Only two of these dorsally and ventrally retouched ends show scraper wear. (Among the combination tools, two truncated ends occurred in conjunction with notched blades and one with a double denticulate.)

*Chronology.* Truncated blades are one of the categories showing noteworthy temporal change in relative frequency. Truncated blades decline in Camaron 3 and continue to have low frequency in the Limon phase and associated material (Table 11, 12).

*Comment.* The differential distribution of scraper wear patterns in this tool category and in others is the rationale for including truncated blades with scrapers in Table 11 (Fig. 34). However, the presence of scraper wear on many examples should not obscure the fact that the edges of these blades could function as unretouched or retouched blades also.

<u>Projectile Points</u> 10 (1 bulbar) (Fig. 33)

<u>Tula Variety</u> 7 (1 bulbar)

*Surface.* Wear on Tula points varies. There is one instance of tip dulling and abrasion. Some cases (2, 2 possible) have ventral and/or dorsal longitudinal striations (distinct from saw wear). The two possible cases also have heavy dorsal saw wear. Of the two other examples, one has no wear striations, the other has heavy saw wear antecedent to the retouching that formed the point tip.

*Form.* In all but two cases both edges of a blade are retouched dorsally to form a point; bases are straight and unretouched. One point was retipped, and an effort was made to ventrally thin the reworked tip. Two points had a different mode of retouch, a combination of dorsal retouch on one edge and ventral retouch on the other. The latter was a retouch mode on medial graver-perforators. One of these Tula points is distinguished from the medial graver-perforators by the greater length of its retouched body and by the long striations it has over the entire dorsal surface. The other case has a much shorter retouched body and is closer to the medial graver-perforators in its dimensions. It has no distinctive wear patterns, but its angular tip links it to the Tula points as opposed to the medial graver-perforators. In addition, neither of these two points has a ventrally cupping tip as do the medial graver-perforators.

The complete Tula points from Patarata all have straight, unretouched bases and fall into the Tula type definition given by MacNeish <u>et al.</u> (1967:76; but compare Garcia Cook 1967, who defines Tula points as having a concave retouched base).

*Chronology.* Camaron 3, Limon, and the collapsed material. Most are from Limon (Tables 11, 12). MacNeish <u>et al.</u> (1967:76) comment that Tula points are widely distributed in Mesoamerica in the Classic and Postclassic.

<u>Tula Barbed Variety</u> 1

*Surface.* No wear patterns are evident.

*Form.* This point is in all respects like the regular Tula points except for two tiny symmetrical barbs on each retouched edge.

*Chronology.* Limon (Table 12).

<u>Tula Side-barbed Variety</u> 1

*Surface.* The point has slight dorsal saw wear.

*Form.* The point is retouched dorsally on one edge and ventrally on the other. It is asymmetrically barbed, with two sharp barbs along the ventrally retouched edge.

*Chronology.* Collapsed material (Table 12).

Stun Variety (?) 1

*Surface.* There is crushing and dulling on the edges of the tip.

*Form.* A blade was dorsally retouched on both edges to form a tapering blunt tip which looks like a possible stem for some tool. However, where the opposite end of the blade is snapped off, the snap hinges have been trimmed by retouch. This suggests we are dealing with a finished tool which may have been a stun projectile point with the "stem" as the tip.

*Chronology.* Limon (Table 12).

Denticulates 23, 1 possible (5 bulbar) 2 in combination (Fig. 33)

*Surface.* All but two denticulates showed longitudinal wear striations along the edge, indicating use in a sawing motion. Most of the edges had heavy wear and dulling; rarely there was only slight slicing wear. The possible denticulate is small and lacks these striations; however, it is a bulbar end which might have received little wear. In most cases the flake scars on the edge of the denticulate either are less worn than the rest of the blade or show little or no wear except on the projecting surfaces of the edge.

*Form.* A denticulate is a serrated edge which characteristically alternates retouch between the dorsal and ventral sides. Alternating flake scars occur at least partly on all but four denticulates; it varies from alternation of flake scars from one side to the other, to the alternation of short stretches of retouch from one side to the other. Of the denticulates lacking alternating retouch, two had only dorsal retouch and two had only ventral retouch. Often relatively large flakes or semi-lunar snaps were made on the blade edge and then variously retouched to help create the dentate edge. In most cases the denticulate edges are relatively thick and somewhat blunt.

Slightly over half of the denticulates were double, that is they had two denticulate edges. In two cases of double denticulates, one edge had alternating retouch while the other had only ventral retouch; one example had alternating retouch on one edge and dorsal retouch on the other. One singe denticulate had slight retouch around the two corners of the ends adjacent to the denticulate edge. A single case of ventral end retouch occurred, unaccompanied by scraper wear; it appears to have been done to thin or blunt the cupping distal end of the blade. This blade has not been listed as a combination tool. Hinge trim, retouched edges, and corner edge retouch occurred in conjunction with denticulates. (Among the combination tools there is a double denticulate with a possible burin and one with a truncated end.)

*Chronology.* Throughout the sequence (Tables 11, 12).

*Comment.* The fact that denticulate flake scars show less wear than do the projecting surfaces of the edge suggests that the tools were used on a relatively unpliant substance. Possibly some of the more irregular flake scars came during use and therefore received slightly less wear than retouch scars; it is also possible that the denticulates had to be retouched often to maintain suitable edges and therefore less wear accumulated on the flake scars. Nevertheless some of the most worn examples show heavy striations penetrating only partially into flake scar areas, and I believe the best explanation of the wear patterns is that they result from use against a relatively rigid substance, possibly tough fibers, bone, or wood. Opposite one ventrally retouched single denticulate was a ventrally retouched edge that also had sawing striations and dulling although it was not a denticulate edge. Again, form does not correlate perfectly with use patterns.

A replicative study of the Patarata denticulates by Brenda Preston at Arizona State University (personal communication) indicates that 8 denticulates can be considered to have serrated edges that were deliberately made; 9 had edges so worn from use that the origin of the serration could not be determined, and 8 appeared to be use or wear denticulates, that is, their serrated edges were similar to ones created by particular uses, such as two-way scraping with a blade edge. Saw wear as I have defined it occurred in all of these categories. Preston's efforts to identify motion patterns or materials that would produce the striation patterns were inconclusive.

Combination Tools 7 (1 bulbar)

*Surface*. The combination tools are sub-divided (a) through (g). On (a), (b) and (e) there are no wear patterns; on (f) the burin lacks wear patterns, and on (g) the scraper lacks wear patterns. On (c) wear striations along the retouched edge and around the notch indicate slicing motions. On (d) some scraper wear is present, and the edges show some sawing and slicing wear; the main wear pattern is slicing wear across one corner of the original distal end. On (f) both denticulate edges have heavy saw wear. On (g) the denticulate edges also have heavy saw striations and dulling.

*Form*. Combination tools have two or more of the types of tools established in the preceeding classification; they also have various retouch modes.

(a) A medial graver-perforator with two edge notches also has two retouched edges. Retouch is dorsal on one edge and ventral on the other, with some alternation along one edge. The tip has been retouched bifacially. One notch was made dorsally, the other, ventrally.

(b) A multiple edge notched blade had a truncated end as well as two retouched edges and corner edge retouch on the truncated end. There is a possibility that the end retouch was extensive hinge trim, perhaps to even the end for hafting. Retouch is ventral except for one notch, the end retouch, and the corner edge retouch, which are dorsal.

(c) A single edge notch was combined with a lateral graver-perforator; it also had one retouched edge and angled backing that extends toward the tip of the graver-perforator. The retouched edge is retouched dorsally, and the backing is almost entirely dorsal also. The notch is dorsally retouched.

(d) A single edge notch occurred with a truncated original distal end and two retouched edges, one dorsally and one ventrally. The truncated end is dorsally retouched, as is the notch.

(e) A single notch, ventrally retouched, on one edge of a blade has a burin on the opposite edge, which was also ventrally retouched below the burin scar. The burin is quite small, less than .1 cm wide and .7 cm long.

(f) A double denticulate occurred with a multiple burin. Both denticulate edges are retouched ventrally. The bulbar end of the burin is missing. Both ends of the blade had been thinned slightly with small flakes, one end bifacially and one unifacially. The burin is .2 cm wide and 3.5 cm long; it could have served as an edge blunting technique.

(g) Another double denticulate occurred with a truncated end. One denticulate edge is retouched dorsally and ventrally; the other is retouched dorsally. The truncated end is retouched ventrally.

*Chronology*. Camaron 1, 3, Limon, and the collapsed material (Table 12).

*Comment*. This constitutes a separate description of the combination tools, which have already been cited under their component tool headings.

Miscellaneous

*Surface*. No wear patterns are evident.

*Form*. This blade section has anomalous form. Each end curves with one or more angled snaps. One end had small sections of dorsal and ventral retouch as well.

## Chert Blade

Endscraper 1 (Fig. 33)

*Material*. Buff-grey chert.

*Surface*. Wear striations are not evident, but the edge of the end of the scraper is worn and blunted.

*Form*. This scraper was made on the original distal end of a thick blade. The blade is broken near the end, but it appears that both edges were retouched dorsally. Dorsal retouch on the end of the scraper is steep.

*Chronology*. Camaron 3 (Table 12).

## Obsidian Flakes

Unretouched Flakes and Unretouched Platform Trim Flakes 26 (14 bulbar)

*Surface*. There is no indication of wear.

*Form*. Among these flakes all but three, small, relatively slender flakes have pronounced bulbs of percussion. There is no clear case of a flake with blade scars on its dorsal surface, although several have flake scars on their dorsal sides. Three chunky unretouched platform trim flakes showed some evidence of a core platform but none was clearly a blade core platform. All but seven flakes are relatively thick, or large and irregular in form (length 1.2 to 4 cm, width 1 to 3.7 cm, thickness .3 to 1 cm). The seven smaller, thinner, and more regular flakes have lengths 1.1 to 2 cm, widths .8 to 1.3 cm, and thicknesses .1 to .2 cm.

*Chronology.* Unretouched flakes occur throughout the sequence. Platform trim flakes occur in Camaron 1, Limon, and the collapsed material (Table 12).

*Comment.* Most of the flakes were probably struck off by percussion. Many suggest core shaping or platform preparation. There is no indication from the chipped tools in the collection that these flakes resulted from efforts to make flakes or flake tools as a final product.

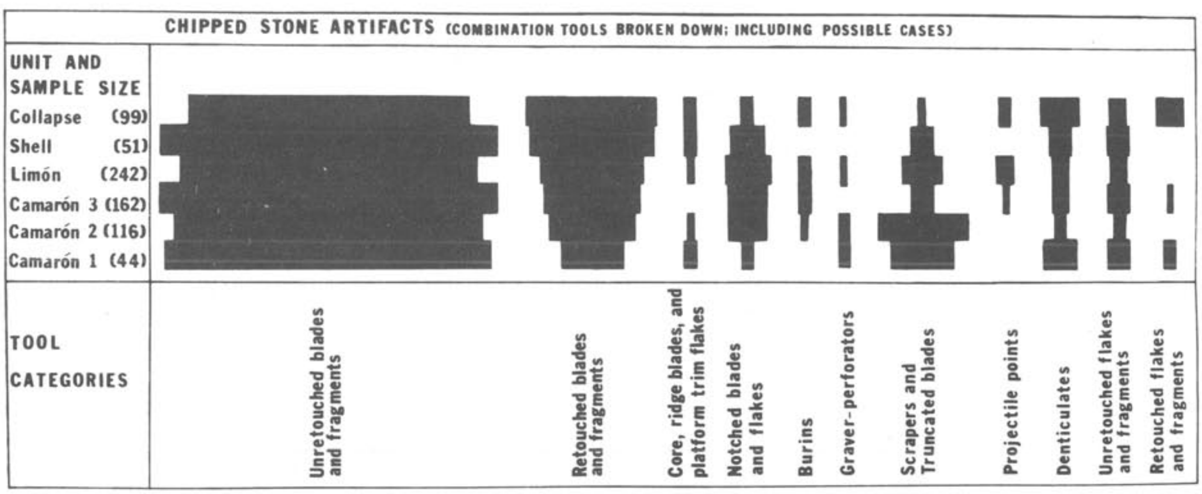



Fig. 34 Summary percentages of chipped stone tools (from Table 11)

Retouched Flakes 4, 4 fragments (4 bulbar)

*Surface.* None except (d) below had wear striations; in the case of (d) the ventral side bears longitudinal slicing striations, suggesting that the flake was used as a knife with the cutting force directed against the ventral side.

*Form.* The bulbs of percussion on the flakes are well-pronounced in all but one case. Three flakes show signs of probable blade scars on their dorsal surfaces. The length of the flakes ranges from 2.5 to 4.6 cm, width, from 1.8 to 2.3 cm, and thickness, from .4 to 1.1 cm. Because they are variable, for ease of description I have sub-divided them.

(a) One flake was retouched only by slight thinning of the bulb of percussion. Several use-flakes came off the distal end of this flake.

Table ~~11~~. Summary Percentages of Chipped Stone Tools

(Combination tools broken down: possible cases counted)

% to nearest whole percent

| ARTIFACT | PROVENIENCE | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Camaron 1 | | Camaron 2 | | Camaron 3 | | Limon | | Shell Deposit | | Collapse | | Total |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | |
| Unretouched Blades and Fragments | 25 | 57 | 63 | 54 | 96 | 59 | 127 | 52 | 30 | 59 | 49 | 50 | 390 |
| Retouched Blades and Fragments | 5 | 11 | 17 | 15 | 28 | 17 | 44 | 18 | 11 | 22 | 23 | 23 | 128 |
| Core and Platform Trim Blades and Flakes | 1 | 2 | 1 | 1 | | | 2 | 1 | 1 | 2 | 2 | 2 | 7 |
| Notched Blades and Flakes | 1 | 2 | 8 | 7 | 12 | 7 | 20 | 8 | 3 | 6 | 2 | 2 | 46 |
| Burins | | | 1 | 1 | 3 | 2 | 4 | 2 | | | 2 | 2 | 10 |
| Graver-perforators | 1 | 2 | 3 | 2 | 2 | 1 | 3 | 1 | | | 1 | 1 | 10 |
| Scrapers and Truncated Blades | 5 | 11 | 18 | 16 | 7 | 4 | 16 | 7 | 2 | 4 | 1 | 1 | 49 |
| Projectile Points | | | | | 1 | 1 | 7 | 3 | | | 2 | 2 | 10 |
| Denticulates | 3 | 6 | 3 | 2 | 4 | 3 | 7 | 3 | 2 | 4 | 7 | 7 | 26 |
| Unretouched Flakes | 2 | 4 | 2 | 2 | 6 | 4 | 8 | 3 | 2 | 4 | 3 | 3 | 23 |
| Retouched Flakes | 1 | 2 | | | 1 | 1 | 1 | 0 | | | 5 | 5 | 8 |
| TOTAL | 46 | | 116 | | 162 | | 242 | | 51 | | 99 | | 714 |

It may have been hafted in view of the thinning of the bulb.

(b) One flake and three flake fragments have dorsal retouch; the complete flake is retouched on the edges and distal end. It and two of the fragments have thin edges, similar to the edges of blades.

(c) One flake had cortex on the striking platform; the flake was retouched ventrally.

(d) Another flake was retouched dorsally on all edges and was quite worn on the end, which had use-flaking both dorsally and ventrally, but more on the ventral side.

(e) An irregular, thick flake, broken at least twice, had been retouched on one facet with relatively large flakes, perhaps to flatten it; the opposite adjoining facet was also retouched.

*Chronology.* Camaron 1, 3, Limon, and the collapsed material (Table 12).

Notched Flake 1 possible (1 bulbar)

*Surface.* No wear striations are evident.

*Form.* A single possible notch was made dorsally on a flake fragment. The dorsal side of the flake bears a blade scar.

*Chronology.* Limon (Table 12).

## Chipped Stone Summary

Chipped stone, including 700 pieces of obsidian and one of chert, is numerically predominant in Patarata lithics. Almost all of the specimens are blades. A core and several core rejuvenation flakes and blades attest to some knapping at the site. By extrapolation from the recent experimental studies of Tringham et al. (1974) on chert, I now regard much of the finer "retouch" as due to use, particularly in the cases of edge retouched blades, truncated blades, and some notched tools. Pointed tools, some denticulates, burins, and some categories of blade retouch appear to be deliberate. Without appropriate controlled functional studies, it is difficult to offer conclusions about the tool uses. Wear striations help establish the direction of tool action. This evidence combined with form, the brittleness of obsidian, and the small size of the tools will be used in a subsequent subsection on lithic analysis to infer some of the activities that may be represented.

Table 12. Chipped Stone Artifacts

B = bulbar end present
P = possible occurrence

| ARTIFACT | PROVENIENCE: Camaron 1 | | Camaron 2 | | Camaron 3 | | Limon | | Shell Deposit | | Collapse | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Obsidian Blades | | | | | | | | | | | | | | |
| Unretouched blades | 25 | (5B) | 62 | (26B) | 90 | (26B) | 117 | (20B) | 27 | (8B) | 48 | (8B) | 369 | (93B) |
| Fragments | | | 1 | | 6 | | 10 | | 3 | (1B) | 1 | | 21 | (1B) |
| Subtotal | 25 | (5B) | 63 | (26B) | 96 | (26B) | 127 | (20B) | 30 | (9B) | 49 | (8B) | 390 | (94B) |
| Retouched blades | | | | | | | | | | | | | | |
| Fragment with 1 retouched edge | | | | | | | 3 | | | | | | 3 | |
| 1 retouched edge | 1 | | 6 | (1B) | 10 | (4B) | 15 | (3B) | 4 | (2B) | 10 | (1B) | 46 | (11B) |
| 2 retouched edges | 3 | (1B) | 6 | (1B) | 6 | (2B) | 10 | (2B) | 1 | | 3 | (1B) | 29 | (7B) |
| 1 corner edge retouched | | | 4 | | 3 | | 9 | (2B) | 2 | | 6 | (3B) | 24 | (5B) |
| Double corner edge | | | 1 | | | | | | | | 1 | | 2 | |
| Triple corner edge | | | | | | | | | | | 1 | (1B) | 1 | (1B) |
| Backed edge | | | | | | | 1 | | 1 | | | | 2 | |
| Angled backing | | | | | | | 2 | | 1 | | 1 | | 4 | |
| Hinge trim | | | | | 2 | | | | | | | | 2 | |

| Table ~~12~~. (Continued) ARTIFACT | PROVENIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
| Retouched 1 edge and hinge trim | | | | 1 | | | 1 |
| Retouched 2 edges and hinge trim | | | | | 1 (1B) | | 1 (1B) |
| Retouched 1 edge and 1 end (a thin, cutting end) | | | | 1 | | | 1 |
| 1 corner edge and opposite end hinge trim | 1 (1B) | | 1 | | | | 2 (1B) |
| 1 corner edge and 1 retouched edge | | | 1 | 2 (1B) | 1 | 1 (1B) | 5 (2B) |
| Double corner edge and 1 re-touched edge | | | 1 | | | | 1 |
| Double corner edge and 2 re-touched edges | | | 1 | | | | 1 |
| Double corner edge, 1 re-touched edge, and backed end | | | 1 | | | | 1 |
| Backed edge and 1 retouched edge opposite | | | 1 | | | | 1 |

| Table 12. (Continued) | PROVENIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| ARTIFACT | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
| Partly backed edge and 2 retouched edges | | | 1 | | | | 1 |
| Subtotal | 5 (2B) | 17 (2B) | 28 (6B) | 44 (8B) | 11 (3B) | 23 (7B) | 128 (28B) |
| Blade Core and Related Blades | | | | | | | |
| Bitapered core, utilized | | 1 | | | | | 1 |
| Ridge blade | | | | 1 | | 1 | 2 |
| Ridge blade with retouched edge | | | | | 1 | | 1 |
| Subtotal | | 1 | | 1 | 1 | 1 | 4 |
| Notched Blades | | | | | | | |
| Single edge notch | | 4 (2B) | 3,1P (3B) | 2 | 1 (1B) | 1 | 11,1P (6B) |
| with retouched edge | | 1 (1B) | 1 | 5 | | | 7 (1B) |
| with 1 corner edge retouched | | 1 (1B) | | 1 | | 1 | 3 (1B) |
| with 1 corner edge and 1 retouched edge | | 1 (1B) | | | | | 1 (1B) |

| Table 12. (Continued) ARTIFACT | PROVENIENCE Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
|---|---|---|---|---|---|---|---|
| with angled backing and 1 retouched edge | | | | 1 | | | 1 |
| on burin edge | | | 1 (1B) | | | | 1 (1B) |
| Single end notch | | | 2 | 1 | | | 3 |
| with 1 re-touched edge | | | | 1 | | | 1 |
| Multiple edge notches | | | 3 | 1 | | | 4 |
| with 1 re-touched edge | | | | 1 (1B) | 1 | | 2 (1B) |
| with 2 re-touched edges | | 1 (1B) | | | | | 1 (1B) |
| with corner edge retou-ched | | | | 2 (2B) | | | 2 (2B) |
| with hinge trim | | | | 1 | | | 1 |
| Multiple notched end, edge, and 1 retouched edge | | | | | 1 | | 1 |
| Subtotal | | 8 (6B) | 10,1P (4B) | 16 (3B) | 3 (1B) | 2 | 39,1P (14B) |
| Subtotal plus combination tools | 1 | | 11,1P (4B) | 19 (3B) | | | 44,1P (14B) |

| Table 12. (Continued) ARTIFACT | PROVENIENCE Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
|---|---|---|---|---|---|---|---|
| Burin | | | | | | | |
| on break | | | 2 | 3 (1B) | | | 5 (1B) |
| on truncation | | 1 | 1 | | | 1 (1B) | 3 (1B) |
| Subtotal | | | | 3 (1B) | | 1 (1B) | 8 (2B) |
| Subtotal plus combination tools | | 1 | 1 | 4 (1B) | | 2 (1B) | 10 (2B) |
| Graver-perforator | | | | | | | |
| lateral | | 1 | | 1 | | 1P | 2,1P |
| lateral with retouched edge | | 1 | 1 | | | | 2 |
| lateral with corner edge | | 1P | | | | | 1P |
| medial | | | | 1 | | | 1 |
| double medial | | | 1 | | | | 1 |
| Subtotal | | 2,1P | 2 | 2 | | 1P | 6,2P |
| Subtotal plus combination tools | 1 (1B) | 2,1P | 2 | 3 | | 1P | 8,2P (1B) |
| Thumbnail Scraper | | 1 (1B) | | | | | 1 (1B) |
| Truncated Blades | 1 | 12 | 2 | 8 | 1 | | 24 |
| with 1 retouched edge | 1 | 1P | | 1 | 1 | | 3,1P |
| with 2 retouched edges | 1 (1B) | 1 | 1 | 1 | | | 4 (1B) |
| with 1 retouched edge and hinge trim | | | | 1 | | | 1 |

Table 12. (Continued)

| ARTIFACT | PROVENIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
| with 1 backed edge | | | | 2 | | | 2 |
| with corner edge | | 1P (1B) | | 2 (1B) | | | 2,1P(2B) |
| with corner edge of retouched end | | 1 | 2 | | | 1 | 4 |
| with corner edge of retouched end and 1 retouched edge | 1 | 1 (1B) | | | | | 2 (1B) |
| Subtotal | 4 (1B) | 15,2P (2B) | 5 | 15 (1B) | 2 | 1 | 42,2P(4B) |
| Subtotal plus combination tools | 4 (1B) | 15,2P(2B) | 6 | 16 (1B) | 2 | 1 | 44,2P(4B) |
| Projectile Points | | | | | | | |
| Tula | | | 1 | 5 (1B) | | 1 | 7 (1B) |
| Tula Barbed | | | | 1 | | | 1 |
| Tula Side Barbed | | | | | | 1 | 1 |
| Stem or Stun | | | | 1 | | | 1 |
| Subtotal | | | 1 | 7 (1B) | | 2 | 10 (1B) |
| Denticulates | | | | | | | |
| Single | | 1 | 1 | 1 | | | 3 |
| Single with 1 retouched edge | 1 (1B) | 1 | | 1 | | 2 | 5 (1B) |
| Single with corner edge | | | | 1P (1B) | | | 1P(1B) |
| Double | | 1 | 1 (1B) | 3 | 1 | 3 (1B) | 9 (2B) |

Table 12. (Continued)

| ARTIFACT | PROVENIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
| Double with hinge trim | | | | 1 | 1 (1B) | | 2 (1B) |
| Double with 1 end backed | | | 1 | | | | 1 |
| Double with ventral end retouched and hinge trim | 1 | | | | | | 1 |
| Double with double corner edge | | | 1 | | | 1 | 2 |
| Subtotal | 2 (1B) | 3 | 4 (1B) | 6,1P(1B) | 2 (1B) | 6 (1B) | 23,1P (5B) |
| Subtotal plus combination tools | 2 (1B) | 3 | 4 (1B) | 6,1P(1B) | 2 (1B) | 7 (1B) | 24,1P (5B) |
| Combination Tools | | | | | | | |
| (a) Medial graver-perforator with 2 edge notches and 2 retouched edges | 1 (1B) | | | | | | 1 (1B) |
| (b) Multiple edge notches with truncated end, 2 retouched edges and corner edge | | | | 1 | | | 1 |

| Table 12. (Continued) ARTIFACT | PROVENIENCE Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
|---|---|---|---|---|---|---|---|
| (c) Single edge notch with lateral graver-perforator, with 1 retouched edge and backed edge | | | | 1 | | | 1 |
| (d) Single edge notch, with truncated end and 2 retouched edges | | | 1 | | | | 1 |
| (e) Single edge notch, with multiple burin and 1 retouched edge | | | | 1 | | | 1 |
| (f) Double denticulate with multiple burin | | | | | | 1 | 1 |
| (g) Double denticulate with truncated end | 1 | | | | | | 1 |
| Subtotal | 2 (1B) | | 1 | 3 | | 1 | 7 (1B) |
| Miscellaneous | | | 1P | | | | 1P |
| Chert Blade Endscraper with 2 retouched edges | | | 1 | | | | 1 |
| Obsidian Flakes Unretouched flakes | 2 (2B) | 2 (2B) | 6 (5B) | 8 (4B) | 2 (1B) | 3 (1B) | 23 (14B) |

Table 12.
(Continued)

| ARTIFACT | PROVENIENCE: Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
|---|---|---|---|---|---|---|---|
| Unretouched platform trim flakes | 1P | | | 1 | | 1 | 2, 1P |
| Subtotal | 2,1P (2B) | 2 (2B) | 6 (5B) | 9 (4B) | 2 (1B) | 4 (1B) | 25, 1P (15B) |
| Retouched flakes | 1 (1B) | | 1 | 1 (1B) | | 4 (2B) | 7 (4B) |
| Retouched flake with cortex | | | | | | 1 (1B) | 1 (1B) |
| Subtotal | 1 (1B) | | 1 | 1 (1B) | | 5 (3B) | 8 (5B) |
| Single notched flake | | | | 1P (1B) | | | 1P (1B) |
| Total | 42 (13B) | 116 (39B) | 160 (42B) | 236 (41B) | 51 (15B) | 96 (21B) | 691,10P or 701(171B) |

## GROUND STONE ARTIFACTS

This typology is consistent with MacNeish et al. (1967) insofar as possible. Dr. Louis Fernandez of the Department of Earth Sciences, University of New Orleans, kindly provided the lithic material descriptions.

### Polished Fragment 1 (Fig. 32)

*Material.* Fine-grained green stone.

*Surface.* The surface is highly polished. Descriptions of wear striations accompany the form description for ease of presentation.

*Form.* The largest intact side is slightly convex longitudinally; the side opposing it is also convex, but transversely rather than longitudinally. This smaller side has striations leading away from the tip, and the tip is somewhat blunted and slightly chipped. Striations on the third flanking side also lead away from the tip and slope away from the largest intact side. However, the largest side bears no striations. The length of the fragment is 1.3 cm, width, .8 cm, and thickness, .3 cm.

*Chronology.* Collapsed material (Table 13).

*Comment.* This fragment might be part of a pendant, or possibly a piece of a miniature adze. It is not clear whether the striations result from use or manufacture.

### Mosaic Mirror Fragment 1 (Fig. 32)

*Material.* According to a scratch test, the material is hematite.

*Surface.* The fragment is corroded but still highly polished on the front. The side and back facets are well ground and smoothed, but not polished.

*Form.* The two intact sides of the fragment measure 1.5 and 1.1 cm, and the fragment is .2 cm thick.

*Chronology.* Limon (Table 13).

### Metate Fragments 7 (Fig. 35)

*Material.* Five are made from vesicular, pyroxene, hornblende, andesite porphyry; one is hornblende, andesite porphyry; another is pyroxene-hornblende andesite.

*Surface.* They are ground and shaped on the bottom and sides, where intact, as well as on the grinding surface.

*Form.* Because of the small size of the fragments, it has not been possible to place them in type categories. The fragments range from 3.4 to 5 cm thick. One fragment has an outer edge that slopes down and inward; another has a nearly rectangular corner, also with a sloping outer edge. One fragment is concave both on the top and bottom, suggesting it had no legs and was reversed during part of the period of its use.

*Chronology*. Camaron 1, 3, the shell deposit, and the collapsed material (Table 13).

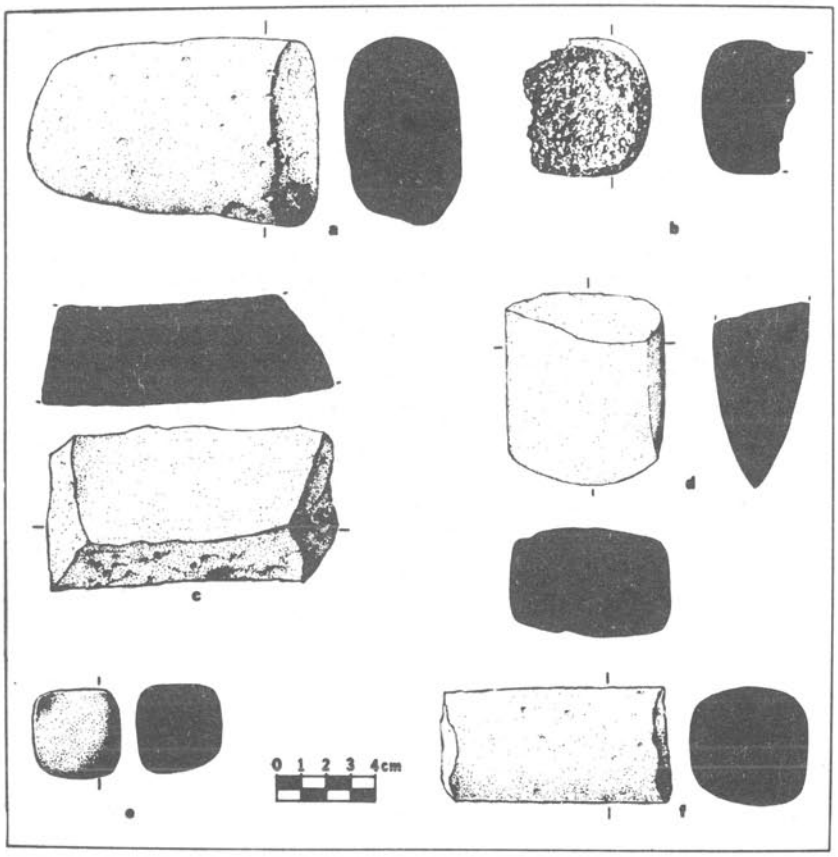


Fig. 35 Sub-rectangular Mano: (a) Limon; Mano-pestle Fragment: (b) Camaron 2, asphalt and resin paint around margins and on end; Metate Fragment: (c) Camaron 1; Celt Fragment: (d) Camaron 3; Pounding Stone: (e) shell deposit; Cuboid Mano: (f) shell deposit.

Mano Fragments 3 (Fig. 35)

*Material*. Two manos are made from vesicular, pyroxene andesite-porphyry, and one is olivine, basalt porphyry.

*Surface*. Wear patterns show on two examples and indicate back-and-forth motions.

*Form*. Two types of manos are represented. One fragment is cuboid, 4.3 by 4.3 cm in cross-section. Three sides are relatively flat, presumably due to use, and the fourth is convex. A second mano is sub-rectangular in shape, with an ovoid cross-section (cf. MacNeish et al. 1967:111). It is 4.7 cm thick and 7 cm wide at the maximum. A very small fragment of a mano appears to have an ovoid cross-section as well, and may also represent a piece of a sub-rectangular mano, but the fragment is not large enough to determine this.

*Chronology.* Camaron 2, Limon, and the shell deposit (Table 13).

### Mano-pestle Fragment 1 (Fig. 35)

*Material.* The stone is vesicular andesite-basalt.

*Surface.* Two opposing sides show flattening and cross-wise wear striations; one shows much heavier wear than the other. The remaining intact side shows no wear. On the end of the tool asphalt and resin paint still adheres, particularly around the margins of the end, but also on the end itself. Striations on the end suggest back-and-forth grinding. There is no flaking that would indicate extremely heavy pounding.

*Form.* Apparently this tool was originally a cuboid mano. The most worn side of the mano is indented, with a "lip" where the mano overhung the metate. The end of the mano is relatively flat and was used as a pestle. The fragment is 5.1 cm thick and greater than 4.7 cm wide.

*Chronology.* Camaron 2 (Table 13).

### Mano or Metate 2 possible

*Material.* One is made from hornblende andesite and the other is pyroxene, hornblende, andesite porphyry.

*Surface.* No wear patterns are evident.

*Form.* One fragment has a small section of a rather flat surface. Both could be small pieces of a mano or metate. Neither fragment is greater than 5.5 cm in any dimension.

*Chronology.* Camaron 1 and 2 (Table 13).

### Pounding Stone 1 (Fig. 35)

*Material.* The stone is andesite-basalt porphyry.

*Surface.* One face is particularly worn down, especially at two corners. Opposite the worn face, the facet is particularly grainy and unworn. A flanking facet to the most worn one has a small amount of red coloring matter adhering.

*Form.* This is a cuboid tool. Its dimensions are approximately 3.5 cm in length, width, and thickness.

*Chronology.* Shell deposit (Table 13).

*Comment.* This tool was probably hafted in view of the grainy, little worn surface that is opposite a much-worn facet. The corner wear on the worn face suggests glancing blows; there is no flaking from use, however. From its shape and size this tool could have been used for cracking nuts or shells as well as pulverizing coloring matter.

Celt Fragment 1 (Fig. 35)

*Material.* The stone is dacite-rhyolite porphyry.

*Surface.* Longitudinal striations occur on both of the main faces near the bit. The celt is moderately polished.

*Form.* The celt has a rectangular cross-section, with the two larger faces converging toward the bit; the poll is missing. The bit has been slightly resharpened near the center, and it bears a few small flake scars, presumably from use. The celt is 6.4 cm in width, and 3.5 cm in thickness.

*Chronology.* Camaron 3 (Table 13).

*Comment.* MacNeish et al. (1967) classify celts mainly according to the shape of the poll; however, their square-poll celts have a quadrangular cross-section whereas the pointed-poll celts have a round to oval section. Presumably the Patarata celt is one of the square-poll types.

Table 13. Ground Stone Artifacts

| | PROVENIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| ARTIFACT | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
| Polished Fragment | | | | | | 1 | 1 |
| Mosaic Mirror Fragment | | | | 1 | | | 1 |
| Metate Fragments | 2 | | 3 | | 1 | 1 | 7 |
| Mano Fragments | | 1 | | 1 | 1 | | 3 |
| Mano-Pestle Fragment | | 1 | | | | | 1 |
| Mano or Metate | 1 | 1 | | | | | 2 |
| Pounding Stone | | | | | 1 | | 1 |
| Celt Fragment | | | 1 | | | | 1 |
| TOTAL | 3 | 3 | 4 | 2 | 3 | 2 | 17 |

## MISCELLANEOUS STONE ARTIFACTS

### River Pebble Grinding Stone Fragment 1

*Material.* Chert pebble.

*Surface.* There are back-and-forth striations and red coloring matter adhering in crevices.

*Form.* The pebble is waterworn, 3.5 by 2.9 by 2.2 cm.

*Chronology.* Camaron 2 (Table 14).

### Miscellaneous Stone 16

*Material.* Three fragments from the shell deposit are of identical material, a fine-grained, slightly argillaceous, carbonate cemented sandstone. A waterworn pebble is a fine-grained, carbonate cemented, quartz sandstone. The remaining fragments consist of one piece of very fine-grained argillaceous sandstone; one of limestone; one of fine-grained, aphanitic limestone; one of fine-grained, iron-stained, carbonate cemented, quartz sandstone; one of fine-grained, quartz sandstone; two of fine-grained basalt; and six of scoria.

*Surface.* Most of the fragments have no surface signs of use. However, two surfaces on the sandstone from the shell deposit are reddened; I was unable to detect definite bits of coloring. It is possible an accidental process like heating would produce the color. The pebble also has a reddish stain on one surface; the color appears to be foreign to the pebble.

*Form.* The pebble is small, measuring 5.1 by 3.8 by 2.1 cm. Most of the other rocks are less than 5 cm in any dimension, although one piece of scoria measures nearly 8 cm across. Other than the pebble, very few fragments manifest any possible water-worn facets.

*Chronology.* Throughout the sequence (Table 14).

*Comment.* Because of the deltaic location of the site, all of these stone fragments and the pebble are anomalous in the natural deposition. It is highly likely that they are broken from other tools or are manuports.

Table 14. Miscellaneous Stone Artifacts

| ARTIFACT | PROVENIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
| River Pebble Grinding Stone Fragment | | 1 | | | | | 1 |
| Miscellaneous Stone | | | | | | | |
| Sandstone | | | | | 3 | | 3 |
| Pebble | | 1 | | | | | 1 |
| Argillaceous Sandstone | 1 | | | | | | 1 |
| Limestone | 1 | | | | | | 1 |
| Aphanitic limestone | | 1 | | | | | 1 |
| Quartz sandstone | | 1 | | | | 1 | 2 |
| Basalt | | | | | 2 | | 2 |
| Scoria | | | 1 | 4 | | 1 | 6 |
| TOTAL | 2 | 3 | 1 | 4 | 5 | 2 | 17 |

## LITHIC ANALYSIS

### Activities

Formal and wear pattern analysis of stone artifacts indicate a number of activities of Patarata inhabitants. The collection includes grinding stones for preparing food, presumably mainly for grinding maize. Grinding tools were also used for preparing pigments, and in one instance asphalt was heated and stirred or pounded with the end of a mano. The presence of a utilized core and a variety of flakes suggests some flint knapping was done locally, although not necessarily at the site itself. The presence of stone artifacts in itself indicates that this necessary material was imported, and the mosaic mirror fragment attests to luxury trade as well.

In cleaning fish and shellfish blades would be particularly useful, and they surely served as general purpose knives used to cut cordage for nets and baskets and for such things as shaving, blood letting, food preparation, etc. A. V. Kidder (1948:160) remarks:

> The flake-blades must have been invaluable tools. Their sharp edges will cut string readily and for whittling soft wood they are practically as serviceable as a steel blade. Held by the two ends and used as a draw-shave they are especially effective, nor are they soon dulled (by the loss of the loss of tiny chips) if manipulated carefully. Work across the grain, or even with the grain if the wood be hard, spoils the edge rather quickly.

Similarly Crabtree and Davis (1968:426) report that "for peeling and trimming soft wood, a freshly struck obsidian blade proved to be superior to the sharpest steel knife."

There is a variety of evidence which indicates that stone denticulates or saws are effective in cutting bone and wood. Semenov (1964:152) comments that:

> Examination of the material from Eliseevich confirms that transverse severing of bone objects was effected by sawing through with a retouched bladelet. The toothed flint edge was eminently suitable for this.

Crabtree and Davis (1968:246) used a small backed obisidian saw to mark cuts and to detatch a fresh willow peg. Wear pattens on Patarata denticulates indicate that they were used with a sawing motion.

In clearing tropical growth, obtaining firewood, building homes and other structures, presumably in making canoes, and probably in the preparation of wooden tools and products, a variety of wood-working tools would be employed--celts, graver-perforators, blades, denticulates, notches, truncated blades, and perhaps the burins. The possible wood-working tools have a range of fineness from heavy items, like the celt, to tools for small-scale work, such as denticulates and graver-perforators. In the manufacture of a wooden bowl, such as the one partly preserved at the site, initial shaping might use heavier implements, with final smoothing accomplished with truncated blades and retouched and/or unretouched blades (cf. Muller-Beck 1965:143-145, who discusses the use of end retouched stone tools in manufacturing wooden artifacts). The carving itself could be executed by flat-tipped gravers supplemented with sharp-tipped graver-perforators for delicate details. Final polishing of wood could be accomplished by the use of abradors or of sand (cf. Muller-Beck 1965:146). Perhaps the utilized coral at Patarata had such a function. Some of these same wood-working tools could be used in making bone objects, as well as for other purposes.

Recent studies of stone tools from the Valley of Oaxaca have shown that obsidian drills and blades can be used in working shell, but that the attrition rate for the tool is very high, making it an unlikely choice for a craftsman working on shell (Jane Pires-Ferreira, personal communication). Shell artifacts from Patarata therefore were probably prepared by some other means than obsidian tools, particularly since all the obsidian had to be imported.

Projectile points, mainly in the upper part of the sequence, suggest some hunting, probably with bow and arrow, or possibly harpoon fishing since two points have side barbs, although the barbs are quite tiny. Occasional deer were killed, and the scraper could have been used on the skins--but the truncated blades are so small that they would make skin treatment tedious and inefficient. Moreover, Semenov (1964:87) points out that scraping and softening skins with an end scraper requires a semi-circular form. The truncated blades at Patarata are generally rectangular in form. Some retouched blades may have been mounted in composite blade clubs or other composite weapons (cf. armed figurines in Ethnic Arts Council of Los Angeles 1971:fig. 97).

## Comparisons

We might expect differences in lithic tool kits from sites in contrasting environments characterized by different subsistence patterns. Similarly, differences in the material and form of tools could relate to differences in the availability of raw materials. To effect comparisons adequate lithic studies and comparable tool categories must be available; I will use data from two highland areas, the Tehuacan Valley and the Valley of Mexico. In such a comparison variability in assemblages could be due to other factors than the two I have mentioned, such as cultural preferences, lithic technology (i.e., that not all groups knew how to produce all of of the tools), and functional specialization in the site(s) from which the assemblage(s) come(s). For the purposes of this comparison I will assume that purely cultural preferences did not have any major effects on the incidence of tool categories and that lithic technology was similar in all the areas. In no case can I adequately control for functional variability in sites in the areas compared. This is a serious problem which will be discussed in the cases below.

Tehuacan data for the Classic Palo Blanco phase (200-700 A.D.) are not fully published, and complete details are not yet available on associations for the excavated lithic material (MacNeish _et al_. 1967). Palo Blanco stone tools come from a variety of kinds of sites--caves, open sites without architectural features, and from a site with architectural features. I have not attempted to functionally differentiate these sites or the occupations in them. Thus, a composite view of the Tehuacan Valley is a mixture of different kinds of sites and presumably of activities as well. To compare with this we have only a limited sample of a single site in the Lower Papaloapan Basin. For the purpose of comparison with Palo Blanco I will lump together the Limon and Camaron phases since they may both be coeval with Palo Blanco.

There are some difficulties with selecting comparable tool categories. To minimize these problems I will use broad categories of tools as follows: cores, fine blades and fragments (excluding tools such as scrapers, burins, notches, graver-perforators, and projectile points made on blades); crude blades and fragments (the only possible crude blade from Patarata is the thick chert blade which falls in the scraper category); scrapers (all kinds) and truncated blades; burins (all kinds); spokeshaves or notched tools; flakes (utilized, retouched, and unretouched); gravers and graver-perforators; projectile points and fragments; bifacial artifacts (excepting projectile points and artifact burins); manos and metates; mullers, milling stones, and grinding tool fragments; mortars, pestles, and bowls; celts and fragments; and adzes and fragments. In addition, I have abstracted from the above groups two broad categories: total blades, fragments, and blade tools; and total food grinding tools. The relative frequencies of the categories are graphed for Palo Blanco and Patarata as well as for the preceeding and succeeding phases in Tehuacan--Santa Maria and Venta Salada (Fig. 36, Table 15).

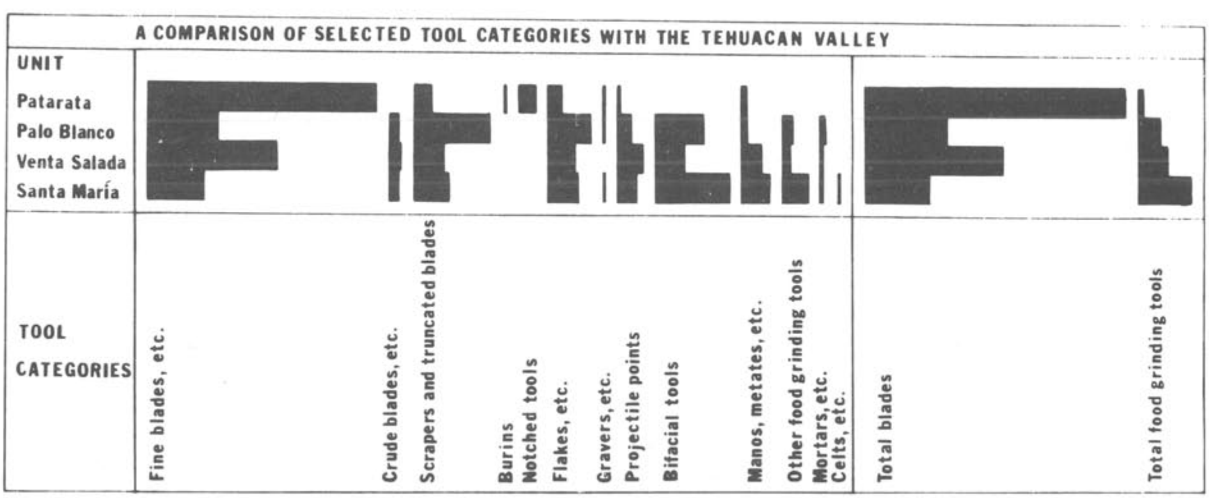



Fig. 36 (based on Table 15)

Some of the tool categories form less than .5 percent and do not appear on Fig. 36. A few appear in small amounts in most of the phases in both areas. However, some categories give a consistent pattern of contrast between any of the three Tehuacan phases and the Patarata material. Scrapers and points, for example, are always more frequent at Tehuacan.

| Table 15. A Comparison of Selected Tool Categories with the Tehuacan Valley (excluding possible cases; combination tools not broken down) % to nearest whole percent | PROVENIENCE | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Patarata | | Palo Blanco Phase (MacNeish et al. 1967) | | Venta Salada Phase (MacNeish et al. 1967) | | Santa Maria Phase (MacNeish et al. 1967) | |
| | No. | % | No. | % | No. | % | No. | % |
| Core | 1 | 0 | | | 6 | 0 | 1 | 0 |
| Fine blades and fragments, including unretouched, ridge, denticulate, and combination tools | 551 | 79 | 296 | 24 | 571 | 44 | 230 | 19 |
| Crude blades and fragments | | | 37 | 3 | 56 | 4 | 32 | 3 |
| Scrapers and truncated blades | 44 (all blade) | 6 | 310 (13 on blades) | 26 | 136 (7 on blades) | 10 | 143 (16 on blades) | 12 |
| Burins | 10 (all blade) | 1 | | | | | | |
| Notches or spokeshaves | 40 (39 blade) | 6 | 5 | 0 | 5 | 0 | 5 | 0 |
| Flakes, unretouched, retouched, and platform trim | 33 | 5 | 181 | 15 | 125 | 10 | 132 | 11 |
| Gravers and graver-perforators | 6 (all blade) | 1 | 9 | 1 | 4 | 0 | 8 | 1 |
| Projectile points and fragments | 10 (all blade) | 1 | 62 | 5 | 121 (7 on blades) | 9 | 86 | 7 |
| Bifacial tools | | | 201 | 17 | 133 | 10 | 316 | 26 |
| Manos, metates, fragments, and mano-pestles | 13 | 2 | 25 | 2 | 92 | 7 | 123 | 10 |
| Other food grinding tools | | | 51 | 4 | 38 | 3 | 106 | 9 |
| Mortars, pestles, and bowls | | | 23 (3 bowls) | 2 | 12 (3 bowls) | 1 | 18 (13 bowls) | 1 |
| Celts and fragments | 1 | 0 | 4 | 0 | 2 | 0 | 14 | 1 |
| Adzes and fragments | | | | | | | 1 | 0 |
| Subtotal of blades | 660 | 93 | 346 | 29 | 641 | 49 | 278 | 23 |
| Subtotal of food grinding tools | 13 | 2 | 96 | 8 | 138 | 11 | 234 | 19 |
| TOTAL | 709 | | 1204 | | 1301 | | 1215 | |

Most scrapers in the Tehuacan phases are not on fine blades and would have been more suitable for skin treatment than the Patarata truncated blades. We may anticipate that the relatively large number of cave excavations may have biased the Tehuacan collection in favor of tools related to hunting. On the basis of faunal remains Flannery (1967) lists most Palo Blanco components as wet season camps where trapping and hunting were practiced, although this was never the primary subsistence activity in them. It is possible that permanent village sites of the Palo Blanco phase would have less hunting activities.

Fine blades occur in increasing percentages in the Tehuacan sequence, but they never form the high percentage evident at Patarata. In contrast flakes are consistently more prevalent at Tehuacan. The importance of obsidian blades at Patarata is even more striking if we compare the percentages of total blades, fragments, and blade tools in the two areas. Bifaces, an important category for Tehuacan, are absent in the Patarata sample. Finally, the relative amounts of all food grinding tools are consistently greater in Tehuacan phases than at Patarata.

I suggest three main factors produce these patterns of contrast. One is the possible bias of the Tehuacan collection in favor of hunting-related activities. The lesser importance of food grinding implements at Patarata may be evidence of a different subsistence orientation, one relying more on estuarine harvesting than agricultural production. Differential availability of raw material for grinding stones could contribute to the contrast, but the proximity of the volcanic Tuxtlas to Patarata would suggest this is not the cause. The predominence of obsidian blade tools at Patarata and the concurrent scarcity of flakes and various bifacial tools suggests an environmental and economic variable: the scarcity of stone in the estuarine environment. Stone was a vital raw material that had to be imported. An obsidian blade core blank is a way to import many latent tools compactly with very little waste (cf. Sheets and Muto 1972, who discuss the efficiency of pressure-blade techniques for production of acute cutting edges). The importance of fine blades and blade tools at Patarata may reflect in part an economical solution to a scarcity problem.

I attempted a similar kind of comparison of types with Tolstoy's (1971) Central Mexican material, but I could not make it as comprehensive as the Tehuacan comparison. One reason is the lack of complete numerical data on food preparation artifacts, and another concerns lack of comparability in tool types. Once again, I have not controlled functional site differences as a variable. In this comparison I used a smaller number of categories: cores; fine and crude blades (excepting truncated blades and scrapers, burins, denticulates, and notches or spokeshaves on blades); truncated blades and scrapers; burins; spokeshaves or notches; projectile points; denticulates. I also separately compared the total blades and blade tools in this selected sample. Central Mexican Classic sites, Palo Blanco, and Patarata are compared in relative frequencies in these categories in Fig. 37 (Table 16).

The percentage of fine and crude blades is more nearly equal for Central Mexico and Patarata than for Palo Blanco. The same holds true for the total number of blades and blade tools. The Central Mexican area is close to various obsidian sources, which may explain the greater use of blades there than in Tehuacan, along with other factors such as the importance of obsidian trade for Teotihuacan (Spence 1967). I suspect that the high proportions of blades in Central Mexico and Patarata may be due to different reasons. However, the issue is moot because coastal canoe transport of obsidian from Central Veracruz to the Patarata area may have made obsidian accessible and less costly than would otherwise seem likely. The comparatively high percentage of scrapers in Palo Blanco relative to the other two areas may again reflect the sampling from caves, but projectile points from Central Mexico form an even higher proportion than in Palo Blanco.

In summary, the lithic comparison of the three areas suggests that costs and accessibility of different materials and environmental/subsistence conditions may affect stone tool kits, and that more carefully controlled comparisons will prove worthwhile.

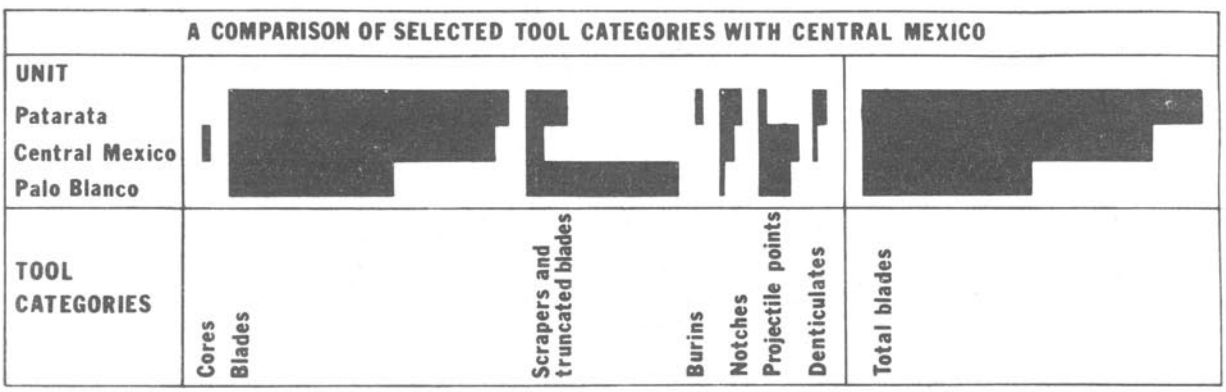



Fig. 37 (based on Table 16).

## Chronology

If we compare the Camaron and Limon phases in the relative frequencies of stone tool types, it is clear that they are closely related assemblages. Patterns of change are to be seen in the increasing relative frequency of retouched blades and in the decline of truncated blades and scrapers. It is possible that stone projectile points are either not present or very rare in the early part of Camaron and that they appear, or become more prevalent, in Limon. The sample size prevents a more conclusive statement about points. The decline in the relative incidence of truncated blades and scrapers suggests two interpretations. One is that the use of these tools and their implied activities such as wood-working, declined in the Limon phase. However, the alternative is that the change results from changes in site and settlement patterns. In other words, the lithic sample, particularly in relation to the small excavation at the site, lacks significant control of horizontal distributions and concomitant spatial/functional variation. Any apparent chronological changes in stone tools at Patarata represent only the small area excavated and may actually reflect changes in activity patterns at the site or in the surrounding area.

Table 16.

A Comparison of Selected Tool Categories with Central Mexico

(Excluding possible cases; combination tools not broken down)

| | PROVENIENCE | | | | | |
|---|---|---|---|---|---|---|
| | Patarata | | Central Mexico (Tolstoy 1971) | | Tehuacan, Palo Blanco (MacNeish et al. 1967) | |
| % to nearest whole percent | No. | % | No. | % | No. | % |
| Cores | 1 | 0 | 27 | 2 | | |
| Fine and crude blades, retouched, unretouched, combination tools | 528 | 80 | 984 | 76 | 333 | 47 |
| Scrapers and truncated blades | 44 (all blade) | 7 | 68 (27 on blades) | 5 | 310 (13 on blades) | 44 |
| Burins | 10 (all blade) | 2 | 2 | 0 | | |
| Notches | 40 (39 on blades) | 6 | 54 (on blades) | 4 | 5 | 1 |
| Projectile points | 10 (all blade) | 2 | 145 (27 on blades) | 11 | 62 | 9 |
| Denticulates | 23 (all blade) | 4 | 8 (all blade) | 1 | | |
| Subtotal of blades | 654 | 99 | 1100 | 85 | 346 | 49 |
| TOTAL | 656 | | 1288 | | 710 | |

## Obsidian Analysis, Sources, and Trade at Patarata

Compositional analysis of obsidian artifacts and natural obsidian sources permits partial identification of trading patterns. (Renfrew, et al. 1966; Griffin, et al. 1969; Cobean, et al. 1971; Hester, Jack, and Heizer 1971; Hester, Heizer, and Jack 1971). In order to obtain further information about obsidian trade at Patarata, Robert Cobean (1974) analysed some of the obsidians for trace elements. Cobean will report later in detail on the results, but with his permission an interim report is included here.

Cobean has analysed eleven samples from Patarata 52 according to the x-ray emission spectroscopy methods described in Cobean, et al. (1971). These samples were chosen by Cobean's inspection of a portion of the Patarata obsidian in order to select representatives of the visible variability in the collection. The reliability of visible characteristics in separating obsidians according to sources has been assessed negatively by several investigators (Griffin et al. 1969), but compositional groups of obsidians at San Lorenzo Tenochtitlan (Cobean et al. 1971:8) showed much more consistency in visible characteristics.

Of the test samples from the Patarata collection, one appeared to be from Guadalupe Victoria (confirmed by compositional analysis) and one from Teotihuacan (also confirmed). The remaining samples were expected to fall into at least two groups, one from Altotonga, Veracruz, and the other, unknown. Three of the samples did fall into the Altotonga range. The remaining six are more similar to the Altotonga source than any other presently sampled, but do not fit its range as closely as the others. These similar samples have been classified as "probably Altotonga." Assuming that the probable and confirmed samples do represent variability in the Altotonga source, it is the major Patarata source area. However, these tested samples are not necessarily representative of the amount of Patarata obsidian from the various sources. They were selected as tests of the visible range in part of the collection.

Time and money did not permit an extensive compositional analysis. Therefore, before testing further samples, Cobean and I made a visual assessment of the remainder of the Patarata collection. According to visible qualities the remainder of the collection falls into the following additional categories: possibly Pico de Orizaba, probably Pachuca (the distinctive green color seems to be a reliable indicator of that source area), possibly San Lorenzo Tenochtitlan Composition Group C, and finally, unknown. The unknown category incudes both those obsidians whose visible characteristics did not suggest a compositional group and those which were too small or thin to permit visual assessment. It is not to be expected that the visual examination will prove to be highly reliable even if further compositional testing continues to lend some support to the visual categories. What may be established through further study is that visual categories have a degree of reliability in giving estimates of the relative importance of some obsidian sources for a sizable obsidian collection, at least for the Mesoamerican area.

According to the visual and compositional examination of the Patarata collection, the Altotonga source supplied between 74 and 86 percent by numbers of the obsidian blades, flakes, etc. throughout the cultural sequence. Rarely represented are Pico de Orizaba, Teotihuacan, Pachuca, Guadalupe Victoria, and San Lorenzo Composition Group C. (The possible Pico de Orizaba examples include obsidian blades, but compare Cobean, et al. 1971:10) None of these minor sources appears to form more than 2% of the obsidian artifacts. Unknown sources represent between 5 and 24% of the obsidian items throughout the sequence, although most phases have between 11 and 20%. there is a possibility of a slight trend toward more diverse source supplies between Camaron 1 and Limon, according to the visual assessment. Again, the reliability of these estimates is not yet adequately established.

According to the tested samples, possibly also according to visual analysis, the Altotonga source was an important one in supplying the Patarata inhabitants. The location of this source is in the northern end of Central Veracruz (Cobean et al. 1971:map). Pico de Orizaba and Guadalupe Victoria are both slightly closer. Pachuca and Teotihuacan sources are more distant, and they supplied very little of the obsidian compared to the three closer sources. Because of the possibility that Patarata drew heavily on the Altotonga source, the trade route for the obsidian has two obvious possibilities. The obsidian may have come by land across Central Veracruz or by water in coastal trade. If the obsidian came by coastal trade via the Gulf, then it is possible that the predominance of obsidian blades in the stone artifacts partially reflects a transportation system that lessened the cost of importing it.

Should the heavy Patarata reliance on Altotonga as a source be confirmed by further compositional analysis, it constitutes another example of what seems to have been a long-standing Southern Veracruz-Tabasco pattern: at a given site, procurement of obsidian was principally from one source. Hester, Heizer, and Jack (1971) discuss this pattern with reference to the earlier sites of San Lorenzo Tenochtitlan, La Venta, and Tres Zapotes. Cerro de las Mesas also seems to have such a pattern, but the analyzed sample is small. Curiously, the principal source for each of these sites differs.

## BONE AND TOOTH ARTIFACTS

Species used to make bone and tooth artifacts are identified through the courtesy of Dr. Elizabeth S. Wing, Florida State Museum. Dr. Wing's identifications are also counted in her vertebrate faunal study in the next section.

### Ear Plugs 4 (Fig. 38)

*Material.* Bone.

*Surface.* One fragment is well polished, inside and out, but the other ear plugs are now weathered, bearing only traces of polish.

*Form.* All are of the "napkin ring" form. Two specimens are complete, and two are fragmentary. Both complete specimens flare slightly more at one end than at the other. The larger of the two measures 1.4 cm and 1.6 cm in its diameters; the smaller extends 1 cm and .9 cm across at the ends. The latter differs from the others in that it has .1 cm squared lips or ridges decorating its two ends. The exterior sides of the ear plugs range from slightly to markedly concave and are 1.2 to 1.3 cm long.

*Chronology.* Bone ear plugs occur in Camaron 2, 3, and the collapsed material. See Table 17.

### Pendants 3 (Fig. 38)

*Material.* One is made of unidentified bone, one, of a Canis familiaris canine, and the third, of turtle carapace, Kinosternon sp.

*Surface.* The bone pendant bears some polish. The carapace is not polished, but its bottom edge is smoothed, and one side has numerous small scratches.

*Form.* The bone pendant is fragmentary and has a needle-like shape. It is now 1.2 cm long, .2 cm wide, and has one pointed end and half a suspension hole at the other end. The tooth pendant is 1.5 cm long and .9 cm wide at its base. The carapace pendant is roughly rhomboid in form. Its suspension hole is large, .4 cm in diameter. The pendant itself measures 1.8 by 1.5 cm along its greatest dimensions.

*Chronology.* The bone pendant occurred in Camaron 3 deposits, the tooth and carapace pendants are from Camaron 2. See Table 17.

*Comment.* The suspension hole on the bone pendant was drilled from both sides, as was the turtle shell. The tooth pendant was perforated from both sides at its tip. The root of the tooth was removed by sawing through from each side and snapping the remaining center part. Two other cut marks remain on the sides of the tooth slightly higher up. The needle-like bone pendant is almost indistinguishable from a needle in form, and only its shortness suggests that it was a pendant. It may be reworked, broken needle point.

Bead 1 (Fig. 38)

*Material.* Shark caudal vertebra.

*Surface.* Edges were smoothed to a circular form.

*Form.* The bead is circular, .5 cm in diameter, .2 cm thick.

*Chronology.* From collapsed material. See Table 17.

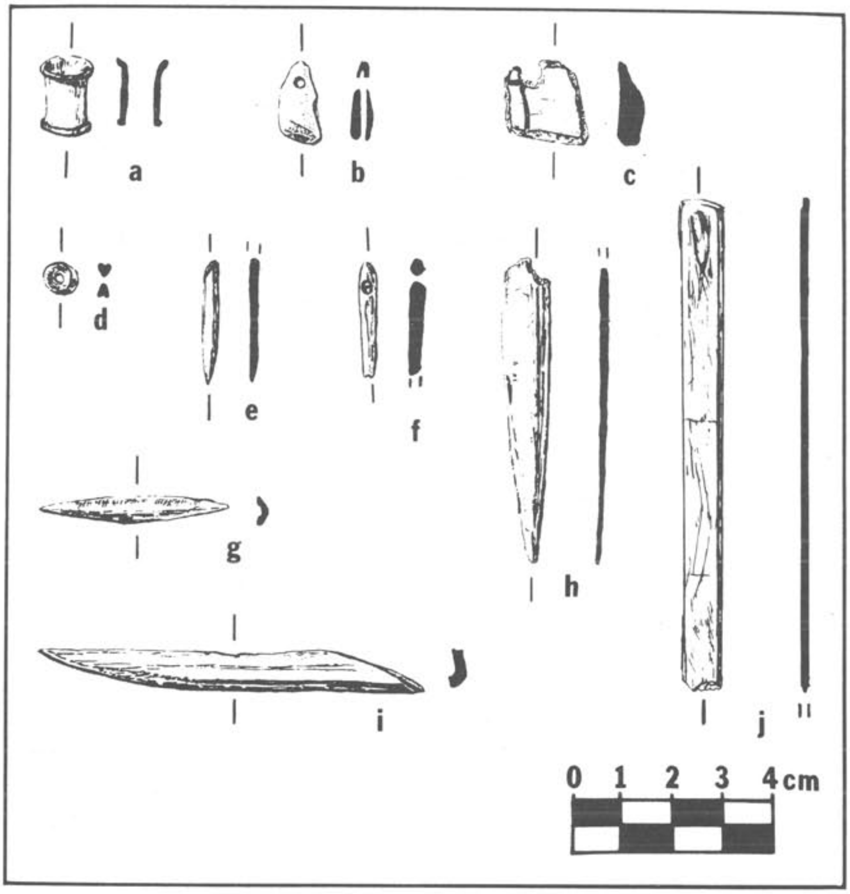



Fig. 38 (a) Bone Ear Plug, collapsed material; (b) Canine Pendant, Camaron 2; (c) Kinosternon Pendant, Camaron 3; (d) Shark Bead, collapsed material; (e) Needle, Limon; (f) Needle, Camaron 2; (g) Gorge, Camaron 3; (h) Awl, Camaron 1; (i) Gorge, Camaron 1; (j) "Swizzle Stick," Camaron 3.

Needles 4 (Fig. 38)

*Material.* Bone.

*Surface.* All are well smoothed and moderately to highly polished.

*Form.* Needles are slender, nearly parallel sided, pointed shafts, either solid and cylindrical in cross-section or flattened on two opposing, broader sides. Butt ends are either blunt or tapered. No complete needle was found; the longest fragment is 2.5 cm. Diameters range from .2 cm to .35 cm.

*Chronology*. Needles occurred in Camaron 2, 3, and Limon. See Table 17 .

*Comment*. The eyes were drilled from both sides.

Needle Preform (?) 1

*Material*. Bone.

*Surface*. Highly polished.

*Form*. This is a section of a bone shaft that shows traces of longitudinal sectioning on one edge. On its flatter side there is a longitudinal groove cut nearly half through the bone. Both ends of the bone are broken off, but the segment being sectioned off is parallel sided and could have served as a needle preform once it was cut free. Final shaping would round the squarish contours. The entire piece now measures 4.1 cm long, .7 cm wide; the width and thickness of the segment being sectioned off are .3 cm, well within the range for Patarata needles.

*Chronology*. Camaron 2. See Table 17 .

Awls 4 (Fig. 38)

*Material*. Bone.

*Surface*. One awl is extremely corroded, but the other three are highly polished, two on both sides, the other, only on the convex exterior.

*Form*. Awls are pointed, flat to semi-lunar in cross section, and broaden away from the point. The points themselves are always flattened in cross-section. All but one of the awls are fragmentary; the complete example is 6.1 cm long, finished bluntly on the non-pointed end. Maximum width ranges from .5 to 1.4 cm.

*Chronology*. Awls occurred in Camaron 1 and Limon. See Table 17 .

*Comment*. See Gorges, Form. Fragmentary awls and fragmentary large gorges may not be formally distinct.

Awl Preforms 2

*Material*. Bone.

*Surface*. A roughly-cut piece of bone bears a polished exterior and a partially polished interior. The other awl preform has remnants of a polished surface, exterior and interior, but it is badly corroded.

*Form*. The roughly cut bone has a slightly semi-lunar cross-section. The length of the piece is 4.3 cm, the width, .6 cm. The other awl preform is incompletely cut away from what appears to be a much larger but worn awl (?). The partly-cut awl is 6.1 cm long, broken at the base.

*Chronology.* The roughly cut bone is from Camaron 2; the other preform is from Camaron 1. See Table 17.

*Comment.* The roughly cut fragment could be a preform for an awl or a shaft of a crudely-made awl. The other awl preform might be a large gorge preform instead.

### Gorges 2 (Fig. 38)

*Material.* Bone.

*Surface.* The smaller gorge is highly polished. The other possible gorge has an interior that is still rough and unpolished.

*Form.* The small gorge is bi-pointed, 3.7 cm long, maximally .5 cm wide in the center. The cross-section is slightly semi-lunar in the center. The other possible gorge is much larger and could have served also as a bi-pointed awl. It is 7.6 cm long and is broken at the center where it would have reached its maximum width.

*Chronology.* The small gorge is from Camaron 3; the larger one is from Camaron 1. See Table 17.

### "Swizzle Stick" 1 (Fig. 38)

*Material.* Bone.

*Surface.* Well polished.

*Form.* This piece is quite flat and thin, 9.4 cm long, .7 cm wide, and .15 cm thick. Its edges are squared off; one end is finished in a roughly rectangular fashion, but the other is now broken.

*Chronology.* Camaron 3. See Table 17.

*Comment.* The use of the artifact is unknown.

### Spatula-like Tools 2 (Fig. 39)

*Material.* The smaller of the tools is made from the left tibiotarsus of Meleagris sp. The larger one is from a Homo sapiens upper humerus.

*Surface.* The smaller tool has interior and especially exterior surfaces well-polished. The larger spatula is also well-polished.

*Form.* The shaft of the Meleagris tibiotarsus was opened and half removed so that the tool shaft is trough-shaped. One articulating end remains.

The other end is nearly flattened and had a blunt to slightly rounded tip. The tool measures 15.7 cm in length. At its widest the shaft is 1.2 cm. The Homo sapiens humerus is a similar tool, but much larger in cross-section and with a much shorter "trough" segment. The articulating end is broken off. The shaft bears a transverse cut mark just above where the bone was opened to make the trough-shaped section. A large part of the tip is broken off, but a small part of its polished, partially smoothed edge remains. The tip was probably rounded, although a pointed end cannot be ruled out. The present length of this tool is 16.8 cm, maximum diameter, 2 cm; the trough segment is now 4.8 cm long.

*Chronology*. The tibiotarsus tool is from Limon deposits. The humerus is from Camaron 3. See Table 17.

*Comment*. Both are well-made artifacts of somewhat uncertain function. For the tibiotarsus the exterior tip seems definitely to have been the working surface. Polish is prominent on the exterior tip, and there, too, the tip area is slightly pitted with wear. Two symmetrically placed shallow grooves on the end suggest the worn end of a weaving tool (A.E. Dittert, personal communication). The bone is not thick enough to have withstood heavy pressure during its use. The fracture patterns on the humerus tip suggested to A.E. Dittert (personal communication) possible use as a punch. This latter artifact is quite heavy and would withstand considerable pressure.

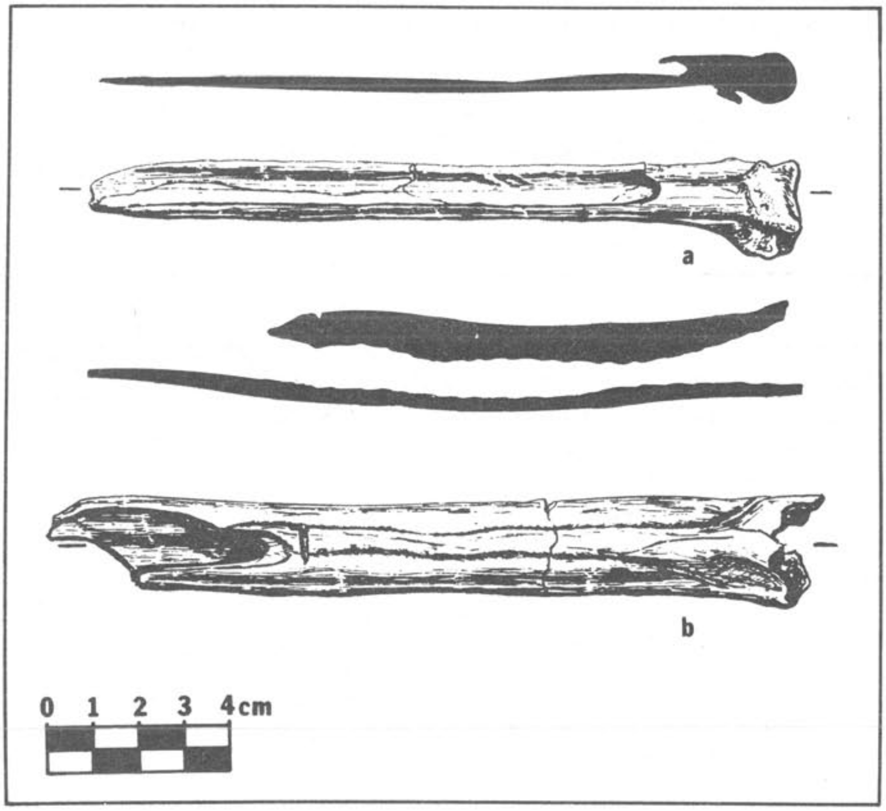



Fig. 39 (a) Spatula-like Tool, Meleagris sp., Limon; (b) see (a), Homo, Camaron 3.

### Miscellaneous 1

*Material.* Bone, probably a section of a long bone.

*Surface.* This piece bears traces of polish inside and out.

*Form.* The fragment is square-edged and smoothed with one finished and tapered end; the other end is broken off. Now the piece is 2.5 cm long, 1.8 cm wide, and .7 cm thick.

*Chronology.* This artifact is from Limon. See Table 17.

*Comment.* Its function is not apparent.

### Transversely Sectioned Bones 15

*Material.* Bone, two are <u>Odocoileus</u> sp, and five are <u>Canis familiaris</u>.

*Surface.* Natural.

*Form.* A number of long bone segments show evidence of incomplete or completed sectioning cuts, the latter in all but one case serving to weaken the bone so that it could be snapped evenly. Additional transverse cut marks are common. Two specimens are deeply grooved but incompletely sectioned. Six were completely sectioned for removal of an articulating end on the bone. Four specimens were completely sectioned, but there is no indication that an articulating end was removed. Three other specimens have additional special characteristics: two small fragments have both transverse and longitudinal deep grooves, one finished end, and an appropriate curvature and size for ear plugs; they may be ear plugs broken in manufacture. Finally, another specimen has completed longitudinal sectioning, incomplete transverse sectioning, and one transverse finished edge. Possibly it is part of a reworked tool.

*Chronology.* Transversely sectioned bones occur in Camaron 2, 3, Limon, the shell deposit and the collapsed material. See Table 17.

### Sectioned Bones 1

*Material.* Bone.

*Surface.* Natural.

*Form.* One fragmentary articulating end was obliquely rather than transversely sectioned. The sectioning was completed by snapping.

*Chronology.* See Table 17.

### Cut-marked Bones 3

*Material.* Bone, except for one piece of turtle carapace. One bone is a vertebra and the other is a long bone from Odocoileus sp.

*Surface*. Natural.

*Form*. The cut marks are transverse on the long bone. Cut marks differ from sectioning marks only because they are shallower and shorter.

*Chronology*. Cut-marked bones occur in the shell deposit and collapsed material. See Table 17.

Table 17. Bone and Tooth Artifacts

| ARTIFACTS | Camaron 1 | Camaron 2 | Camaron 3 | Limon | Shell Deposit | Collapse | Total |
|---|---|---|---|---|---|---|---|
| | PROVENIENCE | | | | | | |
| Ear Plugs | | 2 | 1 | | | 1 | 4 |
| Pendants | | 1 | 2 | | | | 3 |
| Bead | | | | | | 1 | 1 |
| Needles | | 2 | 1 | 1 | | | 4 |
| Needle Preform | | 1 | | | | | 1 |
| Awls | 2 | | | 2 | | | 4 |
| Awl Preforms | 1 | 1 | | | | | 2 |
| Gorges | 1 | | 1 | | | | 2 |
| "Swizzle Stick" | | | 1 | | | | 1 |
| Spatula-like Tools | | | 1 | 1 | | | 2 |
| Miscellaneous | | | | 1 | | | 1 |
| Transversely Sectioned | | 5 | 3 | 1 | 1 | 5 | 15 |
| Sectioned | | | | | | 1 | 1 |
| Cut-marked | | | | | 1 | 2 | 3 |
| TOTAL | 4 | 12 | 10 | 6 | 2 | 10 | 44 |

## Bone and Tooth Artifact Discussion

Patarata bone tools (1) suggest that skins, cloth, or fibers were worked at the site, (2) give evidence of line fishing, (3) indicate manufacture of pendants and ear plugs from local materials for ornamentation, (4) suggest that various other bone artifacts were made at the site, again from local materials. Because there is not an excessive amount of cut-marked or sectioned bone in comparison to finished tools, there is no indication that bone tools were made in excess of local demands or that fancy, decorated objects were made which might be suitable for export or trade. This does not, however, completely rule out the small-scale manufacture of bone artifacts for trade.

Most of the tools appear to have been made by transverse sectioning from long bone shafts of human, dog, turkey, or deer origin. That transversely sectioned (and probably also transversely cut-marked bones) were produced in the course of manufacturing tools is extremely likely; there would be no reason to use this method to split bones for marrow or cooking.

The chronological distribution of the artifacts shows no clear trends, but rather, documents the continued manufacture and use of these items throughout the sequence.

## WOOD ARTIFACTS

### Cut Fragments 2 (Fig. 40)

*Material.* Wood.

*Surface.* Surfaces are relatively even, especially along the cuts.

*Form.* Two small pieces of wood, 2 and 2.5 cm long, bear semi-lunar cuts along their margins. Each piece is thin, approximately .5 cm wide, 2 to 4 mm thick. The fragment from Camaron 2 has shallow semi-lunar cuts on opposite edges in alternating position. The fragment from Camaron 3 has a single cut along one edge forming a hooked, semi-lunar shape.

*Chronology.* Camaron 2 and 3.

*Comment.* Especially the second piece discussed above could hold a gorge fastened into the cut. Nevertheless, the function of these pieces remains problematic, particularly because the fragmentary condition tells little about their original shape. These specimens were not treated with polyethylene glycol to preserve them because workmen put them in with bone material. Some distortion resulted on one, and shrinkage has probably occurred.

### Possibly Cut Fragments 2 (Fig. 40)

*Material.* Wood.

*Surface.* Surfaces are relatively even.

*Form.* From Camaron 3 deposits a small twig fragment 2.2 cm long, 1.3 cm wide, and .6 cm thick bears a suspicious, deep, narrow cut in one edge and a shallow flat groove on one exterior surface. The groove is .3 cm wide, rounded at its end. Another fragment from Camaron 3, 2 cm long, .5 cm wide, and .35 cm thick, is suspiciously flat and even on both sides and is of uniform thickness. It may be a fragment of a cut piece of wood.

*Chronology.* Camaron 3.

*Comment.* These fragments were not treated with preservative (see Cut Fragments, Comment).

### Carved Bowl Fragments 2, 2 possible (Fig. 40)

*Material.* Dr. B. F. Kukachka of the United States Forest Products Laboratory identified the wood as Gliricidia sp. The only Gliricidia species listed by Pennington and Sarukhan (1968:210) among tropical trees of Mexico is G. sepium. Their distribution chart includes it in the Alvarado mangrove area as well as in the rest of Veracruz. In the past this species was used as shade for cacao.

*Surface.* One end of the carved section decayed on the surface, and another end has some longitudinal cracks; nevertheless, interior and exterior surfaces are smooth and even and remain in good condition for the most part.

*Form.* The special deposition conditions of the brown stratum of the Camaron 1 sub-phase resulted in the fortuitous preservation of fragments of a carved wood bowl, most of which joined together. A section of the side of the bowl remains, but the lip and base do not. The vessel was apparently nearly straight-sided, sloping slightly outward, thinning toward the lip, and thickening as it curved smoothly toward the base. One small carved fragment did not join the others; presumably, however, it was part of the same bowl. The main section of the bowl (restored) is 14.6 cm long, 6.8 cm wide, minimally .5 cm thick, maximally 1 cm thick. The small carved fragment is 3.9 cm long, 1.9 cm wide, and 1.8 cm thick. These dimensions describe the pieces after laboratory preservation (Stark 1974a:487-492).

Two very small wood fragments bear no carving or paint. Judging from the finish of the surfaces and the texture of the wood, one probably is a fragment of the bowl, and the other is possibly a fragment of it. Neither joins to the other pieces.

*Decoration.* Still adhering to the interior of the bowl are four small areas of stuccoed polychrome painting; another small area of painted stucco detached from the bowl interior. Black, yellow, and red paint are visible. A carved panel decorates part of the exterior surface. No painting is evident on the outside of the main part of the bowl, but the carved fragment, which is probably from another part of the same bowl, has a small patch of red paint on its exterior carved surface. Thus there is a good possibility that most of the interior and exterior surfaces were painted, although the exterior apparently never had an underlying stucco coat.

*Comment.* The carved panel represents the back of the head of a scroll dragon in profile, facing left (cf. Miles 1965:242, fig. 2 for a discussion of other scroll dragon representations in Mesoamerica). An ear plug appears with a round center piece and two attached scrolls. The carving is worn away just between the round center of the ear plug and the upper scroll, a space which could have been occupied by additional ornamental detail. Behind the ear plug a good part of the carving has been eaten away; however, the two back corners of the panel apparently were occupied by scrolls.

At the corner of the mouth there is an upward turning scroll. The lower jaw is shown with three vertical sections and two longer horizontal sections. Since the lower jaw lacks any use of scrolls or of curved lines, I interpret it as a fleshless lower jaw. The teeth are rectangular. They may be divided into upper and lower sets, but the line dividing them horizontally is probably a crack in the wood surface. The crucial area of the eye is nearly obliterated. Here the carving was somewhat decayed and the trowel point first struck it where part of the eye might have been visible.

A technique used in the Patarata carving is differential relief. Some scrolls and lines are deeply incised and others very shallowly. This focuses attention on the main features of the head. For example, the upper right corner scroll is cut quite shallowly; the ear plug and mouth corner scrolls are much deeper.

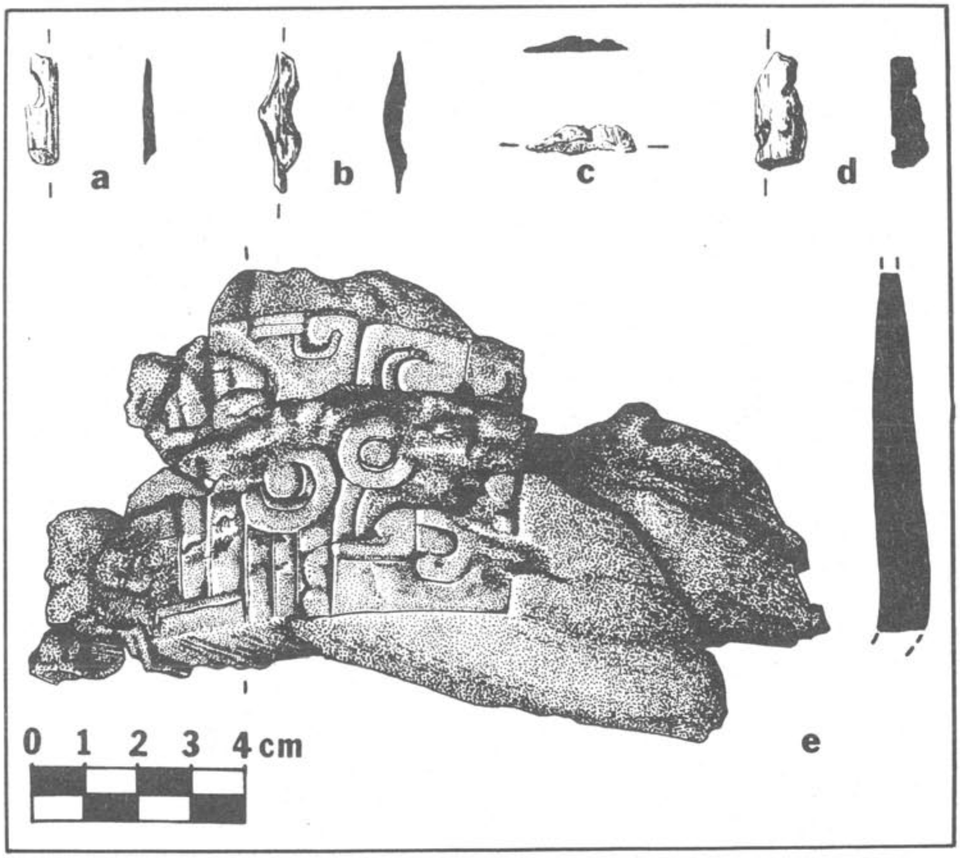



Fig. 40 Wood, Cut Fragment: (a) Camaron 3, (b) Camaron 2; Wood, Possible Cut Fragment: (c) and (d) Camaron 3; Wood, Carved Bowl: (e) Camaron 1, remnants of stucco and polychrome paint on interior.

## Wood Artifact Discussion

In discussing the lithic artifacts and the activities they may reflect, I pointed out that many of the tools could be used in wood-working. The cut and carved wood fragments are not very informative about what kinds of wood artifacts were made, but they do document wood-working. Particularly in the case of the carved bowl, the question arises as to whether or not it represents a local manufacture in the estuarine zone or importation. The former is at least as likely as the latter. There were small ceremonial centers in the mangrove swamp , and craftsmen carved monuments for some of them.

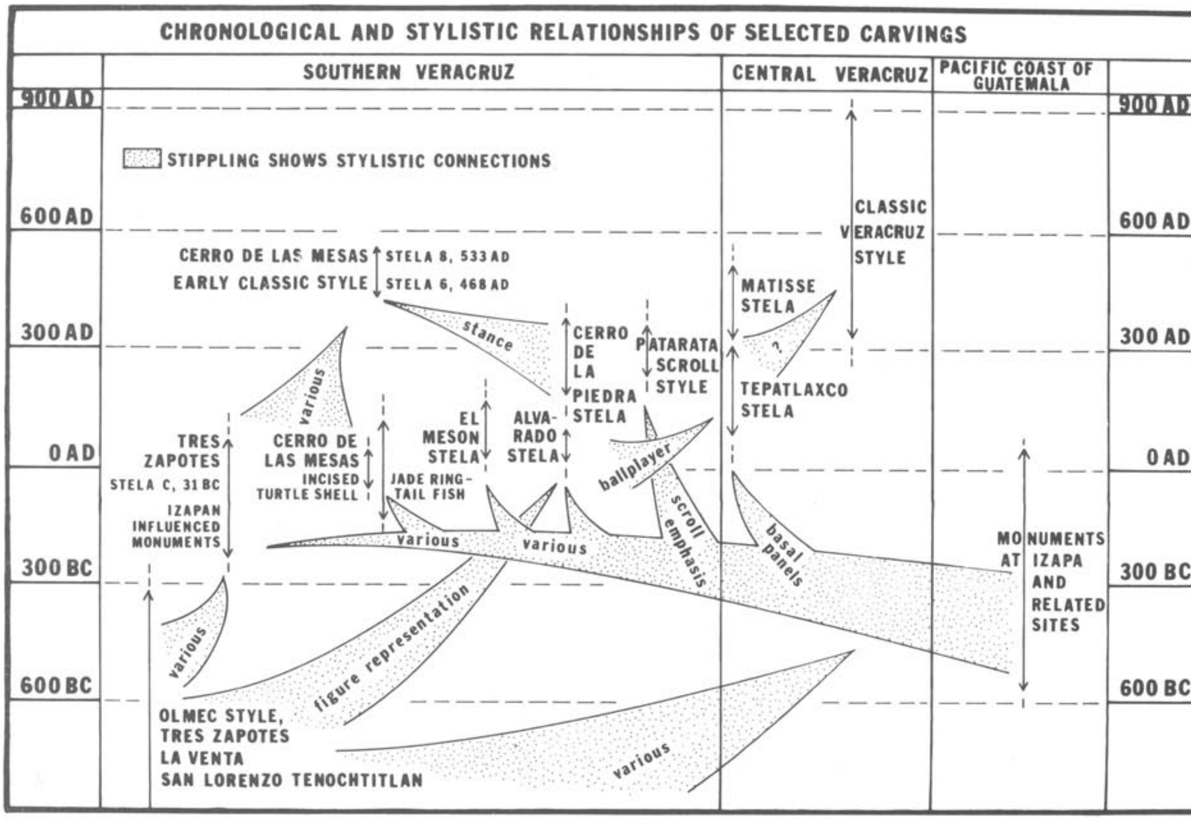



Fig. 41

## Analysis of the Carving Style

### The Patarata Carving

We must expect the Patarata wood carving to have its closest relationships with works that reflect Izapan influence and have an emphasis on scroll designs (Stark 1974a:345-357; Fig. 41 summarizes a stylistic seriation of carvings). Two problems hinder comparisons with other carvings (1) the Patarata carving is incomplete, and (2) it is an attempt to decorate a small longitudinal panel. One of the options in a constrained space is to simplify the subject matter. Of course, most of the corpus available for comparison is that of large-scale sculpture.

Few of the works from the Southern Veracruz area that are pertinent for comparison from a strictly chronological viewpoint actually show specific similarities to the Patarata carving--other than the fact that many incorporate some scrolls (e.g.,Tres Zapotes Monument C). For example, one of the few small works portraying serpent heads is the incised turtle shell found in a Protoclassic burial at Cerro de las Mesas (Drucker 1943a:8f, 79; Coe 1965a:696ff). The serpent heads on this carving resemble those on Stela D at Tres Zapotes and on the large El Meson Stela (Covarrubias 1957:fig. 68), another relief from Southern Veracruz showing Izapan influence. However, the turtle shell is unlike them in featuring double lining. Comparable double lined serpent or dragon heads can be found elsewhere in Guatemala on Kaminaljuyu Stela 11 (Miles 1965:240, fig. 3e) and Bilbao Monument 42 (Parsons 1967). However, none of these dragon heads bears a close resemblance to the Patarata carving because scrolls are not the basic component of their design.

A more comparable small carving is the jade ringtail fish discovered in the huge Cerro de las Mesas jade cache (Drucker 1955:46f). Most of the fish's features are expressed by scrolls and scroll-like volutes. The fish apparently is another of the heirloom pieces in the cache (cf. Coe 1965a:702). Stylistically one would associate it with the Izapan style. Of particular interest is the drooping scroll at the back corner of its mouth, which is in keeping with such volutes on dragons' mouths at Izapa and on other stylistically associated monuments from the Guatemalan highlands.

The corner mouth scroll of the Patarata relief is of another kind. A comparable example is to be seen on the ringtail fish in the Leyden Plate tun glyph (Miles 1965:241, fig. 5d) which is dated 320 A.D. In this case the corner mouth scroll turns up and rises above the level of the upper jaw. This is a common depiction of corner mouth scrolls in Classic Maya sculpture (Spinden 1913:38, fig. 26, Copan Altar O and other examples). On the other hand, there is a Late Preclassic occurrence of this kind of mouth scroll on a bowl from Chiapas (Navarrette 1960:fig. 32g). However, the latter seems to be the exception rather than the rule in the Late Preclassic and Protoclassic. The upturning corner mouth scroll is primarily a Classic to Postclassic trait.

There is one other indication that the Patarata relief has an evolved scroll style. The scroll just above the mouth scroll is not a simple one. Its interior space has been decorated. This space is curvilinear under the curved end of the scroll itself, but its other end has been stepped and squared off, with a short horizontal line added. Such a combination of rectangular and curved forms was used on a Teotihuacan vessel (Soustelle 1967:plate 38). The excised and pigment-filled, abstract scroll panel on this vessel has curved scrolls, frets, and short horizontal lines. It would seem therefore that the scroll style of the Patarata relief is also a relatively evolved one, i.e., close to the beginning of the Early Classic Period in date.

## The Patarata Scroll Style

At this point it is relevant to widen the scope of the discussion: the Patarata wood carving is not the only example of scroll motifs at the site. Scroll motifs in Camaron 1 figurine headdresses and various miscellaneous fragments are stylistically consistent with the wood carving, although they form only abstract designs. It seems justifiable to refer to a Patarata scroll style, at present represented only by portable objects. Also indicating a separate Patarata scroll style is the paucity of closely comparable works in the area and the relative frequency of objects in the style in Camaron 1. One possible explanation is that the Patarata scroll style was confined largely to portable objects and that major sculptures used scroll motifs only occasionally as a subsidiary part of their scenes. An example of this is the El Meson monument. Scroll panels are incorporated into Patarata figurine headdresses, and it is interesting that this monument shows a central figure with a bifurcate headdress, one stalk of which has a small scroll panel. However, in other details the El Meson monument bears no specific resemblance to the Patarata carving; rather, it is an Izapan influenced sculpture, possibly falling into the period 0-300 A.D.

By considering ceramic and wood artifacts together, it is possible to define more precisely the Patarata scroll style. It does not have entrelace designs characteristic of the Classic Veracruz style. Since the Classic Veracruz entrelace style apparently had its inception in the Early Classic Period, there is a possibility of contemporaneity or near contemporaneity for the Patarata scroll style and the earliest examples of the Classic Veracruz style (at Kaminaljuyu a Classic Veracruz style mirror-back was found in Esperanza-Teotihuacan III deposits, Kidder, Jennings, and Shook 1946:237, 250ff; Proskouriakoff 1954:89-90; Coe 1965a: 703). In the Patarata scroll style both abstract and representational designs occur, as evidenced by figurine headdress scroll panels and by the wood bowl. The figurine scroll panels, like the carved wood, often have scrolls emphasized by an incised line on the scroll body and following its contours. Figurine scroll panels also include rectangular forms with shallow, incised hatching, perhaps representing feathers.

The Patarata scroll style is limited to Camaron 1. There is a figurine clothing panel from Camaron 2 decorated with shallow, incised lines forming a scroll and a double-ended or "s" form scroll (Fig. 23). In contrast, a decorated clothing panel from Camaron 1 (Fig. 21) has a scroll form shown in low relief (the drawings do not display well the contrast between the shallow incising and low-relief). It seems reasonable, from the Patarata sample of scroll decorations, to define the Patarata scroll style as a low-relief style and to view the Camaron 2 incised example as a derived variant of the earlier style. Similarly, in Camaron 3 a Miscellaneous Possible Figurine or Whistle Part, Prieto Variety, which is probably part of the body of a Papaloapan Smiling Figure, has circular, hooked, and scroll forms made out of thin, raised tendrils--quite distinct from the Patarata scroll style (Fig. 29).

To summarize, major conclusions of the stylistic study are: (1) the Patarata scroll style is distinct from other published styles in Veracruz, (2) it is an evolved scroll style which seems to post-date Izapan influence in Southern Veracruz, but which possibly preceeds the Cerro de las Mesas Early Classic style in which scrolls are not a dominant characteristic, (3) it is presently represented by figurines and a wood bowl in the Camaron 1 sub-phase, and not by monuments from the surrounding area (a possible additional example is a figurine illustrated in Ethnic Arts Council of Los Angeles 1971:number 54), and (4) it is quite possibly contemporaneous with or only slightly antecedent to the Classic Veracruz entrelace style.

## SHELL ARTIFACTS

### Pendants and Beads

Olivia Pendants 2 (Fig. 42)

*Material.* Olivia sp. valves.

*Surface.* Natural.

*Form.* Both pendants are 1.9 cm long. One is tubular, and the other flares outward toward the bottom.

*Chronology.* The tubular pendant is from Camaron 1; the other is from Camaron 3. See Table 18.

*Comment.* To make the perforations, a crevice was sawed through crossways on the exterior near the tops of the pendants.

Disc Pendant or Spangle 1 (Fig. 42)

*Material.* Shell.

*Surface.* Natural.

*Form.* This is part of a flat disc, .6 cm in diameter, judging from the remaining piece. The disc is extremely thin, .05 cm. The perforation, now broken, is round, drilled through at an angle.

*Chronology.* Camaron 2. See Table 18.

*Comment.* The shell is nacreous, probably from a fresh water clam. The disc could have been suspended or sewn onto clothing.

Polymesoda Pendant 1 (Fig. 42)

*Material.* Polymesoda triangula valve.

*Surface.* Natural.

*Form.* To perforate the shell, it was ground flat on the exterior, back of the hinge. Once the shell was worn thin, it was punctured through.

*Chronology.* Camaron 2. See Table 18.

*Comment.* This pendant is unusual for a Polymesoda triangula valve because it has a strong purple tinge around the margins, possibly the reason it was selected.

Possible Pendant Preform  1 (Fig. 42)

*Material*. Shell.

*Surface*. Natural.

*Form*. This piece of shell is flat, smooth, and relatively even; it is triangular in shape and lacks any perforation. Length is 2.5 cm and width at the base is 1.1 cm.

*Chronology*. Camaron 3. See Table 18.

*Comment*. In the huge quantities of shell from the site, no waterworn fragments were evident, which suggests that this may be a preform.

Table 18. Shell Artifacts

| ARTIFACTS | PROVENIENCE Camaron 1 | Camaron 2 | Camaron 3 | Limon | Total |
|---|---|---|---|---|---|
| Olivia Pendant | 1 | | 1 | | 2 |
| Disc Pendant or Spangle | | 1 | | | 1 |
| Polymesoda Pendant | | 1 | | | 1 |
| Possible Pendant Preform | | | 1 | | 1 |
| Bead | | | 1 | | 1 |
| Bead Blank | | | 1 | | 1 |
| Disc | | | 1 | | 1 |
| Worked Shell | | | 1 | | 1 |
| Asphalt Stained Shell | | | 1 | | 1 |
| Red Stained Shell | | | | 1 | 1 |
| TOTAL | 1 | 2 | 7 | 1 | 11 |

Bead  1 (Fig. 42)

*Material*. Shell.

*Surface*. Natural.

*Form*. The bead is small, slightly tubular, but thin, .2 cm thick and .3 cm in diameter.

*Chronology*. Camaron 3. See Table 18.

*Comment*. The bead was drilled from both sides.

Bead Blank  1 (Fig. 42).

*Material*. Shell.

*Surface*. Natural.

*Form*. This is a solid cylinder or stick. Each end is broken off, and it presently measures 4 cm long and .4 cm thick.

*Chronology*. Camaron 3. See Table 18.

*Comment*. In view of the similarity in size with the shell bead, it is possible this is a blank from which beads were sawed and then perforated.

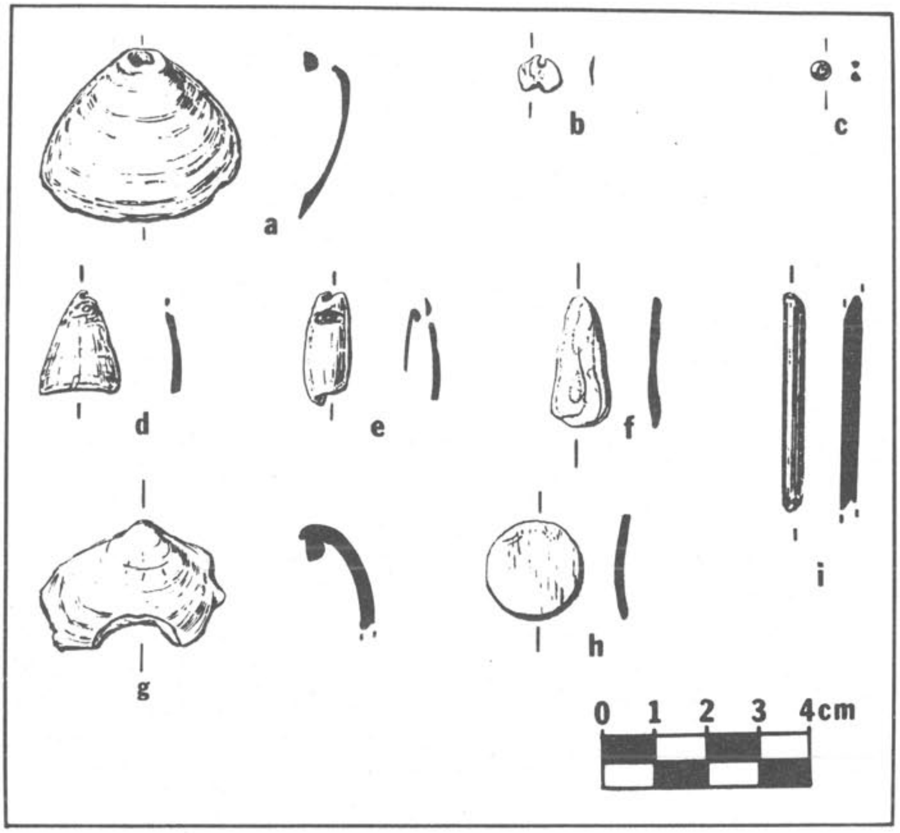



Fig. 42 (a) Polymesoda Pendant, Camaron 2; (b) Disc Pendant or Spangle, Camaron 2; (c) Bead, Camaron 3; (d) Olivia Pendant, Camaron 3; (e) see (d), Camaron 1; (f) Possible Pendant Preform, Camaron 3; (g) Worked Shell, Camaron 3; (h) Disc, Camaron 3; (i) Bead Blank, Camaron 3.

Miscellaneous Shell Artifacts

Disc 1 (Fig. 42)

*Material*. Shell.

*Surface*. Natural.

*Form*. This is a flat shell disc, diameter 1.8 cm, thickness .2 cm.

*Chronology*. Camaron 3. See Table 18.

*Comment.* The function of the disc is unclear. Possibly it is a preform for something else.

Worked Shell 1 (Fig. 42)

*Material.* Polymesoda triangula valve.

*Surface.* Natural.

*Form.* This is a valve from which a semicircular disc, about 1.1 cm in diameter, was removed by sawing or cutting part way and then snapping the disc out.

*Chronology.* Camaron 3. See Table 18.

Asphalt Stained Shell 1

*Material.* Rangia flexuosa valve.

*Surface.* Natural.

*Form.* Unmodified.

*Chronology.* Camaron 3. See Table 18.

*Comment.* The shell is nearly covered over on the interior with asphalt. It is likely the asphalt dripped on accidentally because the shell is too small to use for stirring, etc.

Red Stained Shell 1

*Material.* Polymesoda triangula valve.

*Surface.* Natural.

*Form.* Unmodified.

*Chronology.* Limon. See Table 18.

*Comment.* The shell is stained red on the interior, probably from hematite. It might have been used as a little mixing dish, but the coloring could be fortuitous.

## Shell Artifact Discussion

Shell artifacts are not numerous at P52 and were used mainly for decoration. The possible pendant preform, the bead blank, and the worked shell all suggest that shell artifacts were manufactured locally. Most of the evidence for manufacture comes from Camaron 3. There is no evidence that other than local species were utilized. In trade with other areas shell products may have been exchanged for imported items such as obsidian or other stone.

## CORAL

Two fragments of coral appeared in Camaron 2 deposits. Professor J. W. Wells, Department of Geological Science at Cornell University, was kind enough to identify the specimens. One is Stephanocoenia michelini Milne-Edwards and Haime. The Stephanocoenia is relatively small (length 5.2 cm, width 3.6 cm, thickness 2.3 cm) but of sufficient size to have served as an abrador. One facet has a flat to slightly convex, rather even surface. From the shape of the specimen, this is the "handiest" surface to use for rubbing or abrading. Although this specimen is more worn overall compared to the second one, this more regular facet shows greater wear than the other surfaces. Microscopic examination was necessary to detect the abraded surface. It is probable that this coral was used as an abrasive tool.

Vaughan (1919:360) and Smith (1948:74) list S. michelini as found throughout the West Indies. Professor Wells (personal communication) reports that the species is fairly common from a depth of about 20 feet to about 50 feet. In view of the rarity of coral in the Patarata collection, it is quite possible that the specimen was originally obtained washed up on the Gulf shore rather than sought in its natural habitat.

The second specimen Dr. Wells identified as Solenastrea hyades Dana, a genus which he reports apparently no longer lives this far north along the Mexican coast. The fragment is 5.6 cm long, 2.9 cm wide, and 2.1 cm thick. One small area, about 1 cm in diameter, located on an end, shows distinct flattening abrasion. Because the area is so small, it is difficult to argue that this was necessarily due to human use.

Dr. Donald F. Squires (Andrews 1969:107) points out that modern Solenastrea hyades specimens have been found floating in the Gulf of Mexico and may have arrived on Mexican shores by that means. At Dzibilchaltun Solenastrea hyades specimens were the most common coral found in fill deposits, although this species is less common than some others in reef formations in the West Indies. According to Andrews (1969:107) no function was apparent for the Dzibilchaltun specimens with the exception of one probable ceremonial occurrence in the Cenote Xlacah. At other Yucatecan sites ceremonial and cache associations are predominant.

Moholy-Nagy (1963:69) reports the presence of corals at Tikal; Ricketson and Ricketson (1937:203) at Uaxactun (also Kidder 1947:66); Stromsvik (1942: 72; 88) at Copan; Thompson (1939:181) possibly at San Jose, Belize; W. R. Coe (1959:60) at Piedras Negras; Satterthwaite at Caracol (in W. R. Coe 1959:60); and Thompson (1931:273) at Hatzcap Ceel, Belize. None of these occurrences is cited as having any evidence of use wear on the specimens.

## MISCELLANEOUS MATERIALS

### Petrified Wood Fragment

In Camaron 2 an unworked fragment of petrified wood occurred, measuring 4 by 1.6 by .8 cm.

### Charred Wood Fragments

Small sections of charred twigs and wood fragments and bits of unburned wood occurred scattered throughout the Patarata strata, although some deposits had more carbon chunks and flecks in them than did others. I sent selected Camaron samples of these to Dr. B. F. Kukachka, U.S. Wood Identification Laboratory, and he was kind enough to identify them. From Camaron 1, two pieces were tested, both uncharred, and both are _Avicennia_ sp.; in Camaron 2 two charred samples were tested, both _Avicennia_ sp.; in Camaron 3 one uncharred sample is _Cassia_ sp., and a charred sample is _Inga_ sp. (B. F. Kukachka, personal communication).

From Dr. Kukachka's information it would appear that _Avicennia_ was a main source of firewood. _Cassia_ and _Inga_ may have been used on a less frequent basis. _Avicennia_ is an associated member of the mangrove formation. The wood identifications present strong evidence that the Patarata environment in ancient times was like that of today: an estuarine mangrove swamp. Pennington and Sarukhan (1968:368) comment that _Avicennia germinans_ is used today for posts and for making charcoal.

### Hematite

In Limon deposits occurred a small, irregular piece of specular hematite less than 1 cm long.

### Asphalt

Throughout the Patarata strata were found small pieces of what I shall call asphalt. This substance is sometimes called bitumen, asphalt, asphaltum, and, in the context of Veracruz ceramics, _hule_ or _chapopote_. Usages of these terms vary (cf. Sahagun, 1963:11:61 on bitumen; Hodges 1964:165 on bitumen versus asphalt; Webster's _New World Dictionary of the American Language_ 1951:1:87, 151 which does not clearly distinguish between asphalt and bitumen; Belt 1971:39 on asphalt, _hule_, and _chapopote_). It appears useful to call the asphalt-bearing ceramic paint "asphalt and resin paint" and to eschew the current term _chapopote_; as Belt points out, _chapopote_ originally referred to a yellow ungent with red ochre, used as a paint.

The scattered lumps which occurred in the Patarata strata may be natural bitumen or asphalt, but some samples have the shiny surface characteristic of asphalt and resin paint. No chemical analysis has been performed on them. Andrle (1964:12) reports asphalt cakes along the Gulf shore of the Tuxtlas. Therefore, that natural resource would be available in the area.

One large utilitarian vessel (Patarata Coarse) was coated on most of the interior with asphalt and/or asphalt with resins, indicating that large amounts of asphalt were heated and prepared at the site. Preparation of asphalt in this quantity suggests that it was used for caulking canoes or other items as well as for decoration, possibly of ceramics. It seems reasonable that the scattered asphalt bits in the Patarata site were accidental spills of the substance.

## Summary of Miscellaneous Materials

Non-local materials are represented by the petrified wood and hematite. Asphalt, possibly locally available or obtainable in the neighboring Tuxtlas, can be viewed as a potential export from some coastal and estuarine environments. It is a substance with possible utilitarian functions for caulking or cementing, and it is widely documented in Central and Southern Veracruz as a material used in figurine decoration with asphalt and resin paint. The charred wood identifications by Kukachka are valuable in reconstruction of the site environment.

# CHAPTER FIVE

# FLORAL AND FAUNAL ANALYSIS

## FLORA

### Hugh Cutler

The only corn (Zea mays L.) in the Patarata material is a single carbonized fragment of a cob from Camaron 1. It is 10-rowed with cupules 4.5 mm wide. Cupules are 2.7 mm "long," which would also have been the thickness of grains borne on the ear. Cupules are thickened but not extremely so. It is a variant of the race called Nal-Tel, which is still grown in the region today. I judge that the cob is not an extremely old form because the cob is thickened and cupules are compressed. Nal-Tel is usually grown at low elevations, usually is flint, and fits perfectly with the Patarata location.

There are several specimens of the stone of the mombin plum (Spondias purpurea L.), a tree of tropical Mexico, occasionally planted in villages and producing large quantities of edible plumlike fruits (although it belongs to a completely different family from the temperate climate plums). Easily propagated from cuttings, it is sometimes planted as a fence row and frequently produces so much fruit that the ground is covered. Young shoots and leaves are sometimes eaten cooked or raw. Jocote is one of the many common names, along with ciruela, ciruela morada, etc. They are easy to recognize by the sculptured seed which bears a faint suggestion of a corn cob at first glance.

Most common are fruits of the coyol palm (Acrocomia mexicana Karw. ex Mart.). These are almost globular, with slight points on the end and a visible point of attachment on the other end. They contain an edible, oily seed and are planted in coastal Mexico. There are several species of Acrocomia, all of them with feather-type leaves (as opposed to fan-shaped), and most (perhaps nearly all) with spiny trunks. These are wild-growing in the region, but many of those near villages are planted.

In the Limon phase (P52, S29E41, Pit) there is a fragment of a coconut shell (Cocos nucifera L.), presumably introduced in post-Columbian times on the Atlantic side (there is a slight possibility that there were a few in Panama, but this is doubtful before Columbus).

One charred fragment (3.2 cm long, .8 cm wide) from Camaron 1 was identifiable only as a reed grass or cane. Among the unidentifiable Camaron 1 specimens, one is a fruit shell, but not bottle gourd (Lagenaria) or wild squash (Cucurbita).

FLORAL SPECIMENS BY PHASE

| Species | Number of Specimens |
|---|---|
| Acrocomia mexicana | |
| Camaron 1 | 15 |
| Camaron 2 | 2 |
| Camaron 3 | 15 |
| Limon | 0 |
| | (32 total) |

| Species | Number of Specimens | |
|---|---|---|
| *Acrocomia mexicana* fragments | | |
| Camaron 1 | 20 | |
| Camaron 2 | 9 | |
| Camaron 3 | 5 | |
| Limon | 0 | |
| | | (34 total) |
| *Spondias purpurea* | | |
| Camaron 1 | 2 | |
| Camaron 2 | 1 | |
| Camaron 3 | 1 | |
| Limon | 0 | |
| | | ( 4 total) |
| *Zea mays* | | |
| Camaron 1 | 1 | |
| | | ( 1 total) |
| *Cocos nucifera* | | |
| Limon | 1 | |
| Camaron 3, specimen probably *C. nucifera* | 1 | |
| | | ( 2 total) |
| Reed grass or cane | | |
| Camaron 1 | 1 | |
| | | ( 1 total) |
| Unidentified fragments | | |
| Camaron 1 | 4 | |
| Camaron 2 | 27 | |
| Camaron 3 | 7 | |
| Limon | 2 | |
| | | (40 total) |
| | 114 TOTAL | |

NOTES ADDED BY STARK

The definite *Cocos nucifera* specimen is from a disturbed deposit near the top of the site. It could be relatively recent and intrusive into the pit deposit because of the burrowing of crabs.

Dr. Cutler recommended the unidentified fragments be examined by someone more specialized in wild flora. Several of these specimens were subsequently identified by Mrs. Elinor Lehto, Herbarium Curator, Arizona State University, as seeds of *Thevetia peruviana* Schum. This shrub or small tree grows wild in tropical America, including Veracruz, and has a number of folk medicinal uses (Standley 1924:1152). The seeds and milky juice are poisonous. In Yucatan cotton soaked in the juice is placed in cavities for toothache. A solution prepared with the bark is used to reduce fever, with large doses used as a violent purgative and emetic. Standley notes the plant is often cultivated. The distribution of Thevetia specimens is 1 in Camaron 1, 13 in Camaron 2, and 1 in Camaron 3. The total of 15 seeds reduces the unknown fragments to 27.

## FLORAL SUMMARY

Excellent preservation at P52 combined with a wet screening excavation technique resulted in a collection of vegetal remains from the sequence. The flora includes both domesticated corn and wild economic species. With the exception of the reed grass or cane, wild species are shrubs and trees. Plants providing food predominate, but Thevetia peruviana is used today for its medicinal properties. Although all of the species can be planted in the estuarine zone in favorable localities, this involves only the more elevated site and levee land.

# MOLLUSKS

## INTRODUCTION

Shells from the Patarata site are an important source of data for environmental and subsistence reconstruction. This section will treat only the unmodified shell remains, which can be assumed to be in the site because they are either food debris or accidental inclusions. Modified or worked shells are considered as a category of artifacts. The number of modified shells in relation to the total number of shells is miniscule. In the following discussion, "low salinity" refers to salinities between 0 and 25‰ (parts per thousand).

## ENVIRONMENTAL RECONSTRUCTION

Environmental reconstruction using mollusks can be pursued two ways. On a general level an estuarine setting is indicated. In all phases 99 to 100% of the shells are not freshwater forms. The bulk of them live in brackish water. This verifies through faunal evidence that the ancient location of the site was near or in an estuarine zone, as it is today. A few minor species are marine forms, and the Gulf of Mexico shore and near-shore shelf would be readily accessible. In the case of the few freshwater species, presumably they would have been seasonally available or present in nearby freshwater.

The invertebrate evidence for prehistoric deltaic, mangrove swamps, and hence continuity of modern conditions, does not guarantee channel, current, or sedimentation stability in particular localities. The size of the Papaloapan drainage and the number and volume of its tributaries probably maintained estuarine swamps over a considerable deltaic area even though particular channels shifted and changed in their activity. This can be contrasted with molluscan evidence from the Santa Luisa site in northen Veracruz. At Santa Luisa channel shifts of the Tecolutla and Chichicazapa, along with changes in molluscan species, are interpreted as a localized diminution of estuarine mangrove conditions (Wilkerson 1972:964-965).

In addition to the reconstruction of a general estuarine setting, it is possible to attempt habitat analysis (Matteson 1960; Sparks 1969:403). Some mollusks can be grouped into assemblages characteristic of particular habitats. Deltaic estuaries include many habitats because this setting is highly variable. To the continental shelf and Gulf shore are added lagoon, river, swamp, and marsh locations which vary in substrate, water temperature, currents, wave action, salinity, turbidity, and the stability of these factors. Especially salinity and substrate have been observed to vary significantly with invertebrate assemblages (Parker 1956; 1959; Collard and D'Asaro 1973:IIIG-1).

Unfortunately for archeological reconstruction of exploited habitats, many species may be found in more than one, although their abundance or reproduction may not be optimal in all cases. The Patarata 52 remains do not constitute a natural assemblage, but rather a culturally selected one which could draw on multiple natural habitats. Parker (1956:373) cautions that for paleontological reconstructions: "It must be emphasized that the presence of only one or two of the organisms characteristic of certain environment is not enough to establish the presence of this particular environment."

Therefore, many species at Patarata cannot be referred automatically to characteristic habitats without also assuming that prehistoric collection principally drew on locations where the mollusk was plentiful and readily obtainable. This is an attractive assumption for heavily utilized species, but less convincing for infrequently eaten animals. Despite the pitfalls of reconstructing environments, it is worthwhile to make some observations with reference to prehistoric subsistence. Several of the major subsistence species have a narrow range of suitable habitats.

In my interpretations of habitats I have emphasized the mollusks' characteristic habitats and ones where they have been found live. Seasonal and annual fluctuations in estuaries shift habitats over a period of years. Dead shells collected by sampling a substrate can reflect such past shifts (as well as the reworking of old deposits in some cases). Hence, I pay more attention to situations where live animals are abundant. Characteristic or diagnostic habitats are ones where the species are most likely or uniquely to be found, and they are usually also habitats where the species is abundant (Parker 1959: 2104; Collard and D'Asaro 1973:IIIG-3).

Of the six species constituting more than 1% of the mollusks by phase (three pelecypods: Rangia cuneata, R. flexuosa, Polymesoda triangula, and three gastropods: Neritina virginea, N. reclivata, and Cerithidea scalariformis), five are species found in low salinity habitats (although N. virginea may also thrive in hypersaline habitats). For Polymesoda triangula I have not located information. Each species will be discussed in more detail later.

The snails could be gathered from marshes, from mangrove roots, and from shallow water (only N. reclivata) in areas of low salinity. N. reclivata is particularly a low salinity creature, also tolerating fresh water. N. virginea are found in more variable salinities. In view of the latitude of the Lower Papaloapan, Rangia clams would be present in mud flats or active channels in the mangrove swamp. Parker (1960:309-310) says these mollusks are prevalent in river influenced or river mouth areas rather than marsh conditions; in major river deltas they are also common in interdistributary bays. Rangia occurs in beds and can be plentiful under suitable conditions (Parker 1960:309, 329).

Rangia cuneata is the species most restricted to salinities of less than 10‰. Inland from the mangrove swamp, brackish water scrub in interdisbutary basins also would be a year-round habitat suitable for R. cuneata (Parker 1966:309; Thom 1967:321). R. flexuosa is said to prefer slightly higher low salinities (Parker 1960:309). Presumably some of the lower interdistributary areas and river influenced waters in the swamp would be localities with R. flexuosa and lesser amounts of R. cuneata.

A number of minor species also would be available in such low salinity environments: Brachidontes recurvus (?), Congeria leucopheata, Crassostrea *virginica*, *C. rhizophorae* (?), and *Melampus coffeus*. It is possible, however, that oysters and *B. recurvus* would be more easily gathered from reefs in lagoons and river mouths than from the swamp, where the individuals would not be concentrated.

Tabb and Manning (1961:556) report salinities fluctuate widely in mangrove swamps near Florida Bay, depending on local rainfall and the drainage run-off. Unfortunately such data are largely unavailable for the Papaloapan swamps. In the latter case, extensive deltaic swamps combined with a single tidal inlet would seem to guarantee considerable low salinity swamp and lagoon areas even during the dry season. Villalobos-Figueroa et al. (1966: 79) noted maximum March chlorinity levels of 10‰ in the Alvarado Lagoon. The maximum extent of low salinity conditions would occur during the rainy season.

My judgment that low salinity areas would be extensive even in the dry season is based partly on extrapolation from salinity measurements along the Tabasco coast (see Mezcalapa-Samaria, Thom 1967:306, 309). There, swamp areas around major active channels and their distributaries had bottom salinities below 10‰ even during minimum discharge. The present volume of flow in the Papaloapan combined with the number of tributaries near the mouth suggest that active channels would provide habitats for *Rangia* and other salinity sensitive organisms in the dry season.

Several minor species are not low salinity forms. High to hypersaline habitats have been noted for *Tagelus sp.*, *Phacoides pectinatus*, *Macoma constricta*, *Brachidontes citrinus*, and *Anomia simplex*. Collection of these mollusks in the Lower Papaloapan would rely on lagoons or ponds away from river flow where run-off or rainfall was less than evaporation. Gulf habitats are possible for some of the species. During the dry season the encroachment of saline water from the Gulf would expand high salinity areas. There is no indication that these mollusks were very systematically collected nor that they were of importance in subsistence.

In summary, it is fortunate for the habitat analysis that we can assign the major Patarata species with confidence to various low salinity assemblages. A preponderance of the mollusks were taken from the low salinity environments of marshes, mangrove swamps, and their accompanying water channels. Occasional use of oyster reefs in lagoons (low salinity, but slightly higher than that preferred by *Rangia* and some marsh snails, Parker 1960:309-310) is also possible.

Parker (1960:302, 309, 316) notes that the extremes of low salinity and hypersaline environments are characterized by a restricted number of species compared to other habitats, but populations tend to be very high. Consequently the major species exploited at Patarata reflect a concentration on one or more high density habitats. The oysters and major clams tend to appear in clusters, and the major snails could be gathered easily from roots and stems. The indications are that collection was non-problematic and specialized as to habitats. The habitat specialization could reflect a human response to (1) low salinity habitats in the near vicinity, (2) the ease of gathering high density species, (3) the habitats locally most extensive in area, and/or (4) culinary preference.

Table 19. Patarata 52 Mollusks, Valve Counts

| SPECIES | PROVENIENCE: Camaron 1 | Camaron 2 | Camaron 3 | Limon | Total |
|---|---|---|---|---|---|
| Brackish Water and Marine Mollusks | | | | | |
| Pelecypods | | | | | |
| Anomia simplex | 26 | 5 | | | 31 |
| Arca sp. | 1 | | | | 1 |
| Brachidontes citrinus | | | 1 | | 1 |
| Brachidontes recurvus | | 4 | 6 | 2 | 12 |
| Brachidontes sp. | 6 | 14 | 1 | 1 | 22 |
| Congeria leucopheata | 4 | 1 | | | 5 |
| Crassostrea rhizophorae | 41 | 35 | 12 | 3 | 91 |
| Crassostrea virginica | 70 | 148 | 35 | 4 | 257 |
| Crassostrea sp. | 50 | 38 | 35 | 13 | 136 |
| Macoma constricta | 1 | | | | 1 |
| Phacoides pectinatus | 4 | | | | 4 |
| Polymesoda triangula | 1810 | 1768 | 1163 | 862 | 5603 |
| Rangia cuneata | 502 | 638 | 448 | 247 | 1835 |
| Rangia flexuosa | 24035 | 36940 | 20984 | 7104 | 89063 |
| Tagelus sp. | 21 | 1 | 1 | | 23 |
| Teredo sp. | 1 | 1 | | | 2 |
| Gastropods | | | | | |
| Cerithidea scalariformis | 250 | 491 | 189 | 77 | 1007 |
| Melampus coffeus | 18 | 63 | 7 | | 88 |
| Neritina reclivata | 2799 | 2096 | 764 | 145 | 5804 |
| Neritina virginea | 5785 | 2804 | 1099 | 249 | 9937 |
| Unidentified | | 2 | | | 2 |
| Subtotal | 35424 | 45049 | 24745 | 8707 | 113925 |
| Freshwater Mollusks | | | | | |
| Pelecypods | | | | | |
| Lampsilis (?) alienigena | | 1 | | | 1 |
| Psoronaias semigranosus | 2 | 4 | 6 | 2 | 14 |
| Gastropods | | | | | |
| Pomacea flagellata | 87 | 119 | 20 | | 226 |
| Unidentified freshwater | | 2 | | 3 | 5 |
| Subtotal | 89 | 126 | 26 | 5 | 246 |
| TOTAL | 35513 | 45175 | 24771 | 8712 | 114171 |

Table 20. P52 Mollusks, Minimum Number of Individuals

% to nearest whole percent

| SPECIES | PROVENIENCE: Camaron 1 No. | % | Camaron 2 No. | % | Camaron 3 No. | % | Limon No. | % | Total No. |
|---|---|---|---|---|---|---|---|---|---|
| Brackish Water and Marine Mollusks | | | | | | | | | |
| Pelecypods | | | | | | | | | |
| Anomia simplex | 13 | 0 | 2.5 | 0 | | | | | 15.5 |
| Arca sp. | .5 | 0 | | | | | | | .5 |
| Brachidontes citrinus | | | | | .5 | 0 | | | .5 |
| Brachidontes recurvus | | | 2 | 0 | 3 | 0 | 1 | 0 | 6 |
| Brachidontes sp. | 3 | 0 | 7 | 0 | .5 | 0 | .5 | 0 | 11 |
| Congeria leucopheata | 2 | 0 | .5 | 0 | | | | | 2.5 |
| Crassostrea rhizophorae | 20.5 | 0 | 17.5 | 0 | 6 | 0 | 1.5 | 0 | 45.4 |
| Crassostrea virginica | 35 | 0 | 124 | 0 | 17.5 | 0 | 2 | 0 | 178.5 |
| Crassostrea sp. | 25 | 0 | 19 | 0 | 17.5 | 0 | 6.5 | 0 | 68 |
| Macoma constricta | .5 | 0 | | | | | | | .5 |
| Phacoides pectinatus | 2 | 0 | | | | | | | 2 |
| Polymesoda triangula | 905 | 4 | 884 | 3 | 581.5 | 4 | 431 | 9 | 2801.5 |
| Rangia cuneata | 251 | 1 | 319 | 1 | 224 | 2 | 123.5 | 3 | 917.5 |
| Rangia flexuosa | 12017.5 | 54 | 18470 | 73 | 10492 | 78 | 3552 | 77 | 44531.5 |
| Tagelus sp. | 10.5 | 0 | .5 | 0 | .5 | 0 | | | 11.5 |
| Teredo sp. | 1 | 0 | 1 | 0 | | | | | 2 |
| Gastropods | | | | | | | | | |
| Cerithidea scalariformis | 250 | 1 | 491 | 2 | 189 | 0 | 77 | 2 | 1007 |
| Melampus coffeus | 18 | 0 | 63 | 0 | 7 | 0 | | | 88 |
| Neritina reclivata | 2799 | 12 | 2096 | 8 | 764 | 0 | 145 | 3 | 5804 |
| Neritina virginea | 5785 | 26 | 2804 | 11 | 1099 | 8 | 249 | 5 | 9937 |
| Unidentified | | | 2 | 0 | | | | | 2 |
| Subtotal | 22138.5 | 98 | 25303 | 98 | 13402 | 99 | 4589 | 99 | 65432.5 |
| Freshwater Mollusks | | | | | | | | | |
| Pelecypods | | | | | | | | | |
| Lampsilis (?) alienigena | | | .5 | 0 | | | | | .5 |
| Psoronaias semigranosus | 1 | 0 | 2 | 0 | 3 | 0 | 1 | 0 | 7 |
| Gastropods | | | | | | | | | |
| Pomacea flagellata | 87 | 0 | 119 | 0 | 20 | 0 | | | 226 |
| Unidentified freshwater | | | 2 | 0 | | | 3 | 0 | 5 |
| Subtotal | 88 | 0 | 123.5 | 0 | 23 | 0 | 4 | 0 | 238.5 |
| TOTAL | 22226.5 | 98 | 25426.5 | 98 | 13425 | 99 | 4593 | 99 | 65671 |

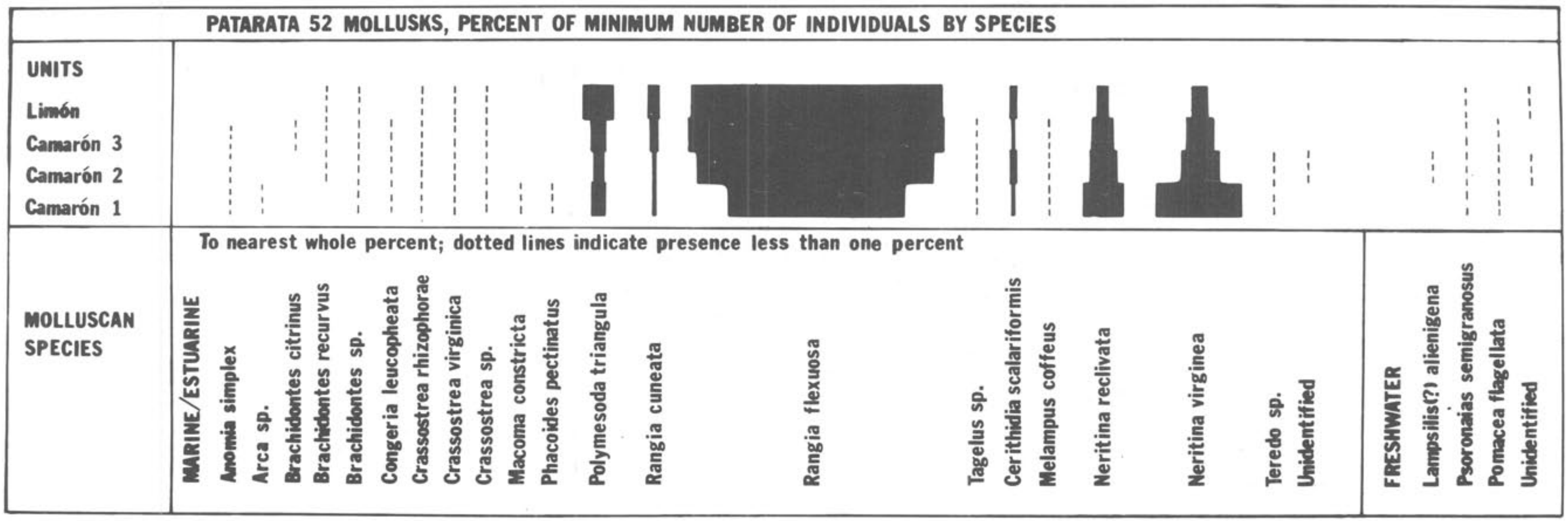

PATARATA 52 MOLLUSKS, PERCENT OF MINIMUM NUMBER OF INDIVIDUALS BY SPECIES
UNITS
Limón
Camarón 3
Camarón 2
Camarón 1
MOLLUSCAN SPECIES
To nearest whole percent; dotted lines indicate presence less than one percent
MARINE/ESTUARINE
Anomia simplex
Arca sp.
Brachidontes citrinus
Brachidontes recurvus
Brachidontes sp.
Congeria leucopheata
Crassostrea rhizophorae
Crassostrea virginica
Crassostrea sp.
Macoma constricta
Phacoides pectinatus
Polymesoda triangula
Rangia cuneata
Rangia flexuosa
Tagelus sp.
Cerithidia scalariformis
Melampus coffeus
Neritina reclivata
Neritina virginea
Teredo sp.
Unidentified
FRESHWATER
Lampsilis(?) alienigena
Psoronaias semigranosus
Pomacea flagellata
Unidentified

Fig. 43

## SPECIES REPRESENTATION

One method of determining the dietary importance of species is to consider their relative percentages in each of the phases (Table 19). Only six species out of twenty-one occur in sufficient numbers to form one or more percent of the total number of individuals in any of the phases (Table 20, Fig. 43, number of bivalves is halved to obtain number of individuals). Rangia flexuosa, R. cuneata, Polymesoda triangula, Neritina virginea, N. reclivata, and Cerithidia scalariformis are the six numerically dominant species.

It is useful to compare this picture with that of some broader species categories. Fig. 44 (Table 21) shows percentages of some lumped categories, although I have not combined the two Rangia species because they differ considerably in the size of the animal. Crassostrea sp. is still less than one percent in every phase but Camaron 2. By combining several of the minor brackish to marine species and by combining all the freshwater species, we still do not have either category reaching one percent in any phase. The species registering one percent or more are Rangia flexuosa. R. cuneata, Polymesoda triangula, Neritina sp., Crassostrea sp., and Cerithidia scalariformis.

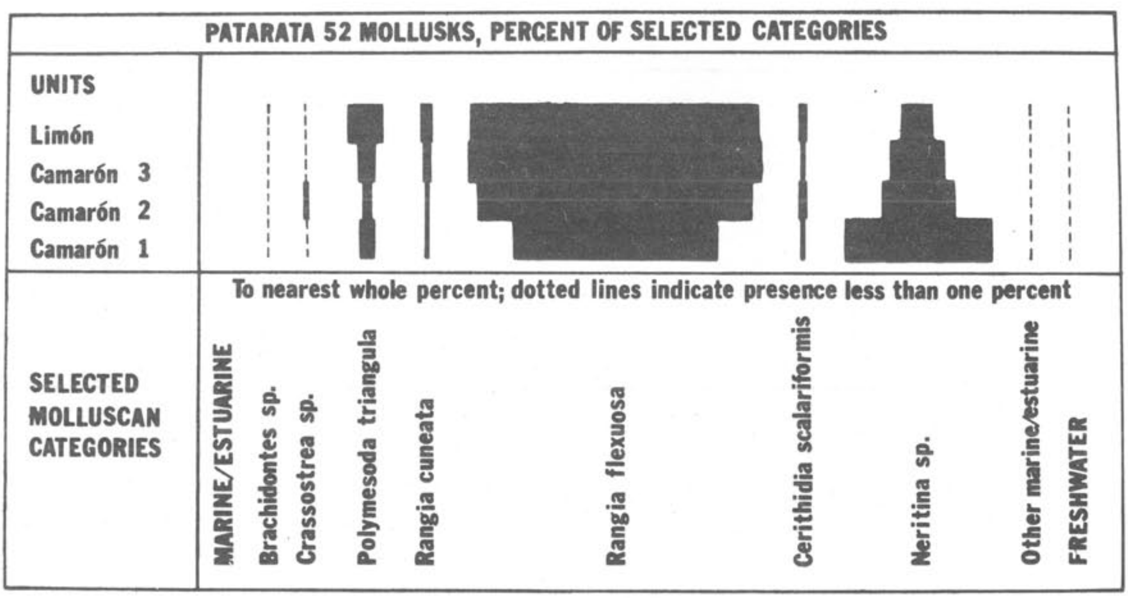



Fig. 44

Because the species vary considerably in their size ranges, it is advisable to attempt to convert from numbers of individuals to the relative weight of food each species would contribute to the diet. An adequate conversion would require two kinds of data in addition to valve counts: weight of the soft parts of full-grown animals of each species, and a means of calculating or estimating the size distribution of individuals in each archeological species (cf. Parmalee and Klippel 1974 for such a study of freshwater forms).

The Patarata field project did not include a study of modern fauna in the

Table 21. Patarata 52 Mollusks
Selected Categories

% to nearest whole percent
no. = minimum number of individuals

| SPECIES | PROVENIENCE Camaron 1 No. | % | Camaron 2 No. | % | Camaron 3 No. | % | Limon No. | % | Total No. |
|---|---|---|---|---|---|---|---|---|---|
| Brackish Water and Marine Mollusks | | | | | | | | | |
| Pelecypods | | | | | | | | | |
| Anomia simplex | 13 | 0 | 2.5 | 0 | | | | | 15.5 |
| Arca sp. | .5 | 0 | | | | | | | .5 |
| Brachidontes sp. | 3 | 0 | 9 | 0 | 4 | 0 | 1.5 | 0 | 17.5 |
| Congeria leucopheata | 2 | 0 | .5 | 0 | | | | | 2.5 |
| Crassostrea sp. | 80.5 | 0 | 160.5 | 1 | 41 | 0 | 10 | 0 | 292 |
| Macoma constricta | .5 | 0 | | | | | | | .5 |
| Phacoides pectinatus | 2 | 0 | | | | | | | 2 |
| Polymesoda triangula | 905 | 4 | 884 | 3 | 581.5 | 4 | 431 | 9 | 2801.5 |
| Rangia cuneata | 251 | 1 | 319 | 1 | 224 | 2 | 123.5 | 3 | 917.5 |
| Rangia flexuosa | 12017.5 | 54 | 18470 | 73 | 10492 | 78 | 3552 | 77 | 44531.5 |
| Tagelus sp. | 10.5 | 0 | .5 | 0 | .5 | 0 | | | 11.5 |
| Teredo sp. | 1 | 0 | 1 | 0 | | | | | 2 |
| Gastropods | | | | | | | | | |
| Cerithidea scalariformis | 250 | 1 | 491 | 2 | 189 | 1 | 77 | 2 | 1007 |
| Melampus coffeus | 18 | 0 | 63 | 0 | 7 | 0 | | | 88 |
| Neritina sp. | 8584 | 39 | 4900 | 19 | 1863 | 14 | 394 | 8 | 15741 |
| Unidentified | | | 2 | 0 | | | | | 2 |
| Subtotal | 22138.5 | 99 | 25303 | 99 | 13402 | 99 | 4589 | 99 | 65432.5 |
| Freshwater Mollusks | 88 | 0 | 123.5 | 0 | 23 | 0 | 4 | 0 | 238.5 |
| TOTAL | 22226.5 | | 25426.5 | | 13425 | | 4593 | | 65671 |

area, and I have not set up a measurement system to estimate quantitatively the sizes of individuals in each species. Under these conditions my conversion of the number of individuals per species to an estimate of their relative food contribution necessarily will be inexact. However, I feel it is useful to make a preliminary effort even though imprecise. Since I have handled and counted the Patarata specimens, I can roughly compare the species shell sizes, taking into consideration their size ranges. Assuming that the volume of the shell is indicative of the volume of the mollusk's soft parts, a rough correction can adjust for size variations in species (Table 22).

I have used the following conversion procedure for the numerically predominant species. Polymesoda triangula, Crassostrea sp., Brachidontes sp., freshwater pelecypods and gastropods, and Rangia cuneata have not been converted, but form the base for comparison of other species. These five categories are not composed of species identical in size, but rather, that are fairly similar in size compared to the other, smaller species. I have halved the numbers of Rangia flexuosa. Neritina sp. has been reduced to one quarter, as have Melampus coffeus and Cerithidia scalariformis. Out of this conversion a somewhat more informative picture emerges about the relative weight contributions to prehistoric diet (Fig. 45).

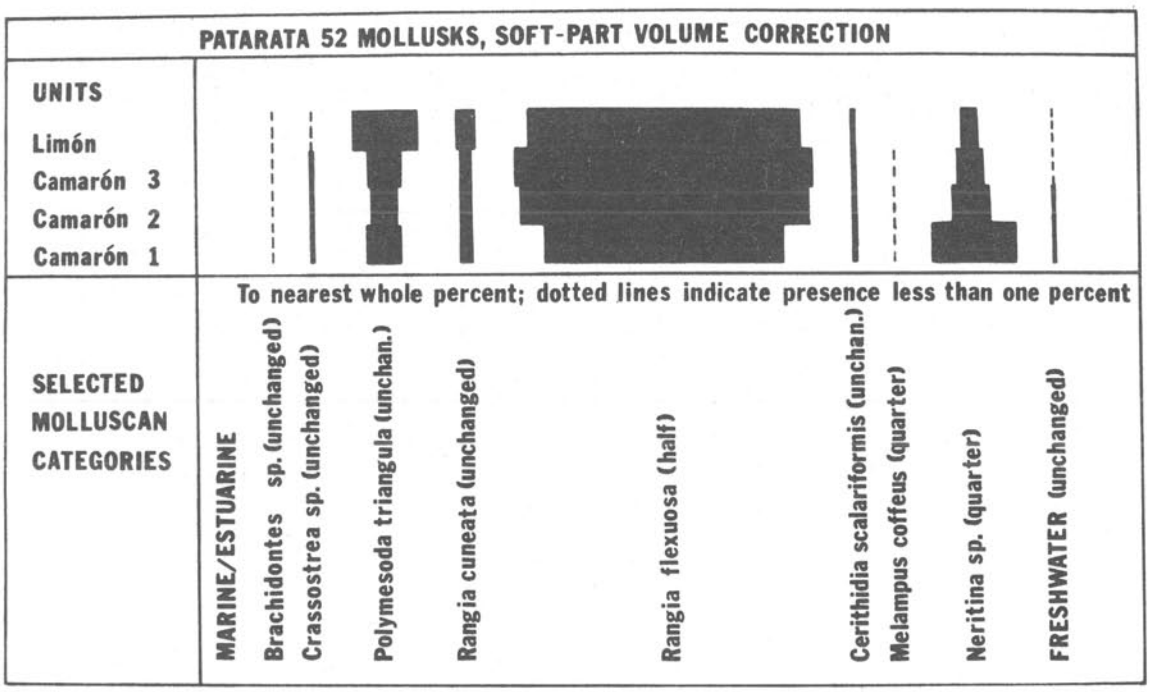



Fig. 45

Rangia flexuosa is still the most important species. Polymesoda triangula and Neritina sp. form important secondary categories, followed by Rangia cuneata. Cerithidia scalariformis, all the freshwater species, and Crassostrea sp. form a minor component of the diet. Melampus coffeus and Brachidontes sp. do not reach one percent in any phase.

Table 22. P52 Mollusks, Soft-part Volume Correction

% to nearest whole percent
no. = minimum number of individuals

| | PROVENIENCE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Camaron 1 | | Camaron 2 | | Camaron 3 | | Limon | | Total |
| SPECIES | No. | % | No. | % | No. | % | No. | % | No. |
| Brackish Water and Marine Mollusks | | | | | | | | | |
| Pelecypods | | | | | | | | | |
| Brachidontes sp., same | 3 | 0 | 9 | 0 | 4 | 0 | 1.5 | 0 | 17.5 |
| Crassostrea sp., same | 80.5 | 1 | 160.5 | 1 | 41 | 1 | 10 | 0 | 292 |
| Polymesoda triangula, same | 905 | 9 | 884 | 7 | 581.5 | 9 | 431 | 17 | 2801.5 |
| Rangia cuneata, same | 251 | 3 | 319 | 3 | 224 | 3 | 123.5 | 5 | 917.5 |
| Rangia flexuosa, half | 6008.75 | 63 | 9235 | 76 | 5246 | 79 | 1776 | 72 | 22265.75 |
| Gastropods | | | | | | | | | |
| Cerithidea scalariformis, one-quarter | 62.5 | 1 | 122.75 | 1 | 47.25 | 1 | 19.25 | 1 | 251.75 |
| Melampus coffeus, one-quarter | 4.5 | 0 | 15.75 | 0 | 1.75 | 0 | | | 22 |
| Neritina sp., one-quarter | 2146 | 22 | 1225 | 10 | 465.75 | 7 | 98.5 | 4 | 3935.25 |
| Subtotal | 9461.25 | 99 | 11971 | 98 | 6611.25 | 100 | 2459.75 | 99 | 30503.25 |
| Freshwater Mollusks, same | 88 | 1 | 121.5 | 1 | 23 | 0 | 1 | 0 | 233.5 |
| TOTAL | 9549.25 | | 12092.5 | | 6634.25 | | 2460.75 | | 30736.25 |

## CHRONOLOGICAL CHANGE

A k-sample chi square ($\chi^2$) test (Siegel 1956:175-179) was used to evaluate the significance of frequency differences in mollusks from the various phases. Use of this test assumes random, independent sampling for mollusks in each of the phases. Although this assumption is not built into the excavation strategy, it will be useful to treat the samples as random and independent; I will assume that the discarding or dumping of mollusks at the excavation location in each phase was independent of preceeding behavior and fairly uniform over the site. In fact, shells were distributed rather evenly through the site deposits, which lacked piles of shells or other indications of differential mollusk dumping. With the chi square formula:

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{k} \frac{(O_{ij}-E_{ij})^2}{E_{ij}}$$

where O = observed number of cases categorized in the *i*-th row of *j*-th column, and E = number of cases expected under the null hypothesis to be categorized in the *i*-th row of *j*-th column.

Contingency table values were adapted from Table 21 of selected mollusk categories. Frequencies by phase of Crassostrea sp., Polymesoda triangula, Rangia cuneata, Rangia flexuosa, Cerithidea scalariformis, Neritina sp., other brackish and marine mollusks, and freshwater mollusks were used in the calculation. The null hypothesis for the test was that there were no significant differences among the sample populations. At the .001 level of significance (with 21 degrees of freedom) the value of $\chi^2$ = 4776.2, which is greater than 46.80, the critical value. Therefore, the null hypothesis must be rejected.

However, with such large sample sizes statistical significance is easily attained with $\chi^2$. More useful would be a measure of the degree of similarity or dissimilarity among the samples, that is, of the degree of relationship between mollusk frequencies and the temporally ordered phases. Several measures are available (Blalock 1972:291-298). I will use Pearson's contingency coefficient, C, which uses the preceeding chi square statistic:

$$C = \frac{\chi^2}{\chi^2 + N}$$

The range of C is from 0 to 1; however, the obtained C must be scaled to 1 by dividing by its maximum value. 0 indicates no relationship, and 1 indicates perfect association. For the Patarata data the value of C = .260. To correct C for an 8x4 contingency table, where q = the number of rows or columns, whichever is smaller, the maximum value of C is given by (Conover 1971:176-177):

$$\max C = \sqrt{\frac{q-1}{q}} = .8660$$

corrected C = .300

This indicates that although there is some association between particular mollusk frequencies and phases, it is not very high, that is, the phases do not differ greatly among themselves in mollusk frequencies.

Simple inspection of the pattern of mollusk exploitation through the Patarata sequence does not show any wholesale shifts, though there are some change trends. Between the Camaron and Limon phases, Polymesoda triangula increases in its relative importance; there is also a slight increase in the Rangia clams. From Camaron 1 sub-phase through to the Limon phase there is a steady decline in the contribution of Neritina sp. to the diet. Lawrence Feldman (personal communication) has pointed out that Pacific coastal clams similar to Polymesoda are not accessible during the rainy season because they are buried under fresh mud. Snails like Neritina virginea, on the other hand, would be available year-round. Should Polymesoda triangula prove to be a predominantly dry season mollusk, Patarata could be interpreted as suggesting a shift from full-time habitation to more part-time use during the dry season. Nevertheless, any such shift was one of degree, and it may indicate that some people from inland areas came down to the mangrove swamp during the dry season, joining the resident population and thus skewing the percentages of mollusks. A third alternative is that the change reflects altered dietary preferences.

Overall, the habitat analysis argues that dietary mollusks were available year-round, but that the rainy season would be richest in preferred macroinvertebrates. Therefore, the sheer availability of edible mollusks does not account for any shift toward greater dry season use, should the latter observation be verified.

## COMPARATIVE DISTRIBUTION

Occurrences of some of the Patarata species at archeological sites in the Maya lowlands usually involve distinct functional contexts. In the Maya lowlands the shells occur predominantly in "ceremonial" locations rather than midden deposits. Similarly, coral occurs ceremonially in contrast to the possibility that Patarata corals had a utilitarian function. We have one indication of a ceremonial context in Veracruz as well. At Cerro de las Mesas sea shells and coral occurred in plain ware jars that Drucker (1943a: plate 25 e, 12, 13, 58) interprets as ceremonial offerings.

The plentiful unmodified shells and corals of the estuarine zone may have been an exportable commodity to inland areas which, like the Maya lowlands, placed value on shell or coral in ritual contexts. It would appear that in the exchange process (if it was that), the raw materials accrued value and may thus have contributed to the prosperity of coastal peoples.

As yet there is no documentation of what shell "consumers" we might consider dependent on the southern Gulf coast. Pires-Ferreira (1973:128-132, 134-136) found Early Formative trade of Atlantic shells to be restricted to freshwater clams. By the Middle Formative there is a decline in this trade. For still later periods, Cerro de las Mesas suggests we should examine sites inland on the coastal plain to confirm or refute trade in shells and shell products.

## SPECIES, ECOLOGY, AND MESOAMERICAN ARCHEOLOGICAL CONTEXTS

### Estuarine and Marine Mollusks

Species identifications were kindly provided by Dr. William J. Clench, who examined a representative sample of the shells from the Patarata collection and gave helpful comments on living habits. I am responsible for the bulk counting and species assignments.

Pelecypods

*Anomia simplex d'Orbigny, 1842 (Common Jingle Shell)*. Andrews (1969:26) found the species relatively common along the coasts of Yucatan. According to Morris (1947:31, 34) the animal lives offshore in moderately deep water. The organism has been found in a considerable range of habitats, with salinity varying from offshore shelf conditions (Parker 1956:316, 337, 345) to variable salinity estuarine bays and hypersaline lagoons (Parker 1959:2123, 2141, 2161, 2164). It is a characteristic species of higher salinity oyster reefs in enclosed bays near Rockport, Texas (Parker 1959:2123, 2161) and forms small reefs itself (Parker 1960:315).

*Comment*. At Patarata A. simplex occurs only in the Camaron 1 and 2 subphases and is a minor species. Elsewhere, unworked examples occur in cache, cenote, and other deposits at Dzibilchaltun; at Mayapan cache and other examples were pierced in several instances (Andrews 1969:26).

*Arca sp.* None of the Arca species listed by Morris (1947:11, 14-16) or Warmke and Abbott (1961:157-158) are described as brackish water mollusks, but rather as marine species.

*Comment*. A single valve occurred in the Patarata site in Camaron 1 and could easily be an accidental occurrence. Andrews (1969:21-22) reports three Arca species in Yucatan, both in natural modern contexts and archeologically. Moholy-Nagy (1963:68) records Arca sp. at Tikal. Feldman (1968: 169) lists Arca sp. from Cojumatlan, Michoacan.

*Brachidontes citrinus Roding, 1798 (Yellow Mussel)*. Warmke and Abbott (1961:162) comment that fresh specimens are commonly washed ashore in Puerto Rico, and this species lives in marine conditions. Parker (1959:2132, 2164, 2165) found infrequent occurrences in various hypersaline lagoons and bays of the Rockport and Laguna Madre areas in Texas.

*Comment*. B. citrinus is even rarer than B. recurvus at Patarata, appearing in a single instance in Camaron 3. Accidental inclusion cannot be ruled out. B. citrinus has not been reported in other archeological contexts.

*Brachidontes recurvus Rafinesque, 1820 (Hooked Mussel)*. According to Warmke and Abbott (1961:162) clusters of these mollusks are found attached to mangrove roots or dock pilings. Dead shells have been found in hypersaline and high salinity habitats, but the species was characteristic, frequent, and alive in low salinity oyster reefs near Rockport, Texas (Parker 1959:2161, 2165). Near the Mississippi mouth it was also characteristic of a high salinity sound and was present in the shallow offshore shelf (Parker 1956:315, 318). Gunter and Hall (1965:64) obtained hundreds of the mollusks by trawling the Caloosahatchee Estuary in Florida. It would appear that in the Lower Papaloapan these mollusks would be most abundant attached to Rhizophora mangle prop roots, perhaps among oysters, and in any low salinity oyster reefs (Tabb and Manning 1961:555-556, 583-

584; Collard and D' Asaro 1973:IIIG-16, IIIG-17; Parker 1960:310). Most Patarata specimens are fragmentary and do not permit accurate size estimates.

*Comment*. This species is absent in Camaron 1 and represented by a few individuals in the other Patarata phases. Prior to 300 A.D. the mussel appears at Santa Luisa, Veracruz in midden and habitation deposits where it constitutes .06% to 10.17% of the shell weight per level; most of the occurrences are in the Palo Hueco phase, dating to around 3000 B.C. (Wilkerson 1972:962-967).

*Congeria leucopheata Conrad (Platform Mussel)*. Morris (1947:39, 42) describes this bivalve as living in the brackish waters of covers and inlets. Tabb and Manning (1961:586) found it available year round in fresh to brackish water at the mouths of larger rivers at Northern Florida Bay; there was an abundance peak between September and December. Gunter and Hall (1965: 64) recovered "many" of the mollusks by trawling in the Caloosahatchee Estuary, Florida. Tabb, Dubrow, and Manning (1962:64) found the animal only in salinities below 5‰ in the North Florida Bay area.

*Comment*. This species was rare in the Patarata collection, occurring only in Camaron 1 and 2. It has not been reported from other archeological deposits.

*Crassostrea rhizophorae Guilding, 1828 (Caribbean Oyster)*. This is a tropical, shallow water oyster (Parker 1960:329). Clumps form on the stilt roots of Rhizophora mangle (Tabb and Manning 1961:585-586). The Patarata specimens generally fall near the lower end of the size range of two to six inches given by Warmke and Abbott (1961:173).

*Comment*. Andrews (1969:26) records several instances of unworked C. rhizophorae in caches and one midden occurrence in Yucatan sites. At Patarata it is a minor species present in all phases. Ostrea spp. were present at Tikal (Moholy-Nagy 1963:68), and Ostrea sp. at Uaxactun in a cache deposit (Stromsvik 1942:90; Kidder 1947:61; Ricketson and Ricketson 1937:199). W.R. Coe (1959:55) reports Ostrea sp. at Piedras Negras in a cache context as does Thompson (1939:180) for San Jose, Belize. Coe (1961:143) and Coe and Flannery (1967:78) record different Ostrea species at La Victoria and Salinas la Blanca, Guatemala, respectively.

*Crassostrea virginica Gmelin, 1791 (Virginia Oyster)*. This oyster thrives in the upper range of low salinity conditions in protected bays and delta fronts, preferring a firm to hard substrate and often forming reefs (Parker 1959:2119, 2123, 2161; 1956:315, 320; Collard and D'Asaro 1973:IIIG-2). Around Rockport, Texas, prolonged higher salinities generally result in replacement with Ostrea equestris. C. virginica is also found less abundantly in other estuarine habitats (Parker 1959:2119, 2161). Andrews (1969:26) reports collecting this species along the Yucatan coast. A few of the Patarata specimens are quite large, but many are only two to three inches (5.1 to 7.6 cm) long.

*Comment*. See C. rhizophorae. C. virginica is a minor species occurring in all Patarata phases. Thompson (1939:180) reports Ostrea virginica at San Jose, Belize in a cache context, and Richards and Boekelman (1937:166) report it from a burial mound near Rio Hok Skum near Corozal.

C. virginica was a major species in midden and habitation deposits at Santa Luisa, Veracruz, contributing between 1.19% and 100% of shell weight by level; it was the major mollusk food in the Archaic and Preclassic Periods (Wilkerson 1972:962-967). Pires-Ferreira (1973:101, 128) reports these mollusks from Early Formative levels of the coastal Gamas site in Tabasco, where they constituted food remains.

*Macoma constricta Bruguiere, 1792 (Constricted Macoma).* Morris (1947:78) says that this species prefers to live in moderately deep water. M. constricta has been found infrequently in a number of habitats around Rockport and Laguna Madre, Texas, as well as in the Mississippi delta area; it is a characteristic species only for high salinity bays around Rockport (Parker 1956:298, 309, 319, 320; 1959:2129, 2162, 2166). Collard and D'Asaro (1973: IIIG-18) report it to be common in offshore troughs and behind bars in bays and sounds.

*Comment.* See Phacoides pectinatus. Other archeological occurrences of this species have not been reported.

*Phacoides pectinatus Gmelin, 1790 (Thick Lucina).* Warmke and Abbott (1961: 177) describe this as a reasonably common shallow-water species, and Andrews (1969:27) found it to be common along Yucatecan shores. The mollusk was common both in hypersaline bays around Rockport (Parker 1959:2136, 2162) and in the low to moderate salinity of Oyster Bay, Florida (Tabb and Manning 1961:556). W.J. Clench informed me that the species can be either marine or partially brackish.

*Comment.* This species was quite rare in the Patarata deposits, occurring only in Camaron 1. The specimens come from below the brown stratum in the sump square, between 290 and 330 cm. The soil at this depth consisted of a fine grey sand, quite distinct from overlying strata. Phacoides pectinatus (four valves) and Macoma constricta (one valve) were both limited to this stratum. It is possible they were not food remains, but natural inclusions. These animals may have preferred such a substrate if it were at one time inundated. Soil deposition conditions below the brown stratum could not be reconstructed from the scanty information derived from the sump excavation; I have not determined if, as is likely, the deeper deposits were in fact inundated or water lain.

Andrews (1969:27) found P. pectinatus as unworked and perforated specimens in archeological contexts at Dzibilchaltun; unworked specimens occurred in the Isla Cancun midden.

*Polymesoda triangula Phillipi, 1849 (Triangulate Polymesoda).* Most of the Patarata specimens range between 2.8 and 4.8 cm in length and 2.6 to 4.2 cm in height; rarely specimens are as small as 1.8 cm in length and 1.6 cm in height. I have had difficulty locating information on this species. Fred G. Thompson (personal communication) expects it to be common in estuary conditions, such as in the Lower Papaloapan, buried 1-2 inches deep in sand.

*Comment.* The relatively large sizes of the specimens suggest that they were selectively gathered by hand. P. triangula is present in all Patarata phases but has not been reported from other archeological contexts. Long and Wire (1966:39) record the presence of a different Polymesoda species from Barra de Navidad, Jalisco, as do Coe (1961:43) at La Victoria and Coe and Flannery (1967:78) at Salinas la Blanca in Guatemala.

*Rangia cuneata Gray, 1831 (Common Rangia)*. The animal is characteristic of delta front and river influenced, low salinity areas (Parker 1956:313, 316, 318, 320, 321; Parker 1959:2117, 2161). It is most abundant and largest near river mouths (Parker 1960:309-310). Low salinities appear to be much more critical for the species than particular deltaic substrates (Parker 1966:35). Hedgpeth (1957:709) gives salinity ranges of around 10‰ to nearly fresh water conditions. Moore (1962:48) notes salinities up to 15‰. The species occurs in both marsh and mangrove settings (Collard and D'Asaro 1973:IIIG-16). According to Parker (1966:35), R. cuneata is an important deltaic form, providing food for fish, crabs, and shrimp. It occurs in beds and can tolerate fresh water (Parker 1960:309, 329). R. cuneata was the most plentiful invertebrate collected by Gunter and Hall (1965:64) by trawling in the Caloosahatchee Estuary, Florida; they obtained one and a half thousand of these mollusks, mainly from muck substrates. Swingle (1971:69) recorded densities of 4.3 and 7.5 per $m^2$ in river mouth areas around Mobile, Alabama.

Abbott (1954:450) reports this species has a normal length of 2.5 to 6.3 cm. However, Parker (1960:309) gives a slightly larger size range of 5 to 10 cm. Most Patarata specimens are within the smaller size range.

*Comment*. Hand collection of these bivalves is a possibility because the size spread characteristic of R. flexuosa does not occur. The size range of trawl samples, for example, is much greater. Gunter and Hall (1965:11, 64) recovered R. cuneata with a length range of 5 to 48 mm; these shells were mainly from muck substrates in the Caloosahatchee Estuary of Florida. At Patarata R. cuneata is numerically a minor, steady component in all phases. See R. flexuosa for archeological distribution.

*Rangia flexuosa Conrad, 1840 (Brown Rangia)*. Abbott (1954:451) describes this as a rare and elusive marsh species. Copious numbers of R. flexuosa occur at Patarata, suggesting the species was readily available and plentiful. Although Parker (1956:320, 321) found this Rangia less common than R. cuneata in the Mississippi delta front, he did find it abundant on one submerged natural levee. His observations of living animals were restricted to low salinity marsh and deltaic localities. Compared to R. cuneata this mollusk is slightly less abundant near river mouths but more abundant where salinities are slightly higher, such as along distributaries, or in interdistributary basins (Parker 1960:309-310). Hedgpeth (1957:709) gives salinity ranges for R. flexuosa of nearly 30‰ to about 2‰. The animals range up to 3.8 cm in length according to Abbott, but Parker (1960:309) gives a larger size range of 5 to 7.5 cm. The archeological specimens occur in a spectrum of sizes from very tiny shells to full-sized individuals on Abbott's scale.

*Comment*. The range in size of the shells, including some that are so small they are difficult to pick up, argues that either (1) the collection method used some drag or scoop process that gathered all sizes of the bivalves, or (2) that during annual flooding in the area, the site was at least briefly inundated on a regular basis, allowing juvenile members of the species to be included accidentally in the site deposition. Verification of the second possibility would require evidence that R. flexuosa was one of three species represented at the site (the other possibilities are Neritina species) that colonize during flooding and that the other species do not do so. I know of no evidence to this effect. Because three of the relatively small species which occur at the site have this marked spread in size, it seems more probable that this could be accounted for by a difference in the ancient collection method.

At Patarata R. flexuosa is numerically preponderate in all phases. One Rangia sp. occurred in midden deposits in the San Lorenzo A phase and one in the Chicharras phase at San Lorenzo Tenochtitlan, Veracruz (M.D. Coe, personal communication). Rangia mendica Gould, 1851 was identified by L. H. Feldman (1969:110-111) at Tarjea, Sinaloa and is described as adapted to a low salinity lagoon and mangrove environment.

*Tagelus sp.* None of the Tagelus species listed by Morris (1947:3-4) or Warmke and Abbott (1961:202-203) is an estuarine animal. Tagelus species observed in coastal Gulf habitats are distributed in high to hypersaline environments (Parker 1959:2125, 2144, 2162, 2166; 1956:318; Collard and D'Asaro 1973:IIIG-18).

*Comment.* Tagelus is a minor species occurring only in the Camaron phase at Patarata. Tagelus violascens Carpenter, 1955 occurred at Barra de Navidad, Jalisco (Long and Wire 1966:39).

*Teredo sp.* The family Teredinidae includes various shipworms. In the mangrove swamp they could live by burrowing into the roots of mangroves (W.J. Clench, personal communication).

*Comment.* Teredo fragments were extremely rare in the Patarata site and occurred only in Camaron 1 and 2 deposits. It seems probable that their inclusion in the site was accidental. Kidder (1947:66) reports marine worm cases at Uaxactun associated with a cache and with burials.

Gastropods

*Cerithidia scalariformis Say (Ribbed Horn Shell).* Bequaert (1942:5:1) reports Cerithidia includes brackish water snails which are often found in abundance on intertidal flats, in lagoons, or in mangrove swamps. This particular species lives most of the day out of the water, frequently crawling up the stems of grass (Bequaert 1942:5:7). According to Tabb and Manning (1961:570), this snail was common in mangrove swamps near Florida Bay prior to a cold winter.

*Comment.* The living habits of this gastropod make it possible that individuals would be accidentally included in the archeological deposits. However, their steady incidence in all phases of deposition argues that they represent food remains. Other archeological occurrences have not been reported, although another species, C. valida C.B. Adams, 1852 was present at Barra de Navidad, Jalisco (Long and Wire 1966:40) and at La Victoria, Guatemala (Coe 1961:143). C. valida and still another Cerithidea species were recorded at Salinas la Blanca, Guatemala (Coe and Flannery 1967:78). C. pliculosa occurred sporadically as a minor species in midden and habitation deposits at Santa Luisa, Veracruz from 300 B.C. to Postclassic times (Wilkerson 1972:962-967).

*Melampus coffeus Linne, 1758 (Coffee-bean Shell or Coffee Melampus).* Morris (1947:228) describes this snail as a mud flat dweller, sometimes climbing up grasses and low shrubs during full tide. It can occupy the borders of shallow estuarine ponds (Hedgpeth 1957:721) and is common in salt marshes and mangrove swamps, distributed from Florida to the West Indies (Warmke and Abbott 1961:153); Andrews (1969:21) found it along the coasts of Yucatan. Collard and D'Asaro (1973:IIIG-16) regard it as a low salinity indicator. Near Florida Bay, Tabb and Manning (1961:582) observed the snails moving intertidally up and down the pneumatophores of the black mangrove to keep above the water line. The snails fed by skeletonizing mangrove leaves. They also found semi-dormant adult snails densely congregated under driftwood in a marl prairie during a period of drought. Presumably snails would be easy to collect in such a condition as well as from the readily accessible pneumatophores. M. coffeus is a food supply for wild ducks (Morris 1947:228).

*Comment.* Two unworked M. coffeus shells occurred in the Isla Cancun midden (Andrews 1969:21). A different Melampus species was a rare occurrence at Salinas la Blanca, Guatemala (Coe and Flannery 1967:78). At Patarata the snail occurs in small amounts in the Camaron phase.

*Neritina reclivata Say, 1822 (Green Nerite).* Morris (1947:120) describes this as a brackish water inhabitant found in the tidal areas of streams. According to Warmke and Abbott (1961:51) and Parker (1960:309), it is a brackish to freshwater species. Hedgpeth (1957:709) gives a salinity range between fresh and about 20‰. The snails are diagnostic of low salinity, deltaic, marsh communities (Parker 1956:313, 315, 317-320; Collard and D'Asaro 1973:IIIG-4). They can appear on grasses and sedges from a few inches to a foot or so above the surface of the water (Parker 1956:313; Swingle 1971:68). However, Moore (1962:17-18) usually found it under shallow water.

*Comment.* See N. virginea. N. reclivata occurs in all Patarata phases. It was also found at Santa Luisa, Veracruz in midden and habitation deposits; it constituted between .08 and 64.3% of shell weight per level and was most common in phases dating A.D. (Wilkerson 1972:962-967).

*Neritina virginea Linne, 1758 (Virginia Nerite).* This is mainly a brackish water snail, but it also occurs part way up rivers and streams (Morris 1947:120). Andrews (1969:6) reports that it is common along the littoral of the Yucatan peninsula. Lawrence Feldman (personal communication) has observed it living on mangrove roots. N. virginea was a characteristic species of shallow, hypersaline, grassy lagoons and bays near Rockport, Texas, and of inlet influenced, hypersaline lagoons in the Laguna Madre area (Parker 1959:2135, 2142, 2162, 2165). Nevertheless, Collard and D'Asaro (1973:IIIG-16) regard it as a low salinity indicator, common in marsh areas of deltas and mangrove swamps. Hedgpeth (1957:709) indicates a salinity range for the species between 15‰ and hypersaline conditions (over 40‰).

It should be noted that Dr. Fred G. Thompson, Assistant Curator of Malacology at Florida State Museum, found the N. virginea specimens in a type collection he received to be N. reclivata. Therefore, my assignment of individuals to either N. virginea or N. reclivata may have been mistaken in some instances. Dr. Clench provided the original identifications from a sample of shells from the site, but I did the mass counting and species assignments.

*Comment*. N. virginea occurs in all Patarata phases. Andrews (1969:6) reports Yucatecan archeological occurrences, possibly at Dzibilchaltun, and at San Jose in a cache. He comments that the larger nerites and neritinas at the Isla Cancun midden were probably used for food. He encountered many shore specimens with perforations by predators, which made holes difficult to distinguish from human drilling for suspension (Andrews 1969:7). Many of the Patarata specimens had perforations which may have been made by predators. Possibly such shells were deliberately selected for suspension. Since Neritina at Patarata ranged from miniscule to full-sized individuals, this may be indicative of an indiscriminate collection process (see Rangia flexuosa), as opposed to selective picking. Conceivably such a collection method could gather up both living and dead, perforated shells. Coe and Flannery (1967:78) record a different Neritina species at Salinas la Blanca, Guatemala. Flannery et al. (1967:451) mention Neritina as an Early Formative Gulf trade item in Oaxaca; however, Pires-Ferreira (1973:105, 120) has subsequently identified this as a Pacific species. Neritina shells composed a necklace of an El Arbolillo burial (Vaillant 1935:169, 238, 249).

## Freshwater Mollusks

Dr. David H. Stansbery, at the Ohio State University Museum of Zoology, provided the majority of these identifications. Dr. W.J. Clench identified Pomacea flagellata.

### Pelecypods

*Lampsilis (?) alienigena Crosse and Fischer, 1893*. A single valve may fall into this category. The valve belongs in the subfamily Lampsilinae, possibly either Villosa or Lampsilis genus. Although tentatively Lampsilis seems preferable, the generic position could be determined only by an examination of the soft anatomy (D.H. Stansbery, personal communication).

*Comment*. This valve occurred in Limon deposits. Because of its rarity, it may have been an accidental inclusion. It has not been noted in other sites.

*Psoronaias semigranosus Von dem Busch, 1842*. Dr. Stansbery has tentatively identified some freshwater bivalves from Patarata as P. semigranosus. He comments that in the Veracruz area

> if the environment were at least mildly estuarine (on the freshwater side), one would expect this type of sculpture in this group. The weight of the shell relative to its size indicates a moving habitat--current, tidal, or wave (along shore) action. It would not be surprising to find P. semigranosus living in a coarse substrate (at least sandy silt) where there is water movement in a near estuarine situation (D.H. Stansbery, personal communication).

*Comment.* A few examples of this species occur in each of the Patarata phases. Although they could represent fortuitous inclusions in the site, they could also have been less preferable food resources utilized extremely rarely. Feldman (1972:125) reports the mollusks from Yucatecan Maya sites.

Gastropods

*Pomacea flagellata Say.* This is a freshwater gastropod, and its appearance in an estuarine environment may have been seasonal as dead individuals floated downriver during the rainy season (W.J. Clench, personal communication); it could also have been gathered from neighboring freshwater environments. However, Lawrence Feldman (personal communication) reports having observed it live on mangrove roots and floating deadwood.

*Comment.* P. flagellata occurs in small amounts at Patarata except in the Limon phase. This species occurred in midden deposits on both San Lorenzo A and Chicharras phases at San Lorenzo Tenochtitlan, at least once in each phase, twice in a mixed deposit (M.D. Coe, personal communication). Moholy-Nagy (1963:68) records Pomacea, probably flagellata, at Tikal and comments that the species is occasionally eaten in the Peten today (1963:78). W.R. Coe (1965:1406) adds that Middle Preclassic Eb trash deposits included large numbers of Pomacea flagellata, indicating that the snail was used as food. W.R. Coe (1959:55) reports this species from Piedras Negras and Ricketson and Ricketson (1937:199), at Uaxactun.

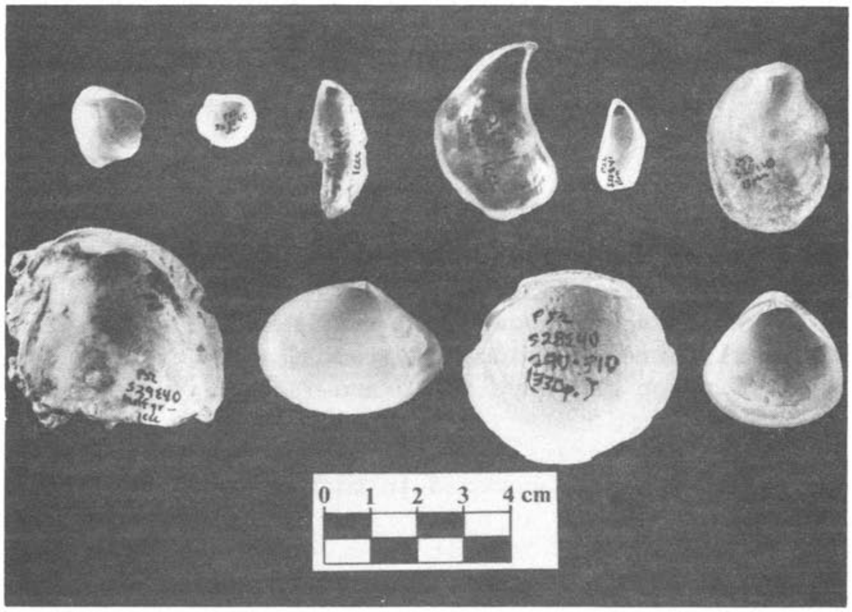



Fig. 46a. First row, left to right, Anomia simplex, Arca sp., Brachidontes citrinus, B. recurvus, Congeria leucopheata, Crassostrea rhizophorae.

Second Row, Crassostrea virginica, Macoma constricta, Phacoides pectinatus, Polymesoda triangula.

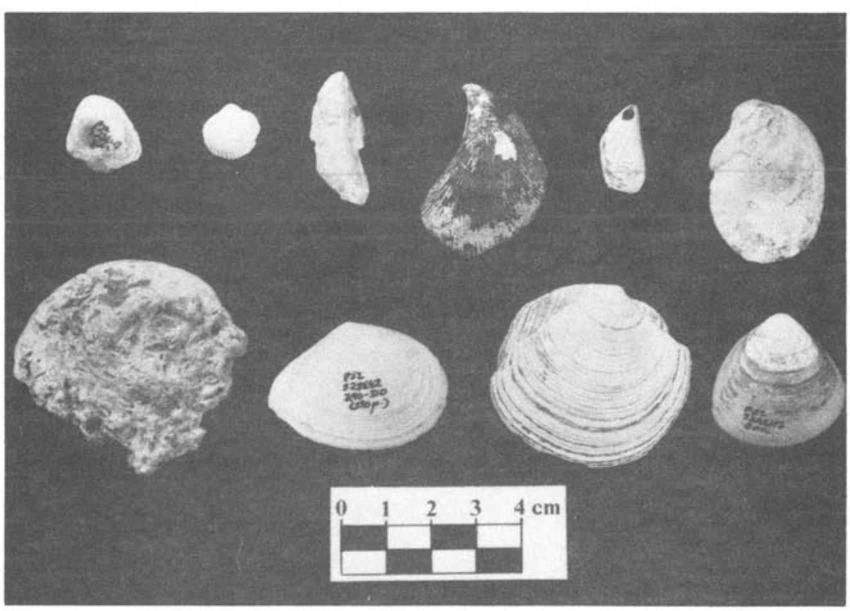



Fig. 46b. As above, obverse.

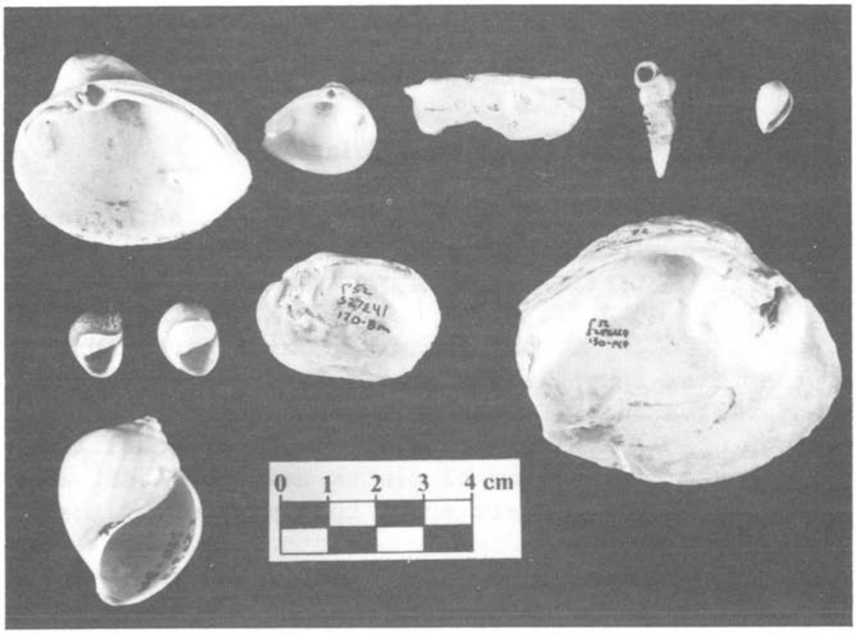



Fig. 47a. First row, left to right, Rangia cuneata, R. flexuosa, Tagelus sp., Cerithidea scalariformis, Melampus coffeus.
Second Row, Neritina reclivata, N. virginea, Lampsilis alienigena, Psoronaias semigranosus.
Third Row. Pomacea flagellata.

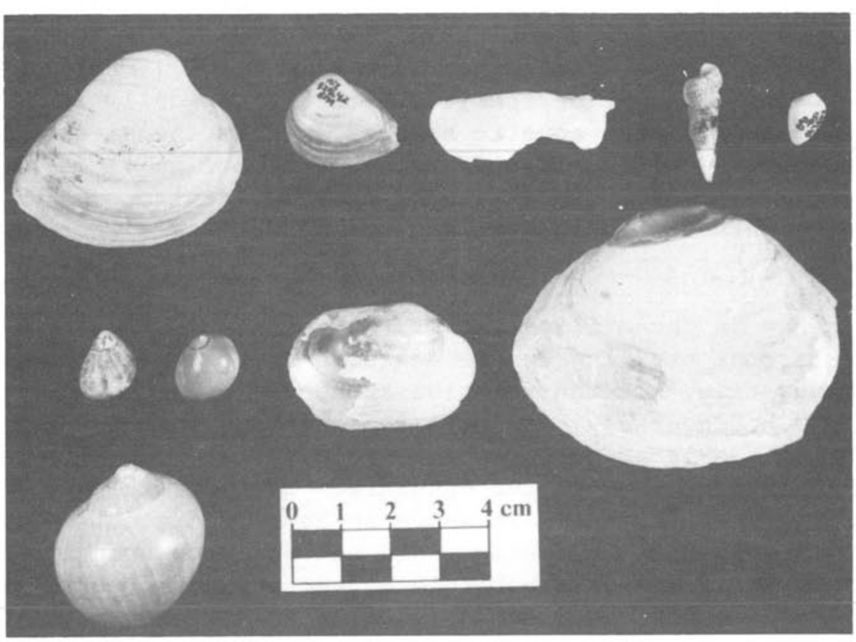



Fig. 47b. As above, obverse.

## VERTEBRATES

### Elizabeth S. Wing

Faunal remains from Patarata 52 provide us with an indication of animal resources used for subsistence purposes in the estuarine area. This study deals only with the vertebrate remains, a sample composed of at least 381 individual animals of 39 different species. In drawing conclusions about prehistoric subsistence, one must remember that the vertebrates constitute only part of the total fauna, which also included invertebrates such as crustaceans and molluscans. Furthermore, meat constitutes less than 50 percent by weight of the typical hunter-gather's or subsistence farmer's diet (Lee 1968). Because remains of plants used for food have largely disappeared, we can only speculate about that portion of the diet. Vertebrates and mollusks with their durable skeletons and shells are well preserved and provide a reasonably complete picture of their use.

As one would expect, the people who lived in this estuarine environment depended heavily on aquatic resources. Sixty-one percent of this vertebrate assemblage are aquatic species. These include both freshwater and marine forms. Salinity in an estuary may fluctuate markedly from low concentrations during the rainy season to higher salinity during the dry season when the flow of freshwater diminishes. Seasonal changes in species composition may be related to the fluctuating salinity of the estuary. All the turtles represented in the site are typically found in freshwater, but may tolerate brackish water. Two catfish (Ictalurus and Rhamdia) are primary freshwater fishes, the cichlid (Cichlasoma) is a secondary freshwater fish, and all other fish except the tripletail (Lobotes), which is marine, are peripheral marine species which are typically found in brackish water. The most important aquatic species in this faunal assemblage are the freshwater musk turtles (Kinosternids) and catfish (Ictalurus) and the peripheral marine catfish (Arius) and snook (Centropomus). These may reflect the catches from different seasons as well as different fishing locations and techniques.

A gradual change in the utilization of the faunal elements is indicated. This change is most striking in the decrease in relative abundance of turtles through time, but the relative abundance of freshwater fishes also decreases. Conversely, an increase in marine fishes, game, and rodents is seen in the later periods (see Table 24). These changes may reflect an ecological change in the esturary. If, for example, the sea level was relatively lower (it is known to have been about 6 feet lower around 2,000 B.C.), brackish water would not encroach upon the site quite as closely and the freshwater habitats of turtles and freshwater fishes would be nearer. Shifts in hunting and fishing patterns might also explain or accentuate changes in use of animals.

The predominant species among the terrestrial forms is dog. The relative abundance of dog is uniform in all four cultural periods suggesting a constant utilization of dog throughout the time of occupation. One can best observe the possible importance of dogs in the Patarata diet when estimates are made of the amounts of usable meat provided by the various faunal constituents. These estimates are derived from published sources or from estimates of average weights of animals of comparable sizes. Assuming dogs were eaten, which seems likely based on early accounts, they contributed almost half the meat consumed, four times more meat than the next most important animal.

Most other Gulf Coast sites also have abundant dog remains in their faunal samples. The faunal assemblage from San Lorenzo is in many respects similar to that at Patarata (Wing ms. ). Dog remains are abundant at San Lorenzo contributing an estimated one-third of the meat.

Our conception of the prehistoric role of dogs may have to be modified in the light of these estimates. Traditionally we think of the most important domestic food animals as being cloven-hooved animals which convert plants to meat. Dogs are usually conceived of as an exclusive meat eater. However, today in rural Mexico, as undoubtedly in prehistoric times, they subsist on table scraps and human waste. By being garbage converters dogs do not compete with man for food and, in fact, are useful in removing waste products from the home site. If their role as waste converters and a steady, reliable meat source is viable, then dogs contributed significantly to the food economy of at least part of the Mexican Gulf Coast.

## SYSTEMATICS OF THE PATARATA FAUNA

### Mammals

Order Marsupialia

*Family Didelphidae*

*Didelphis marsupialis (opossum)*. Opossum is a minor part of this fauna.

Order Primates

*Family Hominidae*

*Homo sapiens (man)*. Human remains are present throughout the site. Some may be associated with burials, others became incorporated in the midden material. A worked long bone is associated with a Camaron 3 level.

Order Edentata

*Family Dasypodidae*

*Dasypus novemcinctus (armadillo)*. Armadillo is a minor part of the fauna associated with the two latest periods.

Order Rodentia

*Family Cricetidae*

*Oryzomys sp. (rice rat)*.

*Sigmodon hispidus (cotton rat)*. Sixteen rodents, three of which are identifiable to the rice rat and cotton rat, are associated with this fauna. They probably do not constitute a food resource but are incidental in the fauna or may represent granary pests.

Order Carnivora

*Family Canidae*

*Canis familiaris (domestic dog)*. Dogs are the single most important animal in this fauna. Dogs play an important role in prehistoric Mexican village life. They may fill this role in several ways--as camp scavengers, guards, help in hunting, food, and ceremonial use. In this site there is no indication from the remains which of these roles the dogs fulfilled. It is evident that dogs were used at a constant rate (20 to 24 percent of the fauna of each period) throughout the occupation of the site.

*Family Procyonidae*

*Procyon lotor (raccoon)*. Raccoon are represented by three individuals in the Early Classic Period.

*Family Felidae*

*Felis sp. (wildcat)*. Remains of one medium-sized wildcat are represented in this fauna.

Order Sirenia

*Family Trichechidae*

*Trichechus manatus (manatee)*. Remains of one manatee are represented in this site.

Order Artiodactyla

*Family Tayassuidae*

*Tayassu tajacu (collared peccary)*. At least one collared peccary is represented in this site.

*Family Cervidae*

*Odocoileus virginianus (white-tailed deer)*. Only two white-tailed deer are represented at the Patarata site. The scarcity of both deer and peccary suggest an almost total lack of hunting in this subsistence economy. It also suggests that dogs were not used in pursuit of game.

Birds

Order Galliformes

*Family Meleagrididae*

*Meleagris gallopavo (turkey).* Turkey is present in small numbers in each cultural period. Turkey may be domesticated though it is not possible to determine this from these remains. In addition to turkey there are remains of at least five unidentifiable birds.

Amphibians and Reptiles

A single bone fragment is referable to an amphibian.

*Family Dermatemyidae*

*Dermatemys mawii (concha blanca).* The type locality of this large river turtle is Alvarado. Their remains are present but not abundant in each cultural period of this site.

*Family Chelydridae*

*Chelydra serpentina (snapping turtle).* Snapping turtle is represented by one shell fragment.

*Family Kinosternidae*

*Kinosternon acutum (musk turtle).* Kinosternon is the most abundant kind of turtle in this fauna and the genera within this family constitute as large a portion of the fauna as do dogs. Musk turtles (Kinosternidae) are relatively more abundant in the earliest levels of the site suggesting a change in the subsistence pattern during occupation of this site.

*Claudius angustatus (chopontile).* At least six individuals are represented in this site; all but one are from the first two cultural periods.

*Staurotypus triporactus (galapago).* At least nine individuals are represented, all from the two earliest cultural periods.

*Family Emydidae*

*Chrysemys scripta (pond turtle).* At least twelve pond turtles are represented. As with Kinosternids, Chrysemys is relatively more abundant in the two earlier cultural periods.

Order Squamata

*Family Iguanida*

*Iguana or Ctenosaura (iguana).* At least four individuals of this large lizard are represented.

*Family Colubridae*

A single snake vertebra is present in the faunal sample.

Order Crocodilia

*Family Crocodylidae*

*Crocodylus sp. (crocodile).* At least eight individual crocodiles are represented in the site.

Fishes

Class Chondrichthyes

Order Rajiformes

A single ray vertebra is present in the faunal sample.

Class Osteichthyes

Order Elopiformes

*Family Elopidae*

*Megalops atlantica (tarpon).* At least one tarpon and possibly three are represented in the site.

Order Clupeiformes

*Family Clupeidae*

*Dorosoma sp. (shad).* Shad is represented by three individuals.

Order Siluriformes

*Family Ictaluridae*

*Ictalurus meridionalis (catfish).* The catfishes, as a group, are the most abundant fish in the fauna, and Ictalurus meridionalis, represented by twenty-four individuals, is the most common catfish species. Ictalurus is a primary fish confined to fresh water.

*Family Pimelodidae*

*Rhamdia sp. (catfish).* Like Ictalurus, this genus is confined to fresh water. Rhamdia is represented by at least four individuals.

*Family Ariidae*

*Arius sp. (sea catfish).* This genus and the following one are peripheral fishes which are basically marine but will enter fresh water. Of these two genera, Arius is the most abundant, represented by at least seventeen individuals.

*Bagre marinus (gafftopsail catfish).* Bagre is represented by one individual. This genus is basically marine, but will enter fresh water.

Order Batrachoidiformes

*Family Batracheididae*

Opsanus beta *(gulf toadfish)*. Toadfish may enter rivers. One is present in this site.

Order Perciformes

*Family Centropomidae*

Centropomus *sp. (snook)*. Snook are the most abundantly represented fish with at least thiry-three individuals in the total fauna. Snook are more common in the earliest cultural periods than in the more recent periods.

*Family Carangidae*

Caranx *sp. (jack)*. Caranx may enter tidal streams. Only one is present in this site.

*Family Lobotidae*

Lobotes surinamensis *(tripletail)*. This marine species is represented by one individual.

*Family Pomadasyidae*

Pomadasys *sp. (grunt)*. Pomadasys may also enter rivers. Two are represented in this fauna.

*Family Sparidae*

Archosargus *sp. (sheepshead)*. Archosargus may enter rivers. It is represented by two individuals in this fauna.

*Family Cichlidae*

Cichlasoma *sp. (cichlid)*. This fresh water species is represented by at least four individuals.

*Family Muglidae*

Mugil *sp. (mullet)*. Mullet enter rivers. They are represented by two individuals in this site.

*Family Eleotridae*

Gobiomorus *sp. (sleeper)*. Sleepers occur in streams. Three are present in this fauna.

| Table 23 Distribution of Vertebrate Fauna at Patarata 52<br><br>No. = Minimum Number of Individuals | Camaron 1 | | Camaron 2 | | Camaron 3 | | Limon | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. |
| Didelphis | 1 | 2 | | | 2 | 2 | | | 3 |
| Homo | 3 | 6 | 4 | 3 | 3 | 3 | 2 | 3 | 12 |
| Dasypus | | | | | 4 | 4 | 3 | 5 | 7 |
| rodent | 2 | 4 | 2 | 1 | 5 | 4 | 4 | 7 | 13 |
| Oryzomys | | | 1 | 1 | | | | | 1 |
| Sigmodon | | | 1 | 1 | | | 1 | 2 | 2 |
| Canis | 11 | 21 | 37 | 24 | 26 | 23 | 12 | 20 | 86 |
| Procyon | | | 1 | 1 | 2 | 2 | | | 3 |
| Felis | | | | | 1 | 1 | | | 1 |
| Trichechus | | | | | 1 | 1 | | | 1 |
| Tayassu | | | | | | | 1 | 2 | 1 |
| Odocoileus | | | 1 | 1 | | | 1 | 2 | 2 |
| bird | | | | | 5 | 4 | | | 5 |
| Meleagris | 3 | 6 | 1 | 1 | 2 | 2 | 1 | 2 | 7 |
| amphibian | | | 1 | 1 | | | | | 1 |
| turtle | | | | | 3 | 3 | | | 3 |
| Dermatemys | 2 | 4 | 1 | 1 | 2 | 2 | 1 | 2 | 6 |
| Chelydra | 1 | 2 | | | | | | | 1 |
| Kinosternidae | | | 14 | 9 | | | 1 | 2 | 15 |
| Kinosternon | 11 | 21 | 22 | 14 | 18 | 16 | 4 | 7 | 55 |
| Claudius | 1 | 2 | 4 | 3 | | | 1 | 2 | 6 |
| Stauotypus | 4 | 8 | 5 | 3 | | | | | 9 |
| Chrysemys | 4 | 8 | 4 | 3 | 1 | 1 | 3 | 5 | 12 |
| iguana | | | 2 | 1 | 2 | 2 | | | 4 |
| snake | | | | | 1 | 1 | | | 1 |
| Crocodylus | | | 2 | 1 | 4 | 4 | 2 | 3 | 8 |
| ray | | | | | | | 1 | 2 | 1 |
| Elopidae | | | 1 | 1 | | | 1 | 2 | 2 |
| Megalops | | | 1 | 1 | | | | | 1 |
| Dorosoma | | | | | | | 3 | 5 | 3 |
| catfish | | | 1 | 1 | 8 | 7 | 5 | 9 | 14 |
| Ictalurus | 2 | 4 | 15 | 10 | 5 | 4 | 2 | 3 | 24 |
| Rhamdia | | | 3 | 2 | 1 | 1 | | | 4 |
| Ariidae | | | 1 | 1 | | | | | 1 |
| Arius | 1 | 2 | 8 | 5 | 4 | 4 | 4 | 7 | 17 |
| Bagre | | | | | 1 | 1 | | | 1 |
| Centropomus | 7 | 13 | 13 | 8 | 10 | 9 | 3 | 5 | 33 |
| Caranx | | | 1 | 1 | | | | | 1 |
| Lobotes | | | 1 | 1 | | | | | 1 |
| Pomadasys | | | 2 | 1 | | | | | 2 |
| Archosargus | | | | | | | 2 | 3 | 2 |
| Cichlasoma | | | 1 | 1 | 2 | 2 | 1 | 2 | 4 |
| Mugil | | | 2 | 1 | | | | | 2 |
| Gobiomorus | | | 3 | 2 | | | | | 3 |
| TOTAL | 53 | | 156 | | 113 | | 59 | | 381 |

| Table 24 Faunal Categories at Patarata 52<br>No. = Minimum Number of Individuals | Camaron 1 | | Camaron 2 | | Camaron 3 | | Limon | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. |
| human | 3 | 6 | 4 | 3 | 3 | 3 | 2 | 4 | 12 |
| dog | 11 | 21 | 37 | 24 | 26 | 25 | 12 | 23 | 86 |
| small rodent | 2 | 4 | 4 | 3 | 5 | 5 | 5 | 7 | 16 |
| small game | 1 | 2 | 1 | 1 | 9 | 9 | 3 | 6 | 14 |
| large game | | | 1 | 1 | | | 2 | 4 | 3 |
| manatee | | | | | 1 | 1 | | | 1 |
| birds | 3 | 6 | 1 | 1 | 7 | 7 | 1 | 2 | 12 |
| amphibians and reptiles | | | 5 | 3 | 7 | 7 | 2 | 4 | 14 |
| turtles | 23 | 43 | 50 | 32 | 24 | 23 | 10 | 19 | 107 |
| primary fishes | 2 | 4 | 19 | 12 | 8 | 8 | 3 | 6 | 32 |
| peripheral fishes | 8 | 15 | 32 | 21 | 16 | 15 | 13 | 25 | 69 |
| marine fishes | | | 1 | 1 | | | | | 1 |
| TOTAL | 53 | | 155 | | 106 | | 53 | | 367 |

| Table 25 Estimates of Meat Yields | Usable meat in kg. | | MNI | Total usable meat in kg. | Percentage contribution of species |
|---|---|---|---|---|---|
| Didelphis | 2.345 | Z | 3 | 7.035 | .7 |
| Dasypus | 3.175 | N | 7 | 22.225 | 2.1 |
| Small rodent | .005 | FSM | 16 | .080 | .007 |
| Canis | 5.975 | Z | 86 | 513.850 | 47.5 |
| Procyon | 2.947 | Z | 3 | 8.841 | .8 |
| Felis | 2.725 | Z | 1 | 2.725 | .3 |
| Trichechus | 90.719 | N | 1 | 90.719 | 8.4 |
| Tayassu | 15.876 | W | 1 | 15.876 | 1.5 |
| Odocoileus | 28.576 | N | 2 | 57.152 | 5.3 |
| Meleagris | 2.520 | L | 7 | 17.640 | 1.6 |
| Chelydra | 1.020 | FSM | 1 | 1.020 | .09 |
| Chrysemys | 2.268 | N | 12 | 27.216 | 2.5 |
| Claudius | .064 | e | 6 | .384 | .04 |
| Dermatemys | 2.268 | e | 6 | 13.608 | 1.3 |
| Kinosternon | .064 | FSM | 70 | 4.480 | .4 |
| Staurotypus | .344 | e | 9 | 3.096 | .3 |
| Iguana | 2.268 | e | 4 | 9.072 | .8 |
| Crocodylus | 15.900 | FSM | 8 | 127.200 | 11.8 |
| ray | .344 | e | 1 | .344 | .03 |
| Megalops | 45.000 | B | 1 | 45.000 | 4.2 |
| Dorosoma | .344 | e | 3 | 1.032 | .1 |
| Ictalurus | .344 | e | 38 | 13.072 | 1.2 |
| Rhamdia | .344 | e | 4 | 1.376 | .1 |
| Ariidae | .344 | e | 19 | 6.536 | .6 |
| Centropomus | 2.268 | e | 33 | 74.844 | 6.91 |

| Table 25. (Cont'd) | Usable meat in kg. | | MNI | Total usable meat in kg. | Percentage contribution of species |
|---|---|---|---|---|---|
| Caranx | 2.268 | e | 1 | 2.268 | .2 |
| Lobotes | 2.268 | e | 1 | 2.268 | .2 |
| Pomadasys | 2.268 | e | 2 | 4.536 | .4 |
| Archosargus | 2.268 | e | 2 | 4.536 | .4 |
| Cichlasoma | .344 | e | 4 | 1.376 | .1 |
| Mugil | .344 | e | 2 | .688 | .06 |
| Gobiomorus | .344 | e | 3 | 1.032 | .1 |
| TOTAL | | | | 1081.127 | |

Z = Zeigler 1973
N = Neitschmann 1973
W = White 1953
L = Leopold 1959
B = Breder 1948
FSM = Florida State Museum data
e = estimate

Table 26 Comparison of the Estimated Dietary Contribution of Different Animal Groups from Patarata and San Lorenzo

| | Patarata | | | San Lorenzo | |
|---|---|---|---|---|---|
| | Total usable meat in kg. | Percentage contribution | | Total usable meat in kg. | Percentage contribution |
| dog | 513.850 | 47.6 | | 107.550 | 34.6 |
| small rodent | .080 | .007 | | | |
| small game | 40.826 | 3.8 | 18.95 | 68.08 | 21.9 |
| large game | 73.028 | 6.8 | | | |
| manatee | 90.719 | 8.4 | | | |
| bird | 17.640 | 1.6 | | 5.544 | 1.8 |
| reptile | 136.272 | 12.6 | 17.2 | 35.000 | 11.2 |
| turtle | 49.804 | 4.6 | | | |
| primary fish | 15.824 | 1.5 | | | |
| peripheral fish | 139.784 | 12.9 | 14.6 | 95.198 | 30.6 |
| marine fish | 2.268 | 0.2 | | | |
| TOTAL | 1080.095 | | | 311.300 | |

# CHAPTER SIX

# AN INTERPRETATION OF PAST BEHAVIOR

A series of ecological questions was raised in the introductory chapter. They concerned the paleoenvironment, the context of occupancy at the site, subsistence patterns, subsistence change, other aspects of the economy, and interrelationships with areas outside the estuarine swamp. Each of these topics will be considered here in turn. Then, evidence of interrelationships will be analyzed using a series of criteria which suggest the spatial extent of a hypothetical ecosystem. The last subsection of this chapter will discuss some additional ecological problems by means of comparisons with archeological research in other estuarine areas of Mesoamerica; limitations on the generality of the proposed ecosystemic model are pointed out. For more information on specific kinds of evidence summarized in the succeeding pages, the appropriate discriptive and analytic sections of the report should be consulted.

## PALEOENVIRONMENT

Analysis of paleoecology cannot proceed without some environmental reconstruction. Geological studies indicate an alluvial landscape for the Lower Papaloapan throughout the Christian era. However, it remains to be demonstrated whether marine littoral, estuarine, or freshwater conditions prevailed in the site vicinity. Because no coring was done to determine the site substrate and associated depositional features (cf. Thom 1967), reconstruction of the site environment will depend on archeological data. I will assume that subsistence activities and materials at the site indicate pursuits conducted predominantly in proximity to the site, perhaps within a 10 km radius. An estuarine setting is documented. The majority of mollusks and vertebrates from the excavations live in estuarine habitats. Wood identifications, especially Avicennia, bear this out. P52 strata deposition is consonant with a deltaic, estuarine environment. The lithic tool kit does not indicate much emphasis on grain agriculture and seems commensurate with aquatic fishing/collecting and wood-working.

The modern deltaic environment, described in the second chapter, contains some non-swamp habitats, its aquatic habitats fluctuate seasonally, and particular localities undergo long-term changes in hydraulic activity and correlated factors such as salinity. For these reasons, one can find non-swamp vegetation on some levees and on site land; freshwater fish and turtles would be seasonally available or at least present in nearby habitats. Thus the estuarine delta reconstruction is not contravened by the archeological occurrence of non-swamp plant foods nor by the use of some freshwater fish, turtles, and mollusks. Because so few freshwater mollusks were used, procurement of freshwater fish and turtles could reflect (1) seasonality, (2) greater return for labor, or (3) dietary preference. Possibly some of the freshwater fauna was obtained through exchange but it is not necessary to assume so.

## OCCUPANCY AT P52

P52 affords three kinds of information pertinent to the question of perennial or seasonal occupancy: structures, artifacts, and food remains. Material culture is the most straightforward indicator of permanent, year-round habitation at the site. Prehistoric architecture, consisting of wattle and daub walls of specially obtained colored clays and of shell floors, argues for more than temporary occupation, as does the frequency of burials at Patarata sites. The inventory of artifacts from P52 includes a range of cooking and serving vessels comprising several ceramic types with decorative and formal diversity. A number of figurines, whistles, incensarios, spindle whorls, and other ceramic artifacts suggest activities ordinarily witnessed by ceramic remains at permanent habitation sites. Awls and needles document other domestic pursuits. There are decorative pendants, beads, and ear plugs of various materials. We have indirect evidence of permanency in habitation from the surrounding prehistoric settlement pattern, which includes "public" sites with artificial construction. Modern habitation in the swamp is year-round, documenting its feasibility. However, there is nothing which would rule out occasional trips to other resource areas.

To corroborate these indications of permanent habitation one can turn to faunal evidence. The preceeding report on mollusks analyzed that fauna to determine if major species were seasonally or permanently available. Compared to the vertebrate fauna, mollusks are less mobile and hence potentially better indicators of permanent local habitats. As reported, I concluded that low salinity areas, which were the major habitats exploited, would be available year-round, although more extensive in the rainy season.

However, there are difficulties attendant on detection of seasonality or its lack through faunal habitat analysis. Throughout the year variability is a keynote of a large estuarine zone, and thus it is difficult to rule out a particular aquatic resource on a seasonal basis. Patarata faunal subsistence is varied, including resources which were predominantly available in the dry season and others that were most plentiful in the rainy season. However, because of estuarine variability, it is difficult to argue that Patarata data necessarily preclude seasonal exploitation. I can only conclude that the present faunal evidence renders it unlikely because there is no clear predominance of dry or rainy season fauna. Furthermore, some agricultural foods were consumed, which provides an alternative food source for any seasonal depletion of faunal foods. The diversity of subsistence would seem to afford a degree of insulation from temporary and seasonal fluctuations in the environment. Of course, estuarine species themselves tolerate many minor, short-term changes in environmental conditions such as salinity. The greatest threat to the faunal subsistence base would probably be extraordinary fluctuations in the environment, such as those caused by hurricanes, unusually severe winter storms, or major floods.

## SUBSISTENCE

### Plant Foods

From the modern environment we know that small fields, gardens, and economic trees can be grown on high land such as levees and sites. Archeological remains indicate that agriculture and silviculture may have been pursued prehistorically. Coyol palm seeds and ciruela fruits were recovered along with a cob of Nal-tel corn. This early-maturing corn is the characteristic precolumbian race in the Mesoamerican lowlands (Wellhausen et al. 1952:60-61). Coyol and ciruela could have been feral on site land, but were probably "encouraged" species. As yet we do not know if crops like corn were grown on sites and levees or obtained through trade. Even if some gardens or fields were planted, additional agricultural provisions may have been desired or needed, depending on estuarine population size.

Problems of differential preservation of plant and animal remains vitiate direct conclusions about the proportions of each in the diet. However, we can see an orientation in lithic technology toward tools suitable for wood-working and other small tasks compatible with estuary-oriented subsistence. Comparison with tool inventories from non-coastal inland sites reveals they have a much greater emphasis on artifacts for preparing agricultural foods. However, the Patarata estuarine emphasis should not obscure the fact that agricultural foods were consistently eaten. Patarata Coarse body sherds from tecomates and ollas are abundant. Not infrequently they have an interior film of lime, suggesting use in soaking and cooking corn. Such vessels could also be used to cook soups with fish and shellfish, so they do not constitute exclusive evidence of maize preparation. Consequently we have no ready means of determining the proportion of agricultural and faunal foods, nor the source of crops.

## Fauna

Invertebrate fauna were a major numerical component of the faunal collection. Rangia and Polymesoda clams, Neritina and Cerithidia snails, and oysters are the most important of the twenty-one species of mollusks represented. In utilizing mollusks the ancient inhabitants concentrated on a few favored or abundant species. Both hand collection and some kind of scoop or drag process were probably employed.

It appears that mollusks were one of the dietary staples because of their steady use and quantity. However, in general mollusks are not as rich a caloric or protein source as fish and game. Per unit volume they do not offer as much protein on the average as fish (one-fourth to one-half as much), but they are roughly comparable to corn in amount of protein though certainly not in calories (about one-seventh as much). They would probably have slightly less than half as many calories as turkey. (Estimates are based on Watt's and Merrill's 1963:Table 1 values for clams, oysters, mussels, catfish, flounder, haddock, pompano, snapper, turkey, and venison.) It seems justifiable to view mollusks as one important element in the Patarata diet despite their small individual size. Because the amount of plant foods consumed is moot, it is not clear which foods were important for calories versus protein. However, I suspect that mollusks figured more as an easily procured protein supplement than as a source of calories. Compared to other faunal foods, one of their assets is their ease of collection.

Dog, turtle, and brackish water fish were mainstays in the vertebrate diet if we assume that the quantity of dog remains means they were being eaten. Since hunting seems not to have been of major importance, this is a likely interpretation of the dog bones. The combination of small and large land game including birds never equals the number of dogs in any phase. It is clear from Wing's study that land fauna, aside form the domesticated dog, played a minor role in the diet and therefore that hunting was of lesser importance than aquatic foods. The only faunal remains not reported here are those of crabs, which have not been identified. Crabs, like fish, were frequently utilized. Considering the heavy use of mollusks, along with the frequency of crabs, fish, and turtles, we can see that much of the animal food was either from rather "passive" or stationary organisms or from relatively small to medium sized species which could be trapped, netted, collected, or caught by line fishing. The inhabitants seem to have relied on food resources which were not particularly problematic in their environment. There is no indication that they made full use of the natural food resources. Migratory winter waterfowl are scarcely represented, and there is no evidence shrimp, another potential food, were eaten (Villalobos-Figueroa et al. 1966:85). However, preservation and excavation techniques may not have been adequate for recovery of shrimp remains.

## Subsistence Change

Hunted land animals are one of the categories of fauna showing chronological change. Camaron 3 and Limon show an increase in the percentage of these remains, although the sample in question is a small one (Table 27 summarizes this data from Table 24). This change coordinates well with the appearance of projectile points in small numbers in Camaron 3 and Limon (they occur also in the collapsed material, which is mainly from the upper part of the sequence). Similarly, during the Limon phase there is molluscan evidence possibly indicating a greater use of dry season species (Polymesoda triangula) as opposed to year-round exploitation. During the height of the dry season, land hunting would be more practicable since greater areas would be accessible by foot. There are a number of possible explanations for the apparent change. Since this shift is one of degree of emphasis, it may simply reflect changing dietary preferences. Another interpretation would be that during the Late Classic Period some groups from inland areas came into the mangrove area seasonally to utilize resources there, augmenting the local population. Alternatively some estuarine inhabitants could have exited during the rainy season. At present I have no way to test these hypotheses in order to select among them.

Table 27 Selected Faunal Categories at Patarata 52

% = % of total from Table 24
No. = Minimum Number of Individuals

| | Camaron 1 | | Camaron 2 | | Camaron 3 | | Limon | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. |
| Game (small game, large game, birds) | 4 | 8 | 3 | 2 | 16 | 15 | 6 | 11 | 20 |
| Game plus Dogs (dog, small game, large game, birds) | 15 | 28 | 40 | 26 | 42 | 40 | 18 | 34 | 106 |
| Selected Aquatic Fauna (turtles, primary fishes, peripheral fishes, marine fishes) | 33 | 62 | 102 | 66 | 48 | 45 | 26 | 49 | 209 |

Greater dry season exploitation helps explain the decrease in the relative contribution of freshwater fish and turtles in the upper part of the sequence, observed by Wing. This pattern of decrease is not based on a large sample and thus by itself is not necessarily a significant change, but it does agree with the other evidence. It is during the dry season that the brackish areas have their greatest extent, and peripheral fish would be more readily available. However, as Wing has pointed out, there are other possible explanations for the decline in freshwater forms, such as rising sea level and thus locally more prevalent brackish conditions. Alternatively a decline in the hydraulic activity of local exploitation areas and a consequent greater salinity could account for the freshwater fish decline.

### Summary

Patarata evidence indicates that foods available in the mangrove swamp supported year-round occupation. Although the diet was diverse, some potential food resources such as waterfowl were little utilized, possibly as much due to the effort requried as to dietary preference. In general, principal animal resources were ones readily available, such as mollusks and possibly dogs, and those that involved fishing skills as opposed to land hunting. Interpretations of the functions of stone tools support these conclusions. Patarata documents a subsistence pattern oriented to estuarine harvesting of faunal foods. In addition, plant foods including crops were part of the diet. There is a temporal shift in the use of faunal foods and more than one explanation can account for it. Nevertheless, no radical changes in subsistence are evident.

## PRODUCTION AND CONSUMPTION

In considering the subsistence pattern, I have outlined some activities of major importance. In the earlier section on material culture, artifact categories and functions indicated additional activities, such as spinning. Rather than summarize these, I will examine site activities in terms of production and consumption.

As indicated by material remains, local production was largely for local consumption. There is no evidence of export industries at the site. However, from local consumption we can see that not all local products could have been consumed locally. Some kinds of goods and/or services had to be exchanged for imported items--principally obsidian and other less frequently used or replenished stone such as hematite, chert, volcanic stones for grinding tools, and the material for the mosaic mirror. Except for obsidian and hematite, these exotic stones were quite possibly manufactured into finished products elsewhere. Ceramic artifacts, such as figurines, pottery, ear plugs, and beads were apparently not manufactured at the site itself, although it is possible pottery was made within the Lower Papaloapan Basin. Several of the pottery types are related enough in paste that a single manufacturing center could have produced a major part of the ceramic inventory. Interestingly, in the 16th century the nearby town of Tlacotalpan was a pottery-making center (del Paso y Troncoso 1905:V:1-11). A few potters still work there today. Since some imported items such as obsidian came from distant sources and others (ceramics, cotton, corn) perhaps came from nearer areas, we can examine local production with the possibility that different mechanisms operated in each case.

Agricultural products and ceramics are likely items for which perishable estuarine products and/or services would have been exchanged. Desirable agricultural products would include not only staple foods but also cotton and cacao. For such products Patarata inhabitants may have turned to a nearby center either within or outside the estuarine zone. Speculation about particular political or economic alignments is useless because relevant data are lacking. Centers probably served as distribution points, but this tells us little about how distribution occurred, whether through small markets, elitist redistribution of tribute to subjects, or peddling, or some combination of these. In such a process suitable exchange products from the mangrove swamp would include shell, shell artifacts, coral, asphalt, salt, firewood, transportable aquatic foods such as mollusks, shellfish, and turtles, and possibly bone and wood items. The latter two materials especially would be widely available, but it is possible that differences in spare time or craft specializations would make the swamps a supplier to nearby farming localities. Unfortunately "natural" specializations are not a sure guide to cultural specializations, which can be responsive to sociopolitical factors (cf. Chagnon 1968:100-101).

In the case of long-distance trade, there are two major possibilities. Local centers could have served as access points for raw materials and goods from more remote areas. However, it is also possible that some mangrove inhabitants had more direct long-distance contacts. It is here that we need to consider an important alternative for understanding the estuarine archeological record. There are a number of hypotheses that could be offered to account for the initial use or occupation of the estuarine zone--one of the most attractive is the large supply of readily available foods. Some special products like asphalt or salt might make an estuarine or coastal area attractive on an intermittent or seasonal basis. But we have to explain why year-round occupation, numerous sites, artificial mounds, and even small ceremonial centers also characterized the use of this environment during at least a portion of its history. We have to explain not merely how people subsisted, but also why they prospered. It is possible that one of the specializations of mangrove inhabitants derived not from products but from services.

Estuarine delta inhabitants, even more than river-dwelling, inland populations, would be expert boatmen. They would have been able to engage in coastal trade, moving their own and inland products to other coastal ports as well as transporting goods throughout the Lower Papaloapan Basin. Thus, the prosperity of the mangrove dwellers may not have been due entirely to exchanges of local products, but in part to a trading specialization. This idea can be offered only as one alternative hypothesis, but it is one which is testable. Identification of the nature and direction of exchange patterns will help define ecosystem boundaries for the Gulf coast.

## BOUNDARIES FOR AN ECOSYSTEM MODEL

Due to the limitations of available information, ecosystemic boundaries for Patarata and the mangrove swamp can only be framed as a hypothesis for future testing. The evidence supporting the boundaries and the assumptions I use illustrate several aspects of the problem of defining boundaries in prehistoric sociocultural ecosystems. I will examine the Early Classic evidence with respect to some of the criteria that can be used. Late Classic data are scant and pose too many problems to attempt an ecosystem definition.

Geographic conditions affecting human behavior can be examined both in terms of biophysical zones and their resources and in terms of the facility of transport and travel. Assuming that the Patarata site is representative of a past adaptation to the mangrove swamp and that the environmental perimeters of the estuarine delta define the boundaries of the subsistence pattern, we have natural limits for this aspect of behavior. Although in subsistence the mangrove swamp may have been a self-sufficient unit, it was not necessarily so. Lack of information on population density and estuarine productivity makes it difficult to be more specific. However, some agricultural foods and materials (cotton) were probably imported. Certainly in a general economic sense the mangrove swamp was not self sufficient. Some goods were imported, but it is not clear how export was handled. The estuarine oriented economy evidenced at Patarata appears to have been a subsystem in a larger economic sphere. If we grant that the estuarine zone was not economically independent, we may still ask if any other biogeographic zones delimited the ecosystem. Both to the west and east there are slightly different environmental conditions: Central Veracruz is more arid, and the volcanic Tuxtlas are more humid. In the 16th century such differences seem to have promoted partially complementary specializations which in turn could have stimulated interaction (Stark 1974a:62-87).

In terms of transport and communication, it is clear that the waterways of the Lower Papaloapan Basin could serve as "highways." Coastal transport and overland trails could have linked more distant parts of Veracruz that are not accessed by the rivers. Therefore, geographic configurations do not suggest major barriers to communications, but, rather, facilitate them.

Another approach to the definition of an ecosystem is through social interactions and communication rather than through economic transactions discussed previously or as affected by geography. Archeological survey and 16th century documents both imply that small habitations were subordinate to a hierarchy of larger centers. Therefore, we can anticipate ties between Patarata and larger neighboring sites. These could involve several levels. On the lowest level Patarata probably had a relationship to a small center in the estuarine zone. However, it is only from sites outside the mangrove swamp that we have excavated material. These are also large sites which must have had a considerable support area and thus may have incorporated smaller centers and numerous habitation sites. Ultimately Patarata may have been subordinate politically and economically to one of these major sites. However, it should not be concluded that a single political unit is necessarily implied for the Lower Papaloapan.

Particularly since settlement patterns suggest that Patarata was part of a more extensive society, material remains at the site can be analyzed comparatively to identify complex stylistic traits shared with other sites. Such shared style traits in many categories of goods and correlated changes in the categories may indicate systemic relationships either as a result of participation in a common trade network supplying the goods or as intercommunication of groups producing and using the same styles of goods.

Pottery and figurines are not clear-cut in the relationships they suggest. In part this is due to chronological uncertainties for sequences at other sites, in part to the selectivity of other descriptions, and in part to the techniques used previously to collect data and control provenience. Furthermore, comparison of ceramics from a habitation site with those from centers might be expected to encounter functional differences. Despite these problems, it seems likely that the nearby major sites of Cerro de las Mesas and Tres Zapotes, to the west and east respectively, were at least partially contemporaneous with some or all of the Camaron sub-phases. Although published reports from these sites do not isolate and describe the Patarata pahses, they do seem to be represented. It is possible that a considerable portion of the Lower Papaloapan Basin exhibits close similarity in its ceramic sequences, especially in comparison to adjacent regions.

Figurines from Patarata and other Veracruz sites suggest that the Papaloapan area may have been to a degree stylistically distinct from Central Veracruz. This distinction seems to be reflected as well by the paucity of pottery traits shared with Upper Remojadas in Central Veracruz. Sculptural styles also argue for distinct developments in Central Veracruz and the Papaloapan area. Near the Papaloapan, Early Classic carvings manifest a tradition distinct from the Classic Veracruz entrelace style: some modified Olmec and Izapan traits are carried through the Early Classic Period (Stark 1974a:348-361). For example, the Patarata scroll style appears to date from the Early Classic, Camaron 1, and reflects an assimilation of Izapan stylistic canons. Toward the end of the Early Classic, Cerro de las Mesas was the center of a conservative but unique carving style with long-count dated inscriptions. At Cerro de las Mesas there is evidence of continuity with previous sculptural traditions as well as local innovation. It is my inference that some kind of supra-community organization in the Lower Papaloapan area retained a measure of independence from Central Veracruz to the west. Otherwise it would be difficult to account for craft continuity that would maintain such stylistic conservatism. Considerable independence from developments to the east is also implied; Matacapan in the Tuxtla Mountains manifests an extraordinary degree of Teotihuacan influence or control. Evidence of Teotihuacan influence at Patarata is slight. More substantial effects are evident in pottery at Cerro de las Mesas and Tres Zapotes. Nevertheless, at neither site do Teotihuacan traits offset the predominantly local character of the collections. As yet, we have no evidence of Teotihuacan influence aside from Matacapan that could not be accounted for by trade. Pottery and figurines in both Central Veracruz and the Papaloapan area have distinctive local traits, and the two areas together have more in common than does either with Teotihuacan.

Sculptural and ceramic styles thus suggest a degree of uniformity within the Lower Papaloapan Basin and a number of distinctions from neighboring areas, although not isolation from them. The maintenance of this degree of similarity over time implies trade or other systemic interactions (e.g. social communications, possibly one or more large polities) tying sites in the estuarine zone to nearby farming areas. The possible existence of more than one major political unit must be emphasized. An ecosystem could comprise competing or fluctuating political and economic organizations.

Contrary to the preceeding evidence are several relationships between Patarata and Central Veracruz. Despite numerous differences, some pottery and figurine traits are shared. Patarata obsidian seems to have come mainly from the Altotonga source in Central Veracruz, and the ground stone material from Patarata also suggests derivation from Central Veracruz sources. If these conclusions are warranted, roughly parallel or redundant interactions with Central Veracruz may be a clue to an ecosystem incorporating the two. However, the alternative interpretation is that exchange between open systems accounts for the multiple ties. In view of the other boundary indices available, the latter alternative seems preferable; but judgments about the strength and nature of ties to Central Veracruz will remain largely subjective until additional information is evaluated. The orientation toward Central Veracruz in lithic trade may in some way reflect a strong Teotihuacan presence to the east.

Despite the numerous questions which remain unanswered, the major proposition I would advance is that the estuarine mangrove swamp *per se* did not define a sociocultural ecosystem during the time span represented by the Camaron phase. The environmental boundaries of the estuarine swamp do not seem to have been significant in more than subsistence orientation and possibly in economic specialization. Evidence suggests (1) that at least part of the Lower Papaloapan Basin, bridging estuarine and farming areas, may prove to be defined usefully as a sociocultural ecosystem, and (2) that this unit interacted more with Central Veracruz than with Southern Veracruz in the Early Classic. Adequate testing will require additional comparative data.

Although some of the content and spatial distribution of a prehistoric ecosystem have been suggested, current data is inadequate to discuss processes of interaction within the hypothetical ecosystem. At present I would suggest only one factor, environmental instability, as a possible regulatory mechanism. The irregular but not infrequent estuarine environmental and faunal fluctuations, such as are occasioned by severe floods and storms, suggest a factor selecting for cooperation between estuarine and farmland peoples. In 1969, for example, after the Patarata fieldwork was completed, a severe flood inundated the nearby town of Tlacotalpan and covered the Patarata site with between 1 and 2 m of water. Any sudden, fairly prolonged change in salinities and in other variables important for estuarine species takes a heavy toll. This is in addition to the physical damage to people and habitations. Ties between estuary dwellers and other groups offer a recourse during periodic difficulties.

## RETROSPECT AND PROSPECT, SOME COMPARATIVE OBSERVATIONS

The purpose of this section is to identify briefly some research problems from a comparison of the status of estuarine ecological studies in Mesoamerica. Such a comparison is useful because some ecological factors have scarcely been touched on in the preceding text. Our understanding of others suffers from the limitations of the investigation. Comparisons with other areas can suggest some ideas about the generality and limitations of the Papaloapan ecosystemic model.

In the introductory chapter I identified the positions that have been taken with regard to the economic role of estuarine mangrove swamps. None of these incorporates population density as a variable which could account for economic differences, nor have differences in estuarine environments been evaluated. From the viewpoint of those such as Andrews (1943:12, 30), who regards the swamp as a marginal environment of low productivity, estuarine occupation might be expected to correlate closely with population density in farming zones. If population density increased elsewhere, requiring more intensive cultivation, individuals might find a less desirable environment attractive, either seasonally or permanently. However, since the labor requirements of hunters and gatherers seem to be less than those of cultivators (Lee 1968; Sahlins 1968), it is probable that large deltaic swamps already would have attracted a population of mixed fisher/collector/levee farmers. How large a permanent population could be supported by deltaic swamps and associated landforms is unknown. Investigators seldom have even been able to determine whether estuarine occupancy was permanent or represented temporary use by inland groups getting food and/or salt (Feldman 1966:47; Shenkel 1971:141). The two may be compatible under conditions of low population density.

However, it would appear reasonable to assume that as available areas became populated and population density increased, access to resources would become restricted to resident groups and processes of specialization and exchange would ensue to move goods between estuarine and farming areas. To restate this, if year-round occupation in the estuarine zone is feasible, if increasing population requires more intensive food collecting or producing, and there is any mutual incentive to trade such as different resources in estuarine and farming areas, I would expect resident groups to exploit the resource because they can do so more economically, especially given the differences in skills and problems of scheduling involved for fisher/collectors and full-time farmers. Specialization and exchange networks would give benefits in terms of diversity of obtainable resources for participating groups and buffers against localized setbacks. Specialization consonant with environmental resources affords inhabitants a chance to concentrate on their production of some crops, goods, or services which can be used to obtain non-local or scarce products.

In summary, this reasoning suggests year-round occupancy of large, deltaic estuarine zones because of their ready food resources. One could also anticipate demographic and economic circumstances leading to specialization and exchange between estarine and farmland inhabitants. Investigations at the Marismas Nacionales (Shenkel 1971), along the coast of Belize

(Craig 1966), and at Patarata provide archeological evidence which tends to support this interpretation or parts of it. In all these cases, the estuarine zones are extensive and diverse in a number of environmental variables. In them we find evidence of permanent residence and of considerable complexity in sociocultural organization (e.g. in construction of public architecture). I expect similar evidence for estuarine deltas in Tabasco and Campeche (cf. Andrews 1943; Ruz 1969; West, Psuty, and Thom 1969; Sisson 1970; Matheny 1962; 1970).

However, not all evidence conforms to this model. By the Early Classic on part of the Soconusco coast there had been abandonment of estuary areas for permanent habitation, and use in the Terminal Preclassic was mainly for temporary salt extraction (Coe and Flannery 1967:84-99). Late Classic Marcos phase reoccupation of the Soconusco around Ocos may have been oriented to farmland, not swamps (Coe and Flannery 1967:96-97). It would appear that only in the Preclassic Period did permanent habitation in and around mangrove swamps occur; at that time the reconstructed subsistence pattern is one of full-time agriculture combined with estuarine fishing/collecting as an adjunct activity. This strategy was facilitated by close zoning of micro-environments.

Soconusco evidence provokes the question of when estuary use could be expected to be seasonal, an adjunct to full-time farming, or non-existent. Seasonal and adjunct exploitation would be most feasible on steeper gradient coasts, where more closely spaced micro-environments occur, and would be more likely where the estuarine zone is not extensive and thus possibly unable to attract or sustain permanent habitation or to offer enough special products and opportunities for coastal/inland transport. In comparison to the Soconusco coast near Ocos, the Marismas Nacionales and Lower Papaloapan have large estuarine deltas; the Belize coast has some deltas and lagoons plus offshore cays and protected coastal waters. It may be that the lesser Ocos area aquatic resources affected prehistoric settlement pattern and economy. However, abandonment of coastal plains and estuaries is not easily explained, as Coe and Flannery note (1967: 99).

Other variables possibly affecting estuarine occupation are many; some of these involve non-local factors. As I suggested for the Lower Papaloapan, participation in and management of long-distance trade could have a number of economic and political benefits for delta inhabitants. Straightforward political domination and control by an outside political power could also affect estuarine economy. It remains to be determined how similar were sociocultural ecosystems incorporating mangrove swamps and why they duplicate each other or diverge.

Another problem revealed by a comparative point of view is one involving generalized versus specialized estuarine subsistence. Some estuarine sites exhibit generalized agricultural/fishing/collecting subsistence. Patarata 52 seems to be an example, although we do not know the source of crops. However, in the Marismas Nacionales around the Teacapan estuary numerous shell mounds exist, differentiated into *Tivela* middens, oyster middens, linear shell mounds mainly containing oyster, and *Anadara* mounds. Besides the genus specializations these distinctions imply two micro-environmental orientations in mollusk collection, one devoted to exploitation of the Pacific littoral and another to the estuary (Shenkel 1971:63, 138). In the Lower Papaloapan pure shell mounds are rare. In mangrove swamps along the coast and in offshore cays of Belize Craig (1966:20, 24) found some sites he believed indicated permanent residence; at others differences in surface faunal remains and nearby aquatic resources led him to identify two subsistence specializations, one in manatees and one in conchs.

The previous issues of permanency of occupation, population density, and specialization may be related to these differences in subsistence; if estuarine inhabitants produced export foods, one could encounter sites specialized in processing particular foods. However, subsistence variability and possible specializations among sites located in estuarine swamps remain to be explained. A settlement pattern approach in future research will be necessary to identify patterned variability through time and to isolate environmental and sociocultural factors which can account for it. Similarly, settlement pattern studies will be required to test the validity of the estuarine-farmland ecosystem model I have proposed.

## Appendix 1

# PHOTOINTERPRETATION AND MAPPING

**Elinor G. Large**

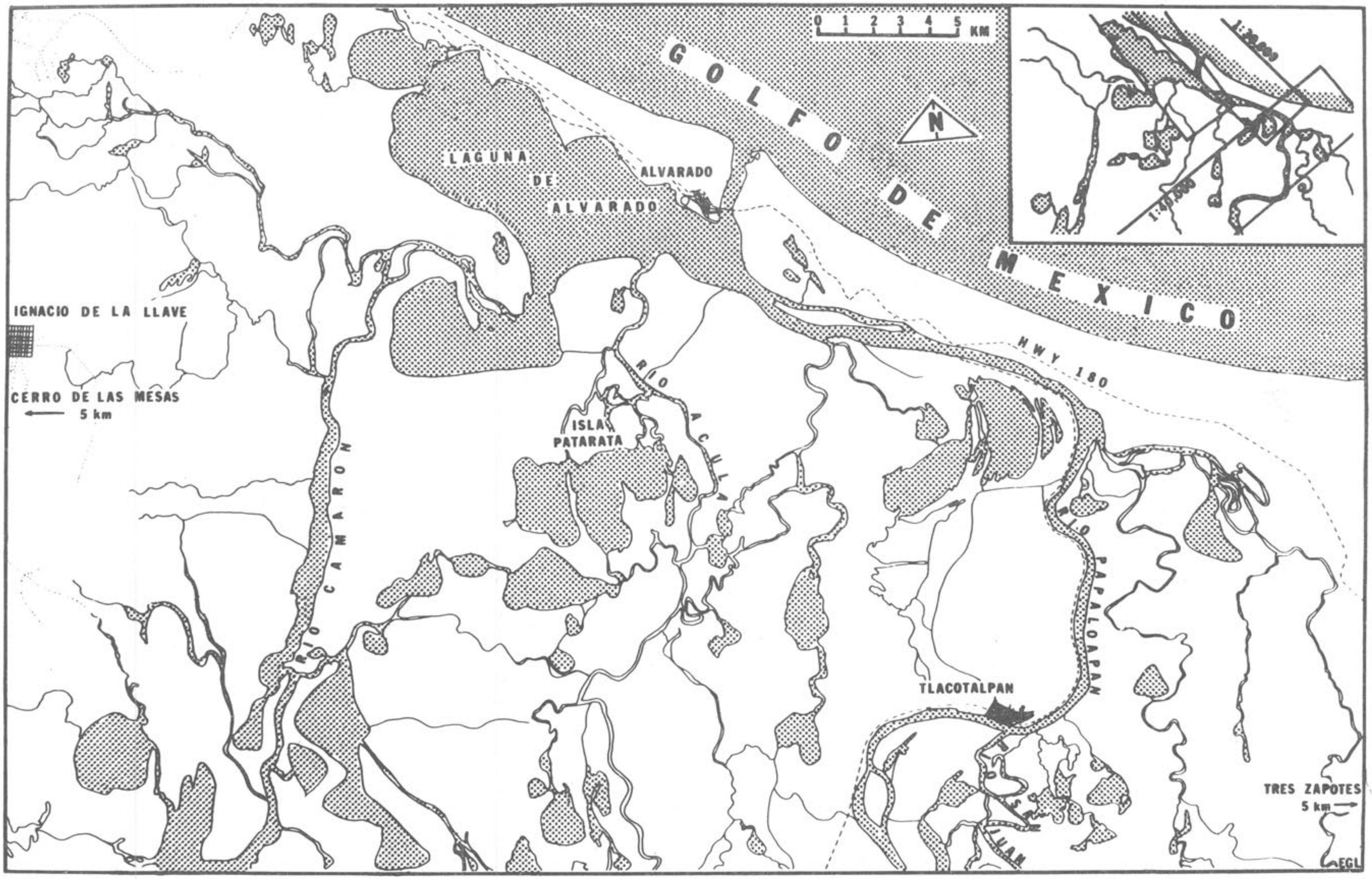
### INTRODUCTION

Regional archeological settlement pattern studies have rarely been attempted along the Gulf coast of Mexico. For the most part those which have been conducted bypassed the extensive stretches of mangrove swamps near elongated coastal lagoons. Site survey is very difficult in the mangrove swamp except along large rivers, and mapping inter-site relationships is impossible without detailed topographic maps. Aerial photography helps circumvent the problems. In 1968-1969, survey in the Lower Papaloapan Basin by Stark was aided by a 1:100,0000, black-and-white uncontrolled aerial mosaic (series 317) obtained from the Compania Mexicana de Aerofoto (CMA). While useful for topographic details, this coverage proved valueless for site identification and mapping because of its scale and quality.

National Aeronautics and Space Administration (NASA) imagery, taken in April 1969 in cooperation with the Mexican Secretary of Communication and Transportation, was examined after the initial survey. The coverage was of high quality but only partly overlapped the area previously surveyed; however, the overlap showed surface features which correlated with sketch maps of archeological sites (see inset on Map 6 for NASA coverage lines). Since aerial photography had not been generally recognized as a useful tool for archeological site location and mapping in such an area, and because it was reasonable to deduce that the patterns visible on the NASA photographs were archeological sites, a field test was conducted in the summer of 1973 by Elinor G. Large and J. Simon Bruder (Bruder, Large, and Stark 1975). The imagery received from NASA included both color and color infrared photographs taken from 15,000′ and 20,000′ (photo scales of 1:30,000 and 1:40,000, respectively). Because the 1:30,000 scale imagery covered the areas of mangrove swamp closest to Patarata, it was the primary source for photointerpretation in the field test. Field survey demonstrated the effectiveness of air photography for site location, mapping, and microenvironmental discriminations. A number of site signatures were defined for mangrove forests and grassy levees, and patterning in site distribution was identified.

### PREHISTORIC SITE DISTRIBUTION

In the summer of 1974 during a third season of survey, a new set of controlled aerial mosaics at 1:20,000 was obtained from CMA (series 1976). These mosaics formed the basis for Map 6, a base map of the landforms and hydrography of the Lower Papaloapan Basin. Both the NASA coverage and these mosaics were utilized to identify archeological sites by photointerpretation using principles developed during the second and third seasons of survey. These sites are located on Map 7. The majority of archeological sites which have been visited and confirmed during the three surveys have been circled to indicate the extent of areas investigated. The site map gives an indication of the possible density of prehistoric occupation of




Map 6. The Lower Papaloapan Basin. Inset map shows coverage of controlled mosaics and NASA lines.

the area, and provides our first glimpse of the prehistoric settlement pattern. Since the black-and-white mosaics are of poorer quality than the NASA photographs, sites shown from them are restricted to those whose identification was most secure. Experience has shown that this does not represent either the number of sites in the area or the full potential of photo-interpretation.

Many of the sites are relatively small (averaging about 30 meters in diameter) and were probably habitation sites. A typical residential pattern in the area today, often found on archeological sites as well as levees, consists of a small jacal house, built on a slightly elevated platform (about 50 cm high), with an outdoor work area and a detached ramada. Most small sites are strung along levees of old channels. In addition, there are several clusters of these small sites (as at La Providencia) and at least one group of sites which could qualify as a village (Cala Larga). The line of sites crossing Patarata and those which cross below the Laguna Macuile are much larger (averaging 50 meters in diameter) and include high artificial mounds. Finally, there are also several large elevated areas which appear to be ceremonial centers with conical and elongated mounds arranged in a formal pattern. Whether these kinds of sites were contemporaneous or represent different phases of settlement is a question which will have to await a large-scale study of the area.

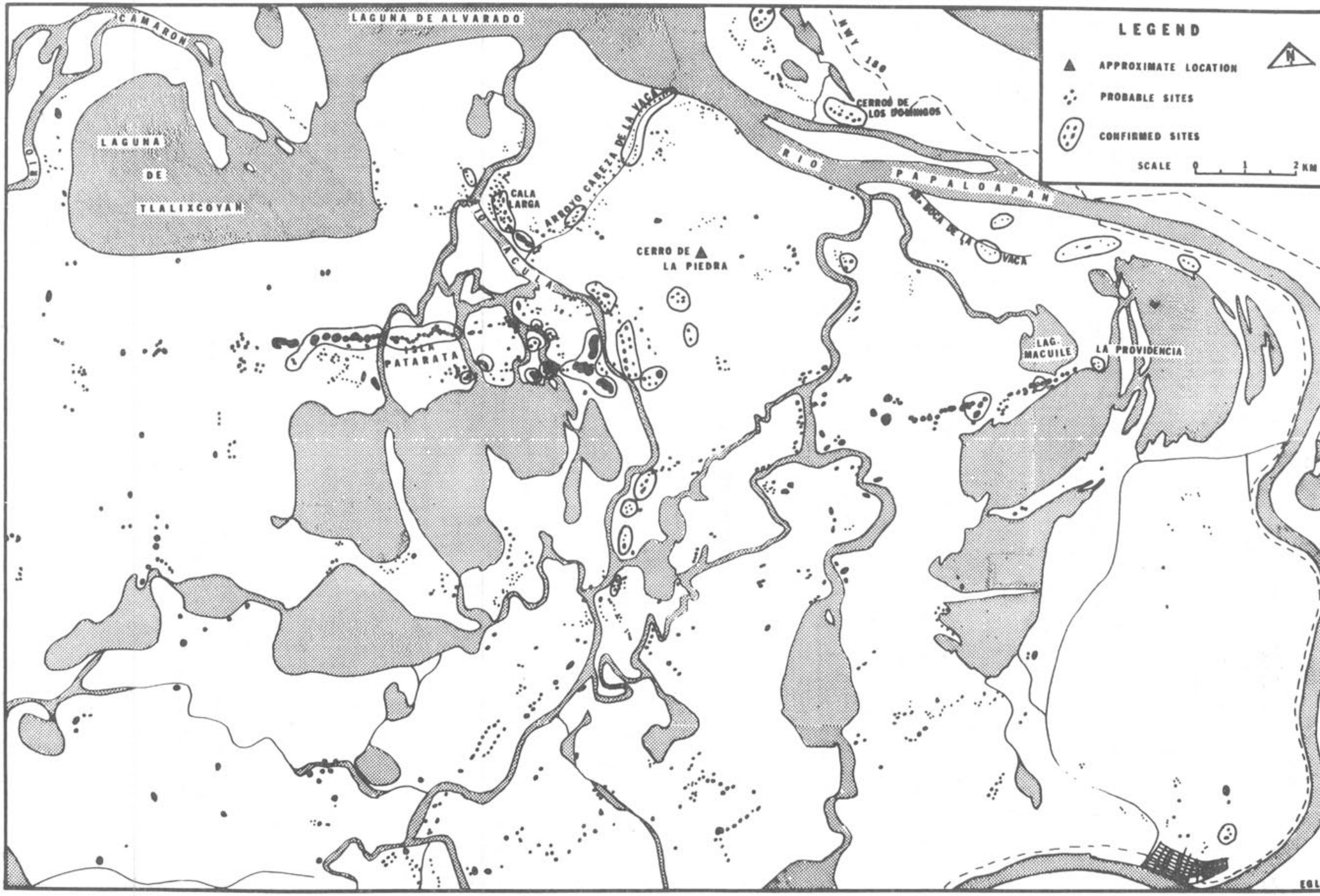
## ENVIRONMENTAL MAPPING

Because of the constraints on map size here, detailed microenvironmental patterns and topography are not presented. Instead, a more general map was constructed of the present land use, landforms, and vegetation for the Lower Papaloapan from analysis of the CMA mosaics (Map 8).

The stabilized sand dunes cover a coastal ridge which runs approximately east-west from 25 km west of Alvarado to the Tuxtla mountains, approximately 45 km east of Alvarado. The dunes range from 20 m to 80 m in height, and from 1 to 9 km inland (Coll de Hurtado 1969:7). The crests of the dunes are grass-covered and principally used for cattle pasture, although some fields of corn have been noted. Within the mangrove forest, most large dry areas (such as ceremonial centers) are also used for cattle pasture, as are lower levees during the dry season. Fenced areas tend to occupy only the highest elevations: (1) the west banks of the Rio Acula and the Rio Papaloapan, (2) a high ridge which penetrates the area from the northwest along the southern boundary of the Laguna de Alvarado, and (3) the area around Ignacio de la Llave. These areas also appear to be principally used for cattle pasture, although some crops are also grown. Along the Rio Camaron and along the Rio Papaloapan below Tlacotalpan both sides of the rivers appear to be areas of freshwater marshes, mudflats, and saltwater marshes merging somewhat imperceptibly into grassy savannas. These areas show little evidence of present use, although drier portions probably also provide cattle pasture.

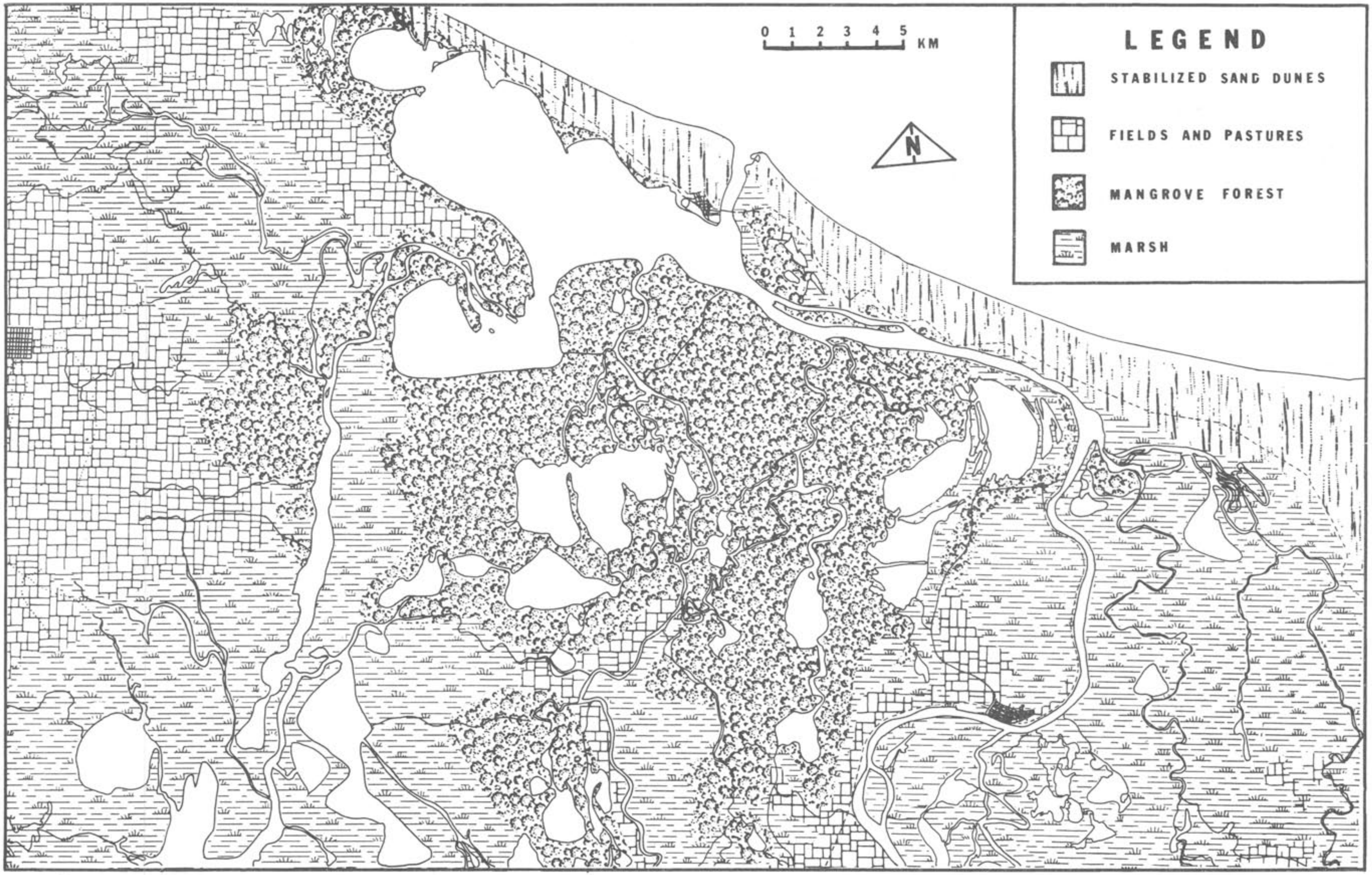
## SUMMARY

Since deltaic habitats shift with distributary growth and abandonment, the present location of various environments within the basin is likely to differ from prehistoric distributions. Reconstruction of paleoenvironments and




Map 7. Prehistoric site distribution.

associated settlement patterns will have to await detailed geomorphological studies, pollen analysis, and additional excavation. Another kind of information can assist prehistoric settlement pattern analysis. Present occupation can serve as a basis for analogs with prehistoric site distribution. One of the most obvious similarities is that of the street pattern of Tlacotalpan and the site locations at Cala Larga. In both cases houses/sites are distributed in a series of concentric curved lines following the contour of the point bars on which they are located. Distribution of modern habitations and sites in linear patterns along levees has already been commented on. However, modern settlement-subsistence patterns themselves need careful study before models are developed and tested for prehistoric periods.




Map 8. Land use, landforms, and vegetation of the Lower Papaloapan Basin.

# Appendix 2

## BURIALS

### Linda Wheeler

The skeletal material from Patarata 52 is very fragmentary. Preservation of bone is poor, partly because the area is subject to seasonal water level changes. Further, the bone suffered destructive action by small marine organisms and by the infiltration of mud into the bony matrix. Barnacles and shells were found adhering to many bones. Larger organisms (crabs, for instance) can move parts of a skeleton over a wide area; thus some parts may not be recovered or may not be identified as belonging to the same individual. Finally the recovery of material from mud is difficult. These factors are further complicated by damage to teeth and bones during shipping. However, the extraction of useful information from even such a fragmentary sample is possible, with the exception of many metric observations.

The sample size is small. Six individuals are represented in burial or possible burial contexts, three infants, two adults whose age could not be closely estimated, and one older adult. Scattered Homo sapiens fragments from other proveniences in the excavation (identified by E.S. Wing) were also inspected but did not appear to pertain to the burials. Cultural placement and provenience data in Table 28 and Fig. 48 were supplied by Stark. Charles F. Merbs provided helpful suggestions during the course of the analysis.

Table 28. Inventory of skeletal Remains, Provenience, Cultural Placement

| NO. | DESCRIPTION |
|---|---|
| F25 | Infant. Mandible, assorted teeth. Fragments of vertebrae, ribs, arm bones, 1 clavicle, 1 scapula. Skeleton in poor condition, many extremely small fragments. No pit evident. Placed on side P52/S27 E41/30-40cm level. Position at top of Camaron 3 deposits, minimally 30 cm below surface, leaves open the question of whether this is a historic or precolumbian burial. If precolumbian, presumably it would data to Limon times or later. |
| F26 | Adult female. Cranium, mandible, portions of face, assorted teeth. Much of postcranial skeleton present, but in poor condition (eroded, fragmentary). Placed in cone-shaped pit which was 1.1 m in depth. Skeleton maximally 1.2 m below present surface in P52/S28E40, seated, legs flexed, with knees up. Top and upper lateral boundaries of pit disturbed by burrows and possibly at the top by the historic shell deposit. On the basis of wall profile, upper part of pit was approximately .8 to .9 m wide; lower portion of pit, distinct in plan view, was approximately .6 m wide. Pit is of probable Limon origin, post-dated by historic shell deposit. |

Table 28 continued

| NO. | DESCRIPTION |
|---|---|
| F27 | Adult male. Cranial and facial fragments. 1 left distal tibia, 1 femoral shaft fragment. Found in P52/S29E41/brown stratum. No indication of pit; Stark was not convinced it represents a burial, although the bones were found close together, lying on a group of sherds. Because the brown stratum was distinctly bounded and densely packed with refuse, it is unlikely that the bones were in an intrusive pit. Hence, a Camaron 1 date is probable. |
| F27a | Infant. 19 cranial fragments, size approximately .6 to 1.3 cm in width. Found with F27. |
| F28 | Adult. Temporal and facial fragments, assorted teeth. Fragments of most postcranial bones. No evidence of a pit. Found in P52/S28E41/blue-grey soil from 170 cm to beginning of brown stratum, also extending into S27E41. Body position uncertain. Many sherds were mixed with the bones. Most of the upper strata in this square collapsed, making it difficult to detect a pit originating in Camaron 3. However, one would expect an intrusive pit into the blue-grey stratum to show clearly because of the latter's distinctive color. Therefore a Camaron 2 placement is suggested. |
| F28a | 1 juvenile mandibular alveolus. Found with F28. |

Although F27 and F28 and the accompanying infant bones were discovered in fairly close proximity (about 1 m horizontal distance and 30 cm vertical distance), it is likely that they represent four individuals rather than two. There is duplication of at least one bone between F27 and F28, and the cranium of F27a is too thin to be associated with the mandible of F28a.

The age and sex of each individual were determined using several methods, depending on the skeletal material present (Table 29).

Table 29. Age and Sex Estimations

| NO. | SEX | METHOD | AGE | METHOD |
|---|---|---|---|---|
| F25 | ? | -- | 6-18mos. | dental eruption |
| F26 | Female | pubis shape, sciatic notch, cranial features | over 50 | pubic symphysis, dental attrition, alveolar resorption, sutural closure |
| F27 | Male | mastoid process, cranial muscle attachments | adult | epiphyseal closure |
| F27a | ? | -- | infant | thinness of cranial fragments |
| F28 | ? | -- | adult | epiphyseal closure |
| F28a | ? | -- | $<$ 3 yrs | size and shape of alveoli |

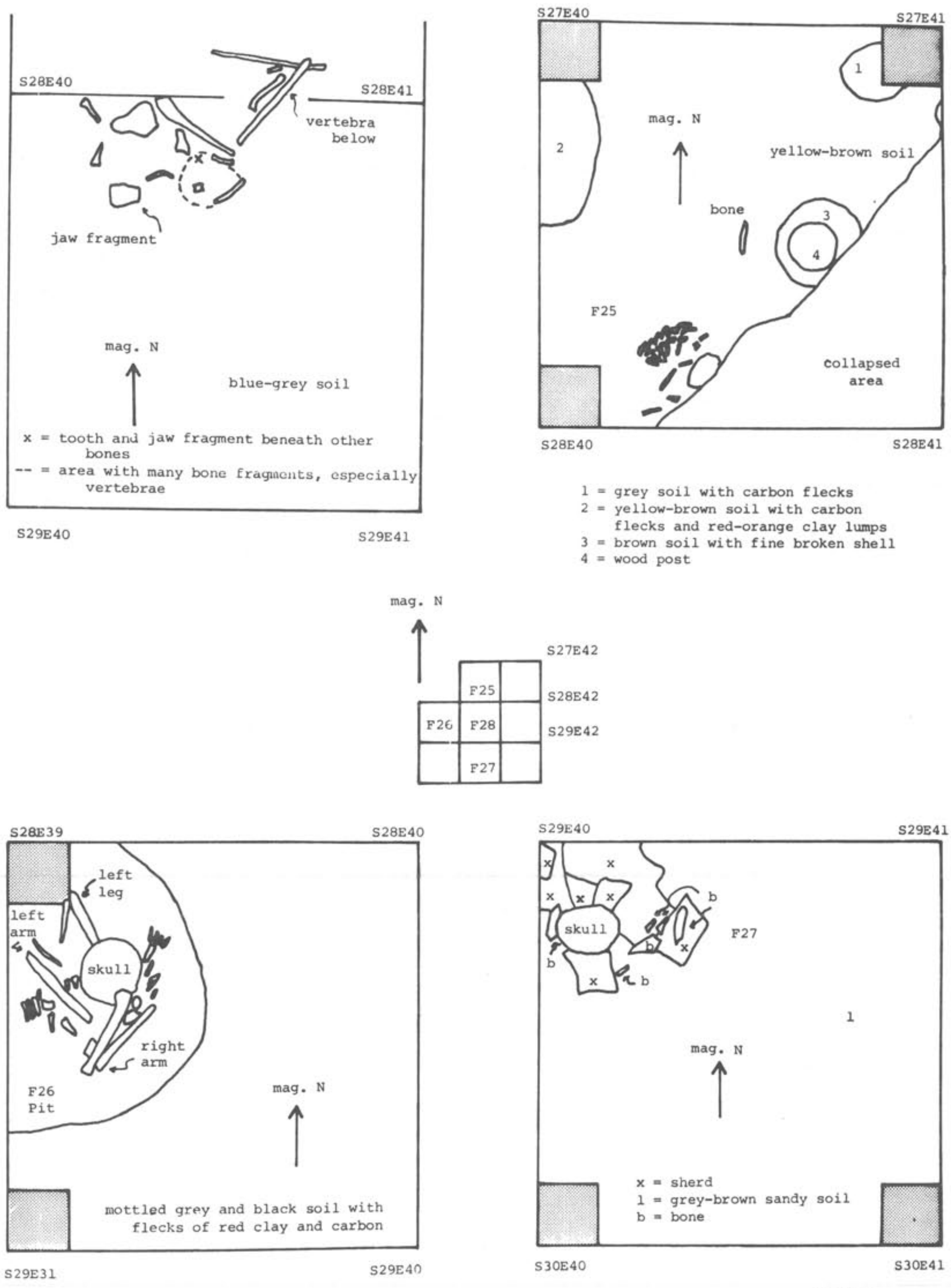

S28E40
S28E41
vertebra below
jaw fragment
mag. N
blue-grey soil
x = tooth and jaw fragment beneath other bones
-- = area with many bone fragments, especially vertebrae
S29E40
S29E41
S27E40
S27E41
1
2
mag. N
yellow-brown soil
bone
3
4
F25
collapsed area
S28E40
S28E41
1 = grey soil with carbon flecks
2 = yellow-brown soil with carbon flecks and red-orange clay lumps
3 = brown soil with fine broken shell
4 = wood post
mag. N
S27E42
F25
S28E42
F26
F28
S29E42
F27
S28E39
S28E40
left leg
left arm
skull
right arm
F26
Pit
mag. N
mottled grey and black soil with flecks of red clay and carbon
S29E31
S29E40
S29E40
S29E41
skull
b
x
F27
1
mag. N
x = sherd
1 = grey-brown sandy soil
b = bone
S30E40
S30E41
-BLS-

Fig. 48

## CRANIAL AND POSTCRANIAL OBSERVATIONS

Both of the adults for whom crania were found show definite artificial deformation. The cranium is flattened posteriorly and superiorly, so that the posterior portion of the parietals bulges out laterally (more on the left than on the right in the one intact cranium). This gives the skull almost a square appearance from a posterior view and makes the widest part of the skull occur above the auditory meatus, midway between it and the top of the skull. No sutural bones were noted, even though they might be expected from deformation pressure.

The size of cranial areas of muscle attachment and of mastoid processes varies a great deal among individuals. In the one individual (F26) possessing a complete tympanic plate, the external auditory meatus is oval. No dehiscence is present. The same individual shows several discrete traits on the mandible. There are bilateral mylohyoid arches (one arch shows post-mortem breakage). Mandibular tori are also present; the socket for the left canine shows that it was double-rooted. Muscle attachments on this mandible are robust.

Because of the extremely fragmentary condition of the material, few cranial and no postcranial measurements could be taken. The only complete mandible was also too damaged to permit reliable measurement. Cranial measurements from F26, the only intact cranium, are: maximum length, 124 mm; maximum breadth, 155mm; Basion-bregma height, 129 mm; length-breadth index, 80.0

The adult postcranial material tends to be somewhat robust, with well-developed muscle attachments. No discrete traits were noted.

## DENTAL OBSERVATIONS

The adult dental material shows mendium to extreme wear. Both individuals show dentine exposure. F26 shows such extreme wear that the tooth surfaces present only an outer ridge of enamel surrounding a dentine core. Several teeth are worn almost to the roots, making it impossible to see cusp patterns or number. It is possible this reflects a diet high in shellfish and ground corn, which could result in the ingestion of many small particles of grit. No caries were found, but F26 has several large abscesses, affecting both roots and teeth. F26 also shows partial resorbtion of the right $M_3$ alveolus and complete resorbtion of the left $M_1$ to $M_3$ alveoli. The upper molars (from F28 only) show the patterns 4, 4-, and 3+. The first lower molar from F26 is so worn that number of cusps cannot be determined. The second lower molar shows a Y4 pattern. No Carabelli's cusp was evident on the upper molars. The adult incisors and canines were so worn that any shoveling would have been destroyed. However, the deciduous incisors and canines from F25 all show medium shoveling.

## PATHOLOGY

The only pathology noted was osteophytosis in F26. This was evidenced by a great deal of lipping on the bodies of the two lumbar vertebrae present (lower lumbar), and Schmorl's nodes in the body of one of the cervical vertebrae. Osteophytes were not found elsewhere in the postcranial joints, nor was eburnation. However, many of the long bone ends were fragmentary.

Fig. 49 Skull F26, anterior view showing cranial deformation.

# Appendix 3

## GROUND STONE

### Louis Fernandez

Most of the samples examined are andesites or andesite-basalts containing orthopyroxene (hypersthene) $\pm$ hornblende $\pm$ augite. Texturally and compositionally these samples most closely resemble the monuments from Cerro de las Mesas described by Williams and Heizer (1965). Although the exact location of the source rocks for the above mentioned monuments has not been pinpointed (Williams and Heizer 1965:10), it is believed that they come from the Sierra Negra-Orizaba region, part of an extensive belt of Cenozoic volcanic rocks. The most characteristic feature of these andesitic rocks is that they contain hypersthene, whereas none of the rocks used in the Olmec sites to the east contain hypersthene. Thus, until more is known about the Cenozoic volcanics in the Cerro de las Mesas region, all that can be said concerning the Patarata andesites is that they probably come from the Sierra Negra-Orizaba region.

The Patarata olivine basalt sample is similar to the "columnar basalts" used at La Venta and San Lorenzo. Nevertheless, since the source of the latter rocks is still an enigma and since basalts may well be found in the cenozoic volcanics west of Cerro de las Mesas, a positive identification of the source of this sample is impossible.

The dacite-rhyolite porphyry is unlike any samples previously described. It, too, may find its origins in the Cenozoic volcanics near Cerro de las Mesas rather than in the Tuxtla region.

SAMPLE ANALYSIS

1. Pounding Stone, Andesite-Basalt Porphyry, Shell deposit (P52/S28E40/Stratum 1).

Phenocrysts of plagioclase and pyroxene are set in a very fine-grained matrix.

Plagioclase phenocrysts (20%) are twinned and zoned, varying from .25 to 1.5 mm. The pyroxenes (15%), both clino and ortho, anhedral to euhedral and .25 to .5 mm in diameter, are present both as single crystals and as glomerocrysts. The orthopyroxenes are slightly pleochroic, pale pink to colorless.

The groundmass is a feebly polarizing felsic mat.

2. Metate Fragment, Vesicular Pyroxene-Hornblende Andesite Porphyry, Camaron 3 (P52/S29E40/la or 2ccc-Blue-grey stratum).

Phenocrysts of plagioclase, pyroxene, and hornblende are set in a fine-grained matrix which is dominantly plagioclase with interstitial pyroxenes and iron-oxides.

The plagioclase phenocrysts (20%), zoned and twinned, vary from .25 to 1.5 mm. The orthopyroxenes (10%) are slightly pleochroic, pale pink to pale yellow, .25 to 1 mm and equant to euhedral. They are commonly present in clusters. The hornblendes (less than 5%) are strongly pleochroic, yellowish brown to yellowish red to russet red. They commonly have iron-oxide alteration rims.

The fine-grained matrix consists dominantly of plagioclase microlites with interstitial iron-oxides and pyroxenes.

3. Metate Fragment, Hornblende Andesite Porphyry, Camaron 3 (P52/S29E40/1ccc-2ccc).

Phenocrysts of hornblende and plagioclase and microphenocrysts of pyroxene are set in a very fine-grained, brownish matrix of plagioclase with minor iron-oxides and pyroxene.

The hornblende phenocrysts, up to 4 mm long, strongly pleochroic, light to dark green to greenish brown, account for 10% of the rock. Phenocrysts of blocky, zoned plagioclase laths (20%) vary from .25 to 1 mm in maximum diameter.

The fine-grained groundmass consists of microlites of plagioclase, less than .1 mm, and has a brownish color probably due to interstitial pyroxenes and altered iron-oxides.

4. Metate Fragment, Pyroxene-Hornblende Andesite, Camaron 1 (P52/S27E41/Brown Stratum).

Phenocrysts of plagioclase feldspar, pyroxene, and minor hornblende are set in a fine-grained matrix of plagioclase with minor pyroxene and iron-oxides.

The plagioclase phenocrysts (30-35%), .25 to 1.5 mm, are complexly zoned and twinned. The orthopyroxenes (10%) are characteristically elongated (.25 to .5 mm) and slightly pleochroic, pale pink to pale brown. They tend to be glomeroporphyritic and commonly have iron-oxide rims. Hornblende, strongly pleochroic, light green to greenish brown to deep red, is scarce, less than 5%.

The groundmass consists dominantly of plagioclase microlites and blocky laths with interstital iron-oxides and minor pyroxene.

5. Metate Fragment, Vesicular Pyroxene Andesite-Basalt, Camaron 1 (P52/S28E42/210-220 cm).

See number 12 except:

(a) pyroxene phenocrysts are both ortho and clino,
(b) pyroxenes are larger, up to 1.5 mm,
(c) feldspar phenocrysts are more abundant and larger, .1 to 1.5 mm,
(d) iron-oxide patches are abundant,
(e) olivine is rare, microphenocryst,
(f) hornblende is present but rare,
(g) groundmass is slightly coarser.

6. Metate Fragment, Vesicular Pyroxene Andesite-Basalt, Shell deposit (P52/S27E41/Strata 1 and 2).

See number 12.

7. Metate Fragment, Vesicular Pyroxene Andesite-Basalt, Camaron 3 (P52/S27E41/40cm-1ccc).

See number 5 except:

(a) no olivine,
(b) hornblende is more abundant.

8. Metate Fragment, Vesicular Pyroxene Andesite-Basalt, Collapsed Material.

See number 12 except:

(a) has both ortho and clinopyroxenes,
(b) groundmass is slightly coarser grained.

9. Mano or Metate Fragment, Pyroxene-Hornblende Andesite Porphyry, Camaron 1 (P52/S29E42/Brown Stratum).

Phenocrysts of plagioclase, hornblende, and pyroxene are set in a very fine-grained matrix of plagioclase with interstitial pyroxene and iron-oxides.

The plagioclase phenocrysts (25%), .5 to 1.5 mm, are strongly zoned and some are strongly corroded (altered along zones to sericite). The pyroxene phenocrysts (10%), pleochroic, colorless to slightly brownish, are commonly rimmed by secondary iron-oxide. The hornblende, strongly pleochroic, light green to yellow, brown to reddish brown, are the least abundant of the phenocrysts (less than 5%). They are commonly associated with pyroxenes and iron-oxides.

The very fine-grained, brownish groundmass consists of plagioclase microlites and interstitial pyroxene and iron-oxides, less than .1 mm in diameter.

10. Mano Fragment, Vesicular Pyroxene Andesite-Basalt, Camaron 2 (P52/ S28E41/Blue-grey Stratum-140 cm).

See number 5 except:

(a) no olivine.

11. Mano Fragment, Olivine Basalt Porphyry, Limon (P52/S27E41/Stratum 4-20 cm).

Phenocrysts of olivine are set in a medium-grained matrix of plagioclase and pyroxene with interstitial iron-oxides.

Olivine phenocrysts, .25 to .5 mm, vary from anhedral to euhedral and almost all contain a thin rim of iddingsite. The account for 25% of the bulk rock volume.

The groundmass, less than .1 to .1 mm, consists of plagioclase laths and prisms of clinopyroxene. Interstitial iron-oxides are common.

12. Mano Fragment, Vesicular Pyroxene Andesite-Basalt, Shell Deposit (P52/S29E41/Stratum 1).

Plagioclase and orthopyroxene phenocrysts are set in a very fine-grained matrix of fledspar microlites and interstitial iron-oxides. One olivine phenocryst was observed.

Plagioclase phenocrysts, .25 to 1 mm, are zoned and twinned and are by far the dominant phenocrystic phase (≅ 40%). The orthopyroxenes (10%) are slightly pleochroic, pale yellow to pale pink, commonly present in clusters, and usually are rimmed by iron-oxide. Some opaque iron-oxides, microphenocrysts (less than 5%), are present as equant grains or partially lining some of the vesicles.

The very fine-grained matrix is strongly vesiculated and consists of feldspar microlites and interstitial iron-oxides.

13. Celt Fragment, Dacite-Rhyolite Porphyry, Camaron 3 (P52/S28E40/2ccc-Blue-grey Stratum).

Phenocrysts of quartz and altered feldspars and amphiboles are set in a felsic, feebly polarizing matrix.

The feldspar phenocrysts, up to 1 mm, are the most abundant (25%). Some show vague remnants of twinning, most being almost completely altered to carbonate and/or sericite. Embayed quartz phenocrysts are generally smaller, .25 to .5 mm, and less abundant (10-15%). Slightly pleochroic amphibole, .25 to 1 mm, pale green to pale yellow, are the least abundant of the phenocrysts (less than 5%).

The fine-grained, feebly polarizing felsic groundmass contains granules of opaque iron-oxides.

14. Mano-pestle Fragment, Vesicular Andesite-Basalt, Camaron 2 (P52/S28E 41/170cm-Brown Stratum).

Microphenocrysts of plagioclase and pyroxene are set in an iron-stained matrix of plagioclase with interstitial pyroxene and iron-oxides.

Orthopyroxene microphenocrysts ($\cong$ 10%), .1 to .5 mm, are commonly present in clusters associated with plagioclase. Blocky laths of plagioclase microphenocrysts, less than .25 mm, grade into the groundmass feldspar.

The sub-trachytic groundmass consists dominantly of plagioclase laths with interstitial pyroxene and altered iron-oxides.

SUMMARY OF MATERIAL ANALYSIS

Source analysis of ground stone materials suggests that the andesites and andesite-basalts may derive from Cenozoic volcanics in the Sierra Negra-Orizaba region to the west of the Lower Papaloapan. Other samples are inconclusive as to possible source, but seem compatible with the same source area. There is no evidence for derivation to the east from the nearby Tuxtla region. Ground stone artifacts therefore suggest trade with Central Veracruz.

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