PREHISTORIC RACES OF MAIZE AND CULTURAL DIFFUSION

by

Mary Eubanks Dunn

University of North Carolina

Research Laboratories of Anthropology

Chapel Hill

1977

ACKNOWLEDGMENTS

There are many individuals who have made important contributions toward bringing this study to fruition. It would be practically impossible to name everyone who has helped me throughout my research. There are certain people without whose help the work would probably never have been realized, and I wish to acknowledge their valuable roles.

I especially want to thank Dr. Paul C. Mangelsdorf, the one most responsible for my involvement in the study of this unique subject.

I thank the following museums for their co-operation in allowing me to examine and photograph the maize jars in their collections: the Museo Nacional de Antropología y Arqueología, Lima; the Museo Amano, Lima; the Muse "Rafael Larco Herrera", Lima; the Museo Arqueológico "Bruning" de Lambayeque; the Museo Frissell de Arte Zapoteca, Mitla, Oaxaca; the Museo Nacional de Antropología, Mexico, D.F.; the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; the University Museum, University of Pennsylvania, Philadelphia; the Metropolitan Museum of Art; the Brooklyn Museum; the Museum of the American Indian, Heye Foundation; the Middle American Research Institute, Tulane University; and the Duke University Museum of Art.

I thank Ing. Ricardo Sevilla for his invaluable assistance on many occasions which greatly aided my field research in Peru. I also thank Dr. Edward J. Dunn for his help in the collection of data in the field.

There are five individuals who have guided my graduate studies at the University of North Carolina. They have greatly influenced my thinking as reflected in this study, and their contributions have been invaluable. They are Dr. Donald L. Brockington, chairman of my Ph.D. committee; Dr. Emeline H. Richardson; Dr. Richard A. Yarnell; Dr. Robert Daniels; Dr. Joffre Coe. I am very grateful to them for all their help and instruction.

I recognize and thank Dr. Major M. Goodman with whom I consulted on the identifications of the maize races. His criticisms and comments on the botanical aspects of this work have been most helpful.

I am extremely grateful to the National Geographic Society under whose auspices the field work in Peru was carried out. I also thank Research Corporation for its financial support of my research in Mexico.

Finally, I thank the Department of Anthropology at Southern Methodist University for a one-year appoinment as a Research Associate. This made it possible for me to do the analysis of my materials and to complete the research and writing of the dissertation. Individuals at SMU for whose co-operation and assistance I am especially grateful are Dr. Alan Skinner; Anne Justen; Bill Westbury; Dr. William Mahler, Director of the SMU Herbarium; Barney Lipscomb, Herbarium botanist; Jim Stevens, Science Librarian.

CONTENTS

LIST OF TABLES

LIST OF PLATES

FIGURES IN THE TEXT

CHAPTER I

INTRODUCTION

This is an archaeological and botanical study identifying races of maize, *Zea mays* L., in relief on pre-Columbian urns and effigy jars. These maize depictions are impressions from molds which were formed from actual ears of maize. The ceramic facsimiles duplicate the external morphology of the botanical specimen in detail. The external characters of the ear provide the basic data for the identifications of the races of maize depicted on the pottery.

This unique method of realistically depicting maize occurs primarily on the pottery of two highly developed, contemporaneous, pre-Columbian cultures: the Moche of the North Coast of Peru, and the Zapotec of the Valley of Oaxaca in southern Mexico. There are a few examples of pottery depicting mold-made maize from two later Peruvian cultures; the Chimú and coastal Inca (Grobman et al. 1961:110). The use of this technique to realistically display maize may have been more widespread in Mesoamerica than present evidence indicates. There have been reports of finds of mold-made mazorcas (For this and all other terms, see "Terminology" section at the end of this chapter.) from an early Postclassic site in Morelos (Donovan C. Senter personal communication), and from excavations near Lake Amatitlán in highland Guatemala (Nicholas M. Hellmuth personal communication). In addition, there is at least one example of an Aztec brazier depicting mold-made

maize at the Museo Nacional de Antropología in Mexico City (Eubanks 1973:150).

Objectives

These replicas of maize provide a unique and valuable source of evidence for cultural contact between Mexico and South America. Because races of maize are distinct and tend to be local in distribution, they are potentially good indicators of trade and migration (Pickersgill 1972:99). However, the value of geographic races as evidence for or against cultural contact has been limited by the nature of archaeological materials. Finds of maize have been numerous, but they consist primarily of cobs, rarely with kernels in place or in direct association with cobs. There are exceptions where well preserved complete maize ears have been found. They include Tularosa Cave, a dry cave site in New Mexico (Cutler 1952), and several sites on the dry, coastal desert of Peru. The Peruvian materials include some complete ears from the Central Coast site, Ancón, described by Reiss and Stübel (1880-1887), a large collection of maize ears from the Los Cerillos site in the Ica Valley on the South Coast (Grobman et al. 1961:75), some ears from the Paracas Cavernas site (Yacovleff and Herrera 1934), two collections from Ocucaje Cavernas, a site contemporaneous with Paracas Cavernas (Grobman et al. 1961:83), and approximately nineteen collections of maize from twelve archaeological sites in the area of the upper Nazca Valley, including the site Cahuachi (Grobman et al. 1961:83-86; Towle 1961).

Outside the above mentioned exceptions which come primarily from the dry South Coast of Peru, the principle maize remains at archaeological sites are cobs (Nickerson 1953:80), and when other parts of the plant are found, they are practically never in association with cobs (Cutler 1946:276). It has been estimated that ninety per cent of maize material in archaeological collections is cobs (Lenz 1948:353). Consequently, prehistoric maize classification depends largely upon a special set of cob characters. These include row number, shank diameter, cob diameter, shape of cob, width and depth of cupules, height of rachis-flaps, kernel thickness, width of lower glume, rachis diameter and pith diameter (Nickerson 1953:81-83). In *Zea mays*, selection has been for the ear, and its characters are central to the classification of races of maize (Mangelsdorf 1974; 102). The degree to which observable cob characters on archaeological specimens are significant for racial identifications is not known. These have not been tested to determine the relative importance of the genotype, the environment, their interaction and sampling error on the expression of the characters (Bird 1976). Furthermore, there may be ambiguity in racial identifications of cobs as noted by Mangelsdorf, MacNeish and Galinat in reference to the races Nal Tel and Chapalote. They point out that ". . . the two races are quite similar and it is generally not possible to distinguish the two by their cobs" (1967b:188). The ceramic maize replicas provide corroborative evidence for identification of archaeological maize remains. They also provide evidence for a better understanding of the prehistoric distributions and relationships of races of maize, and may yield

information regarding the times at which certain events in the evolution of maize occurred.

If there is a sufficient body of botanical data indicating contact between Mexico and Peru, then there should be corroborative evidence from archaeology, physical anthropology and linguistics to support the hypothesis of cultural contact between the two areas. A comparison of evidence supporting contact may also help to elucidate the nature of the contact situation. Important questions regarding the ceramic evidence other than the botanical identifications are: (1) did this apparently unique method of realistically displaying maize have a single origin or was it an independent invention? (2) do other aspects of the pottery reflect strong similarities, such as use, decoration, subject matter and iconography?

In a broad perspective, the study of the ceramic evidence for prehistoric races of maize may ultimately contribute to better understanding of the development of pre-Columbian civilizations by providing data for testing the hypothesis that hybridization of maize from South America and Mesoamerica yielded more productive races better adapted to variations in climate and environmental conditions. These more productive strains, in turn, may have contributed to an expanded food supply, possibly accelerating population growth which influenced the development of civilization during the Classic period.

The study of cermaic maize replicas may make a contribution to botany by providing new information for generating and testing hypotheses regarding the evolution of maize.

Previous Studies

Hébert described the use of molds by Peruvian artisans to depict fruits and vegetables in their natural forms. He reported that there were seventeen vessels depicting mold-made maize in the collection of the Musée d'Ethnographie, Paris (1902).

Safford reported finds of funeral vases with representations of fruits and vegetables in graves near Trujillo and Chimbote on the North Coast of Peru. He recognized the use of molds in the fashioning of these naturalistic representations on urns from Oaxaca, as well as on the jars from the Peruvian North Coast. He pointed out the botanical significance of these specimens:

> Often actual specimens of maize, squashes, peanuts and fruits have been used for making molds for burial vases found interred with the mummies; and the original model has been reproduced with such accuracy that the horitcultural varieties of such staples as maize and squashes are clearly discernible, and the specimens may be compared with corresponding varieties now cultivated (1917:14).

This molding technique has also been described by Linné (1925) and Weatherwax (1954).

Yacovleff and Herrera (1934:254) observed that unquestionably the botanical species of the ceramic reproductions of fruits and vegetables could be identified due to the exact and precise attention to every detail. This realistic expression of fruits and vegetables was important to the Moche because these items were vital to survival and were believed to have had magical powers (1934:252). These authors further noted that the images of maize ears were impressions from molds formed from natural models. They are represented with such exactitude that the perfect characteristics

of the grains and ears of the varieties cultivated in different localities are distinguishable, and the excavated natural remains of these varieties are extremely rare (1934:259).

Whereas Safford (1917) first recognized specific varieties of fruits and vegetables were represented by these mold-made forms, Mangelsdorf and Reeves (1938) first employed this observation in support of a theoretical supposition. They postulated that Peru was the primary center of maize domestication. Bolivia is one of the few places where podcorn, the proposed ancestor of cultivated maize, is found today. However, its representation by a Peruvian specimen in the Yale Peabody Museum demonstrated that podcorn had been present in Peru in prehistoric times. In 1939, these authors illustrated a number of Mexican and Peruvian artifacts representing maize, including some Moche jars and an Oaxacan urn. They discussed the ceramic depictions as archaeological evidence bearing on the evolution of maize.

In their classification of Mexican maize races, Wellhausen et al. identify mold-made ceramic representations of maize on several pieces of pottery. On one Zapotec urn, they identify the ancient, indigenous race Nal Tel on the basis of similarity of shape, row number and kernel type (1952:Fig. 2). This urn has also been illustrated by Eubanks (1973:Plate 42).

In their classification of Peruvian races of maize, Grobman et al. (1961) identify ten "proto" races on effigy jars from museums and private collections in Peru. This is the first time identifications of cermaic specimens are supplemented by measurements of the ceramic ears. It is probable that many of the jars illustrated by

Grobman et al. are also presented in this corpus. However, I have been unable to verify duplication because Grobman et al. do not give the museum locations and catalogue numbers of the specimens illustrated.

Mangelsdorf (1974) devoted a chapter of his book *Corn: Its Origin, Evolution and Improvement* to "Corn in Prehistoric Art." In his discussion of the importance of maize as an object of worship among cultures of the New World, he noted the depictions of maize on various pre-Columbian art forms. He emphasized the occurrence of maize impressed from molds made from actual ears on the pottery of two highly developed civilizations in Mexico and Peru. A number of pre-Columbian objects depicting maize were illustrated.

In regard to the molding technique, Mangelsdorf (1974) posed some theoretical questions which are taken into consideration by this study: (1) did this method of depicting mold-made maize have a common origin? (2) if it did, where did it originate? (3) can time periods for the diffusion and hybridization of certain races be established on the basis of the artifacts on which they are identified? He pointed out that the last question involves the problem of rumored, numerous falsifications among collections of Zapotec urns. In reference to this problem, he stated: "Indeed it is gratifying to be able to report that at least one student of archaeology is now engaged in studies of this nature" (1974:188).

In my master's thesis (Eubanks 1973), an attempt was made to evaluate the antiquity of twenty-six Zapotec urns depicting mold-made maize with identifiable races. The methodological approach

co-ordinated the identifications with a rigid stylistic analysis. The urns were palced in categories of "authentic" and "suspect" according to artistic style and botanical race. When a modern race was identified, an urn's antiquity was considered "suspect". These criteria have since been proven untenable on the basis of thermo-luminescence (TL) tests made by David W. Zimmerman, Director of the Center for Archaeometry, Washington University, St. Louis, Missouri. TL tests on samples from one of the pieces labelled "suspect" showed the vessel to be at least 1,000 years old (David W. Zimmerman personal communication).

Shaplin made a stylistic analysis of 1,000 photographs of Zapotec urns complemented by the results of TL tests made by Zimmerman on 100 urns at the St. Louis Museum of Fine Art. Only seven per cent of the urns tested were proven to be fraudulent. This led Shaplin to conclude "that a wider range of style and iconography existed in ancient Oaxaca than archaeologists have heretofore supposed" (1975: 37). In light of this new knowledge regarding Oaxacan ceramics, a re-evaluation of Zapotec urns in my thesis which were labelled "suspect" will be presented in this study.

Sources of Data

The corpus of photographs of vessels depicting mold-made maize replicas on which this study focuses is comprised of specimens in various museum collections in Peru, Mexico and the United States. All the vessel depicting mold-made maize in relief among those collections which were available for study were examined, photo-

graphed, measured and described. Those museums which contributed specimens to this corpus include:

Museo Nacional de Antropología y Arqueología, Lima

Museo Amano, Lima

Museo "Rafael Larco Herrera", Lima

Museo Arqueológico "Bruning" de Lambayeque

Museo Nacional de Antropología, Mexico, D.F.

Museo Frissell de Arte Zapoteca, Mitla, Oaxaca

Middle American Research Institute, Tulane University, New Orleans, Louisiana

Duke University Museum of Art, Durham, North Carolina

National Museum of Natural History, Smithsonian Institution, Washington, D.C.

University Museum, University of Pennsylvania, Philadelphia, Pennsylvania

Brooklyn Museum, Brooklyn, New York

Museum of the American Indian, Heye Foundation, New York

Metropolitan Museum of Art, New York

St. Louis Museum of Fine Art, St. Louis, Missouri

One goal of the field research was to establish an exhaustive corpus of all vessels depicting mold-made maize in the museums of Mexico and Peru. This goal was not fully realized. The corpus is not exhaustive.

The Museo "Rafael Larco Herrera" in Lima is the largest collection of Moche pottery in existence. It boasts as many as 44,000 pots. This particular collection has, on conservative estimate, between

fifty and seventy jars depicting mold-made maize in relief. Of these, I was allowed to study and photograph only twelve. Those twelve jars have been illustrated by members of the Larco family in previous publications. Permission to study the twelve was granted only after I signed a legal document stating that the photographs would appear solely in my dissertation and would never be published. I also had to commit all the negatives of those jars to the museum upon completion of the dissertation.

Other Moche jars necessarily excluded from this corpus were three on display at the Museo Nacional de Antropología y Arqueología. They could not be removed from their glass display cases. One or two other vessels at the Museo de Arqueología de la Universidad de Trujillo may also have been excluded. Although I went to Trujillo, the museum was being moved to a new location, and I was not able to gain access to the collection.

In Mexico, one urn on display at the Museo Nacional de Antropología was excluded because it could not be removed from the display area. One or two others on loan to foreign museums were also excluded.

It is emphasized that there is a large number of unstudied jars in Peru which would have at least doubled the present corpus of twenty-six jars with mold-made maize which can be reasonably identified as to race. Such a large number could influence conclusions drawn on the basis of present data. In view of the findings, the scientific information which might be obtained from those vessels could conceivably make an important contribution to man's

understanding of the distribution and evolutionary relationships of prehistoric races of maize, and subsequently, how they influenced the development of pre-Columbian civilizations.

Method and Theory

There are four basic assumptions in the methodology: (1) the ceramic depictions of maize were impressed from molds; (2) the molds were formed from real maize ears; (3) the mold-made maize can be distinguished from stylized forms; (4) the race of maize can be reasonably well identified.

A maize mold from Chancay in the collection of the Museo Amano provides concrete evidence for the use of such molds in Peru (Plate 1). A maize mold from Oaxaca has not been located by the author, but the existence of maize molds from there has been confirmed by John Paddock who reported he has seen some (personal communication).

Evidence that the molds were formed from real ears is provided by the unique characteristic of the pairing of kernel rows. The alternating rows of paired kernels often form an easily detected zigzag pattern (Plate 2). An even number of paired rows usually produces straight rows; an odd number of paired rows produces a spiral pattern (Nickerson 1953:79). This characteristic, along with the size and shape of the ears and kernels, make mold-made specimens clearly distinguishable from conventionalized ones. Stylized representations of maize are depicted either with all the rows evenly aligned or with all the rows alternating. In stylizations, the kernels are often uniformly shaped; whereas there is variation of kernel shape in

nature. Plates 3 and 4 illustrate vessels with stylized depictions of maize.

Over 300 races of maize from Latin America have been recognized and classified in eleven publications by the National Academy of Sciences-National Research Council along with the Harvard University Bussey Institute publication on the maize races from Mexico. Racial identifications of prehistoric specimens are made, whenever possible, on the basis of comparisons of data on living races provided in the above publications to data from the ceramic specimens. Mangelsdorf and Pollard have noted that "it has become a common procedure for botanists analyzing collections of prehistoric remains of corn of a particular country to relate ancient specimens, so far as is possible, to the living races of that country" (1975:49). Cutler recognized that the study of prehistoric maize presents a particular problem because types found "may either represent developments in the region where their remains are now found or which may in prehistoric times have been introduced from another region" (1946:275-276). For reason, when a race depicted on the pottery of one country could not be identified among races of that country, the identifications were sought among races in other countries.

The morphology of the ear (internal and external characters), the tassel and the plant, as well as genetic, cytological, physiological and agronomic characteristics are important taxonomic considerations in the classification of maize (Wellhausen et al. 1952:12). However, in *Zea mays*, selection has largely been for the ear. Therefore, ear characters are central to the classification of races

of maize (Mangelsdorf 1974:102). The shape and size of the ear and kernel have been stressed as particularly important diagnostic characters because they have a broad genetic base (Anderson and Cutler 1942:72). Kernel row number, which is relatively constant within a race, is another diagnostic character (Cutler 1946:275). These traits can be observed and recorded for the ceramic botanical facsimiles. The data provide a reliable basis for the identifications of maize races depicted on the pottery. All measurements are made using metal Vernier calipers, and the data are recorded as follows:

Ear Shape.- Ear shape ranges from cylindrical to conical. Ears may be long-tapering or short-tapering. Some ears are short, wide and ovoid.

Ear Length.- Ear length is measured from tip to base and is recorded in centimeters.

Ear Diameter.- The diameter is measured at the mid-point of the length of the ear and is recorded in centimeters.

Row Number.- It is assumed that half the circumference of the ear is depicted on the pottery. The count of visible rows is doubled to give the number of kernel rows for the full ear.

Kernel Shape.- Kernels may vary from rounded to wide and flattened in shape. They may be square-shaped or isodiametrical. Some kernels are slightly pointed or diamond-shaped. Others are so pointed that they are beaked and overlapping. These are referred to as imbricated. Some may display denting, i.e., an indentation on the kernel surface. Kernel rows may be straight, spiraling, or irregularly arranged.

Kernel Width.- Kernel width is obtained by measuring paired kernels, then dividing by two. The measurement is recorded in millimeters.

Kernel Thickness.- The measurement for kernel thickness, recorded in millimeters, is obtained by measuring ten consecutive kernels, then dividing by ten.

Width/Thickness Index.- The width/thickness index is the positive number obtained by dividing kernel width by thickness. It provides an index of the kernel cross section. Cutler proposed this index because when prehistoric specimens are compared with some living races, although there may be differences in kernel sizes, there are similarities in kernel shapes (1946:277).

Because the measured data are central to the racial identifications, it is important to know how much shrinkage may have occurred during the firing of pottery in order to gage how closely the ceramic data approximate the data for the actual specimen from which the mold was made. After experimentation using this molding method to produce ceramic facsimiles of maize, the author has determined that the amount of shrinkage for the entire process is less than one per cent. Therefore, in addition to showing precise ear and kernel shape, the ceramic facsimiles provide data which closely approximate the actual measurements of the botanical specimens represented.

Although the data from the ceramic replicas may closely approximate measurements from the prehistoric specimens from which they were duplicated, it is emphasized that the data presented are measurements of maize ears which were being grown over 1,000 years ago.

This data is necessarily compared to data from living races. How close the data may fit data from modern races depends on how much modern types have changed over the last 1,000 years. Therefore, the data cannot be expected to always fit closely. It is also emphasized that although certain characters such as ear shape, kernel shape and row number are remarkably constant within a race (Cutler 1946), there is a degree of subjectivity in any racial identification. Many specimens are not easily identified because they may closely approximate more than one similar, related type of maize. Frequently, when this ambiguity exists, the discussion includes comparisons to reasonable, alternate choices for the identification.

A basic assumption is that races of maize are distinct and tend to be local in distribution. The wide diversity of Latin American varieties of maize is attested by the fact that over 300 races have been described for Latin America. In addition to regional variation among races, there is also a high degree of variability within maize populations (Anderson 1946). One of the contributing factors to the variability in *Zea mays*, a cultivated plant, is that it is largely cross-fertilized and the variation is largely intraspecific (Mangelsdorf 1974:101). Another important consideration of variability in plant populations is environmental factors (Nickerson 1953: 96). Due to variability within maize populations, in this study of maize races, several specimens are ideally required for racial identifications. The author does not ignore the problem of variability within populations. However, because reliable methods for measuring ranges of variation have not been developed and tested,

there are no data available with which to compare data presented here. The one exception of which I know is the study by Goodman and Pateriani (1969) in which they provide ranges of variation for 111 characters of fifty-five races and subraces of maize from eastern South America. None of the races included in their sample have been identified on any specimens in this corpus. This problem has also been seriously addressed by Bird who is presently working on a method for studying the range of variability within maize populations through multivariate analysis of measurements of specific characters. He applied this method to maize collected in the Andean highlands in the departments of Huanúco and Pasco (1970).

It is also possible that measures of variability for modern maize races may not be applicable to prehistoric populations of maize. It is presumed that the Indian carefully selected for different types of maize for different purposes and carefully maintained these as pure types, just as today in many remote areas. Cutler has observed:

> Scarcely less amazing than the great diversity of maize. . . is the fact that so many varieties cultivated today have remained constant over so long a period of time. Indian fields form plant populations where optimum conditions for the evolution of new races are present. . . That more races have not arisen is probably the result of rigid and constant selection toward definite standards. These standards vary in different districts and even today are often regulated by traditions and religious beliefs. (1946:258-259)

Evidence to support the assumption that variability in prehistoric maize populations was considerably less than in modern maize races has been presented by Anderson. In his work in Guatemala, where there are many different varieties of maize, he was impressed by the high degree of uniformity within maize populations. He observed

that in Guatemala "the plant-to-plant variation of *Zea mays* is less than any other region we have studied" (1947:438). He suggested that one explanation for the stability of Guatemalan maize was "a rigid selection for physical type in picking seed ears. Among pure-blooded Indian farmers maize is often very carefully selected for type" (1947:441). (I assume that Anderson's reference to the term "pure-blooded" is actually an ethnic identification.)

Precise information regarding the geographical distinctiveness and the range of variability of prehistoric maize populations may ultimately be provided by a careful comparative analysis of the large numbers of maize remains in the New World archaeological record. It has been emphasized that ninety per cent of these consist of cobs. Therefore, such analysis awaits the development of a reliable method for distinguishing those cob characters which may be reliable indicators for distinguishing maize races. In addition to a better method for analyzing archaeological maize remains, more emphasis needs to be made in archaeology on improved recovery and preservation techniques, along with careful, accurate, detailed descriptions. In his discussion of the many finds of cobs at numerous sites along the coast of Peru, Bird observed the surprising lack of literature on the remains. In reference to the published reports that do exist, he observed: "As with most reports on archaeological maize, those on Peruvian material have few data or illustrations" (1970:123). Furthermore, archaeologists must be very careful in specifying cultural context and considering any possibility of intrusion or contamination of material (Dunn n.d.). The importance of this has been

dramatized by a report of the discovery of corn at the Middle Woodland Spoonville site in Michigan (Yarnell 1965:31), which was subsequently radiocarbon dated 1950 A.D. (Munson 1966:64).

Another problem involved in interdisciplinary botanical and archaeological research is the lack of specific interpretations regarding local developments and diffusion. Bird, a botanist, has commented on the interpretational problems posed by the "great controversy over the relative importance of local innovations and diffusion of cultural traits" (1970:126). The archaeologist, in considering the question of cultural diffusion, is severely limited by the nature of his materials. He is restricted to making inferences about cultural change on the basis of archaeological remains. He rarely has access to conventional historical documentation, and may have to seek documentation from legendary history. The degree of reliability of this kind of documentation is questionable. In regard to this problem, Thompson has emphasized: ". . . no New World archaeologist can escape the popular acceptance of the pervasive influence of the Lost Tribes of Israel" (1958:ii).

Other areas of anthropology which may provide supplementary evidence for cultural diffusion are linguistics and physical anthropology. These are particularly relevant to a consideration of migration, where with movements of large groups of people, one might expect to find linguistic similarities, as well as resemblances of physical types.

Linguistics and physical anthropology, however, may or may not provide corroborative evidence for other kinds of cultural contact.

This depends on the nature of the contact situation. Situations of culture contact may be identified archaeologically by the presence of intrusive elements from one culture into the area of another culture.

Two types of intrusive elements from cultural contact situations have been defined. They are: (1) site-units, i.e., a site or an occupation level in a site, which is homogeneous enough to be considered to represent the culture of a single place at a single time; (2) trait-units, i.e., items transported by human agency. The type of intrusive element considered in this study is the trait-unit. In considering the possibility of intrusive trait-units, there is the logical possibility that a particular trait-unit could have been a local, independent invention, even though it may occur earlier with local antecedants in another area. If this is a possibility, supplementary evidence, preferably in the form of material objects which could be transported, are necessary to establish the probability of cultural contact (Wauchope 1955:7-8). There are four criteria for establishing intrusion of a trait-unit: (1) an object may be considered intrusive in an area if no local antecedant for that object is present, but there are antecedants for the object in another area where the object is also found; (2) the two objects must be demonstrated to be contemporaneous, and the evidence for intrusion is strengthened if the object occurs at an earlier date in the area where it has antecedant developments; (3) the possibility for physical contact between the two areas, i.e., travel between the donor and recipient cultures, must be demonstrated, and (4) the more

complex and the more numerous the artifacts, the stronger the case for contact between two cultures. This is a basic theoretical proposition inherent in the discussion and interpretation of the findings of this research on the ceramic evidence for the spread of prehistoric races of maize.

Terminology

There are general terms which have specific meanings in this paper. There are also some special terms, the meanings of which may be unfamiliar to readers. These terms are defined under two categories: archaeological and botanical.

Archaeological Terms

Classic.- Classic refers to the civilizational development characterized by extensive construction, population growth and concentration in urban centers, class differentiation, and craft specialization. During this time, there was an active trade in raw materials and luxury items. Yet, there was a distinctive regionalism reflected in local art styles. According to Willey and Phillips: "Technologies, elements, goods - these were exchanged; but complete idea systems remained regionalized" (1958:187).

In Mesoamerica, the Classic period has been dated according to inscriptions on Mayan monuments. Two differing correlations of dates for the Mayan monuments have received widest acceptance by archaeologists. They are the Goodman-Martinez-Thompson (GMT) correlation and the Spinden correlation. On the basis of the GMT

correlation, the beginning of the Classic period is assigned to 300 A.D., and it extends to 900 A.D. (Willey 1966:90). Adherents of the Spinden correlation place the beginning of the Classic period 260 years earlier, extending it from 40 A.D. to 640 A.D. (Coe 1966:29). In this study, the dates for the Classic period follow the GMT correlation. It is assumed that the same chronology applies to Classic period developments in Oaxaca as it does for the Mayan area.

Although Classic is not the term used to denote this stage in most of the published literature on Andean archaeology, it was decided to employ this term cross-culturally for the Andean region and Mesoamerica in accordance with its use by Willey and Phillips (1958) for the sake of continuity in discussion. Other terms employed in references to this cultural, developmental stage in Peru include: Early Intermediate (Willey 1971), Florescent (Larco Hoyle 1966), and Regional Developmental (Lumbreras 1974). Willey places the beginning of this period in Peru at 200 B.C. and extends it to 600 A.D. (1971:86). For the purposes of this paper the use of the term Classic period generally refers to the span of time from ca. 300 A.D. to 900 A.D. In Peru, this covers the chronological periods on the North Coast, Moche III, IV, IVA and possibly the beginning of Moche V.

Monte Albán I-V.- Monte Albán, a mountain just outside the city of Oaxaca, was a Zapotec political and religious capital for centuries, and the chronological periods for the Valley of Oaxaca, based on changes in ceramic styles, are named for this site.

Urns with representations of mold-made maize are assignable to Monte Albán III and IV, which roughly correspond to the Classic period. Monte Albán III is subdivided into Monte Albán IIIA and IIIB. Monte Albán IIIA is distinguished from IIIB on the basis of the presence or absence of stylistic features from the great Classic period site Teotihuacán in the Valley of Mexico. Ceramic styles and shapes, along with architectural features and mural painting styles during IIIA reflect similarities with styles from Teotihuacán (Bernal 1965:802). Monte Albán IIIB, on the other hand, is marked by the absence of traits from outside the Valley of Oaxaca, and it is characterized by cultural isolation. Monte Albán IIIB has been described by Bernal:

> In contrast with the older periods, we have found nothing at this time which comes from outside. It appears that Zapotec culture turns in on itself and becomes detached from the stream of events in Mesoamerica. I believe that this complete introversion was responsible for the marked aesthetic and technical decadence in Period IV. (1965:805)

On the basis of Shaplin's observation that it was during IIIB that ornaments of urns were "stamped out in molds," it is assumed that the urns with mold-made maize first appear in IIIB. Shaplin's statement that "the maize figures seem to be associated with the latest material at Monte Albán and may even belong to Epoch IV after the metropolis was abandoned" lends further support to this supposition (1975:19). The cultural manisfestations for Monte Albán IIIB and IV are quite similar and are not easily differentiated. What distinguished the two periods is the abandonment of Monte Albán, marking the end of Monte Albán IIIB (Bernal 1965:804).

Monte Albán IIIB and IV do not reflect a distinct chronological sequence as implied by the dates for Monte Albán III, 200-900 A.D. and Monte Albán IV, 900-1200 A.D. (Flannery et al. 1967: 447). In effect, these two periods overlap chronologically. Monte Albán IIIB represents cultural manifestations at Monte Albán up until the ceremonial abandonment of the site, and Monte Albán IV represents cultural manifestations at other sites in the Oaxaca Valley, some which were in existence at the same time as Monte Albán IIIB. Radiocarbon dates from Lambityeco, an early but well established Monte Albán IV site, range from ca. A.D. 650-750 (Rabin 1970: 15). Recent dates for Monte Albán III are A.D. 150-900, and for Monte Albán IV are ca. A.D. 650-1200 (Donald L. Brockington personal communication).

Zapotec.- Zapotec is one of the Indian languages spoken by people in the Valley of Oaxaca today. It is used in reference to cultural manifestations at Monte Albán because from Monte Albán IIIA "it is possible to demonstrate that there was a continuous cultural tradition in the Valley of Oaxaca from that time until the Spanish conquest and consequently, to the present day" (Bernal 1965:802).

Moche.- Moche is the term employed in reference to the Classic period culture of the Peruvian North Coast (Bennett 1939). This is the name of one of the valleys where the culture occurs, and is used in accordance with the archaeological custom of naming cultures for places where they are found. Moche cultural remains are found in other nearby coastal valleys as well. Other terms in the literature

which refer to Moche culture include Proto-Chimú (Uhle 1913), Early Chimú (Kutscher 1950), Mochica, a language spoken by inhabitants of the North Coast at the time of arrival of the Spanish (Schaedel 1951) and Muchic (Rowe 1948).

Moche I-V.- The Moche Valley is where important remains for cultural development on the North Coast of Peru have been found, and the chronological periods, based on changes in ceramic styles, have been named for this valley. The five periods are presumed by some archaeologists to have extended from 100 A.D. to 800 A.D. (Larco Hoyle 1966; Lumbreras 1974). Moche III is believed to have begun ca. 300 A.D. (Larco Hoyle 1966). Due to the nature of archaeology on the North Coast, where controlled excavations have been limited and for which there are few and conflicting radiocarbon dates, specific dates have not been accurately assigned to the different periods. Moche IV has been divided into two subphases: IV and IVA. The five phase chronological sequence was first suggested by Larco Hoyle (1948). The validity of these phases and their sequence was confirmed on the basis of seriation of pottery from thirty-one grave lots from site F at Moche (Donnan 1965:117).

Technical terms used in describing ceramics, including general art historical terms which have different shades of meaning in different contexts, and more specific, unfamiliar terms are defined for their use in this paper.

Motif.- Motif is used to designate a dominant idea or central theme, such as the association of a particular deity with maize.

Attribute.-Attribute denotes an inherent characteristic, such as an object associated with or belonging to a particular personage.

Element.-Element refers to a constituent part, i.e., the individual components of an attribute.

Stylized or Conventionalized.-These two terms are used interchangeably to refer to representation according to a stylistic pattern rather than according to nature.

Mold-made.-Mold-made is used herein to refer specifically to impressions formed from molds which were made directly from natural objects. It is used to distinguish this particular technique from the term molded, which may refer to any molding process.

Tocado.-Tocado refers to the headdress of a figure on an urn.

Aspas.- Aspas refers to the eye elements which are characteristic of the Zapotec deity the God of Glyph "L".

Mazorca.-Mazorca is Spanish meaning ear of corn, and it is used herein to refer to the ceramic maize replicas.

Olla.-An olla is a jar with a round bottom and vertical neck.

Florero.-A florero is a high-necked jar.

Botanical Terms

Race.-The definition of race herein follows Anderson and Cutler (1942:71) who define race as "a group of related individuals with enough characteristics in common to permit their recognition as a group." This is a loose definition which they further qualify:

> From the standpoint of genetics a race is a group of individuals with a significant number of genes in common, major races having a smaller number in common than do sub-races. The degree to which a species can be divided into recognizable races and sub-races will depend upon the degree to which it has been divided into distinct intra-breeding groups with distinctive combinations of genes.(Anderson and Cutler 1942:71-72)

Tripsacoid.- Tripsacoid describes certain characteristics attributed to the crossing of *Zea mays* and *Tripsacum*, a related grass. Those charactersitics which may be observed on the ceramic specimens include straightening of rows, reduction of row numer and a barren cob tip (Cutler 1946:263-264; 271).

Imbricated.- Imbricated refers to the overlapping of kernels. It occurs with pointed kernels.

Podcorn.- In podcorn, each kernel is partially or totally enclosed by its own surrounding glumes (husks). This is usually considered to be a primitive trait.

CHAPTER II

MOCHE EFFIGY JARS

Physical Setting

The Moche occupied the North Coast of Peru from the Piura Valley near the boundary of Ecuador to the Casma Valley in the south, approximately 250 miles north of Lima (Fig. 1). The long, narrow Peruvian coast is one of the world's driest deserts (Gillin 1945:4). It is composed of shifting sand dunes and rocky slopes rising abruptly out of the Pacific Ocean where there are a few rock-bound harbors. The desert plain is cross-cut by many rivers of varying capacities. Some river valleys support agriculture by means of irrigation.

The greatest development of Moche culture took place in the Moche Valley (also called the Santa Catalina Valley) and the Chicama Valley, a larger valley just to the north of Moche. Moche influence then spread south to the Virú, Chao, Santa and Nepeña Valleys, and north from the heartland to the Jequetepec and Lambayeque Valleys. More recently, evidence for Moche influence has been found as far north as the Piura Valley at Cerro Vicús and Loma Negra (Benson 1972b:10-11).

Chronology

Due to the few controlled stratigraphic excavations and few radiocarbon dates for the North Coast, there is little information on which to base accurate chronological placement for Moche develop-

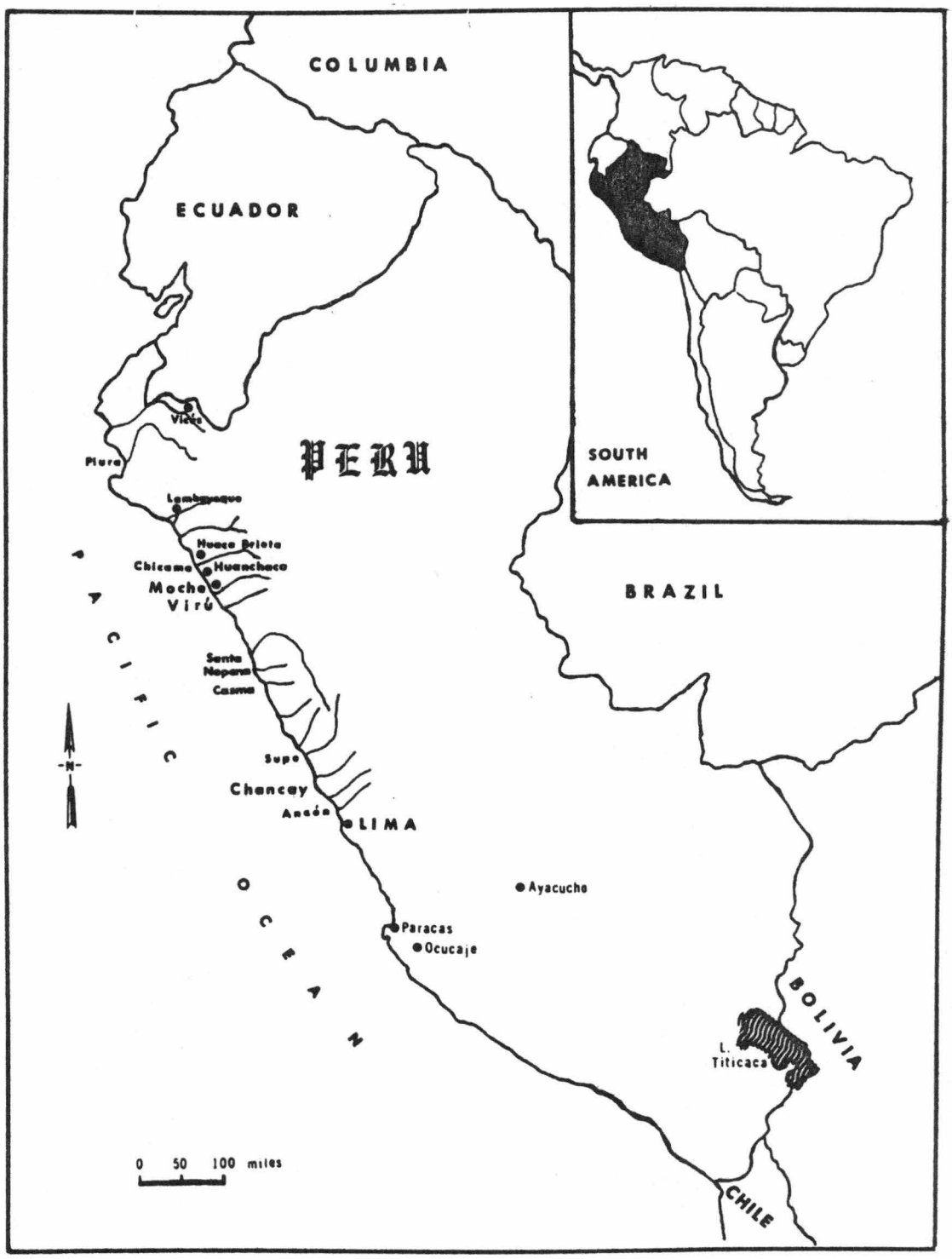

Figure 1. Map of Peru.

ment beyond a general range during the Classic period from ca. A.D. 300-900.

The height of Moche development apparently occurred during Moche III, which began, on rough estimation some time around 300 A.D. Larco Hoyle postulates that the feline god first appeared in its human form in Moche IV (1966:92). The feline deity in it anthropomorphic manifestation with fanged human face occurs on the majority of the vessels depicting maize. If Larco Hoyle's assumption that the anthropomorphic feline deity first appeared in Moche IV is accepted, then the pottery depicting mold-made maize can be clearly assigned to Moche IV. Other evidence to place many of the pots in Moche IV is provided by the distinctive stirrup-spout form (Fig. 2) that is diagnostic of Moche IVA. It is impossible to assign an accurate date for the beginning of Moche IV, but it must have been some time around 600 A.D., and it presumably continued until around the beginning of the 9th century A.D. when the more decadent artistic styles of Moche v began to appear (Lumbreras 1974). The chronology is important because if the estimated dates of ca. A.D. 600-800 for Moche IV are accepted, then Moche pottery depicting mold-made maize is apparently contemporaneous with the occurrence of mold-made maize on Zapotec urns which can be assigned with a degree of confidence to Monte Albán IIIB-IV, ca. A.D. 600-900. Contemporaneity is an important criterion that must be established for any consideration of contact between the Zapotec and Moche.

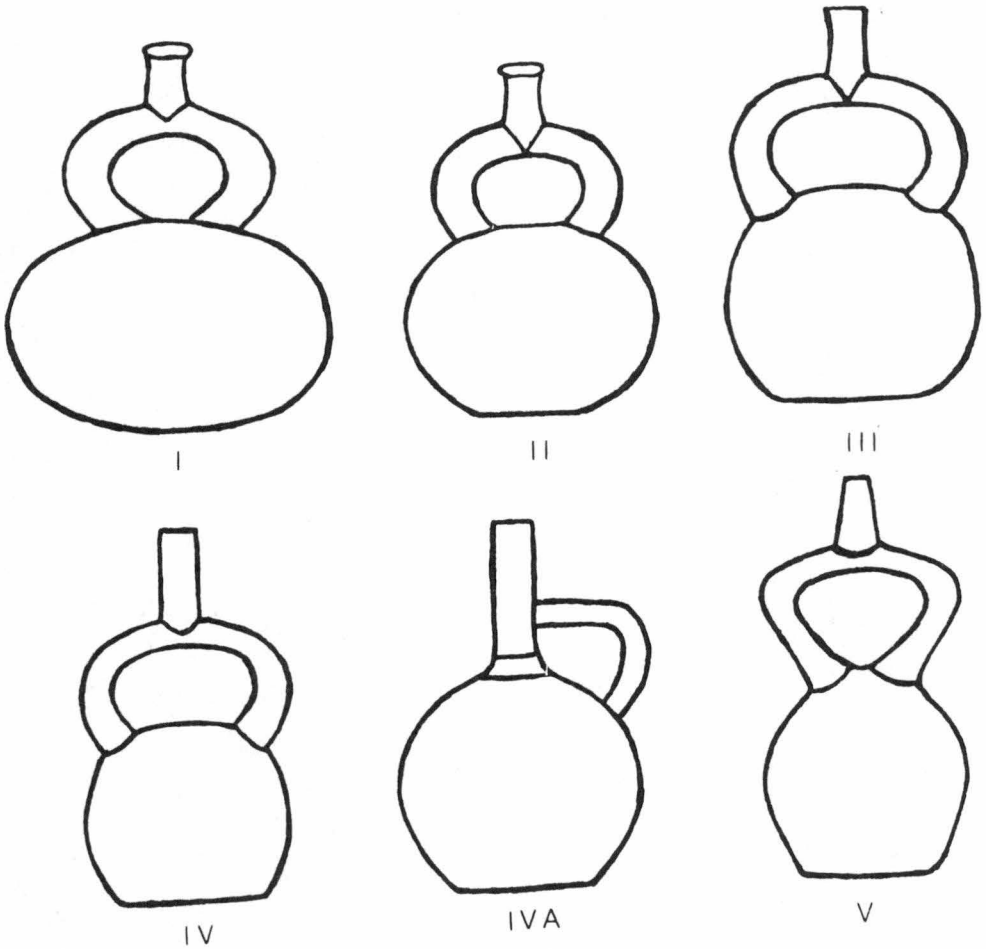

Figure 2. Moche phase stirrup-spout vessel forms. (Willey 1971:139)

Context

An outstanding feature of Moche material culture is the pottery. The beautiful paintings and excellent quality of the modeled forms depict all aspects of Moche life with realism unparalled by art forms in other pre-Columbian cultures. It is a rich source of cultural information about the Moche, their lifestyle and world view.

Molding was a basic technique which played a part in the manufacture of almost all ceramic objects. The majority of forms used by the Moche had local antecedants in the ceramics of the Cupisnique, Salinar and Gallinazo ceramics. Cupisnique culture appeared on the North Coast during the Middle Formative period. Its center was the Chicama Valley. Cupisnique is the coastal manifestation of Chavín culture which appeared in the Andean highlands ca. 800 B.C.(Lumbreras 1974:57). It has been suggested that there are direct relationships betweeen Chavín and the Mesoamerican Formative Olmec culture (Spinden 1917). Maize agriculture first becomes prominent with Chavín, and a fanged, feline god associated with snakes and condors appears at this time. The stirrup-spout form and the Moche fanged deity have antecedants in the Cupisnique culture (Kan 1970). Salinar is an Upper Formative culture which followed Cupisnique in the Chicama Valley. The use of the mold can be documented by Salinar pottery. Also, designs of triangles, stepped lines and other geometric forms painted in red and white appear on Salinar ceramics (Lumbreras 1974). Salinar cultural manifestations

are followed by a new style referred to as Gallinazo. Gallinazo culture occurred in the Chicama and Virú Valleys. It disappeared with the early manifestations of Moche culture in the Chicama Valley, but continued to exist in the Virú Valley until Moche expansion during Moche III. Gallinazo was marked by extensive agriculture based on canal irrigation. Gallinazo is noted for the decorative technique of negative, or resist, painting on its pottery. Features of Gallinazo ceramics which carry over into Moche styles are painted designs of straight and undulating lines, circles, triangles, steps, spirals and rings painted in black on an orange surface (Strong and Evans 1952).

The molds used in the manufacture of pottery were made of fired clay which had been formed over an actual object, such as an ear of maize. All Moche molding involved pressing moist clay into the molds, rather than pouring in a liquid clay slip. As the clay began to dry, it was easily removed from the mold (Donnan 1965:117-118). This technique minimizes shrinkage and is why ceramic objects closely approximate the real objects from which they were modelled. The same molding technique was employed by the Zapotec. Evidence for the use of molds comes from published reports of finds of molds (Uhle 1889; Kroeber 1925; Strong and Evans 1952; Thompson 1963), the fact that the joining seam may be visible on the pottery (Plate 34), and repeated occurrences of identical pots (Parsons 1962).

Mold-made representations of many different species of fruits and vegetables provide a good picture of Moche ethnobotany. It has been observed that the plant "most commonly depicted is maize"

(Trimborn 1968:125). A survey by the author of depictions of fruits and vegetables illustrated in nineteen publications supports Trimborn's observation. Of eleven different plants depicted in the illustrations from the nineteen publications, there were thirty-three illustrations of vessels depicting maize, *Zea mays*; fourteen depicting potatoes, *Solanum spp.*; seven depicting squashes, *Cucurbita maxima* and *Cucurbita moschata*; six depicting yucca, *Manihot esculenta*; five displaying peanuts, *Arachis hypogaea*; three representing pacae, *Inga*; two depicting gourds, *Lagenaria siceraria*; and one each representing papaya, *Carica candicans*; anonas or guanabana, *Anona muricata*; and achira, *Cana edulis*. Out of a total of seventy-five illustrations of fruits and vegetables in important publications, forty-two per cent of the plants depicted is maize. The plant most frequently depicted after maize is the potato; there are thirty-three illustrations of maize and fourteen of potatoes. Table 1 provides a list of these illustrations of fruits and vegetables along with the references in which they have been published. Some of the maize jars listed in Table 1 may also appear in this corpus. But since the sources do not indicate museum locations and museum catalogue numbers, I am unable to verify duplication here. Out of thirty-three representations of maize, twenty-one occur on vessels in association with Ai-apaec, the Moche fanged deity. This strongly suggests the symbolic, ritual importance of maize.

Pottery was the primary votive offering in Moche burials. The dead were placed in rectangular graves, often lined with stones,

TABLE 1.--MOCHE VESSELS DEPICTING PLANTS

Plant	Association	Reference
Maize	Ai-apaec	Benson 1972b:Fig. 2-4
Maize	Ai-apaec	Fuhrman 1922:Plate 25
Maize	Ai-apaec	Weatherwax 1954:Fig. 66
Maize	Ai-apaec	Friedberg 1958:Plate IIIB
Maize	Ai-apaec	Grobman et al. 1961:Fig. 30
Maize	Ai-apaec	Grobman et al. 1961:Fig. 36
Maize	Ai-apaec	Disselhoff 1967:50
Maize	Ai-apaec	Grobman et al. 1961:Fig. 35
Maize	Ai-apaec	Friedberg 1958:Plate IIID
Maize	Ai-apaec	Grobman et al. 1961:Fig. 31
Maize	Ai-apaec	Baessler 1902-03:Fig. 290
Maize	Ai-apaec	Schmidt 1929:Fig. 4
Maize	Ai-apaec	Weatherwax 1954:Fig. 66
Maize	Ai-apaec	Friedberg 1958:Plate IIIA
Maize	Ai-apaec	Towle 1961:Plate VII
Maize	Ai-apaec	Ville de Genève 1943:Plate 48
Maize	Ai-apaec	Grobman et al. 1961:Fig. 28
Maize	Ai-apaec	Mangelsdorf 1974:Fig. 16.14
Maize	Ai-apaec	Weatherwax 1954:Fig. 66
Maize	Ai-apaec	Baessler 1902-03:Fig. 292
Maize	Ai-apaec	Weatherwax 1954:Fig. 66
Maize	Frog	Schmidt 1929:178
Maize	Rat	Schmidt 1929:185
Maize	Basket	Larco Hoyle 1963:Fig. 11
Maize	Bowl	Towle 1961:Plate VIIIA
Maize	Plant	Larco Hoyle 1945:12
Maize	Mound	Grobman et al. 1961:Fig. 27
Maize	Mound	Vargas 1962:Fig. 6
Maize	On a vessel	Grobman et al. 1961:Fig. 34
Maize	On a vessel	Vargas 1962:Fig. 5
Maize	Basket	Vargas 1962:Fig. 4
Potato	Prisoner	Benson 1972b:Fig. 3-22
Potato	Prisoner	Wardle 1940
Potato	Prisoner	Larco Hoyle 1945:12
Potato	Prisoner	Kosok 1965:111
Potato	Prisoner	Kosok 1965:111
Potato	Mutilated figure	Kosok 1965:111
Potato	Mutilated figure	Sawyer 1966:Fig. 77
Potato	Mutilated figures	Klein 1967:Fig. 30
Potato	Monkey	Schmidt 1929:185
Potato	Plain	Towle 1961:Plate XVB
Potato	Plain	Benson 1972b:Fig. 1-11
Potato	Plain	Vargas 1962:Fig. 1
Potato	Plain	Vargas 1962:Fig. 2
Potato	Plain	Vargas 1962:Fig. 3

TABLE 1.--Continued.

Plant	Association	Reference
Squash	Owl	Sawyer 1966:78
Squash	Plain	Benson 1972b:Fig. 4-7
Squash	Plain	Larco Hoyle 1938:Fig. 36
Squash	Plain	Towle 1961:Plate VIA
Squash	Plain	Towle 1961:Plate VIB
Squash	Plain	Towle 1961:Plate VIB
Squash	Plain	Vargas 1962:Fig. 12
Yucca	Ai-apaec	Benson 1972b:Fig. 5-20
Yucca	Ai-apaec	Sawyer 1966:76
Yucca	Ai-apaec	Larco Hoyle 1945:19
Yucca	Plain	Larco Hoyle 1963:Fig. 67
Yucca	Plain	Schmidt 1929:185
Yucca	Plain	Vargas 1962:Fig. 7
Peanut	Female figure	Wardle 1940
Peanut	Plain	Larco Hoyle 1945:12
Peanuts	Bowl	Towle 1961:Plate IXA
Peanuts	Bowl	Benson 1972b:Fig. 4-8
Peanuts	Bowl	Vargas 1962:Fig. 10
Pacae	Single pod	Towle 1961:Plate IXB
Pacae	Single pod	Schmidt 1929:184
Pacae	Single pod	Vargas 1962:Fig. 15
Gourd	Plain	Larco Hoyle 1963:Fig. 11
Gourd	Plain	Vargas 1962:Fig. 11
Pepino	Single fruit	Larco Hoyle 1938:Fig. 37
Pepino	Several fruits	Vargas 1962:Fig. 17
Papaya	Plain	Vargas 1962:Fig. 18
Anonas	Plain	Vargas 1962:Fig. 19
Achira	Plain	Vargas 1962:Fig. 20

cane or adobes. Pottery jars were placed around the body and in niches inside the graves, along with food and other offerings (Larco Hoyle 1944:170). In general, archaeological reports from Peru do not provide as much specific information regarding the context of pottery in the burials as do reports from Oaxaca.

Description

Most of the jars presented in this study are a beautiful, oxidized orange ware. A few are highly polished, black reduction ware. The orange ware vessels may occur decorated with a cream colored slip and reddish-orange or brownish-red paint. Some vessels have geometric designs painted in black, adapted from the Gallinazo style.

There are three shapes of jars: the stirrup-spout jar, a plain jar with a straight or slightly flaring neck, and an olla.

The stirrup-spout is composed of two arched tubes which meet in a single cylindrical spout. The arched tubes and spout are of consistent thickness and are well rounded. The main part of the jar is spherical with a flat base. Some jars have an annular base. A variation of the stirrup-spout is a container with a straight, cylindrical spout and a curved handle attached to the spout and the jar. This is the form which characterizes Moche IVA (Fig. 2). Bennett points out that roughly fifty per cent of Moche ceremonial vessels are stirrup-spout jars (1944:101). However, in this corpus, about thirty per cent of the vessels are stirrup-spout jars.

The plain jar form is composed of a spherical body with a slightly flaring neck. These jars have a flat base. Approximately forty per cent of the jars in this corpus are of this shape.

The olla forms are flatter and wider than the other vessels. They have flat bases and short, constricted necks. Some have two small handles, one on either side of the spout. These are probably strap handles. The ears of maize on these forms are on top of the jars on the flattened area around the spout, giving the appearance of maize in a basket. They are sometimes referred to as "baskets of maize" (Plates 44-51).

The few proveniences reported for the jars were either recorded on the vessel or were indicated to me by museum employees. With the exception of the Museo Amano, none of the Peruvian museums had card catalogues or other available recorded information on the jars in their collections.

Out of a total corpus of thirty-seven Moche jars, twenty-two represent the anthropomorphic fanged deity Ai-apaec. Ai-apaec is the Moche creator god whose origins can be traced back to the Chavín feline deity. The word *aiapek* is Yunga (Mochica) and means creator or maker (Zevallos Quiñones 1946:178). Apparently, its use is an expression of the omnipotence of this deity. Evidence that Ai-apaec was the god of agriculture comes not only from the god's association with maize and yucca on pottery, but also from the grave of the warrior-priest in the Virú Valley excavated by Strong and Evans. The warrior-priest was interred with among other things, a digging stick with the handle carved into a representation of Ai-apaec

with fangs, wearing a headdress with a feline decoration. Ai-apaec on the digging stick was accompanied by a small boy wearing a bag over his shoulder and shown holding three pieces of turquoise in his hand as if he were sowing seed. It has been suggested that the turquoise grains represent maize kernels, and that the three snakes curling around the god's back are symbols of water and canal irrigation (Strong and Evans 1952:199).

The most characteristic attribute of Ai-apaec is the human face with the double-fanged mouth (Lumbreras 1974). The fanged mouth occurs on all but two of the twenty-two Ai-apaec figures in this corpus. Another important feature which occurs on all but one of the figures is the pointed terminus of the head. It is suggested that this pointed terminus is meant to represent the tip of a maize ear. On some examples, the point is shown completely covered with embossed kernel-like elements; while on others, it is void of these kernel motifs, as if to represent an ear in which the kernels did not form over the tip. This is characteristic of tripsacoid maize races.

Other Ai-apaec features include the treatment of the eyes in which the sclera are painted in a cream color and the iris and pupil are unpainted. Personal adornments include ear ornaments shaped like snake heads, bead necklaces and bracelets or arm bands sometimes worn by the figures. Seven figures display the characteristic elements of a Moche warrior's helmet, four circular ornaments around the face connected by a cord tied underneath the chin. On six of the jars, Ai-apaec is accompanied by two smaller figures, one on either side of the main figure. These small companions also have pointed heads;

some have fangs, and some have an arm reaching out to touch one of the maize ears encircling the jar.

The vessels which do not represent Ai-apaec include ones with a rat nibbling on a single ear, a bowl containing three maize ears, several ears on a jar giving the appearance of a mound of maize, ollas like baskets of maize, and a jar representing a maize plant with a bird perched in the tassels. Also included is a double mold. Table 2 presents a summary of the general descriptive features of the pottery.

TABLE 2.--MOCHE POTTERY: GENERAL FEATURES

Color		*Representations*	
Red	4	Bowl of maize	1
Red and white	23	Ai-apaec	22
Red and black	2	Rat	2
Red, white and black	2	Maize plant	1
Black ware	6	Mound of maize	4
Shape		*Attributes of Ai-apaec*	
Stirrup-spout	12	Fangs	20
Moche IVA spout	4	Whiskers	1
Plain	14	Companion figures	6
Olla	7	Snake	1
Bowl	1	Bare pointed head	19
Annular base	2	Pointed head covered with kernels	2
Provenience		Fillet headdress	1
Virú	7	Warrior's helmet	6
Lambayeque	3	Snake-head ear ornaments	6
Huanchaco	1	Earspools	6
		Bead necklace	2
Painted Geometric Designs		Arm bands	1
Zigzag	2	Hair	2
Stepped fret	1	Seated cross-legged	1
Curvilinear	1	Holding ears of maize	5
Circles	5		
Stripes	12		
Incised Designs			
Fish	2		

Thirty-seven Moche jars are presented in the following order: plain jars depicting Ai-apaec, plain jars depicting Ai-apaec accompanied by double figures, stirrup-spout jars depicting Ai-apaec accompanied by double figures, stirrup-spout jars depicting Ai-apaec, stirrup-spout jars depicting rats, stirrup-spout jars depicting a maize plant, stirrup-spout jars of mounds of maize, bowl of maize and ollas resembling baskets of maize. The vessels are introduced in catalogue format. Each specimen is designated by a number preceded by the letter P. After the catalogue number, basic information including the plate or plates in which the specimen is illustrated, the vessel type, provenience, museum location and museum catalogue number, fabric, dimensions and race of maize identified on the jar is listed. Description of the specimen follows the catalogue entry.

Plain Jars Depicting Ai-apaec

There are ten plain jars depicting Ai-apaec alone. The first two of these illustrated are quite similar (Plates 5, 6 and 7), although not identical. Both pieces are in the collection of the Muse Nacional de Antropología y Arqueología, and they were both excavated in the Virú Valley.

P-1. Plates 5 and 6. Plain jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología KK/16583

Fabric: red and white

Dimensions: ht. 0.215 m, width 0.137 m.

Race of maize: Karapampa

The Ai-apaec figure has a pointed head with the kernel elements displayed above the face but with the tip barren and painted white. The figure wears the characteristic Moche warrior's helmet. There is a band across the forehead with concentric circle ornaments at each corner of the face. These are connected by a cord to two smaller concentric circles that appear like earspools. The cord extends underneath the chin and is tied in a knot. The bottom third of the jar is unadorned. The top part of the vessel body is encircled by maize. Fourteen distinct maize ears can be counted, but the ears are blended into the body in such a way that a complete half round of the ear is not depicted. The plain lower third of the jar is painted white. Between the ears of maize surrounding the jar are kernels in low relief which appear to have been produced from a mold of the same kind of maize displayed by the encircling ears. This creates the effect of the jar being continuously covered with maize, with the area in low relief contrasted with the mold-made maize because it is painted white. This gives a striped appearance to the jar, which complements the four sets of three white vertical stripes on the flaring spout of the jar.

P-2 Plate 7. Plain jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 158

Fabric: red and white

Dimensions: ht. 0.202 m, width 0.132 m.

Race of maize: Karapampa

This jar is quite similar to the jar illustrated in Plates 5 and 6. The faces of the figures are identical. The maize on both

jars is virtually identical; it appears to have been impressed from the same mold. This jar is slightly smaller in overall size. The main difference between the two vessels is that the first had vertical stripes on the spout, and this jar does not. Also, the lower third of the first jar is painted white. The lower third of this jar is unpainted and has a white stripe painted around the jar at the junction of the plain section with the upper portion of the vessel.

P-3. Plate 8. Plain jar, provenience unknown.

Museum of the American Indian 23/296

Fabric: red and white

Dimensions: ht. 0.163 m, width 0.131 m.

Race of maize: Confite Morocho

This jar is also similar to the jars described for P-1 and P-2. There are four groups of three vertical parallel lines painted on the spout, as described for P-1. There is a white band demarcating the area of transition from the ears of maize to the unadorned lower portion of the jar, as described for P-2. The difference in this jar is that it is somewhat smaller than the two preceding vessels, and the ears of maize encircling it represent a different race.

P-4. Plate 9. Plain jar, provenience unknown.

Museo "Rafael Larco Herrera" J-432

Fabric: red and white

Race of maize: Pollo

This jar represents Ai-apaec with the characteristic elements of the Moche warrior's helmet. It is encircled by ten distinct ears of maize. The ears have barren tips emphasized by white paint, and complemented by the bare, pointed terminus of the figure's head. The figure's arms are displayed grasping two of the maize ears. The unadorned base of the jar is painted white, and there are parallel, vertical white lines on the neck of the jar.

P-5. Plate 10. Plain jar, provenience unknown.

Museo Nacional de Antropología y Arqueología 1/027

Fabric: red and white

Dimensions: ht. 0.28 m, width 0.195 m.

Race of maize: Clavo

This vessel has a deformed shape and thick deposits of a residue, probably calcium carbonate, which obscure the details of the maize. The figure's head is a bare point, and its only adornment is a bead necklace. There are four groups of three white vertical, parallel lines on the neck of the jar. The body of the vessel is quite globular. The lower part is unadorned, and the mid-section is composed of eleven maize ears encircling the entire jar.

P-6. Plates 11 and 12. Plain jar, excavated in the Lambayeque Valley.

Museo Nacional de Antropología y Arqueología KK/16591

Fabric: red

Dimensions: ht. 0.28 m, width 0.172 m.

Race of maize: Mochero

The figure of Ai-apaec is stylistically different from the preceding figures. The mouth is much wider and is slightly open. The fangs are not painted white. The eyes are much rounder and wider. The head is tilted forward, giving the jar, from the side view (Plate 12), a shape much like some Moche vessels depicting gourds or squashes. The base of the jar is rounded. Its lower portion is unadorned. The mid-section and the area behind the head are covered with maize ears, sporadically placed. Some of the ears are complete, whereas others display only a portion of the ear. On some of the ears, the rows are spiralling, and on some, the rows are straight. The maize replicas do not, however, appear to represent two different races. They seem to represent a race in which both types of kernel arrangements occur.

P-7. Plates 13 and 14. Plain jar, excavated in the Lambayeque Valley.

Museo Nacional de Antropología y Arqueología 2/4756

Fabric: red

Dimensions: ht. 0.23 m, width 0.167 m.

Race of maize: Polulo

The fanged Ai-apaec figure is stylistically similar to the preceding figure from the Lambayeque Valley. It has the same wide, slightly open mouth and rounded eyes. The head, however, does not tilt forward, and the neck of the jar is straight, without flaring as on other jars. The figure wears no jewelry. It has a bare, pointed head, and its ears are depicted. The base of the jar is

somewhat rounded and plain, and the main body of the jar is encircled with ears of maize. There are two smaller ears, one on each side of the vessel, placed at the base of the figure's head behind its ears.

P-8. Plate 15. Plain jar, provenience unknown.

Museo "Rafael Larco Herrera" 2295

Fabric: red and white

Race of maize: Kcello

The Ai-apaec figure has large ears and wears snake-head ear ornaments. The eyes of the figure are almond-shaped, as are the eyes of the figures in Plates 5-9, but its mouth is wider and slightly open, in the same style as the jars from the Lambayeque Valley. The lower third of the vessel is palin and a white line encircling it demarcates the transition to the above section which has five maize ears on the front of the jar. The back of the jar does not have any maize ears on it. The head of the figure forms a bare, pointed tip, but just below the terminus is a band of three rows of kernel-shaped elements.

P-9. Plate 16. Plain jar, provenience unknown.

Museo "Rafael Larco Herrera" 2995

Fabric: red

Race of maize: Kcello

This jar depicts Ai-apaec wearing snake-head ear ornaments, but it is unusual because the figure does not have the characteristic fangs of the deity. The lower section of the vessel body is plain,

unpainted, and is surmounted by a section encricled by twelve ears of maize with barren tips. The figure's head is bare and pointed.

P-10. Plate 17. Plain jar, provenience unknown.

Museo Amano 59

Fabric: red and white

Dimensions: ht. 0.27 m, width 0.18 m.

Race of maize: Kcello

The Ai-apaec figure is quite similar to the one described for P-9. It is unusual because it does not have the characteristic fangs of the deity.

Plain Jars Depicting Ai-apaec with Two Companion Figures

P-11. Plates 18 and 19. Plain jar, excavated in the Lambayeque Valley.

Museo Nacional de Antropología y Arqueología KK/16624

Fabric: red and white

Dimensions: ht. 0.31 m, width 0.184 m.

Race of maize: Mochero

The vessel has a globular body which is unadorned. The slightly flaring neck of the jar emerges from behind the head of the figure of Ai-apaec. The figure has the wide, partially open mouth and round eyes displayed on other jars with a provenience of the Lambayeque Valley. It also has strands of hair hanging down the sides of its face to about shoulder length. It appears to be wearing a pointed cap, bare at the tip and otherwise covered by pointed kernel-like elements. There is an ear of maize on each side of the head, and

emerging from each ear is the face of a small human-like figure without fangs. The heads of the two small figures also end in a pointed terminus. Surrounding the jar behind the head of Ai-apaec are more maize ears. The ears alternate between straight and spiralling kernel rows (Plate 19). The neck of the jar is decorated by four groups of three parallel, vertical white lines.

P-12. Plate 20. Plain jar, provenience unknown.

Brooklyn Museum 1890

Fabric: red and white

Dimensions: ht. 0.31 m, width 0.20 m.

Race of maize: Mochero

This jar is virtually identical to the one described under P-11. The only difference is that it does not have the vertical, parallel stripes on the neck of the jar. Instead, it has a white stripe encircling the rim of the mouth of the jar. Another similar vessel is illustrated by Baessler (1902-03:Fig. 292). The provenience for the jar is Pacasmayo, about sixty miles south of Lambayeque. These jars apparently represent a regional style.

P-13. Plates 21 and 22. Plain jar, provenience unknown.

Museo "Rafael Larco Herrera" 2300

Fabric: red and white

Race of maize: Pollo

On this jar, Ai-apaec wears a bead necklace, snake-head ear ornaments, and is accompanied by two smaller, fangless figures. All the figures have bare, pointed heads. The jar is red ware with

a plain lower section, surmounted by eight distinct ears of maize encircling the vessel. A companion figure emerges from one of the ears on each side of Ai-apaec and an arm of each figure reaches out to touch the maize ear before it. The background area of the maize and companion figures, including the head of the main figure is painted white. It should be noted that the maize ears on this jar are quite flattened, and presumably, they do not depict full half rounds of the ear.

P-14. Plate 23. Plain jar, provenience unknown.

Brooklyn Museum 41.1275-74

Fabric: red, black and white

Dimensions: ht. 0.22 m, width 0.13 m.

Race of maize: Enano

This jar represents Ai-apaec accompanied by two companion figures. It is decorated with geometric designs painted in black and white. On the lower section of the jar, which has no relief decoration, there are circles and stepped-fret designs painted in black, and white stripes. Above this area are six maize ears in relief around the jar with the intermediate areas decorated with large bosses. The fanged Ai-apaec figure is flanked by the companion figures whose heads emerge from an ear of maize on each side. The heads of all three figures end in a bare pointed terminus with a fillet of bosses across the forehead. The black geometric designs are characteristic of influence from the antecedant Gallinazo culture in the Virú Valley.

Stirrup-spout Jars Depicting Ai-apaec with Two Companion Figures

P-15. Plates 24 and 25. Stirrup-spout jar, excavated in Huanchaco.

Museo "Rafael Larco Herrera" J-30839

Fabric: red, black and white

Race of maize: Confite Iqueño

The spout on this jar depicting Ai-apaec accompanied by two smaller figures is a modified form of the traditional stirrup-spout and is diagnostic of Moche IVA (see Fig. 2). The tubular spout is attached directly to the jar with a curved tubular handle attached to the body of the vessel and to the spout. This vessel also has an annular base. The Ai-apaec figure has rounded eyes, wide mouth with fangs and whiskers painted in black on the cheeks. The companion figures flanking each side of the central figure have the same fangs and whisker markings but do not have ears showing, as does Ai-apaec. The lower part of the jar is plain, surmounted by the figures whose heads emerge from the body of the vessel which is completely covered with an embossed background which extends up around the heads of the figures which terminate in bare points. Three ears of maize are on the front of the vessel. The central ear is larger than the ear on each side of it. The companion figures each have an arm reaching around to the small ears. Around the mouth of the spout are black curvilinear designs which are reminiscent of designs on other Moche vessels which represent the tenacles of an octopus.

P-16. Plate 26. Stirrup-spout jar, provenience unknown.

Museo "Rafael Larco Herrera" 3993

Fabric: black

Race of maize: Guaribero

The stirrup-spout on this jar is broken off, but the two holes in back indicate that it was the traditional form of stirrup-spout. There is a tiny hole in the top of the cap of the central figure indicating that this was a whistling jar. The main Ai-apaec figure has large, flaring ears with snake-head ear ornaments and wears a pointed cap covered with pointed kernel-like elements. There are smaller figures without fangs with pointed caps covered with kernels and arms reaching out to hold on to the maize which completely surrounds the main portion of the jar. The base of the jar shows that Ai-apaec is seated cross-legged. This is the only instance of one of these figures seated cross-legged among the Moche vessels. It is, however, the prevalent posture for the figures on Zapotec urns. Whereas, the headdresses of the figures are completely covered with kernels, the mold-made maize ears encircling the jar have barren tips.

Stirrup-spout Jars Depicting Ai-apaec

P-17. Plates 27 and 28. Stirrup-spout jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 1/2865

Fabric: red and white

Dimensions: ht. 0.194 m, width 0.184 m.

Race of maize: Chococeño

The vessel body is entirely surrounded by large, thick conical ears of maize, surmounted by a figure of Ai-apaec lying on his stomach with arms in front and legs spread out in back. Part of the spout is attached to the figure's back. Ai-apaec is accompanied here by a snake curling around the jar. Ai-apaec has large round eyes, a very wide fanged mouth, and large ears with snake-head ear ornaments. He wears a bead necklace and red and white striped bands around his wrists. His clothing is painted in red, and he has bare feet. He wears a fillet headdress, which originally had an ornament attached to the front but which is presently broken off. The fillet may have had a feline head attached in front, as is often seen on other depictions of Ai-apaec wearing a fillet headdress (Kroeber 1925:220).

P-18. Plate 29. Stirrup-spout jar, provenience unknown.

University Museum, University of Pennsylvania 67-36-1

Fabric: red and white

Dimensions: ht. 0.224 m, width 0.152 m.

Race of maize: Pollo

The technical execution of this jar is excellent. It is beautifully formed, highly polished, and well fired. Ai-apaec wears the characteristic features of a Moche warrior's helmet and the kernel elements cover the head above the helmet features. The head forms a bare, pointed terminus. Ai-apaec's arms are shown reaching out to hold onto two maize ears in front of the jar, and the vessel is surrounded by ten maize ears.

P-19. Plate 30. Stirrup-spout jar, provenience unknown.

Museum of the American Indian 5/1741

Fabric: red and white

Dimensions: ht. 0.190 m, width 0.138 m.

Race of maize: Pira

This jar is simlar to the one described for P-18. The plain, lower portion of the red ware vessel is painted white and the stirrup-spout is painted white, along with the features of the Moche warrior's helmet, the bare tip of the head, the sclera of the eyes and the fangs.

P-20. Plate 31. Stirrup-spout jar, provenience unknown.

Museo "Rafael Larco Herrera" 2281

Fabric: red

Race of maize: Huancavelicano

There is a plain, narrow band at the base of this vessel. The remainder of the jar is covered by ears of maize. Only the fanged face of the deity and the bare, pointed terminus of the head are displayed. There are thirteen ears of maize surrounding the jar.

P-21. Plate 32. Stirrup-spout jar, provenience unknown.

Museum of the American Indian 4/8898

Fabric: red and white

Dimensions: ht. 0.206 m, width 0.119 m.

Race of maize: Pira

This Moche IVA jar is similar to the one described for P-20. The spout of this jar, however, is somewhat deviant from the forms of other stirrup-spout jars. The tubular spout emerging from the

vessel is unusually wide. A flattened, curved handle is attached to the spout and to the body of the vessel. Unlike other Moche IVA jars of this type, this handle is not a hollow tube. The vessel is red ware with white paint on the spout, the narrow base, the bare pointed head, the round earspools the figure is wearing, the sclera of the eyes and the fangs. The figure's head is tilted forward like that of the figure in Plate 11.

P-22. Plates 33 and 34. Stirrup-spout jar, provenience unknown.

Museo Arqueológico "Bruning" de Lambayeque B-99

Fabric: black

Race of maize: Confite Morocho

This vessel is the black ware diagnostic of the Chimú culture which followed Moche cultural develpoment on the North Coast after an interim period of stylistic influence and domination from Tiahuanaco. The Chimú culture dates ca. 1100 A.D. This period saw the revival of such Moche traits as the stirrup-spout jar, the fanged god, representations of maize in relief, some of which were still mold-made from real maize. All of these traits were suppressed during Tiahuanacoid domination. They were later revived in distinct, modified forms. Black ware was, by this time, the prevalent form of pottery and the stirrup-spout jars have characteristic, narrow spouts, as seen on this jar in Plate 34. The wide, globular body of this vessel is completely covered with kernel elements which apparently were molded from actual maize. However, the ears are so well blended into the body of the jar that they are indistinguishable and cannot serve for racial identification. Ai-apaec wears a pointed cap

covered with kernels, except for the extreme tip which is bare. The figure has large ears, fangs and its two hands are shown. A very small ear of maize is held in one hand. Something was held in the other hand, but it has been broken off.

Stirrup-spout Jars Depicting Rats

P-23. Plate 35. Stirrup-spout jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología KK/16602

Fabric: red and white

Dimensions: ht. 0.195 m, width 0.165 m.

Race of maize: Perla

This is a Moche IVA red ware stirrup-spout jar representing a rat, sitting up on his hind legs, holding a large ear of maize upright and nibbling on the tip of the ear. White paint delineates the tail, whiskers, teeth and ears of the animal, and covers the vessel spout.

P-24. Plate 36. Stirrup-spout jar, provenience unknown.

Duke University Museum of Art 73.1.507

Fabric: red and white

Dimensions: ht. 0.188 m, width 0.175 m.

Race of maize: Perla

This is a Moche IVA red ware stirrup-spout jar depicting a rat very similar to the one described for P-24. White paint decorates the animal's ears and abdomen, as well as the jar spout. The tail is modelled in low relief and is not painted white.

Stirrup-spout Jar Depicting a Maize Plant

P-25. Plate 37. Stirrup-spout jar, excavated in the Moche Valley.

Metropolitan Museum of Art 67.167.19

Fabric: red and white

Dimensions: ht. 0.281 m, 0.206 m.

Race of maize: Pollo

This is a Moche IVA stirrup-spout jar which represents a maize plant with a bird perched on the tassels. The red ware vessel is covered with a cream or white slip and is divided into five sections marked by red lines painted around the jar. The bottom section is marked by red vertical stripes. Above this is a plain section. The mid-section has a mold-made ear of maize attached to the jar in the front of the vessel and one in the back. Leaves or husks of the ears are painted on the jar, spreading out from the ears. The section above this is undecorated and is surmounted by the top section which curves around and has tassels painted on it. The bird, closely resembling a parrot, is perched on the top of the jar and leans toward the front. Its markings, beak and eyes are painted red. It has a curved beak, similar to that of a parrot or a toucan.

Stirrup-spout Jars of Mounds of Maize

P-26. Plate 38. Stirrup-spout jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 1/1681

Fabric: red

Dimensions: ht. 0.208 m, width 0.150 m.

Race of maize: Perlilla

This Moche IVA stirrup-spout jar is covered with maize as if to represent a mound of maize. The maize ears are so well blended into the body of the jar that they are barely distinguishable. The tips of the maize ears have all been blended together to form one tip at the top of the jar.

P-27. Plate 29. Stirrup-spout jar, provenience unknown.

Museo "Rafael Larco Herrera" 4677

Fabric: red

Race of maize: Güirua

The ears on this specimen are somewhat more distinct than those on P-26. Barren tips are represented on the maize ears, and the jar terminates in a barren tip.

P-28. Plate 40. Stirrup-spout jar, provenience unknown.

Museo "Rafael Larco Herrera" S-39160

Fabric: red and white

Race of maize: Güirua

This Moche IVA red ware jar depicts a mound of maize in a somewhat different fashion. There are four mold-made ears on front of the jar. The main body of the jar, however, is covered with a stylized kernel pattern and is shaped like the other jars representing a mound of maize. The jar is red ware, and the stirrup-spout and the annular base are painted white. There is also white outlining the four ears of maize. The maize ears have barren tips.

P-29. Plate 41. Stirrup-spout jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 1/1680

Fabric: red and white

Dimensions: ht. 0.197 m, width 0.180 m.

Race of maize: Güirua

This jar is virtually identical to the one described for P-28.

Bowl of Maize

P-30. Plates 42 and 43. Bowl of maize, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 1/2609

Fabric: red

Dimensions: ht. 0.107 m, diameter 0.170 m.

Race of maize: Imbricado

This object is unusual because it is not a functional container. It represents a bowl of three maize ears. It is red ware and is definitely a Moche period piece. This is the only specimen I have seen which could not serve the purpose of being a container of some kind. It is important because it depicts the only example I have found from Peru of maize with clearly imbricated kernels.

Ollas Representing Baskets of Maize

P-31. Plate 44. Olla, provenience unknown.

Museo Arqueológico "Bruning" de Lambayeque 7761

Fabric: black

Race of maize: Huancavelicano

This black ware vessel is decorated with ears of maize and fish designs in low relief. All of the vessels in this group are distinguished by their composite-silhouette bodies. The constricted neck of this vessel has a flaring rim.

P-32. Plate 45. Olla, provenience unknown.

Museo Arqueológico "Bruning" de Lambayeque B-1918

Fabric: black

Race of maize: Huancavelicano

This vessel is virtually identical to the one described for P-31. The one noticeable difference is the presence of two small loops on either side of the spout, which may have been used for threading cord for carrying.

P-33. Plates 46 and 47. Olla, provenience unknown.

Museo Arqueológico "Bruning" de Lambayeque B-1917

Fabric: black

Race of maize: Pollo

This vessel has a flattened shape, giving it a distinct basket-like appearance. There are fourteen ears of maize on the top of the olla. The spout is slightly flaring and is flanked by small loops which may have been used for threading a carrying cord.

P-34. Plate 48. Olla, provenience unknown.

Museo Arqueológico "Bruning" de Lambayeque MB-1927

Fabric: red and black

Race of maize: Huancavelicano

The edge of the everted rim of the jar and the rim of the upper half of the vessel body are decorated with a black zigzag design. The maize on this jar is also painted. Some ears are red and others black. All the ear have barren tips. This jar also has small loops presumably for threading a carrying cord.

P-35. Plate 49. Olla, provenience unknown.

Museo Nacional de Antropología y Arqueología 36/1376

Fabric: red and white

Dimensions: ht. 0.15 m, diameter 0.21 m.

Race of maize: Huancavelicano

The distinguishing difference between this jar and the one described for P-34 is that the zigzag decoration on P-35 is painted white and is only on the outer rim of the vessel. In addition, the ears of maize are not painted.

P-36. Plate 50. Olla, provenience unknown.

Duke University Museum of Art 73.1.408

Fabric: red and dark brownish-red

Dimensions: ht. 0.106 m, diameter 0.175 m.

Race of maize: Pagaladroga

This vessel may have been used for containing chicha, an alcoholic beverage made from maize. Chicha was an important ceremonial drink, providing a means of intercession with the gods (Nicholson 1960:290). The small orifice on the side of the vessel would have been a convenient pouring spout which could be plugged until time for consumption. The ears of maize on this jar are painted dark

reddish brown and dark red, colors of types of maize used in the making of chicha.

P-37. Plate 51. Olla, provenience unknown.

Museum of the American Indian 7/2734

Fabric: black

Dimensions: ht. 0.163 m, diameter 0.125 m.

Race of maize: Kculli

This vessel may also have been used for containing chicha. It has the same small orifice on the side of the jar. There is the face of a man, without fangs, on the neck of the spout. This is a decorative style diagnostic of the Chimú culture. Moche jars always have plain, unadorned spouts.

CHAPTER III

ZAPOTEC URNS: A RE-EVALUATION

Physical Setting

The Valley of Oaxaca is in the highlands of southern Mexico (Fig. 3). The capital of the state of Oaxaca is the city by the same name which is located at the convergence of three arms forming the Y-shaped valley. The three arms include the Etla Valley to the west, the Tlacolula (or Mitla) Valley to the east, and the Zaachila Valley to the south. The average elevation of the valley floor is 1,550 meters. The climate is semi-arid with an annual rainfall of 500-700 millimeters which occurs mainly during the summer months (Flannery et al. 1967:445-449). Although the temperatures in the valley may be well adapted to year-round planting of maize, water is scarce and maize is planted seasonally, between April and June, to correspond with the approaching rainy season (Kirkby 1973:54-55).

The archaeological record for the Valley of Oaxaca demonstrates cultural continuity, from as early as Monte Albán I, up until the present day. On the basis of a radiocarbon date from Monte Negro in association with a Monte Albán I level, this period begins as early as 650 B.C. (Rabin 1970:14). The archaeological cultural remains have been attributed to the Zapotecs (Jiménez M. 1970:12). No scholar has seriously questioned the attribution.

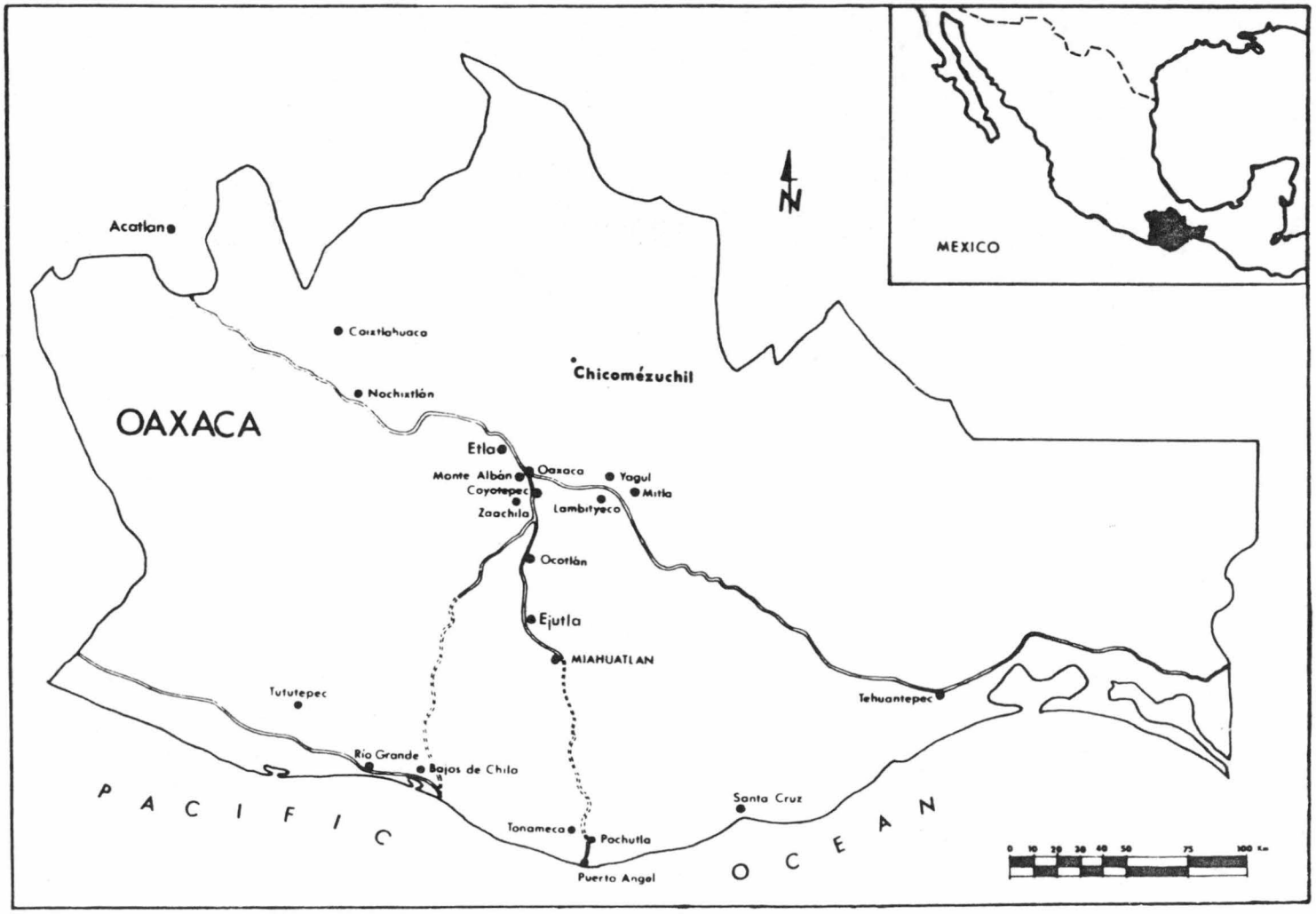

Figure 3. Map of the state of Oaxaca.

Chronology

Flannery et al. have distinguished seven major chronological periods in the Valley of Oaxaca, beginning with San José ca. 1200 B.C. (1947:447). The periods Monte Albán I-V have been established on the basis of ceramic styles from the excavations at Monte Albán. The urns which are the subjects of this study are assignable to Monte Albán III and IV, which correspond roughly with the Mesoamerican Classic and early Postclassic periods.

Monte Albán III is divided into two phases, IIIA and IIIB. The urns with depictions of mold-made maize are presumed to belong to IIIB on the basis of the use of the mold and the association of certain deities with maize, both features attributed to Monte Albán IIIB (Shaplin 1973; Paddock 1970:193). It is inferred on the basis of the extensive building activity at Monte Albán that IIIB was a period of major population growth in Oaxaca (Paddock 1970:149).

Context

Zapotec urns have been found in the antechambers and interiors of tombs (Caso and Bernal 1952:10). They were also placed in niches on the outside walls, above entrances and on the roofs of tombs (Saville 1899:361; Saville 1904:51), and they have been found as part of offerings buried in the floors of ceremonial centers (Lothrop 1972:76).

Some authors have suggested that the urns contained food offerings to the dead or ashes of the dead (Linné 1938:90; Mason 1929:177).

However, the urns have practically always been found empty (Caso and Bernal 1952:10; Anton 1969:48). Saville has suggested that "offerings of food, drink and incense were intended for the deities" whom the urns represented (1904:60). Caso and Bernal remark that on occasion offerings of obsidian blades, jade beads, snail shells used as bells or bones of small animals have been found inside urns (1952:10). In addition, Caso reported the find of an urn containing some greenstone figurines of Teotihuacán style and some jade beads in a Monte Albán IIIA offering buried in Monticulo I at Monte Albán (1938:10). Although Zapotec urns are not funerary urns in a strict sense, they served primarily as grave goods.

Description

The ceramic urns are made out of a highly-fired, porous gray ware. They are usually composed of a cylindrical vessel with an anthropomorphic or theriomorphic figure built out in front of the cylinder. The figures represent numerous deities from the Zapotec pantheon. The attributes of the divinities are symbolic of such aspects associated with Zapotec life such as the calendar, life and death, sustenance and everyday activities (Boos 1966b:19).

The figures are most frequently depicted seated cross-legged and wearing elaborate headdresses. Certain notable stylistic conventions recur. A relative degree of importance is assigned to the different parts of the figure, shown by the size and attention to detail given them. These include, beginning with the most important

element and following in degree of importance, the headdress, technically termed the tocado, the most important and outstanding feature of an urn. The elements of the headdress have special significance for the divinity or its *nagual*, the guardian spirit or alter ego of the god which the urn may represent (Boos 1966b:17). The second most important aspect is the face, which often has a characteristic nasal or buccal mask. Third is the pectoral ornament, a necklace which frequently has a characteristic glyph medallion displayed on the figure's chest. Then to be considered is the figure's personal jewelry, which indicates status. Lastly, come the arms, hands, legs and feet. The limbs are often clumsily modelled, commonly large, mold-made hands are attached at odd angles. The feet are usually out of proportion, roughly modelled, having two to four toes. The posture most common for these figures is a cross-legged seated position with the palms of the hands placed on the knees.

Classification of the deities represented on Zapotec urns is based upon that devloped by Caso and Bernal (1952) in which there are forty-four main categories and 138 subcategories. Eight of these are represented by urns depicting mold-made maize. One of the urns falls in an unidentified category. The names and descriptions for those deities presented here follow that assigned the respective categories by Caso and Bernal. Table 3 lists the characteristic attributes of the eight identified Zapotec deities and the one unidentified god represented on urns depicting mold-made maize in this corpus.

Table 3. Characteristic Attributes of Deities on Urns Depicting Maize.

Deity	Tocado	Face	Attire	Posture	Races of Maize
God of Glyph "L" (Pitao Cozobi) the principal maize deity	"C" glyph forms central medallion	Aspas, nasal mask, buccal mask	Pectoral glyph, loin cloth, ear spools	Seated cross-leggdd	Nal Tel
Cocijo, God of Lightening and Rain	"C" glyph forms central medallion (there are exceptions where it is not present)	Nasal mask, buccal mask, "merlon" eyebrows, squared lower eyelids, extended, forked tongue	Pectoral glyph, loin cloth, ear spools	Seated cross-legged	Nal Tel
God with the Ear of Maize in His Headdress	"C" glyph superimposed by ear of maize forms central medallion; or figure with two hands an ear of maize as central ornament; or entire tocado consists of standing ears of maize	Unmasked	Pectoral glyph, loin cloth, ear spools	Seated cross-legged or sometimes standing	Nal Tel
God Displaying the Mask of the God Cocijo as the Medallion of the Headdress	Cocijo mask as central medallion; pair of hands suspended in lower part; trefoliate element and maize	Unmasked, youthful personage	Pectoral glyph, loin cloth, ear spools	Seated cross-legged	Nal Tel
God with the Bow-Knot in His Headdress	Bow-knot as central medallion	Unmasked or wearing mask of God of Glyph "L" or Cocijo	Pectoral glyph, loin cloth, ear spools, bead necklace	Seated cross-legged	Chapalote
Goddess "13 Serpent"	Tocado consits of woven or plaited strands of hair, often adorned with ball-shpaed elements	Unmasked	Huipil, quichquemitl, bead necklace, ear spools	Seated cross-legged, kneeling, or standing	Unidentified
Opossum God		Round, staring eyes; nose with indented ridge spiral-up to forehead; lips pulled back baring teeth	Pectoral glyph, loin cloth	Seated cross-legged or standing	Nal Tel
Goddess "2 J"	"J" glyph forms central medallion	Unmasked	Huipil, quichquemitl, bead necklace, ear spools	Generally appears standing or kneeling	Dent corn
Unidentified					Nal Tel, Conico

In general, of all the urn categories, ones representing Cocijo are most numerous (Caso and Bernal 1952:17). Cocijo, the God of Lightening and Rain, was the most important deity in the Zapotec pantheon. Since maize was the mainstay of pre-Columbian life (Coe 1962b:46), and the develpoment and survival of urban society depended on the successful production of maize, this divinity who controlled the elements upon which the success of maize and other crops depended was of paramount importance. However, Cocijo is not included in Caso and Bernal's "Maize Complex," and of the many Cocijo urns in existence, comparatively few have depictions of maize. The primary attribute associated with Cocijo is the face mask with its characteristic elements: the bifurcated tongue protruding from open jaws representative of a serpent; the nasal and buccal elements which are bands across the nose and cheeks representive of a feline; "merlon-shaped eyebrows" said to represent the heavens, a high place, or infinity; and the squared, indented, lower eyelids representing clouds (Boos 1966b:27). Although there are exceptions where it is not displayed, the "C" glyph centrally located in the tocado also seems to be a characteristic attribute.

The God of Glyph "L" was so named by archaeologists because of the elements above and below each eye, which resemble the Zapotec Day-Sign referring to movement or earthquakes. This Day-Sign was labeled glyph "L" (Caso 1929:39-40), and by extension Pitao Cozobi, which is the Zapotec name for this deity who is more popularly known in the literature as the God of Glyph "L", although no "L" glyph is actually represented with the figure and the deity

is not associated with earthquakes. Characteristic attributes of the divinity are the eye elements, referred to as aspas, a nasal mask in the form of a nose knot, a buccal mask in the form of lines curving around each cheek, and the "C" glyph forming the central attribute of the tocado. This god first appears during Monte Albán IIIA. Thereafter, it became quite widespread (Boos 1966b:177-78).

The category of the "God with the Ear of Maize in His Headdress" is generally represented by a figure with a "C" glyph as the central medallion of the tocado which is superimposed with a stylized ear of maize. For the pupose of this study, this category has been extended, as proposed by Boos (1966a:348), to include figures which have as the central attribute of the tocado two hands holding a naturalistic ear of maize, and some which have naturalistic ears of maize standing vertically in the headdress.

The "God Displaying the Mask of the God Cocijo as the Medallion of the Headdress" is another deity found. One diagnostic of this category is that all the figures are young, even at times adolescent. The headdress is centered around the god Cocijo, depicted with the characteristic facial mask and "C" glyph, and having a pair of hands suspended in the lower part of the headdress and on each side of the mask. A few of the figures have a second pair of hands in the tocado. The face of the personage on the urn is typically represented without any mask. There is a trefoliate element and maize symbol, also characteristic of this category, which occurs on each side of the Cocijo mask in the headdress (Boos 1966b:65).

The "God with the Bow-Knot in His Headdress" is another deity found in connection with depictions of maize. The main diagnostic of this category is the bow-knot as the central ornament of the headdress. The personage may appear unmasked or wearing a mask characteristic of Cocijo or the God of Glyph "L" (Boos 1966b:404).

The next deity is the Goddess "13 Serpent," characterized by a headdress of woven strands often adorned with ball-shaped ornaments which may represent bells (Boos 1966b:352).

Another deity represented is the Opossum God whose diagnostic elements include the round, staring eyes, the indented ridge of the creature's nose which forms a spiral extending up to the forehead, and the lips pulled back showing the teeth (Boos 1966b:237).

Following the Opossum God is the Goddess "2 J," so named for the "J" glyph always depicted in the headdress. She always wears the indigenous feminine dress, the *huipil* or undergarment, and the *quichquemitl*, the bordered outer garment. She generally is portrayed standing with her arms crossed on her bosom or hanging by her sides (Boos 1966a:338).

In addition to these deities, there are three vessels encircled by ears of maize. The Goddess "2 J" appears on one of these vessels and the other two do not have divinities on them.

Re-evaluation

It has been common knowledge among archaeological circles for a long time that there are large numbers of suspect Zapotec urns

in museum collections. There have been direct references to this fact in the published literature (Boos 1966b:15-16), and there have been photographs of urns published with statements of opinions bearing upon the authenticity or suspicion regarding pieces (Boos 1964; Shuler-Schömig 1970).

In my master's thesis (Eubanks 1973), urns depicting maize were classified in four categories: authentic, considered authentic, suspected fake, and fake. Included in the authentic category were excavated specimens. Included in the fake category were pieces labeled by museum officials as fakes. Fake refers to any piece of post-Columbian manufacture which is included in a collection of Zapotec urns.

Pieces in the two categories, considered authentic and suspected fake, include all pieces which were not officially excavated or which have not been designated fake by museums. Three criteria were followed in placing urns in one of these two categories. They included the combination of attributes, provenience, and the race of maize identified.

Certain attributes are associated with each deity, e.g. specific glyphs or masks with particular features. If there was an omission of a particular element, or a confusion of a certain attribute normally associated with another deity, then the authenticity was considered questionable. The urns show close conformity technically in the details of the figures represented and in the clay used in their manufacture which was obtained from certain localities in

the Valley of Oaxaca. Any unusual variations of these aspects were given careful consideration concerning a specimen's authenticity.

All specimens with a provenience of Zaachila or Miahuatlán were placed under the category of suspected fake because fake factories are known to have been operated in these towns in the past.

Any urn on which a race of maize botanically classified as modern was identified was also considered suspect.

A re-evaluation of the urns placed in the category suspected fake based on these three criteria is made possible from the results of thermoluminescence (TL) tests performed on Zapotec urns by David W. Zimmerman at the Washington University Center for Archaeometry in St. Louis, Missouri. Thermoluminescence involves heating a sample of ground pottery weighing approximately one gram to 400 degrees Centigrade. The light output is measured and the glow curve of a sample of the ancient pottery is compared to the glow curve of a sample of modern pottery (Aitken 1968:370). The tests made by Zimmerman involve a measurement of the zircon particles of which Oaxacan pottery has a high content.

In conjunction with a stylistic analysis of Zapotec urns by Shaplin (1975), Zimmerman made TL tests on 117 urns in the St. Louis Museum of Fine Art's collection. Only seven per cent of those pieces were found to be fraudulent, and Shaplin has subsequently concluded that "a wider range of style and iconography existed in ancient Oaxaca than archaeologists have heretofore supposed" (1975:37).

In 1975, Zimmerman made thermoluminescence tests on an urn which was labeled suspected fake in my master's thesis (Eubanks 1973:Plate 58). This urn had a natural radiation dose of 200 *rads*, giving it an approximate age of 1,000 years (David W. Zimmerman personal communication). This urn depicts the Goddess "2 J" on the front of a brazier type vessel encircled by standing ears of maize. This vessel type seemed atypical of Zapotec urns, and accordingly, it and two other vessels of the same type were placed in the category of suspected fake.

Twelve Zapotec urns classified as suspected fake in my master's thesis (Eubanks 1973) have been re-evaluated, and are now, on the basis of recent findings from thermoluminescence testing, considered to be bonified antiquities. Eight of the re-evaluated specimens are discussed and illustrated. The four specimens not illustrated here include urns which are very similar to ones illustrated here, and they are mentioned in the discussion of the urns which they resemble. Two other specimens which are new additions to my corpus are also presented here. The ten Oaxacan specimens illustrated are presented in catalogue format. Each is designated by a number preceded by the letter Z. After the catalogue number, basic information, including the plate in which the specimen is illustrated, the vessel type, provenience, museum location and museum catalogue number, fabric, dimensions, chronological period to which the piece has been assigned, and the race of maize identified on the specimen, is listed. Description of the specimen follows the catalogue entry.

Oaxacan Urns

Z-1. Plate 52. Urn of the God of Glyph "L", excavated in Miahuatlán.

Museo Nacional de Antropología 6-5421

Fabric: buff

Dimensions: ht. 0.296 m, width 0.168 m.

Period: Monte Albán IIIB

Race of maize: Nal Tel

This is an ornate urn, probably made in Monte Albán IIIB, which has the "C" glyph as the central medallion of the tocado, surmounted by a plume flanked on either side by an ear of maize. The symbol for undulating water occurs on either side of the "C" glyph. It is a wave element composed of two full loops. The face has the aspas and buccal mask, but lack the nasal mask. The nose was broken and has been repaired, so the nasal mask may have originally been present. The figure wears a pectoral, ornate earspools, a bracelet on both wrists, a feather cape and loin cloth bordered by inverted pyramid designs. The figure is seated cross-legged. In back of it is an elablorately carved dossel.

Z-2. Plate 53. Urn of the God of Glyph "L", excavated in Zaachila.

Museo Nacional de Antropología 6-275

Fabric: dark gray

Dimensions: ht. 0.267 m, width 0.194 m.

Period: Monte Albán IV

Race of maize: Nal Tel

I originally stated: "There is no question in my mind that the two urns in Plates 31 and 32 (Plate 53 in this work) are fakes" (Eubanks 1973:82). That judgment, however, was almost certainly in error. An urn of the exact same style in the St. Louis Museum of Fine Art (cat. no. 68:452) was determined to be of ancient origin by TL dating (Lee A. Parsons personal communication). The description and re-assessment of this piece also applies to a similar urn (Eubanks 1973:Plate 32) not illustrated here. On this urn, the "C" glyph is the central medallion of the tocado surmounted by a plume. However, the plume does not extend over the entire headdress as is usually seen. The face has an unusually large nasal mask. It also has the buccal mask. The pectoral glyph cannot be identified. The maize is depicted as a single ear extended vertically on each side of the face, with a scalloped decoration surrounding the back of the maize and the figure's face, extending from the base of the plume to the shoulders. The execution of the entire piece is not typical of Zapotec art style, and it may represent the development of a regional style.

Z-3. Plate 54. Urn of the God Cocijo, excavated in Zaachila.

Museo Nacional de Antropología 6-6672

Fabric: gray

Dimensions: ht. 0.374 m, width 0.403 m.

Period: Monte Albán IV

Race of maize: Nal Tel

There are two other virtually identical Cocijo urns (Eubanks 1973:Plates 34 and 35) which are not illustrated here, but which also fall under the same description and re-assessment. The "C" glyph is the central medallion of the tocado. It is surmounted by a plume, flanked on each side by an ear of maize with stylized silks and staminate tips. The water symbol composed of two full loops appears on the headband on either side of the "C" glyph. The face has a large nasal mask and bifurcated tongue, with squared eye elements. The figure wears a pectoral glyph partially hidden by the long protruding tongue. It also wears elaborate, ornate earspools. The hands are depicted but the arms are not. Parts of a feather cape are visible. These flat bottomed, disproportionately wide urns may have served a dual purpose as brazier covers. Urns used as brazier covers are unusual, but they do occur (Caso and Bernal 1952:44, Fig. 56).

Z-4. Plate 55. Urn of the God Cocijo, excavated in Zaachila.

Museo Frissell de Arte Zapoteca 4279

Fabric: dark reddish-brown

Dimensions: ht. 0.106 m, width 0.850 m.

Period: Monte Albán IV

Race of maize: Nal Tel

This florero (Eubanks 1973:Plate 36) is thought to belong to Monte Albán IV, although the double-spout vase fist appears in Monte Albán IIIA (Caso and Bernal 1965:887). The spouts on each side of the vessel are ears of maize. The figure has the characteristic

Cocijo mask and the central medallion of the tocado is the face of the Tiger God surmounted by a plume of upright trifoliate elements (Boos 1966a:15). The jar itself forms the figure's body, with arms and feet. This is an unusual treatment for Zapotec pottery, but it is characteristic of Moche jars from the North Coast of Peru.

Z-5. Plate 56. Urn of the God with the Ear of Maize in His Headdress, excavated in Ejútla.

Museo Frissell de Arte Zapoteca 4889

Fabric: black with traces of buff

Dimensions: ht. 0.135 m, width 0.750 m.

Period: Monte Albán IV

Race of maize: Nal Tel

This small florero resembles a bottle. It is highly polished black with buff paint on the kernels of the maize in the tocado. Like the vessel in Plate 55, the jar forms the figure's body with the hands and feet depicted. The figure's head is fashioned into the spout of the bottle. There is a single ear of maize composing the headdress in turban style. There is a curved double line dividing the ear of maize in two. Although the maize was flattened considerably, the pairing of the kernel rows is detectable and the maize is mold-made. Boos (1966a:95) assigns this piece to Monte Albán II. If this is an accurate placement, then the use of the mold to display maize began much earlier than other evidence suggests.

Z-6. Plate 57. Goddess "2 J", excavated in Chicomézuchil.

National Museum of Natural History 115033

Fabric: gray with white traces

Dimensions: ht. 0.159 m, diameter 0.190 m.

Period: Monte Albán IV

Race of maize: unidentified dent corn

This vessel (Eubanks 1973:Plate 48) represents the Goddess "2 J". It is in the form of a brazier and is encircled by maize ears, each impressed from the same mold. This form of circular jar encircled by maize ears is unusual for Oaxaca. In my master's thesis all urns of this type were considered to be either of questionable antiquity or as imported items (Eubanks 1973:89). However, TL dating has established that this particular piece is at least 1,000 years old (David W. Zimmerman personal communication).

Z-6 is the only vessel encircled with ears of maize with a figure on it. The characteristic "J" glyph which forms the tocado of the Goddess "2 J" is not present because the vase has been damaged. However, she can be identified on the basis of her characteristic, indigenous, feminine dress, the *huipil* or undergarment, and the *quichquemitl*, the bordered outer garment. She is in a kneeling position with her arms crossed over her chest. Boos (1966b:338) describes this goddess in Monte Albán IIIB as standing with her arms crossed over her chest or hanging at her sides. The kneeling pose is apparently quite unusual on Zapotec urns. As far as I know, there is only one reference which describes it (Rickards 1938:151). The association of the Goddess "2 J" with maize is not extraordinary

because this goddess, along with the Bat God, the God with the Bat God in the Headdress, the God of Glyph "L", and the God with an Ear of Maize as the Central Medallion of the Headdress, compose the five deities of the Zapotec Maize Complex (Caso and Bernal 1952:65).

Z-7. Plate 58. Vessel encircled with ears of maize, provenience unknown.

Museo Nacional de Antropología 6-6012

Fabric: gray

Dimensions: ht. 0.158 m, diameter 0.217 m.

Period: Monte Albán IV

Race of maize: Dzit-Bacal

This urn (Eubanks 1973:Plate 49) had also been considered questionable in regard to its antiquity or origin because of the unusual shape and because the race of maize identified is presently grown in Campeche, Yucatán and Guatemala.

Z-8. Plate 59. Vessel encircled with ears of maize, excavated at Monte Albán.

Middle American Research Institute 35-5976

Fabric: gray

Dimensions: ht. 0.15 m, diameter 0.14 m.

Period: Monte Albán IIIB

Race of maize: Nal Tel

On this vessel (Eubanks 1973:Plate 51) there are four ears of maize with trifoliate elements, stylized silks and staminate tips.

The base of the urn is encircled by bullet-shaped ornaments, probably intended to represent bells. The trifoliate elements superceding the staminate tips of the maize are normally associated with the "J" glyph.

Z-9. Plate 60. Ears of maize from an urn, excavated in Mitla.

Middle American Research Institute 35-6004

Fabric: gray

Dimensions: ht. 0.175 m, width 0.90 m.

Period: Monte Albán IV

Race of maize: Güirua

This is a fragment of two maize ears which were originally on a vessel encircled by ears of maize. TL tests on this piece indicate that it is about 1,000 years old (David W. Zimmerman personal communication).

Z-10. Plate 61. Urn of the God of Glyph "L", provenience unknown.

University Museum, University of Pennsylvania NA-2141

Fabric: gray

Dimensions: ht. 0.28 m, width 0.18 m.

Period: Monte Albán IIIB

Race of maize: Chapalote

This piece has been damaged. One arm is broken off. Both side pieces of the tocado are missing, and the nose has been damaged. The figure is seated cross-legged. The full arms are shown, the hand holding the maize has the elbow resting on the knee. The figure

has the buccal mask, the aspas over the eyes, and presumably it had the characteristic nose knot or nasal mask. The central medallion of the tocado is the "C" glyph, and the rest of the parts are missing. The figure wears elaborate earspools, a pectoral, a bracelet and a loin cloth.

CHAPTER IV

THE RACES OF MAIZE

I have tentatively identified nineteen races of maize on thirty-five Peruvian jars, and six races on thirty-one Mexican specimens. There are five problems inherent in the racial identifications of the ceramic specimens. (1) The identifications are based on comparisons of maize grown over 1,000 years ago to races grown today. There are some discrepancies in the comparative data, particularly in relation to size. (2) The identifications are based solely on comparisons of external morphological characters of maize ears. Data on internal characters of the ears and other parts of the maize plant that would be pertinent to racial identifications are not available from the ceramic replicas. (3) The identifications are made on the basis of information regarding living races published in the "Races of Maize" monographs (Brieger et al. 1958; Grant et al. 1963; Grobman et al. 1961; Ramírez et al. 1960; Roberts et al. 1957; Timothy et al. 1963; Timothy et al. 1961; Wellhausen et al. 1957; Wellhausen et al. 1952). There are some limitations regarding the published data. Some races have not been carefully collected and described, particularly in Central America. There are also some inconsistencies in the data throughout the series of published reports. (4) The problem of variability within plant populations has been discussed in the "Introduction." The question

of variability cannot be adequately dealt with because of the lack of available data for ranges of variability for different races. (5) Although races of maize in Mexico, Central America and South America can generally be distinguished, most races can be assigned to different closely related groups (Brown and Goodman 1977). Within these groups, it is sometimes difficult to distinguish between races which presumably may have a significant number of genes in common for certain diagnostic characters. For this reason, some of the ceramic specimens may closely resemble several different races. When this occurs, there is a high degree of subjectivity in the choice for racial identification. Therefore, in order to minimize the element of subjectivity and maximize the potential contribution of the ceramic maize replicas, when the identification for a specimen could have been chosen from more than one race, the alternate choices are indicated in the discussion of the identifications.

Maize Races on Moche Jars

The races of maize identified from the ceramic replicas on Moche jars represent diversity in the many different races, in the various kinds of climates and environments where they are grown today, and in the different countries in which modern collections for classification of the races have been made. On the basis of the maize represented on the pottery, many races appear to have been more widespread in prehistoric times. If their present distributions are indications of their prehistoric ranges, then at quite early times, Peru appears to have been a center for contact and exchange between divergent

cultural groups from a wide geographical area. Table 4 compares the data for the ceramic specimens and the botanical races. Below, each race is described and discussed in terms of possible significance for botany and archaeology.

Karapampa. Karapampa is an eight rowed pop-flint variety of maize reported from the highlands of Bolivia. This race has a slender cylindrical ear and the kernels are tapered to varying degrees (Ramírez et al. 1960). It appears to be represented on two of the thirty-five pots (Plates 5, 6 and 7). On both jars, Karapampa is depicted in association with Ai-apaec wearing a Moche warrior's helmet.

Grobman et al. (1961:Fig. 38) illustrate a vessel depicting ears similar to the ones being described here. They are said to represent a race designated as "Proto-Confite Morocho" or "Proto-Karapampa." These authors describe the maize on the jar as closely resembling present day Confite Morocho but acknowledge that it is an obvious variant, and they suggest that it may represent Karapampa, the eight-rowed Bolivian popcorn. The reason I chose Karapampa for the identifications of similar specimens in this corpus is evidenced by a comparison of the data on the external morphological characters of the ear for Confite Morocho and Karapampa with the average values for the ceramic specimens, which show a closer relationship with Karapampa (Table 5).

TABLE 4.--RACES OF MAIZE AND MOCHE CERAMIC SPECIMENS COMPARED IN EXTERNAL CHARACTERS OF THE EARS.

				Kernel Characters		
Race	*Length/cm*	*Diam/cm*	*Row No.*	*Width/mm*	*Thickness/mm*	*W/T Index*
Karapampa (Bolivia)[1]	12.2	1.90	8.8	7.86	4.00	2.37
Specimen						
MNAA KK/16583 (Pls. 5 & 6)	8.2	2.20	8.0	7.50	4.00	1.88
MNAA 158 (Pl. 7)	8.2	2.20	8.0	7.50	4.00	1.88
Average	8.2	2.20	8.0	7.50	4.00	1.88
Race						
Confite Morocho (Peru)[2]	6.7	2.30	10.6	5.87	4.55	1.29
Specimen						
Bruning B-99 (Pls. 33 & 34)	3.3	1.50	8.0	4.00	2.50	1.60
MAI 23/196 (Pl. 8)	5.4	2.00	8.0	5.00	2.90	1.72
Average	4.4	1.75	8.0	4.50	2.70	1.66
Race						
Enano (Peru)[2]	7.2	2.30	16.0 (Irr)	5.30	3.70	1.43
Enano (Bolivia)[1]	6.9	2.73	16.4	4.79	3.30	1.45
Specimen						
Brooklyn 41.1275-74 (Pl 23)	6.6	2.80	14.0	5.00	4.10	1.22
Race						
Pollo (Venezuela)[3]	11.2	3.67	9.8	9.70	5.20	1.87
Pollo (Colombia)[4]	8.8	2.93	10.0	7.94	4.96	1.60
Specimen						
Bruning B-1917 (Pls. 46 & 47)	8.0	2.20	8.0	8.25	4.23	1.95
Larco 2300 (Pls. 21 & 22)	7.0	2.30	8.0	7.00	4.60	1.52
Larco J-432 (Pl. 9)	8.9	3.00	10.0	6.25	3.35	1.87
MMA 67.167.19 (Pl. 37)	6.2	2.70	10.0	6.50	4.00	1.63
UM 67-36-1 (Pl. 29)	10.4	2.60	10.0	7.00	3.70	1.89
Average	8.1	2.56	9.2	7.00	3.98	1.77

TABLE 4.--Continued.

Race	*Length/cm*	*Diam/cm*	*Row No.*	*Kernel Characters*		
				Width/mm	*Thickness/mm*	*W/T Index*
Kculli (Peru)[2]	9.2	4.71	12.0	10.27	6.01	1.71
Specimen						
MAI 7/2734 (Pl. 51)	7.7	2.30	10.0	6.50	3.60	1.81
Race						
Pira (Venezuela)[3]	10.9	2.56	10.8	5.80	3.00	1.93
Pira (Colombia)[4]	11.2	2.50	11.0	6.49	3.58	1.81
Specimen						
MAI 5/1741 (Pl. 30)	7.5	2.40	10.0	6.00	3.60	1.67
MAI 4/8898 (Pl. 32)	8.8	2.30	10.0	6.00	3.50	1.71
Average	8.2	2.35	10.0	6.00	3.55	1.69
Race						
Huancavelicano (Peru)[2]	11.45	4.50	8.8	11.60	6.20	1.87
Specimen						
Larco 2281 (Pl. 31)	9.00	2.90	8.0	7.50	4.00	1.88
Bruning 7761 (Pl. 44)	5.60	1.80	6.0	6.70	3.50	1.91
Bruning MB-1918 (Pl. 45)	5.60	1.80	6.0	6.70	3.50	1.91
Bruning MB-1927 (Pl. 48)	7.50	2.65	8.0	7.50	3.50	2.14
Bruning MB-1927 (Pl. 48)	5.90	2.35	8.0	7.50	3.50	2.14
MNAA 36/1376 (Pl. 49)	6.70	2.60	8.0	7.50	3.25	2.31
Average	6.72	2.35	7.3	7.23	3.54	2.04
Race						
Pagaladroga (Peru)[2]	14.3	4.19	15.0	7.80	4.10	1.90
Specimen						
Duke 73.1.408 (Pl. 50)	8.6	2.80	10.0	7.00	3.80	1.84

TABLE 4.--Continued.

Race	Length/cm	Diam/cm	Row No.	Kernel Characters		
				Width/mm	Thickness/mm	W/T Index
Mochero (Peru)[2]	9.3[5]	4.13	- (Irr)	7.60	4.50	1.69
Specimen						
MNAA KK/16591 (Pls. 11 & 12)	8.5	2.50	10.0	6.40	4.00	1.61
MNAA KK/16624 (Pls. 18 & 19)	7.5	2.20	8.0	6.00	3.20	1.88
Brooklyn 1890 (Pl. 20)	8.0	2.70	10.0	6.50	3.47	2.03
Average	8.0	2.47	9.3	6.30	3.47	1.82
Race						
Kcello (Bolivia)[1]	11.9	3.72	10.0	9.52	4.14	2.30
Specimen						
Larco 2295 (Pl. 15)	6.5	2.35	8.0	7.00	3.50	2.00
Larco 2995 (Pl. 16)	7.5	2.65	8.0	7.47	3.75	1.99
Amano 59 (Pl. 17)	8.2	2.80	8.0	7.60	3.90	1.95
Average	7.4	2.60	8.0	7.36	3.72	1.98
Race						
Clavo (Colombia)[4]	20.0	3.22	11.1	8.32	5.15	1.62
Specimen						
MNAA 1/027 (Pl. 10)	10.2	3.40	10.0	7.50	4.65	1.61
Race						
Perla (Peru)[2]	18.4	4.50[5]	15.6	8.80	5.00	1.76
Specimen						
MNAA KK/16602 (Pl. 35)	13.5	5.50	22.0	7.50	4.50	1.67
Duke 73.1.507 (Pl. 36)	12.3	5.70	22.0	7.50	5.20	1.44
Average	12.9	5.60	22.0	7.50	4.85	1.56

TABLE 4.--Continued.

Race	Length/cm	Diam/cm	Row No.	Kernel Characters		
				Width/mm	Thickness/mm	W/T Index
Güirua (Colombia)[4]	16.2	3.41[5]	12.2	7.97	4.88	1.63
Specimen						
Larco 4677 (Pl. 39)	12.9	4.50	12.0	7.50	4.80	1.56
Larco S-39160 (Pl. 40)	10.3	3.90	14.0	7.00	4.36	1.61
MNAA 1/1680 (Pl. 41)	10.7	3.80	14.0	6.50	4.50	1.44
Average	11.3	4.07	13.3	7.00	4.55	1.54
Race						
Guaribero (Venezuela)[3]	11.7	3.64	15.5	7.00	3.80	1.84
Specimen						
Larco 3993 (Pl. 26)	8.4	3.00	14.0	6.40	3.68	1.73
Race						
Chococeño (Ecuador)[6]	12.4	4.08	19.6	6.60	4.20	1.57
Chococeño (Colombia)[4]	11.0	3.65	17.2	6.47	4.10	1.57
Specimen						
MNAA 1/2865 (Pls. 27 & 28)	11.0	4.00	16.0	6.00	3.10	1.73
Race						
Imbricado (Colombia)[4]	11.0	3.80	14.3	7.23	5.26	1.37
Specimen						
MNAA 1/2609 (Pls. 42 & 43)	14.6	3.70	12.0	7.40	5.25	1.35
Race						
Perlilla (Peru)[2]	11.1	4.17	14.0	6.62	4.96	1.33
Specimen						
MNAA 1/1681 (Pl. 38)	11.8	3.50	12.0	6.00	4.85	1.24

TABLE 4.--Continued.

Race	Length/cm	Diam/cm	Row No.	Kernel Characters		
				Width/mm	Thickness/mm	W/T Index
Polulo (Chile)[7]	9.6	2.37	12.0	5.25	3.47	1.51
Specimen						
MNAA 2/4756 (Pls. 13 & 14)	11.4	2.50	10.0	5.00	4.00	1.25
MNAA 2/4756 (Pls. 13 & 14)	4.7	2.30	10.0	5.00	4.10	1.21
Average	8.1	2.40	10.0	5.00	4.05	1.23
Race						
Confite Iqueño (Peru)[2]	5.7	2.44	16.8	4.70	4.50	1.04
Specimen						
Larco J-30839 (Pl. 25)	6.5	2.80	14.0	4.70	4.75	.99
Larco J-30839 (Pl. 24)	3.5	2.00	12.0	4.70	4.75	.99
Average						

[1]Brieger et al. 1958. [2]Grobman et al. 1961. [3]Grant et al. 1963. [4]Roberts et al. 1957.
[5]Major M. Goodman personal communication. [6]Timothy et al. 1963. [7]Timothy et al. 1961.

TABLE 5.--CONFITE MOROCHO, KARAPAMPA AND AVERAGES FOR CERAMIC SPECIMENS COMPARED IN EXTERNAL CHARACTERS OF THE EAR.

				Kernel Characters		
Race	*L/cm*	*Diam/cm*	*Row No.*	*W/mm*	*T/mm*	*W/T Index*
Confite Morocho[1]	6.7	2.3	10.6	5.87	4.55	1.29
Karapampa[2]	12.2	2.9	8.8	7.86	3.32	2.37
Specimen Average	8.2	2.2	8.0	7.50	4.00	1.88

[1]Grobman et al. 1961. [2]Ramírez et al. 1960.

Confite Morocho.- The ear of maize described here is the smallest ear found on any of the vessels in this corpus. It is considerably smaller than Confite Morocho as it is known today, or as it is known from archaeological collections (Grobman et al. 1961). For this reason, an alternative identification of Pisankalla from Argentina, a highland popcorn with very small ears, might be more appropriate (Brieger et al. 1958). The reason for selecting Confite Morocho over Pisankalla is related to kernel row number. The ceramic specimen has eight rows. Eight-rowed ears have not been reported in the literature for Pisankalla from Argentina; whereas, eight-rowed ears commonly occur among collections of Confite Morocho. Confite Morocho is considered by Mangelsdorf (1974) to be the progenitor of most eight-rowed races.

This race is found on a Moche effigy jar representing Ai-apaec (Plate 8), and on a black ware stirrup-spout jar depicting Ai-apaec which has the narrow spout diagnostic of Chimú pottery (Plate 33). During the Chimú era, there was a revival of some earlier Moche motifs, including the concept of the fanged god Ai-apaec in association with maize, as on the jar in Plate 33. The entire body

of the vessel is covered with tapered kernels showing distinctive pairing of the kernel rows, a botanical trait not observed in stylized depictions of maize (Mangelsdorf 1974). However, because the kernels are blended into the vessel body, there are no distinct ears surrounding the jar. The example for racial identification is a miniature ear held in the left hand of the Ai-apaec figure. It has eight straight rows of slightly pointed, diamond-shaped kernels on a very short, tapering ear.

The specimens on both of these jars are comparable in size to the Argentine brachytic popcorn, Lady Finger Pisankalla (Brieger et al. 1958), but in kernel shape and row number, they more closely resemble Confite Morocho (Table 6).

TABLE 6.--PISANKALLA, CONFITE MOROCHO AND CERAMIC SPECIMENS COMPARED IN EXTERNAL CHARACTERS OF THE EAR.

				Kernel Characters		
Race	*L/cm*	*Diam/cm*	*Row No.*	*W/mm*	*T/mm*	*W/T Index*
Pisankalla[1]	7.8	1.74	12.8	4.20	2.70	1.56
Confite Morocho[2]	6.7	2.30	10.6	5.87	4.55	1.29
Specimen						
Bruning B-99	3.3	1.50	8.0	4.00	2.50	1.60
MAI 23/196	5.4	2.00	8.0	5.00	2.90	1.72

[1]Brieger et al. 1958. [2]Grobman et al. 1961.

Confite Morocho is a primitive, ancient, flinty popcorn which may be a living counterpart of the first domesticated maize in Peru (Grobman et al. 1961). It is still found growing in the Andean highlands. Its center of distribution is in the Department of Ayacucho. The small ear on this vessel may be a replica of the earliest domesticated maize in Peru. Archaeological finds of such

tiny maize cobs in association with religious or ceremonial objects have been made at sites in the Department of Lambayeque on the far North Coast of Peru. At the same sites, cobs of larger, more productive races are found in domestic contexts. This indicates that this primitive, small-eared race was grown for ritual purposes (Oscar Hernández Córdova personal communication).

Confite Morocho is found today at elevations of 2500-3000 meters above sea level. Grobman et al. (1961) postulate that it was once more widely distributed in Bolivia and Ecuador, growing at intermediate elevations and in the river valleys along the coast. It had not evolved yet for environmental specificity. Because of its early maturity and adaptability to extreme environmental conditions, it could be grown in these areas.

The Indians of the Andean highlands still grow Confite Morocho in small plots. It is used for consumption in its popped form. Because of the difference from other races in flowering time, it continues to grow in relatively pure form. The Indians select ears for their small, flinty kernels which are particularly good for popping (Grobman et al. 1961).

Kculli.--Kculli is a high altitude race with short, spheroconical ears which taper toward the tip. It has an average of twelve kernel rows, and the kernels may be slightly imbricated or rounded. It is described by Grobman et al. as a primitive race from Peru (1961:154-158). Kculli is used for dyeing foods and drinks, in particular chicha and maize and tapioca flour jellies called

mazamorras. The name Kculli is said to be derived from the Quechua word *kculli* (pronounced k'hulli), which means black. Ears of Kculli are very dark purple.

Grobman et al. discuss the ceramic evidence for the existence of Kculli in prehistoric times. They illustrate a clay replica of Kculli (1961:Fig. 40), and observe that it must have been a distinct race in the early agricultural period on the coast of Peru. Its presence there is indicated by the dark pericarp color of ears among archaeological collections from Los Cerillos, Ocucaje, Paracas and Nazca (1961:157).

Enano.--Ears of Enano are quite small and sphero-conical in shape. This is an early maturing race. The small, flinty kernels are tightly compacted on the cob and are irregularly arranged (Ramírez et al. 1960:141; Grobman et al. 1961:163). Enano has sixteen to eighteen kernel rows. In Peru, it has been collected in jungle areas in the Department of Madre de Dios, notably along the Tambopata River, a branch of the Madre de Dios river system (Grobman et al. 1961:163). Enano is much like the race Confite Puneño, but its characteristics are more tripsacoid. The common name of the Peruvian collections is Tambopateño. This race appears to have a wider distribution in Bolivia than in Peru (Grobman et al. 1961:164). Enano is represented on an Ai-apaec jar (Plate 23).

Pollo.--Pollo is a primitive race of popcorn found growing today in the Andean highlands. Collections of Pollo have been made in Colombia (Roberts et al. 1957) and in Venezuela (Grant et al. 1963). It has been identified among archaeological plant remains from the

site of El Tiestal in Venezuela (Mangelsdorf and Sonója 1965). Ears of the ancient, indigenous Mexican races Nal Tel and Chapalote introgressed by Pollo have been identified from finds at Sitio Pití, an archaeological site in the Chiriquí highlands of Panama (Linares, Sheets and Rosenthal 1975).

Pollo is represented on five vessels, three depicting Ai-apaec (Plates 9,21 and 29), one depicting a maize plant (Plate 37), and one resembling a basket of maize (Plate 46).

With the exception of the maize ears on the jar in Plate 29, the ears displayed on the vessels have the characteristic shape of Pollo. They are small, cylindrical and slightly tapering. They have rounded kernels. The ear of the "basket of maize" jar (Plate 46) shows an irregularity in the arrangement of the kernel rows at the base, a characteristic often seen in ears of Pollo. The ear shape in Plate 29 cannot be determined because the original upper portion is missing. It was apparently broken off and repaired by the museum.

Today, Pollo grows relatively isolated in Colombia. Its center of distribution is Boyacá, the region where the archaeological remains of the Chibcha culture have been found. Roberts et al. (1957) hypothesize that Pollo was grown there by the cave dwellers who preceded the Chibcha. Grant et al. (1963) emphasize that Pollo has striking similarities to the highland Guatemalan races Nal Tel Tierra Alta, Serrano and Quicheño Precoz. They suggest that Pollo was a result of cultural contact between the highland Maya of Central America and the Chibcha of the Andean highlands.

The identifications of Pollo on these Moche vessels provides evidence that Pollo was more widespread during the Classic period than its present distribution, and contribute to the mounting botanical evidence in support of a theory of cultural contact throughout a wide area in Latin America among different groups during the Classic period.

Pira.-Pira is a primitive popcorn race found in Colombia and Venezuela. It has short, slender, flexible ears with ten to twelve kernel rows. The ears are slightly tapered from base to tip. The kernels are small and rounded (Roberts et al. 1957; Grant et al. 1963).

Pira is represented on two Moche stirrup-spout jars (Plates 30 and 32). Roberts et al. (1957:40) suggest that Pira may be related to the Peruvian races Confite Morocho and Confite Puntiagudo, but note that the ear shape and regular arrangement of the flattened, white kernels are markedly different from the Peruvian popcorns. Pira's present distribution in Colombia is in the Department of Cundinamarca, growing at an average elevation of 1100 meters. In Venezuela, its distribution is restricted to the state of Táchira, bordering Colombia (Grant et al. 1963:36). It apparently does not have any closely related counterparts, and has not given rise to any races by hybridization or selection. It is geographically and genetically isolated, and is centered in the Magdalena Valley at low altitudes.

Huancavelicano.--The center of distribution for Huancavelicano is in Peru in the Department of Huancavelica, for which the race is named. It is a high altitude race grown at elevations from 2200 to

3500 meters above sea level. It is an eight-rowed race, but occasionally ears may have ten rows. The ears are small, and range from cylindrical to conical. The kernels are wide and pointed. Grobman et al. note the similarity between Huancavelicano and Confite Morocho and postulate that the former derived from the hybridization of Confite Morocho and Kculli. It is a putative parent of the Cuzco races and is believed to have originated early in the development of agriculture in the southern highlands of Peru. It is reported that there are prehistoric stone replicas of Huancavelicano in private collections in Lima, and that one of these was found at an archaeological site on the coast in the Chancay Valley (Grobman et al. 1961:196).

The data for the ceramic replicas identified as Huancavelicano are considerably smaller than the data from modern collections of this race. The ceramic replicas, however, show a striking resemblance to Huancavelicano in ear shape, kernel shape and the row number. The kernels on the pottery examples are all very wide and pointed (Plates 44, 45, 48 and 49). On two of the jars, the ears have four kernel rows, doubled to give a count of eight for the full ear. On two others, however, there are only three kernel rows which can be detected (Plates 44 and 45). It is proposed that these do not represent the full half rounds of the ears because they are in very low relief. Presumably, these replicas were impressed from a mold made from an eight-rowed ear, but when they were added to the jars, they were worked into the clay in such low relief that the fourth row for the full half round was obscured. The four vessels

depicting Huancavelicano are all "basket of maize" ollas. Two are black ware jars with fish designs, and two are red ware jars decorated with painted zigzag borders.

Mochero.--Mochero is a very early maturing race grown on the North Coast of Peru. It has a limited distribution today in the Departments of La Libertad, Lambayeque and Piura. It is not grown at altitudes over fifty meters above sea level. Mochero has short, stubby ears which are cylindrical. They are tapering at the tip and rounded at the base. The kernels have up to fourteen rows and tend to be irregularly arranged so that the kernel rows appear in a spiral pattern. The name Mochero has been assigned to this race by Grobman et al. because some of the first collections made were from the Moche Valley (1961:201). Another name given this type of maize by farmers is Blando Local. On the North Coast, Mochero is a prized variety for making chicha.

Mochero is represented on three vessels in association with Ai-apaec (Plates 11, 12, 18, 19 and 20). Two have the provenience Lambayeque. Grobman et al. report that Mochero's "largest concentration is found in the small dry valleys of the 'Pueblos' area north of the city of Chiclayo, where it is irrigated by the summer or *avenida* waters of small, irregularly flowing rivers" (1961:198). Chiclayo is in the Department of Lambayeque. This drought resistant race can be harvested in three and a half months after planting and does not require more than two irrigations.

Pagaladroga.-Pagaladroga is classified by Grobman et al. (1961:201) as an anciently derived race, meaning that it came into existence in pre-Columbian times through the hybridization of primitive popcorns or other races already derived from primitive forms. It has a slender, cylindrical ear with a slight taper towards the tip. It may have from twelve to sixteen kernel rows, frequently with an irregular arrangement. The kernels are small and somewhat imbricated (1961:202).

Pagaladroga is represented on the "basket of maize" vessel in Plate 50. It is suggested that the jar was used as a chicha container. Pagaladroga is almost extinct today. It is still grown by a few farmers in the northern coastal valleys from Trujillo to Piura. Grobman et al. (1961:203) suggest that it was much more widespread on the Peruvian North and Central coasts during the Formative and Classic periods. Other names for Pagaladroga include Putita and Aleli (1961:205).

Pagaladroga is used in chicha manufacture. Nicholson (1960:291) lists a race called Aleli and one called Pagadroga or Pogladroga as types of maize used for making chicha on the North Coast. He describes Pagaladroga as a "strictly local variety" in the Pacasmayo area.

Kcello.-Kcello has been collected in the highlands of Bolivia. Collections were made in the southern departments of Potosi, Tarija, Chuquisaca and Cochabamba. It was also collected in the Department of La Paz in a region north of Lake Titicaca. This race has been found growing at a mean altitude of 3560 meters. Ears of Kcello

have eight to ten straight rows. The ears are straight with a taper at the tip. It has yellow, flinty kernels and is an early maturing race (Ramírez et al. 1960:56). Kcello has been identified on three Moche jars representing Ai-apaec wearing snake-head ear ornaments (Plates 15, 16 and 17).

Clavo.-Clavo, a Colombian race, has a long, slender ear with a taper toward the tip. It frequently has an enlarged base with irregular rows. This feature is evident on the ears surrounding a jar depicting Ai-apaec wearing a bead necklace (Plate 10).

Clavo is thought to be a relict race introduced from Peru where it now has no counterpart (Roberts et al. 1957). This specimen provides evidence to support the hypothesis that Clavo was present in Peru in prehistoric times.

Güirua.-Güirua, a Colombian race, is indentified on three stirrup-spout jars giving the appearance of being mounds of maize (Plates 39, 40 and 41). Ears of Güirua are usually long, slender and tapering, but some short, thick, conical ears are found. The kernels are intermediate in size and are well rounded (Roberts et al. 1957).

The distribution of Güirua is limited to the Department of Magdalena near the Sierra Nevada de Santa Marta, an area formerly inhabited by the Tairona culture which is believed to have received strong influences from Central America and Mexico (Loven 1935; Reichel-Dolmatoff 1965). The origin of Güirua is unknown. The meaning of the name is unknown, but it is presumed to be of Indian origin because it is the name given this race by the non-Spanish speaking Indian farmers from whom it was collected (Roberts et al 1957).

Roberts et al. (1957) assign Güirua to the category, "Races Probably Introduced," which means that it has no obvious progenitor in Colombia, but has a counterpart in another country. It is interesting to note that Güirua's counterpart is Negro de Chimaltenango, a highland race from Guatemala (Wellhausen et al. 1957). Whether this race diffused from Central America into Mesoamerica, as proposed by Mangelsdorf (1974), cannot be determined on the basis of present evidence. However, the presence of this race in Colombia and highland Guatemala strongly points to cultural contact between the two areas. Güirua's representation on a Moche vessel suggests these contacts extended as far south as Peru during the Classic period. The identification of this same race on a mazorca sherd from Mitla, Oaxaca, (Plate 60) is testimony for direct connections between southern Mexico and South America.

Guaribero.- Guaribero is another Venezuelan race. It has short, conical ears and a high row number of thickly arranged, flinty kernels. Grant et al. (1963) suggest that these are a distinctive combination of characters which indicate that Guaribero may be a race of considerable antiquity. The identification of Guaribero on a Moche effigy jar (Plate 26) lends evidence to document the antiquity of this race.

Chococeño.- Chococeño is found growing today on the Pacific coast of Colombia and Ecuador (Timothy et al. 1963). A form of Chococeño introgressed with Coastal Tropical Flint is also grown in the Darien region of Panama by a group of Chocó Indians who migrated from Colombia about twenty-two years ago (Nickerson and Covich 1967).

Chococeño is a highly unusual race because of its extremely tripsacoid characteristics and the way in which it is cultivated. It has thick, short, conical ears with a high row number of narrow, thin kernels. The ears encircling this stirrup-spout jar representing Ai-apaec wearing a flat, caplike headdress, snake-head ear ornaments and accompanied by a snake curling around the jar (Plate 27) resemble Chococeño. They also bear some resemblance to the race Alazan, which is an alternate choice for the identification of this specimen. Table 7 compares the data for the external characters of the ears of Chococeño, Alazan and the ceramic specimen. The width/thickness index for Alazan compares more favorably with the ceramic specimen's index than the index for Chococeño does.

TABLE 7.--CHOCOCENO, ALAZAN AND CERAMIC SPECIMEN COMPARED IN EXTERNAL CHARACTERS OF THE EAR.

				Kernel Characters		
Race	*L/cm*	*Diam/cm*	*Row No.*	*W/mm*	*T/mm*	*W/T Index*
Chococeño[1]	12.4	4.08	19.6	6.60	4.20	1.57
Chococeño[2]	11.0	3.65	17.2	6.47	4.10	1.57
Alazan[3]	15.8	4.90	14.2	9.20	4.80	1.92
Specimen						
MNAA 1/2609	14.6	3.70	16.0	6.00	3.10	1.93

[1]Timothy et al. 1963. [2]Roberts et al. 1957. [3]Grobman et al. 1961.

Chococeño is grown by a primitive method of cultivation in Ecuador and Colombia in a region of very high rainfall, sometimes exceeding 400 inces in one year (Roberts et al. 1957). In the area for planting, the small trees and bushes are cut over, then the seed is sown out over this area. It germinates on top of the ground with the plants growing up through the cut over vegetation.

Chococeño is classified as a "Colombian Hybrid Race" (Roberts et al. 1957), which means that it was derived in Colombia through the hybridization of previously existing races, but there is no evidence to show when this hybridization occurred. This identification indicates that Chococeño was present as early as the Classic period. Its presence in Peru by this time may lend credence to the hypothesis that Chococeño has had influence on Peruvian races (Roberts et al. 1957).

Imbricado.- Imbricado is a Colombian pointed popcorn which is also found to the south in Ecuador and Peru (Roberts et al 1957). Three ears of Imbricado, each formed from the same mold, occur on a Moche piece which represents a bowl of maize. This piece is not an actual container, as are the other jars in this corpus (Plate 42). The maize ears have twisted rows and long, pointed, imbricated or overlapping kernels which are characteristic of Imbricado. This race has affinities with Guatemalan Imbricado (Wellhausen et al. 1957), and with Palomero Toluqueño from Mexico (Wellhausen et al. 1952). Palomero Toluqueño is considered by Mangelsdorf to be the ancestor from which all pointed popcorns of South America are descended (1974).

In addition to the vessels depicting maize, a two-part mold is included in this corpus (Plate 1). The provenience of this mold is the Valley of Chancay. Ironically, I have not found any vessels depicting mold-made maize which have Chancay for the provenience. The Valley of Chancay is on the Central Coast of Peru. This mold is the only example of a maize mold that I have seen. It is important

because it documents the use of such molds for those who might otherwise question a basic premise of this research.

Whereas most of the depictions of maize are of only half the ear, this mold was meant for fashioning a complete ear. A section of the mold has a hole in the center. This mold could have been used to form a vessel in the shape of a complete ear with the hole providing for the attachment of the spout to the vessel body. A vessel of this type is illustrated by Grobman et al. (1961:Fig. 130).

The race represented by the mold cannot be adequately identified on the basis of only a negative of the ear. However, the shape and measurements provide useful data for forming a guess about its identification. The ear most closely resembles the highland Guatemalan race Imbricado (Table 8). Imbricado from Central America has twelve to sixteen rows of pointed, imbricated kernels on long, tapering ears (Wellhausen et al 1957). The mold has twelve rows of imbricated kernels, and although the race cannot be positively identified, it is unquestionably a pointed popcorn.

TABLE 8.--IMBRICADO FROM CENTRAL AMERICA AND CERAMIC SPECIMEN COMPARED IN EXTERNAL CHARACTERS OF THE EAR.

				Kernel Characters		
Race	*L/cm*	*Diam/cm*	*Row No.*	*W/mm*	*T/mm*	*W/T Index*
Imbricado[1]	16.2	4.8	14.4	8.60	4.60	1.87
Specimen						
Amano 128	16.0	3.5	12.0	8.50	4.30	1.98

[1]Wellhausen et al. 1957.

Perla.-Perla is grown today in the North and Central coastal valleys of Peru, from Chincha in the south to Virú in the north. Ears of Perla are of medium length, and range from cylindrical to conical. It has a high number of kernel rows, averaging 15.6. Grobman et al. classify Perla as an "Anciently Derived Race," meaning it originated from a Primary Race (1961). A "Primary Race" is defined as one believed to have originated during pre-Columbian times through isolation, hybridization and selection from Primitive Races. Secondary Races are also said to have "appeared largely in the Post-Columbian Epoch" (1961:138). Perla has been identified on two stirrup-spout jars representing rats (Plates 35 and 36). The maize ears on these jars are large and have a high number of kernel rows. If the identification of Perla is accepted, then these specimens provide evidence that this race was grown in pre-Columbian times as early as the Classic period. Grobman et al. point out that there are similarities in the morphological and cytological characteristics of Perla and Alazan, and that the distribution of these races is overlapping. It is suggested that the Moche were growing Perla, one of the most productive races of maize grown on the coast today, during the Classic period.

Perlilla.-Perlilla is a Peruvian race which falls under the category "Imperfectly Defined Races"(Grobman et al. 1961). This race has been found with a limited distribution in the lowlands of Huanúco. The ears are cylindrical and the kernels have an irregular arrangement. Although it has not been determined that Perlilla is a distinct race, Grobman et al. postulate that it could

perhaps "represent the missing link in the distribution of round-seeded tropical popcorn races in the east Andean central lowlands" (1961:332). Perlilla seems to be represented by some archaeological corncobs found in caves near Lauricocho, Huanúco, and they are interpreted as providing evidence for the distinctiveness and antiquity of Perlilla (Grobman et al. 1961:334). The identification of Perlilla on a Moche jar (Plate 38) provides corroborative evidence for this interpretation of the archaeological maize remains from Lauricocho.

Polulo.-Polulo is a finger-shaped popcorn with narrow ears and ten to sixteen kernel rows. Timothy et al. (1961) illustrate three representative ears of Polulo, varying from an ear with highly irregular rows, to one with slightly twisted rows, to one with straight rows. Polulo's kernels also vary from pointed to rounded in shape. This same variation is seen in the ears depicted on this jar representing Ai-apaec (Plate 13). The ears encircling the jar are relatively long with irregular rowing and some slightly pointed kernels. These contrast with two short ears placed on the sides of the jar at the level of the figure's head. These smaller ears have slightly twisted rows of more rounded kernels.

Though Polulo apparently is not duplicated in collections of living maize races from other South American countries (Timothy et al. 1961), it is reported among finds of archaeological maize cobs from a site near the town of Chiu Chiu in the Atacama Desert of northern Chile (Mangelsdorf and Pollard 1975). Maize remains appear in the

archaeological record there in association with the appearance of artificial means of irrigation ca. 100 A.D. Mangelsdorf and Pollard (1975) suggest that Polulo has affinities with the Peruvian popcorn race Confite Morocho, also described here.

Confite Iqueño.-Confite Iqueño has been described and classified solely on the basis of archaeological maize remains. The available data for Confite Iqueño was obtained from a collection of unusually well preserved maize ears from the Los Cerrillos site in the Ica Valley on the South Coast of Peru (Grobman et al. 1961).

Confite Iqueño is a popcorn which is said to be a forerunner of the floury coastal races. The ears are short and almost shperical in shape. They vary in length from two centimeters to nine centimeters. The kernels have an irregular arrangement of twelve to twenty-four rows of round, almost isodiametrical shape. This race is identified on a stirrup-spout jar representing Ai-apaec accompanied by two smaller figures (Plate 24). Outside of the Ica Valley, it has also been described among archaeological remains at a site in northern Chile by Mangelsdorf and Pollard (1975). These authors postulate that Confite Iqueño is related to the race Capio Chico Chileño, a race grown in Chile today.

Maize Races on Mexican Specimens

Six races of maize have been identified on twenty-seven Zapotec urns and on some mazorca sherds, i.e. mold-made maize replicas broken from urns. The sherds include complete ears and some fragments of maize ears. Not included among the identifications is a specimen

with depictions of a type of dent corn. The measurements for this specimen have not been available and they are required for a definite identification. Four of the races identified are Mexican races. Two of the races identified, however, are South American varieties. One is presently grown in Colombia; the other in Ecuador. The wide variety of different races and geographical distributions seen on the Peruvian pottery is not represented on the Oaxacan specimens. Table 9 compares the races of maize with the Mexican ceramic replicas.

Nal Tel.-Nal Tel is an early maturing, primitive race of pod-popcorn, The ears are short with a slight taper, and the kernels are small and rounded (Wellhausen et al. 1952:59). Nal Tel is the race most frequently depicted on Zapotec urns. It is represented on twenty-one of the twenty-seven vessels in Table 9. The repeated representation of Nal Tel on Monte Albán IIIB and IV urns implies that during these periods Nal Tel had special religious significance for the Zapotecs. Whether Nal Tel was the main type of maize grown for subsistence is open to question. The consistent depiction of Nal Tel on urns, however, along with its faithful representation in its natural form, when all other aspects of the urns are highly conventionalized, strongly suggest important symbolic connotations for this race. It is emphasized that, in contrast to the Moche who realistically depicted many food plants on their pottery jars, maize was the only plant realistically depicted on Zapotec urns.

Nal Tel is an ancient indigenous race which matures after several good rains, making it highly valuable in a dry area. It may have been retained by the Zapotec for votive offerings because

TABLE 9.--RACES OF MAIZE AND MEXICAN SPECIMENS COMPARED IN EXTERNAL CHARACTERS OF THE EARS.

Race	*Length/cm*	*Diam/cm*	*Row No.*	*Kernel Characters*		
				Width/mm	*Thickness/mm*	*W/T Index*
Nal Tel (Mexico)[1]	7.9	2.70	11.4	6.70	3.90	1.86
Specimen						
MNA 6-2293	-	2.30	10.0	4.75	3.60	1.32
MNA 6-2290	-	2.30	10.0	4.75	3.60	1.32
MNA 6-2289	-	2.20	10.0	4.50	3.60	1.25
MNA 6-6717	-	2.55	8.0	7.00	4.60	1.52
MNA 6-6754	-	2.20	8.0	6.50	3.75	1.73
Frissell 6883	-	2.65	10.0	7.20	3.60	2.00
MNA 6-338	-	2.50	12.0	6.00	4.00	1.50
Frissell 8870	-	2.60	10.0	7.50	4.20	1.79
Frissell S-1796	-	2.75	10.0	7.50	4.20	1.79
MNA 6-6708	7.6	2.30	10.0	5.00	3.00	1.67
MNA 6-6758	-	2.00	8.0	5.50	3.60	1.53
MNA 6-5421 (Pl. 52)	-	2.60	8.0	6.75	4.60	1.47
MNA 6-275 (Pl. 53)	-	2.10	10.0	5.50	3.80	1.45
MNA 6-328	-	2.30	10.0	6.00	3.90	1.54
MNA 6-6697	-	2.60	10.0	6.00	3.60	1.67
MNA 6-6672 (pl. 54)	-	2.50	10.0	6.00	4.00	1.50
MNA 6-6674	-	2.30	10.0	6.00	3.80	1.58
Frissell 4279 (Pl. 55)	5.9	1.85	8.0	5.75	3.45	1.67
Frissell 4889 (Pl. 56)	-	3.90	12.0	6.00	3.60	1.67
St. Louis 68:452	-	2.50	8.0	6.20	4.10	1.51
St. Louis 3051.73	-	2.50	8.0	6.20	4.00	1.55

TABLE 9.--Continued.

Race	*Length/cm*	*Diam/cm*	*Row No.*	*Kernel Characters*		
				Width/mm	*Thickness/mm*	*W/T Index*
Chapalote (Mexico)[1]	11.0	2.90	12.3	6.70	4.10	1.63
Specimen						
Frissell 8269 (Pl. 2)	10.0	2.65	12.0	6.00	3.80	1.58
MNA 606885	10.1	2.90	12.0	7.50	4.60	1.63
UM NA-2141 (Pl. 61)	9.7	3.00	12.0	6.75	4.80	1.41
Average	9.9	2.85	12.0	6.75	4.40	1.54
Race						
Dzit-Bacal (Central America)[2]	17.2	3.80	9.2	10.20	4.30	2.37
Specimen						
MNA 6-6012 (pl. 58)	11.9	2.80	12.0	7.00	3.70	1.89
MNA 6-6223	-	3.10	8.0	7.50	3.60	2.08
Average	11.9	2.95	10.0	7.25	3.65	1.99
Race						
Conico (Mexico)[1]	13.6	4.30	16.0	6.60	3.60	1.83
Specimen						
MNA	8.2	3.20	16.0	5.50	4.00	1.38
Race						
Güirua (Colombia)[3]	16.2	4.30	12.2	7.97	4.88	1.63
Specimen						
MARI 35-6004	16.0	3.50	14.0	7.75	4.35	1.78

TABLE 9.--Continued.

Race	*Length/cm*	*Diam/cm*	*Row No.*	*Kernel Characters*		
				Width/mm	*Thickness/mm*	*W/T Index*
Canguil (Ecuador)[4]	11.1	3.30	15.0	5.60	4.50	1.24
Specimen						
Senter U5/4554 (Pl. 62)	-	3.20	14.0	6.00	5.00	1.20
Senter U5/4552	-	3.20	14.0	5.50	5.20	1.06
Senter U5/4239	-	3.00	12.0	5.75	5.00	1.15
Average	-	3.10	13.3	5.75	5.06	1.14

[1]Wellhausen et al. 1952. [2]Wellhausen et al. 1957. [3]Roberts et al. 1957. [4]Timothy et al. 1963.

it is an ancient variety, descended from primitive maize such as that found in the Valley of Tehuacán (Mangelsdorf, MacNeish and Galinat 1967b:188). Although Nal Tel is not as productive as other maize races, it is dependable because it is more drought resistant than many other races.

The name Nal Tel is from the name commonly used to refer to this variety of maize in the Yucatán Peninsula. Wellhausen et al. report that the name is of Mayan origin; that *nal* means ear of maize, and *tel* means rooster. (I realize the rooster is of Old World origin.) They indicate that since the rooster is an early riser, the name refers to the early maturity of this type of maize (1952:62). The Mayan origin of the words is confirmed by the *Motul Dictionary*. However, the meaning of the words is slightly different from the above interpretation. *Nal* refers to maize in the fresh state, i.e. before it is dried (Martinez Hernández 1929:662). *Nal* is what is commonly referred to as corn on the cob, and in Mexico, it is sold in the markets boiled in the husks (Victoria Bricker personal communication). *Tel* is derived from the root *te*, and it refers to a plant (Martinez Hernández 1929:846-847). The name Nal Tel may be interpreted as referring to a corn plant in ear before the stalks have been doubled (Victoria Bricker personal communication). This interpretation also indicates that the name is used to designate an early maturing variety of maize.

Nal Tel ranges in elevation from 100 meters to 1800 meters, but is best adapted to lower elevations. Modern collections of this race have been principally in the state of Yucatán and in neighboring

parts of Guatemala. Ears, virtually identical to ears of Nal Tel from Yucatán, were collected in the Huasteca area of the Gulf Coast, and other collections have been made in Oaxaca and Guerrero (Wellhausen et al. 1952:60). Plates 52, 53, 54, 55 and 56 illustrate urns with representations of Nal Tel.

Archaeological remains of Nal Tel have apparently been found in Oaxaca. There have recently been finds of quantities of maize in early deposits by members of the Oaxacan project directed by Kent V. Flannery (Donald L. Brockington personal communication). As far as I know, however, the only published report of any of these finds is a brief description of three cob fragments found at the site Fábrica San José in the Etla Valley. They have been described as "Nal Tel-like", and were presumably carbonized because they are reported to have been used for fuel (Ford 1976:264).

Chapalote.-Like Nal Tel, Chapalote is an ancient indigenous race and primitive popcorn. Ears of Chapalote are distinct from Nal Tel in their pronounced cigar shape and brown pericarp (Wellhausen et al. 1952:54-58). However, in the early stages of evolution, as evidenced by materials from the Valley of Tehuacán, these two races could only be distinguished by their pericarp colors (Mangelsdorf 1974:117). Chapalote is found today in a restricted area in the states of Sinoloa and Sonora, but it is believed to have been more widespread in prehistoric times in western Mexico and parts of the southwestern United States. Present collections of Chapalote range in elevation

from 100 to 600 meters. However, it is adapted to a wider elevation range and will produce ears at an altitude up to 2200 meters.

Chapalote has been identified on three Zapotec urns. It is distinguished from representations of Nal Tel by the longer, more cylindrical ears.

Dzit-Bacal.-Plate 58 shows a vessel encircled with twenty maize ears. All of the ears were impressed from the same mold. The maize on this vessel has been identified as Maíz Blando de Sonora (Eubanks 1973:90-91), Olotillo (Wellhausen et al. 1952:217), and Quicheño (Mangelsdorf 1974:192). The long, cylindrical ears closely resemble the shape of ears of Olotillo. However, the kernel width/thickness index for Olotillo seems too high to compare favorably with the index for the ceramic replicas. Although Quicheño seems a good choice on the basis of comparison of ear shape and size, it has more rounded kernels than those displayed by the ceramic specimens. Major M. Goodman (personal communication) suggested that the ears on this urn most closely resemble the race Dzit-Bacal. Of the three reasonable choices for identifcation of the race, the data for Dzit-Bacal compare most favorably, as shown by comparisons of the data for Dzit-Bacal, Quicheño and Olotillo with the data for the ceramic specimens in Table 10.

The name Dzit-Bacal, like Nal Tel, is also of Mayan origin. *Dzit* is a classifier meaning long and thin (Martinez Hernández 1929:285). *Bacal* refers to the maize cob, specifically with the kernels removed

(Martinez Hernández 1929:126). Therefore, it is presumed that the name Dzit-Bacal is used to designate this variety of maize on the basis of its long, thin cobs.

TABLE 10.--QUICHENO, OLOTILLO, DZIT-BACAL AND CERAMIC SPECIMENS COMPARED IN EXTERNAL CHARACTERS OF THE EAR.

				Kernel Characters		
Race	*L/cm*	*Diam/cm*	*Row No.*	*W/mm*	*T/mm*	*W/T Index*
Quicheño[1]	13.8	3.6	12.5	8.7	6.8	1.28
Olotillo[2]	19.8	3.8	9.4	10.8	3.9	2.77
Dzit-Bacal[1]	17.2	3.8	9.2	10.2	4.3	2.37
Specimen						
MNA 6-6012	11.9	2.8	12.0	7.0	3.7	1.89
MNA 6-6223	-	3.1	8.0	7.5	3.6	2.08

[1]Wellhausen et al. 1957. [2]Wellhausen et al. 1952.

Dzit-Bacal has been described as a sub-race of Olotillo (Wellhausen et al. 1952:146). In Mexico, its present distribution is in the lowlands of Yucatán and Campeche. It is also found in Guatemala in the departments of Jutiapa, Jalapa, El Progresso, Zacapa, Chimaltenango, Escuintla, San Marcos and Quetzaltenango (Wellhausen et al. 1957:96-100). The main difference between Olotillo and Dzit-Bacal is that the latter race has smaller, more flinty kernels, a more flexible cob and is less tripsacoid. Dzit-Bacal may have derived from the hybridization of Nal Tel and Olotillo (Wellhausen et al. 1952), or possibly from the hybridization of Guatemalan Nal Tel with a flexible-cobbed race similar to Clavo of Colombia (Wellhausen et al. 1957:100).

Conico.-Conico has short, conical ears with a distinct taper from base to tip. Its status as a pre-Columbian race has been corroborated by its identification from carbonized remains from Teotihuacán (Anderson 1946:161). It is the predominant race of maize grown in the Valley of Mexico today. It apparently developed through the hybridization of Palomero Toluqueño and Cacahuacintle (Wellhausen et al. 1952:84). An example of this race appears on an Aztec brazier, indicating that the molding technique to realistically depict maize was used by another culture (Eubanks 1973:150). However, this is the only example of an Aztec ceramic piece I know of with such a representation.

Güirua.-Güirua has been fully described elaswhere in this chapter (see pp. 99-100). It is illustrated on an Oaxacan specimen in Plate 60. This Colombian race has a counterpart in Guatemala, the race Negro de Chimaltenango.

Canguil.- Plate 62 illustrates one of three mazorca sherds shown to me by Donovan C. Senter. These sherds were excavated from an archaeological site near Xochicalco, Morelos. They are dated to the Early Postclassic period, ca. A.D. 900-1100. They are orange ware with traces of white. The sherds are unique and remarkable for the shape of their kernels which are strongly imbricated and distinctly beaked. The data for the characters does not compare well to data for Pepitilla, the Mexican pointed popcorn race (Wellhausen et al. 1952:135-141). The kernels on the ceramic mazorcas are larger and most closely approximate those of the Ecuadorean race Canguil, which has the same type of excessively

beaked, imbricated kernels (Table 11). Canguil has been collected in the Andean highlands at a mean altitude of 2260 meters (Timothy et al. 1963:24).

TABLE 11.--PEPITILLA, CANGUIL AND CERMAIC SPECIMENS COMPARED IN EXTERNAL CHARACTERS OF THE EAR.

				Kernel Characters		
Race	*L/cm*	*Diam/cm*	*Row No.*	*W/mm*	*T/mm*	*W/T Index*
Pepitilla[1]	19.0[2]	5.5[2]	15.5	7.90	3.5	2.28
Canguil[3]	11.1	3.3	15.0	5.60	4.5	1.24
Specimen						
Senter U5/4554	-	3.2	14.0	6.00	5.0	1.20
Senter U5/4552	-	3.2	14.0	5.50	5.2	1.06
Senter U5/4239	-	3.0	12.0	5.75	5.0	1.15

[1]Wellhausen et al. 1952. [2]Major M. Goodman personal communication. [3]Timothy et al. 1963.

It has been suggested that the maize represented by the sherds may actually be a variant of Pepitilla found today in the same area as the Mexican race Arrocillo Amarillo (Major M. Goodman personal communication). The present distribution of Pepitilla is in Morelos and northern Guerrero in the Upper Balsas River Basin at elevations of 1000 to 1700 meters above sea level (Wellhausen et al. 1952:139).

Dent Corn.- The vessel in Plate 57 is encircled by ears of maize whose kernels show a slight indentation, i.e. denting. Denting is a characteristic of the race Tuxpeño, a race considered to be ancestral to the highly productive Corn Belt dent corn grown in the Midwestern part of the United States (Mangelsdorf 1974:191). The ears on this vessel closely resemble Tuxpeño, as suggested by Wellhausen et al (1952:148). A definite identification of this race, however, must await a comparison of measurements of the ear characters

of the ceramic mazorcas. This vessel provides evidence for the existence of dent corn in Oaxaca as early as ca. 600 A.D. Other evidence for the presence of prehistoric dent corn has been shown by finds in association with the Fremont culture in Utah dating from A.D. 900-1200 (Galinat and Gunnerson 1963:154).

CHAPTER V

CONCLUSIONS

Twenty-five races of maize have been identified on sixty-six vessels. Nineteen of these races are represented on thirty-five Peruvian jars; six races are found on twenty-seven Oaxacan urns and four mazorca sherds from Morelos. Some of the races identified provide evidence to suggest there was cultural contact between Mesoamerica and South America during the Classic period, ca. A.D. 300-900.

The Colombian races Pollo, Güirua and Imbricado, identified on Moche jars, have affinities with Mesoamerican races. The races Nal Tel and Dzit-Bacal, identified on Oaxacan urns, are grown today primarily in Yucatán and Guatemala. The Colombian race Güirua has been identified on a Oaxacan specimen, as well as on Moche jars. If the identifications are accurate, they provide evidence that the Zapotec and Moche were either in direct contact with each other, or were in contact with an intermediate cultural group from which both were receiving mutual goods. The identification of the Ecuadorean race Canguil on early Postclassic mazorca sherds from Morelos suggests that this race had spread northward into Mexico from South America as early as 900 A.D. This also implies contact between Mesoameric and South America.

In view of these findings, a comparative analysis of the pottery depicting mold-made maize and a review of other kinds of evidence for cultural contact between the two areas are considered and discussed in order to demonstrate corroborative evidence for contact and to understand the nature of the diffusion. The findings are also discussed in terms of potential contributions to our understanding of the evolution of races of maize from the archaeological record.

Comparative Analysis of the Pottery Vessels

The pottery and vessel forms do not provide any evidence for direct contact. The Zapotec pottery is predominantly gray ware. The Moche pottery is predominately orange ware with some painted decoration in red, white and black. The pottery from both areas is generally well fired and highly polished. The Oaxacan urns are almost all cylinders with the figure built out in front of the container. The Moche jars are the plain jar form, the "basket" olla and the stirrup-spout. Depictions of figures are incorporated into the body of the vessel.

There are four exceptions among the Oaxacan pieces in which the body of the figure is incorporated into the vessel body as is the method of fashioning on Moche jars. These take on a more characteristic bottle shape, two of which are illustrated in Plates 55 and 56 (cf. Eubanks:Plates 21, 30, 36 and 44). The pottery of these rather unusual jars ranges from brown to dark gray or black.

Two have proveniences of Zaachila; one is from the Mixteca and another is from Ejutla. Since none are purportedly from Monte Albán, and they represent what may be considered provincial wares, the difference in execution is thought to represent regional variation in style rather than an import. Furthermore, the maize identified on these vessels is not unusual, but is the race identified on most Oaxacan specimens, Nal Tel.

Other pottery from Oaxaca which may represent the adaptation by the Zapotec of a foreign idea in the manufacture of pottery are vessels surrounded by maize ears (Plates 57, 58, 59 and 60). Included are three vessels and a sherd of two maize ears. It is assumed that the latter was probably from this same type of vessel on the basis of the shape of the interior wall present behind the maize ears. These vessels are made of the same well-fired gray ware as are most other Zapotec urns. The vessel shape, the method of displaying the full length of the maize ear rather than a section of it, and some of the maize races identified suggest these pots reflect influences from outside Oaxaca. The circular shape with vertical walls may be related to tripod bowls and incensarios from the Guatemalan highlands (Rands and Smith 1965:112). Similar types have also been found in burials on the Pacific coast of Guatemala (Shook 1965:183). Two of the maize races, Dzit Bacal (Plate 58) and Güirua (Plate 60) also suggest Guatemalan influence. Dzit-Bacal is considered to be of Guatemalan origin, and Güirua has a Guatemalan counterpart, Negro de Chimaltenango.

Maize on Zapotec urns is almost always associated with a god. Races of maize have been identified on urns representing eight different deities from the Zapotec pantheon. On most of the Moche jars, maize is also associated with a deity. It is, however, associated with only one divinity, Ai-apaec. Similarities between the divine representations include solemn, staring expressionless visages, representations of jewelry, including wrist bands, ear ornaments and bead necklaces. There is one Moche jar (Plate 26) which is unusual because the figure is apparently seated cross-legged. This posture is typical of the majority of the figures on Zapotec urns.

The most frequently depicted Zapotec deity was Cocijo, the God of Lightening and Rain. There are several Cocijo urns with maize in the tocado. The main attributes associated with Cocijo are the elements of the face which is composed of the bifurcated tongue protruding from the open jaws of a serpent and the nasal and buccal bands which are representative of feline charactersitics. The most important attribute of Ai-apace is the fangs which are supposed to denote the feline characteristics of the Moche god. A close association of this deity with a serpent is evident from the numerous representations of Ai-apaec wearing snake-head ear ornaments and the jar with a serpent curling around it. Although fangs do not occur on any of the Zapotec urns with representation of maize, there are examples of figures with fangs among the categories of Cocijo, the God with the Buccal Mask of the Serpent, the Jaguar God and the Bat God (Boos 1966b; Caso and Bernal 1952). Although the figures represented on the jars depicting mold-made maize do not provide any

evidence for a direct relationship between the two cultures, they definitely share certain basic underlying religious concepts associating feline and serpent attributes with the most important deities, and these in turn, have an association with maize.

Covarrubias traces the origin of the various Mesoamerican rain gods, Cocijo, Chaac and Tlaloc, back to the Olmec jaguar deity in the Preclassic period (1957:60). Parallels between the Olmec feline and the feline representations in the Formative Chavín culture from Peru have been observed by numerous authors (Benson 1972a). It has been postulated that there are direct relationships between the Olmec and Chavín cultures with Chavín having derived from the Olmec (Spinden 1917; Strong 1943). The Moche fanged deity derived from the Chavín feline god (Rowe 1962). It is proposed that there may be an indirect historical relationship between the Zapotec rain god and the Moche feline deity which can be traced to antecedant forms in the Olmec and Chavín cultures respectivly. However, there does not appear to be any direct relationship between the Zapotec and Moche deities.

It has been pointed out that the technique of using the mold to give impressions of maize that are precise replicas of the natural ears is practically unique to the Moche and Zapotec Classic period cultures. A few isolated occurrences of representations of mold-made maize on the pottery of other cultures have been noted. These include an Aztec brazier, mazorca sherds from Morelos and some Chimú vessels. There is no evidence, however, that these representations were produced on a large scale, and these are all Postclassic period manufactures.

Another example is a mazorca on a fragment of a headdress from an incensario from highland Guatemala for which I have no information regarding chronological placement.

The question whether this particular technique was an independent invention or whether it originated in one place and diffused to the other has been raised. Mangelsdorf observed: "This is a highly sophisticated form of ceramic art that so far as I know was not generally practiced with native plant products in any other part of the world" (1974:188). Although cultures all over the world have always depicted plants on vase paintings, stone carvings, incised or embossed on metals, woven in cloth and other artistic media, this molding technique appears to be unique to these two cultures of the New World at this early time in history. The closest examples to the maize casts are impressions of wheat accidentally fired in Iron Age pottery from Europe and the Near East which have been recognized and used as the basis for identifications of the grains (Helbaek 1959:368).

Considerations bearing on the problem of independent invention or a single origin include: (1) whether there are local antecedants in the receiving culture; (2) contemporaneity of the two items; (3) possibility for physical contact, and (4) the number and complexity of the artifacts shared. Contemporaneity of the use of the mold-made maize replicas has already been established.

The depictions of fruits and vegetables on the pottery of the North Coast of Peru appears in the Early Formative among Cupisnique grave goods ca. 1000 B.C. (Larco Hoyle 1966:51). Molded forms appear

in the Vicús ceramics by the Middle Formative ca. 600 B.C. (Larco Hoyle 1966:223). The use of molds to depict fruits and vegetables in their form true to nature has a long, antecedant development in Peru. Furthermore, the technique is used to represent at least eleven different plants. In Oaxaca, the only plant depicted by this method is maize. Its use is adopted suddenly during Monte Albán IIIB, and there is no demonstrable evidence for the use of this technique among any earlier cultures in Mesoamerica. Its abrupt occurrence in Oaxaca is apparently without any local antecedant development.

Elsewhere in Mesoamerica, the use of the mold first appears at Teotihuacán during the Classic period ca. 450 A.D. At this time molds were used to stamp out figurines and decorative ornaments which were applied to pottery vessels (Cook de Leonard 1971:184 ff.). There is no earlier use of molds in Mesoamerica. Molds for making figurines are the distinguishing marker between Teotihuacán II and Teotihuacán III (Covarrubias 1957:136). During the late Classic period the making of mold-made figurines spread throughout Mesoamerica. It occurs in the Olmec area of the Gulf Coast, in the Huasteca region, and in Maya pottery of the Tepeu phase at Uaxactún (Willey 1947:85). In contrast to this sudden appearance of mold-made ceramic objects in Teotihuacán III in the Valley of Mexico and its subsequent rapid widespread dissemination in Mesoamerica, mold-making occurred in Peru on the North Coast over a thousand years earlier and gradually gained popularity there as a method of pottery manufacture over a time span of hundreds of years.

Because the races of maize identified and the sudden appearance of molds in Mexico during the Classic period suggest contact between Mesoamerica and South America, it is necessary to review the possibilities for physical contact between the two areas and to look at other kinds of artifacts that may represent diffused traits or traded objects.

Other Evidence for Culture Contact

The evidence for trade between Mesoamerica and South America, and proposed routes for interchange between these two areas, has been thoroughly reviewed by Chard (1950).

Possible means for pre-Columbian travel were overland by foot, by sea in canoes or sailing rafts, or by a combination of both. From Mesoamerica to South America there are three possible routes: (1) by canoe along the Caribbean coast, (2) overland and (3) by sea along the Pacific coast. By sea along the Caribbean would have been relatively easy in dugout canoes travelling close to shore. The winds and currents do not present any major obstacles to travel along this route, and Chard considers this an established trade route from the Yucatán Peninsula along the Caribbean coast of Colombia and Venezuela (1950:2). An overland route would have been considerably longer and more difficult because it extends through mountains and jungles, but it was possible. Chard also considers this an established route from the Valley of Mexico to Panama.

Maritime trade along the Pacific coast would have been considerably more difficult because of strong currents, a rugged shoreline

and rough seas. Chard considers seafaring trade along the west coast of Mexico and Central America south to the coast of Ecuador as conjectural. He concedes the possibility of limited, sporadic seacoast trade from Panama south to the coast of Ecuador (1950:2).

Edwards, on the other hand, considers maritime trade between the western Guatemalan coast south to the Manabí coast of Ecuador, and perhaps as far south as the Chiclayo Valley on the north coast of Peru, via large dugout canoes or sailing rafts a distinct possibility (1969:4). He maintains that the actual conditions of the currents and the winds are not always as severe as have been reported, and that at certain times of the year, lengthy sailing voyages on the open sea would have been feasible.

It has been demonstrated that conditions along the Pacific coast are not always as difficult as Chard has described, and at certain times of the year, travel by sailing crafts would be entirely possible. From January to March, there are northerly winds which make rapid sail from as far south as the Gulf of Guayaquil to ports farther north in Central America relatively easy. The return trip is possible, but it takes two or three times as long (Murphy 1941:9). In his study of different means of aboriginal navigation, Edwards has convincingly shown that there was prehistoric sea travel along the Pacific coast by means of large dugout canoes and sailing rafts of light weight balsa wood (1965a). Furthermore, the large balsa log sailing rafts of Guayaquil which were in use on the coasts of Colombia, Ecuador and northern Peru were capable of making long sea voyages (Edwards 1960; 1965b).

There is evidence from ethnohistorical accounts which supports the contention that there was seafaring trade along the northern coast of South America at the time of the arrival of the Spanish. The first description of an encounter of an Indian sailing craft in the Pacific was written by Francisco de Xeréz. It was a description of an encounter by Bartolomeo Ruíz, a captain under the command of Francisco Pizarro, of a large raft with a sail carrying twenty men, loaded with cloth and other goods for trade off the coast of Ecuador (Porras Berrenechea 1937:66). Other hisotrical evidence bearing directly on the possibility of sea trade between Mesoamerica and South America is the translation of a Spanish document which contains a letter from the royal accountant Rodrigo de Albornoz to Charles V, dated December 15, 1525. This letter describes reports by Indians on the Zacatula coast at the mouth of the Balsas River of islands in the south that are rich in pearls and precious stones. Indians from the south were said to have travelled northward in large canoes bringing luxury items to trade for local products. The Indians from the south were said to have stayed for as long as five or six months to await good weather and calm seas before leaving to go back south (West 1961:133).

Although it can be demonstrated that there was long-distance trade by the Aztecs, Maya and Inca which extended into parts of Central America when the Spanish first arrived, the question of the antiquity and the nature of such distant contacts is more difficult to show. The evidence for long-distance contacts between the two areas comes totally from archaeology and depends on interpretations

of remains of material culture. Inferences concerning sea travel by peoples along the Pacific coast of northern South America for long distances must be made with due caution. It is noted that the only depictions of boats of any kind by the Moche are of small fishing boats. There are no illustrations of large sailing rafts laden with trade goods.

Evidence for trading contacts between Mesoamerica and South America has been considered by a number of authors, and it consists primarily of rather sporadic lists of cultural traits which have been found in both areas. On the Formative time horizon, Coe has compared pottery from La Victoria on the Pacific coast of Guatemala to Valdivia ceramics from the coast of Ecuador. On the basis of shared traits such as irridescent painting and pottery shapes, he has proposed that the two areas were directly connected through maritime trade (1960:384). Also, on this early time horizon, Porter has compared features including stirrup-spout jars, color zoning, zoned rocker stamping, flat and roller clay stamps, the feline motif and dual representations from Tlatilco in the Valley of Mexico to traits from the Chavín culture of Peru. She suggests there may have been connections between the two areas (1953:372).

The evidence for contacts during the Classic period include trait lists and some references to specific traits. Kidder observed similarities of traits such as trophy heads, human sacrifice, tripod vessels, metallurgy, negative painting and different pottery shapes (1940:459). Borheygi expanded the list to include sixty different traits shared between different regions in Mesoamerica and South

America. He observed Mesoamerican influences in archaeological materials from the Guatemalan highlands and the Pacific coast of Ecuador, and postulated contact by sea between the two areas during the Classic period (1959).

Some specific traits that have received special attention are metallurgical techniques (Willey 1955:41-42); copper items from western Mexico (Mountjoy 1969); shaft tombs in western Mexico (Meighan 1969:15); a thin orange vase in Ecuador (Jijón y Caamaño 1949); decoration of teeth by inlay and filing (Saville 1913); representations of the chimaera in art from Peru and western Mexico (Meighan 1969:18); non-functional copper axes from Oaxaca (Lothrop 1932:258); emeralds from South America at Coclé in Panama (Lothrop 1937), and a Mixtec tripod vase with a painted Peruvian design (Covarrubias 1957:196).

It can be seen by the long but incomplete list above that there are many instances of items or traits found in Mesoamerica or South America that suggest contact between the two areas. Such traits, however, are sporadic and it may be argued that contacts reflected by the occurrence here and there of sporadic trade items do not bear directly on the problems of the origins, history and development of the cultures involved. There is, however, a growing body of evidence for contact between Oaxaca and the coasts of Ecuador and northern Peru. There are several objects which have been found at Monte Albán that may be interpreted as Peruvian imports. Included is a gold crown with a single gold feather which is identical to the gold crowns worn by Moche and Chimú dignitaries. This is the

only example of one of these crowns found anywhere in Central America or Mexico (Lothrop 1936:72-73). Along with this crown small squares of differing sizes of sheet gold with a single small hole in the middle near the upper edge, identical to thin gold squares the Moche sewed on cloth to completely cover the robes of dignitaries have been found at Monte Albán (Caso 1969:Lám. 24). Other imported items at Monte Albán include a copper object fashioned like a pair of large scallop shells with a Peruvian design (Lothrop 1936:72-73), and thin, non-functional copper axes which are commonly found on the north coast of Peru (Lothrop 1932:258).

It has been pointed out that the use of molds in pottery manufacture and metallurgy appear sometime in the Late Classic period in Mesoamerica without precedent anywhere in Mexico or Central America. These appear to be technological innovations which moved northward from South America where both have a long history of development. It is proposed that the surgical procedure of trephination may also have been derived from South America. Caso reported a trephined skull from Tomb 80 and two others from Tomb 84 in excavations at Monte Albán (1938:38-39). These three, plus two others, were found in Monte Albán IIIB levels at that site. Skull surgery was practiced extensively in Peru, but the Monte Albán skulls represent the only examples of trephination in Mesoamerica, and they are found only in the Monte Albán IIIB period, the same time at which the mold-made maize impressions suddenly occur on Zapotec urns. Wilkinson argues against the possibility that the Monte Albán trephined skulls are evidence for diffusion of the surgical technique

from Peru. Since the techniques used is each place were different, he concludes that trephination at Monte Albán occurs independently of its practice in Peru (1975). However, since the custom does occur in both places, this may be an example of the diffusion of the idea without the technique. Trephination in Mesoamerica is apparently restricted to Monte Albán during the late Classic period, and at this same time at Monte Albán, other evidence for contact with South America seems to cluster.

In review, the four criteria for culture contact are met. It has been shown that there are local antecedants in Peru for traits that appear in Oaxaca during the late Classic period, and that there are no antecedants for the traits in Mexico or Central America. These include the use of the mold to realistically display maize, the presence of certain gold and copper items which do not appear anywhere else in Mesoamerica and the practice of trephination which is without precedent outside of South America. All of these occur at the same time period in the same place. Because these traits appear in Oaxaca, but are not found in intervening areas, it is proposed that they are the result of direct contact by means of maritime travel along the coast from northern Peru to western Mexico. The possibilities for sea travel have been discussed, and it has been demonstrated that such travel was at least probable in the late Postclassic period before the arrival of the Spanish in the New World. That there was such travel five hundred years earlier cannot be demonstrated by the archaeological record at the present

time. The botanical evidence complements the archaeological evidence. Two South American races of maize have been identified on Mexican specimens. These include Güirua from Colombia and Canguil from Ecuador. Güirua has a counterpart in Guatemala, and its presence may be the result of indirect diffusion by way of highland Guatemala. Canguil, on the other hand, has no intermediate counterparts and it is not found today in Mexico.

If the direction of diffusion can be inferred on the basis of the presence of local antecedants in a region, as proposed by Lanning (1963), then it can be inferred that there were movements northward from South America into Mesoamerica. Presumably, if the contacts were a result of trade, there would have been exchange of goods and ideas in both directions. The question of intercontinental contacts is a historical problem. It bears upon cultural origins, dispersals and the development of civilization. The present study brings together data which indicates the existence of cultural contacts. Future studies and archaeological explorations should yield increasing evidence for a better understanding of the nature of such contact and the influence it had on cultural development during the Classic period.

Evolution of Maize: The Archaeological Record

Peru

There has been excellent preservation of archaeological plant remains on the Peruvian coast due to the extremely dry, desert climate. This is particularly true on the south coast where large

collections of complete ears have been found. In fact, the only archaeological finds of maize in the highlands are from Ayacucho (MacNeish et al. 1970). Therefore, knowledge of the evolution of maize in Peru is based primarily on the archaeological record from the coast.

The maize finds from Ayacucho represent the oldest maize remains found in Peru. The radiocarbon dates for the Chihua phase to which these remains have been assigned range form 4,300 B.C. to 2,800 B.C. (MacNeish et al. 1970:38). It was originally believed that this maize represented a primitive prototype of the Peruvian race Confite Morocho. However, upon re-assessment of the materials, Galinat proposed that the remains represent a separate, more primitive race which he names Ayacucho. Galinat postulates that Ayacucho is ancestral to many of the indigenous Peruvian races (1972:107-108). No descriptions of the Ayacucho maize remains have been published yet. Therefore, it is impossible to compare it to other archaeological collections. Another find of very early maize in a pre-ceramic context has been reported from Huarmey on the Central Coast (Kelley and Bonavía 1963). No descriptions for this early maize have been published either. Towle (1952a; 1952b and 1954) has described a number of maize collections from the coast, and Grobman et al. (1961) have described the evolutionary sequence of coastal races. There appear to have been basic differences between maize types from the South Coast and varieties from the North Caost. In general, South Coast maize has ovoid, spherical ears with a high kernel row number. Most ears have sixteen or eighteen rows of isodiametrical

kernels. There is a distinct evolutionary trend in South Coast maize from ca. 500 B.C. to 800 A.D. toward increased size of ear length and ear diameter. There is also a change in kernel arrangement from irregular, spiralling rows to straight rows with a reduction of kernel row number.

Approximately contemporaneous North Coast maize collections contrast with trends exhibited by South Coast maize. The small ears are cylindrical and have characteristically low kernel row numbers. North Coast maize ears tend to have eight or ten rows. During the same time period of over a thousand years, North Coast maize exhibits little change morphologically and only a slight increase in size.

Grobman et al. (1961) propose that the races Confite Iqueño, Confite Morocho, Kculli, Rabo de Zorro, Uchuquillo, Confite Puneño, Chullpi, Confite Puntiagudo and Enano had appeared in Peru by the end of the Formative period. Races added to this list during the Classic period include Alazan, Perla, Pardo, Mochero, Chaparreño, Pagaladroga, Huayleño, Huancavelicano, Ancashino and Piricinco. Only three more races appeared in the Postclassic period. These were Rienda, Chancayano and Cuzco.

Eight of the nineteen races which are postulated to have appeared by the Classic period have been identified on the ceramic maize specimens in this corpus. They include Confite Iqueño, Confite Morocho, Kculli, Enano, Perla, Mochero, Pagaladroga and Huancavelicano. Other races identified on the pottery which may be added to this list are Karapampa, Pollo, Pira, Kcello, Clavo,

Güirua, Guaribero, Chococeño, Imbricado, Perlilla and Polulo. The Indians apparently had a wide variety of different kinds of maize during the Classic period.

Mexico

The plant remains from a number of dry caves have provided evidence for a good evolutionary sequence of Mexican maize races. Included are maize remains from Swallow Cave in the state of Chihuahua (Mangelsdorf and Lister 1956), and La Perra cave maize remains from Tamaulipas dated ca. 2,500 B.C. (Mangelsdorf, MacNeish and Galinat 1956; 1967a). The remains from La Perra and Swallow caves resembled tiny cobs of a very primitive pod-popcorn from Bat Cave, New Mexico (Mangelsdorf and Smith 1949; Mangelsdorf, Dick and Cámara-Hernández 1967), but they were somewhat larger. The Swallow cave maize from northwestern Mexico has been described as a prototype of the ancient race Chapalote which is still grown in Mexico today. The maize from La Perra cave in northeastern Mexico was more closely related to the ancient race Nal Tel, which is also still grown in Mexico and Guatemala. Nal Tel and Chapalote are closely related pod-popcorns, and the two races are frequently indistinguishable on the basis of cob remains.

The most complete picture of the evolution of maize in Mexico has been provided by excavations in a series of five dry caves in the Valley of Tehuacán in southern Puebla and northern Oaxaca. Over 24,000 specimens of maize remains were obtained from these caves, and they provide a well defined sequence showing how over

a period of 6,500 years, maize evolved from a grass with tiny ears into a highly productive plant food. Maize is present at Tehuacán ca. 5,000 B.C. During the Abejas phase, ca. 3,400 B.C. to 2,300 B.C., two new types of maize appear. These include an early tripsacoid type and another type described as the race Nal Tel. These types are early agricultural maize. The ears are larger, and they exhibit more variability than the maize in earlier levels.

During the Palo Blanco phase at Tehuacán, 200 B.C. to 800 A.D., a type of maize described as belonging to the Nal Tel-Chapalote complex predominated. During this period, a new type of slender popcorn resembling the Mexican race Arrocillo Amarillo and the Colombian race Pira Naranja was introduced. Following the appearance of the new slender popcorn, five new races developed. These have been identified from the upper levels of Coxcatlán and El Riego caves. They include the modern races Conico, Zapalote Chico, Tepecintle, Chalqueño and an unidentified dent corn (Mangelsdorf, MacNeish and Galinat 1967b:178-200).

It is interesting to note that eight-nine per cent of the depictions of maize on ceramic specimens from Oaxaca are of the races Nal Tel and Chapalote. The earliest, most primitive cultivated maize types for Mexico were still being represented on the pottery of Oaxaca roughly 3,000 years after their first appearance, and at a time when there is evidence that the Indians had access to more productive maize races. This raises the question, were these primitive, less productive types of maize being grown in Oaxaca

during the Classic period, or were other more productive races grown for consumption and these primitive races maintained for ritual use? The answer in part may be provided by present day peasants in the Valley of Oaxaca who continue to grow low-yielding, early maturing Indian maize rather than opt for much higher-yielding hybrid varieties available to them. Oaxacan peasants tend to plant just enough maize for their households, even when more land for surplus crops is available for planting. In years when moisture conditions are favorable for increased production, rather than plant enough maize for a surplus crop, Oaxacan peasants plant less, just enough for their households. The Indian peasant in Oaxaca chooses security over increased productivity. This same idea seems to influence the Indians of the Andean highlands who still grow the primitive popcorn Confite Morocho when a number of other much higher-yielding maize races could be grown there.

Other races identified from specimens in this corpus include Conico, Dzit-Bacal, Canguil and Güirua. Conico has been identified on an Aztec brazier which can be dated ca. 1,400 A.D. The remainder of the races are on Classic period urns, with the exception of Canguil, which is on some early Postclassic sherds and dates ca. 900 A.D. Dzit-Bacal has been identified from archaeological maize remains in northeastern Mexico (Mangelsdorf, MacNeish and Galinat 1956). Güiura and Canguil have not been identified from any archaeological plant remains. Their presence on the pottery presumably represents the northward diffusion of these races from South America by 900 A.D.

Prehistoric Races of Maize and Cultural Historical Relationships

Maize has been the mainstay of subsistence for the Indians of Latin America for almost 4,000 years. From the time that agriculture began in the areas where New World civilizations developed, the most important crop was maize. This plant food provided the subsistence base for expanding populations: and population growth, increased productivity of maize and the development of civilization are intricately interrelated. Therefore, an understanding of the evolution of civilization in the New World is intimately tied to understanding the evolution of maize.

The findings from the ceramic maize replicas complement present knowledge from the archaeological record regarding the evolution of maize. It has been shown that by the Classic period, there was a wide variety of maize races in Peru, including some of the most productive types presently grown on the North Coast. For Oaxaca, there apparently were fewer different types of maize. The main race seems to have been the primitive pod-popcorn Nal Tel, and the limited archaeological plant remains from Oaxaca are also of this race (Ford 1976). There is also an indication that, in Oaxaca during the Classic period, new races of maize were being introduced from South America.

If, indeed, new races were being introduced from South America, they were being transported into Mesoamerica as a result of cultural diffusion. This is the inevitable conclusion because maize does not have a natural mechanism for seed dispersal and is thereby

entirely dependent on man for its survival. Maize races outside geographical areas of adaptation indicate cultural movements.

An understanding of cultural diffusion is vital to any study of sociocultural systems. The questions of origins and histories of cultural groups, technologies, artistic styles, ideologies, trade routes and patterns of exchange depend on whether there were cultural contacts linking geographcial areas or whether cultures were evolving in isolation. It has been shown that maize is a cultigen from which insights into cultural diffusion may be gained. There are cultural reasons, as well as botanical reasons, why this is so.

In addition to its importance as a plant food, maize had symbolic and religious connotations which may be the reason for its frequent depiction. For example, maize is realistically depicted on numerous effigy vessels from Peru and Oaxaca in association with important deities. Votive offerings of maize were placed in shrines in ceremonial centers. Maize was a principal food placed in graves as offerings for the dead. In Peru, there is evidence that maize kernels were sometimes placed in the mouth and nostrils of the dead (Towle 1952a:227). Chicha, a fermented drink made from sprouted maize kernels, was an important ritual beverage in Mexico and Peru (Oviedo y Valdés 1851-55).

In addition to its important uses as a plant food and an object of worship and venerations, certain varieties of maize had special medicinal uses (Cobo 1890-95). There is some evidence from ethnology

to at least suggest that the use of maize for treating certain illnesses has its origin in pre-Columbian times. Among the Callahuayo Indians of the Bolivian highlands today, there is a group of travelling medicine men. Included among their various medicines is a type of podcorn. It is a primitive type of maize in which the individual kernels are completely enclosed by separate glumes or husks. This variety of maize is almost extinct today and may have survived extinction because of Indian beliefs in its curative powers. Podcorn, ground into a fine powder, is administered by the medicine men in the treatment of "el aire", a term which refers to conditions causing difficulty in breathing, including tuberculosis, asthma and bronchitis (Cárdenas 1943). These Indian medicine men from the Andean highlands travel all over South America and into Central America to treat patients at great distances. It is thought that they are practicioners of ancient medicine because along with their packs of remedies, they characteristically carry a *quena*, a reed flute of pre-Columbian origin (Cutler 1944:293). These travelling medicine men may be a mode of diffusion.

It is suggested that the various uses of different types of maize which are adapted to specific geographical areas and environmental conditions, may have been an important factor making maize a valuable exchange commodity, thereby linking distant cultures through trade. It has been reported by the sixteenth century chronicler Bernal Díaz del Castillo that Indians travelled by canoe along the northern Pacific coast of South America and engaged in port to port trade in maize and salt (1934:178).

The Chibcha Indians of the Colombian highlands were engaged in extensive trade of salt and emeralds in exchange for gold (Bollaert 1860; Von Hagen 1952), and there was a widespread aboriginal salt trade in Mexico (Mendizabal 1928). Evidence presented here suggests that during the Classic period there may have been long-distance trade in maize and other perishable commodities which may have left few traces in the archaeological record.

This study represents an interdisciplinary approach combining botany and archaeology to bring new evidence to bear on anthropological problems. It demonstrates the usefulness of approaches based on interdisciplinary methodologies for testing hypotheses of cultural diffusion. With increasing sophistication and utilization of scientific techniques for improved recovery and more detailed analyses of archaeological remains, combined with more extensive excavations in intermediate areas, it is proposed that increasing evidence to show cultural contacts between Mesoamerica and the Andes will be brought to light and will contribute to a greater understanding of the historical relationships between New World aboriginal cultures, and therefore, aid understanding of cultural process.

Summary

I have identified nineteen races of maize on thirty-six Peruvian vessels. This indicates that during the Classic period in Peru, from approximately 300 A.D. to 900 A.D., there was a wide variety of maize available on the North Coast.

Eight of the nineteen races on Moche jars, including Confite Iqueño, Confite Morocho, Kculli, Enano, Perla, Mochero, Pagaladroga and Huancavelicano, corroborate the hypothesis of Grobman et al. (1961) that these races had evolved by the end of the Classic period.

Another Peruvian race, Perlilla was also identified on a Moche jar indicating that this race had appeared by the end of the Classic period as well. Heretofore, the specificity and antiquity of this race has been hypothetical.

Nine of the eighteen races identified on Peruvian jars are races which are not found in Peru today. They represent races from Chile, Bolivia, Ecuador, Colombia and Venezuela. It is suggested that this indicates these races, found today only outside Peru, had much wider distributions during the Classic period.

The identification of the race Polulo corrobrates the identification of this race from archaeological remains, and indicates that there may have been contact between the North Coast of Peru and the coast of Chile during the Classic period.

The identifications of the Colombian races Pira, Clavo, Pollo, Imbricado and Güirua establishes the existence of these races by 900 A.D., and points to cultural relationships between highland Colombia and the north coast of Peru during the Classic period.

Of the Colombian races identified, Güirua and Pollo have counterparts in Central America. Güirua, presently found in Santa Marta, the area of development of the Tairona culture, has a counterpart in highland Guatemala. Its counterpart is the race Negro de

Chimaltenango. The race Güirua in Peru and in Oaxaca by 900 A.D. strongly suggests contact between the two areas. Because the Oaxacan specimen more closely resembles Colombian Güirua, as opposed to its Guatemalan counterpart Negro de Chimaltenango, it is suggested that Güirua may have been introduced into Mexico by way of Oaxaca, and from there, it diffused southward into Guatemala where it is still found today.

The identification of the Colombian race Pollo on Moche jars shows that Pollo, which is believed to be closely related to the Mexican races Nal Tel and Chapalote, was present in Peru during the Classic period. The measurements on many of the Moche jars which have representations of Pollo are closer to the dimensions for Nal Tel and Chapalote. This seems to support the close relationship of these three primitive races as proposed by Mangelsdorf (1974). It is suggested that comparative studies of archaeological remains identified as Pollo, Nal Tel and Chapalote will demonstrate that these three races are derived from the same lineage and that Pollo is a manifestation of the southward diffusion of Nal Tel from central Mexico.

The identification of the highland Bolivian race Kcello demonstrates that this race was more widespread during the Classic period. Since it is not a lowland race, its presence on Moche pottery by 900 A.D. suggests that it was an ancient exchange commodity being transported down to the coast from the highlands.

The identification of Guaribero, a Venezuelan race found today in areas along the established Arawak trade routes which converged at the island of Trinidad, suggests that trade routes which Chard (1950) describes as having extended as far as Colombia, actually extended as far as the North Coast of Peru. It may be that the identification of Guaribero shows that these ancient trade routes had been established during or before the Classic period. The race Guaribero was in existence by 900 A.D. and was more widespread than its documented modern distribution indicates.

In a re-evaluation of maize on Zapotec urns, it was pointed out that urns previously considered suspect, on the basis of identifications of presumed modern maize races in an earlier study (Eubanks 1973), have been demonstrated to be at least a thousand years old as indicated by the results of TL tests. Therefore, the once presumed modern races have been shown to be of prehistoric origin, and the vessels once considered suspect are bonified antiquities.

The races Nal Tel, Chapalote and Dzit-Bacal have been identified on Oaxacan urns. These races have been previously identified from archaeological maize remains for which the identifications here provide corroboration. Nal Tel is the race most frequently depicted on Zapotec urns. This race may have had special symbolic significance for the Zapotec, and it was probably the most widely grown race in Oaxaca during the Classic period. Although it is an ancient race and not as productive as other races which may have been available to the Indians of Oaxaca at that time, it has the

advantage of being an early maturing variety which does not require a lot of moisture. This would have been particularly advantageous in Oaxaca, a relatively dry area where rainfall is an important factor determining the success of crop production. The maintenance of this primitive race by the Zapotec may indicate that they were more concerned with being assured of the success of their crop than with trying to grow more productive varieties of maize in order to provide a surplus.

It is suggested that seed selection strategies among modern peoples may be a subject that merits further study now before the introduction of modern maize hybrids leads to the extinction of indigenous Indian varieties and nullifies decision patterns based on them.

On the North Coast of Peru, where rainfall was not a determining factor of crop production because the Moche depended on irrigation for watering their fields, more different kinds of maize and more productive varieties of maize were grown.

In addition to the identification of the Colombian race Güirua on a Oaxacan specimen discussed above, the Ecuadorean race Canguil has been identified on some mazorca sherds from Morelos which are dated ca. 900 A.D. These sherds indicate that connections between Mexico and South America were established by this time period.

It would appear that all of the maize races identified on the pottery in this corpus had a wider geographical distribution during the Classic period than they do today. It is suggested

that the North Coast of Peru may have been a major center of cultural exchange, connecting Mesoamerica and South America. The Classic period was characterized by tremendous activity and cultural development. It is proposed that this was in part due to active exchange between widespread cultural traditions.

The diffusion of different races of maize apparently gave rise to new races through hybridization and acclimatization to new environments. It is suggested that the expanded gene pool for maize races during the Classic period gave rise to more productive, more adaptive hybrids which were a contributing factor to the population increase during the Classic period.

There are some limitations regarding the identifications of maize races that have been pointed out. The measurements from the ceramic maize replicas are necessarily compared to data for living races. Evolution is a continuous process and the maize races from 1,000 years ago cannot be expected to perfectly match modern strains. In addition, modern distributions of maize races do not necessarily reflect prehistoric distributions. Furthermore, there is the question of variability within races and variability due to environmental factors. Ideally, larger samples than are presented in this corpus for many of the races are required to bolster the validity of the identifications. It is also pointed out that though the racial identifications are based on observable, measurable characters, there is a degree of subjectivity in the identifications.

There are a large number of Zapotec and Moche vessels depicting maize in museum collections in the United States, Canada and several countries in Europe. Present findings warrant that an exhaustive, comparative study of those vessels promises to: (1) add weight by quantification to the validity of the identifications of the races; (2) contribute to the knowledge about the prehistoric distribution and evolution of these races; (3) corroborate identifications of archaeological maize remains, and (4) provide further evidence for cultural contacts between Andean and Mesoamerican cultures during the Classic period.

It has been said: "The more fully we understand the relationships of the various races and sub-races of maize in space and time, the more we will be able to infer about the civilizations and peoples who used and distributed this maize" (Anderson 1943:63). This interdisciplinary study of the ceramic evidence for the spread of prehistoric races of maize is an effort toward achieving this goal.

BIBLIOGRAPHY

Aitkern, M. J.
1968 "Thermoluminescent Dating in Archaeology: Introductory Review." In *Thermoluminescence of Geological Materials*. D. J. McDougall, ed.

Anderson, Edgar
1943 "Races of *Zea mays* II: A General Survey of the Problem," *Acta Americana* 1:58-68,

1944 "Maiz Reventador," *Annals of the Missouri Botanical Garden* 31:301-315.

1946 "Maize in Mexico," *Annal of the Missouri Botanical Garden* 33:147-247.

1947 "Field Studies of Guatemala Maize," *Annals of the Missouri Botanical Garden* 34:433-467.

Anderson, Edgar and Hugh Cutler
1942 "Races of *Zea mays* I: Their Recognition and Classification," *Annals of the Missouri Botanical Garden* 29:69-89.

Anton, Ferdinand
1969 *Ancient Mexican Art*. G. P. Putnam's Sons, New York.

Arsandaux, H. and P. Rivet
1921 "Contribution a l'Etude de la Metallurgie Mexicaine," *Jounal de la Société des Americanistes de Paris*, n.s. 13:261-280.

Baessler, Arthur
1902-03 *Altperuanische Kunst: Beiträege zur Archäeologie des Inca Reichs*. Band III. Verlag von A. Asher and Co., Berlin.

Bennett, Wendell C.
1939 "Archaeology of the North Coast of Peru: An Account of Exploration and Excavation in Virú and Lambayeque Valleys," *American Museum of Natural History Anthropological Papers* 37, pt. 1.

1944 "The Archaeology of the Central Andes," In *Handbook of South American Indians, II*. Julian H. Steward, ed.

Benson, Elizabeth P., ed.
1972a *The Cult of the Feline*. Dumbarton Oaks Research Library and Collections, Washington, D.C.

1972b *The Mochica*. Praeger Publishers, New York.

Bernal, Ignacio
1965 "Archaeological Synthesis of Oaxaca." In *Handbook of Middle American Indians, III, pt. 2*. Robert Wauchope, ed.

Bird, Robert McKelvy
1970 *Maize and Its Cultural and Natural Environment in the Sierra of Huanúco, Peru*. Ph.D. dissertation, University of California, Berkeley.

1976 "Tracing the Evolution of Maize." Paper delivered at the Symposium on "Origin of *Zea mays* and Its Relatives."

Bollaert, William
1860 *Antiquarian, Ethnological and Other Researches in New Granada, Ecuador, Peru and Chile*. Trübner and Co., London.

Boos, Frank H.
1964 *Las urnas zapotecas en el Real Museo de Ontario*. Corpus Antiquitatum Americanensium, I. Instituto Nacional de Antropología, Mexico.

1966a *Las urnas zapotecas de las Colecciones Frissell y Leigh del Museo Frissell de Arte Zapoteca, Mitla*. Corpus Antiquitatum Americanensium, II. Instituto Nacional de Antropología, Mexico.

1966b *The Ceramic Sculptures of Ancient Oaxaca*. A. S. Barnes and Co., Inc., New York.

Borhygi, Stephen
1959 "Pre-Columbian Cultural Connections between Mesoamerica and Ecuador," *Tulane University, Middle American Research Institute Records II, nos. 6 & 7*.

Brieger, F. G., J. T. A. Gurgel. E. Paterniani, A. Blumenschein and M. R. Alleoni
1958 *Races of Maize in Brazil and Other Eastern South American Countries*. National Academy of Sciences Publ. 593. National Research Council, Washington, D.C.

Brown, William L. and Edgar Anderson
1947 "The Northern Flint Corns," *Annals of the Missouri Botanical Garden* 34:1-29.

Brown, William L. and Major M. Goodman
1977 "Races of Maize." In *Corn and Corn Improvement*. C. F. Sprague, ed.

Byers, Douglas S., ed.
1967 *Prehistory of the Tehuacán Valley, I. Environment and Subsistence*. University of Texas Press, Austin.

Cárdenas, Martin
1943 *Notas preliminares sobre la materia medica boliviana*. Publicaciones de la Universidad de Cochabamba, Bolivia.

Caso, Alfonso
1928 *Las Estelas Zapotecas*. Mexico: Secretaria de Educación Publica.

1938 Exploraciones en Oaxaca, quinta y sexta temporadas 1936-37. *Instituto Panamericano de Geografía e Historia*, Publ. 34.

1969 *El Tesoro de Monte Albán*. Instituto Nacional de Antropología e Historia, III. Mexico, D.F.

Caso, Alfonoso and Ignacio Bernal
1952 *Urnas de Oaxaca*. Instituto Nacional de Antropología e Historia, II. Mexico.

1965 "Cermaics of Oaxaca," In *Handbook of Middle American Indians, III, pt. 2*. Robert Wauchope, ed.

Chard, Chester
1950 "Pre-Columbian Trade Between North and South America," *Kroeber Anthropological Society Papers* 1:1-27.

Cobo, Bernabé
1890-95 *Historia del Nuevo mundo*. 4 vols. E. Rasco, Sevilla.

Coe, Michael D.
1960 "Archaeological Linkages with North and South America at La Victoria, Guatemala," *American Anthropologist* 62:363-393.

1962a "An Olmec Design on an Early Peruvian Vessel," *American Antiquity* 27:579-80.

1962b *Mexico*. Frederick A. Praeger, Publ., New York.

1966 *The Maya*. Frederick A. Praeger, Inc., Publ., New York.

Cook de Leonard, Carmen
1971 "Minor Arts of the Classic Period in Central Mexico." In *Handbook of Middle American Indians, X, pt. 1*. Robert Wauchope, ed.

Covarubbias, Miguel
1957 *Indian Art of Mexico and Central America*. Alfred A. Knopf, Inc., New York.

Cutler, Hugh C.
1944 "Medicine Men and the Preservation of a Relict Gene in Maize," *Journal of Heredity* 35:290-294.

1946 "Races of Maize in South America," *Harvard University, Botanical Museum Leaflets* 12:257-291.

1952 "A Preliminary Survey of Plant Remains of Tularosa Cave," *Fieldiana: Anthropology* 40:460-479. Chicago.

Díaz del Castillo, Bernal
1934 *Verdadera y Notable Relación del Descubrimiento y Conquista de la Nueva España y Guatemala, II*. La Tipografía Nacional, Guatemala.

Disselhoff, Hans Dietrich
1967 *Daily Life in Ancient Peru*. McGraw-Hill, New York.

Donnan, Christopher B.
1965 "Moche Cermaic Technology," *Nawpa Pacha* 3:117-134.

Drennan, Robert D.
1976 Fabrica San José and Middle Formative Society in the Valley of Oaxaca. In *Prehistory and Human Ecology of the Valley of Oaxaca, IV*. Kent A. Flannery, ed.

Dunn, Mary Eubanks
1975 "Ceramic Evidence for the Prehistoric Distribution of Maize in Mexico," *American Antiquity* 40:305-314.

n.d. "Suggestions for the Evaluation of Archaeological Maize Remains," *American Antiquity* (In press, ms. 1977.)

Edwards, Clinton R.
1960 "Sailing Rafts of Sechura: History and Problems of Origin," *Southwestern Journal of Anthropology* 16:368-391.

1965a "Aboriginal Sail in the New World," *Southwestern Journal of Anthropology* 21:351-358.

1965b *Aboriginal Watercraft on the Pacific Coast of South America*. Ibero-Americana 47. University of California Press, Berkeley.

1969 "Possibilities of Pre-Columbian Maritime Contacts Among New World Civilizations," In *Precolumbian Contact within Nuclear America*. J. Charles Kelley and Carroll L. Riley, eds.

Eubanks, Mary W.
1973 *A Study of the Interrelationship of the Authentication of Zapotec Urns and the Evolution of Maize*. M.A. thesis, University of North Carolina, Chapel Hill.

Flannery, Kent V., ed.
1973 *Prehistory and Human Ecology of the Valley of Oaxaca, I*. Memoirs of the Museum of Anthropology, University of Michigan, No. 5.

1976 *Prehistory and Human Ecology of the Valley of Oaxaca, IV*. Memoirs of the Museum of Anthropology, University of Michigan, No. 8.

Flannery, Kent V., M. J. Kirkby, A. V. T. Kirkby and Aubrey W. Williams
1967 "Farming Systems and Political Growth in Ancient Oaxaca," *Science* 158:445-454.

Ford, Richard I.
1976 "Carbonized Plant Remains," In *Prehistory and Human Ecology of the Valley of Oaxaca, IV*:261-268. Robert D. Drennan.

Friedberg, Claudine
1958 "Contribution a l'étude ethnobotanique des tombes précolombiennes de Lauri (Pérou)," *Journal d'Agriculture Tropicale et de Botanique Appliquée* 5:397-434.

Fuhrman, Ernst
1922 *Peru II*. Folkwang-Verlag G. M. B. H., Hagen i. W. und Darmstadt.

Galinat, Walton C.
1972 "Common Ancestry of the Primitive Races of Maize Indigenous to the Ayacucho Area in Peru," *Maize Genetics Co-operative Newsletter* 46:108-109.

Galinat, Walton C. and James H. Gunnerson
1963 "Spread of Eight-Rowed Maize from the Prehistoric Southwest," *Harvard University, Botanical Museum Leaflets* 20:117-160.

Gillin, John
1945 *Moche: A Peruvian Coastal Community*. Smithsonian Institution Institute of Social Anthropology Publ. 3, Washington, D.C.

Goodman, Major M. and E. Paterniani
1969 "The RAces of Maize: III. Choices of Appropriate Characters for Racial Classification," *Economic Botany* 23:265-273.

Grant, Ulysses J., William H. Hatheway, David H. Timothy, Climaco Cassalett D. and Lewis M. Roberts
1963 *Races of Maize in Venezuela*. National Academy of Sciences Publ. 1136. National Research Council, Washington, D.C.

Grobman, Alexander, Wilfredo Salhuana and Ricardo Devilla in collaboration with Paul C. Mangelsdorf
1961 *Races of Maize in Peru*. National Academy of Sciences Publ. 915. National Research Council, Washington, D.C.

Hay, Clarence L., Samuel K. Lothrop, Harry L. Shapiro and George C. Valliant, eds.
1940 *The Maya and Their Neighbors*. Appleton-Century, New York.

Hébert, J.
1902 "Quelques mots sur la technique des céramistes Péruviens," *Journal de la Société des Américanistes de Paris* 4:1-7.

Helbaek, Hans
1959 "Domestication of Food Plants in the Old World," *Science* 130:365-372.

Jijón y Caamaño
1949 "Un vaso 'thin orange" del país Caraqui, Ecuador," *American Antiquity* 11:65-75.

Jiménez Moreno, Wigberto
1970 "Mesoamerica Before the Toltecs." In *Ancient Oaxaca*. John Paddock, ed.

Kan, Michael
1072 "The Feline Motif in Northern Peru." In *The Cult of the Feline*. Elizabeth P. Benson, ed.

Kelley, David H. and Duccio Bonavía
1963 "New Evidence for Preceramic Maize on the Coast of Peru," *Nawpa Pacha* 1:39-41.

Kelley, J. Charles and Carroll L. Riley
1969 *Precolumbian Contact within Nuclear America*. Southern Illinois University, University Museum Research Recordd No. 4. Carbondale.

Kidder II, Alfred
1940 "South American Penetrations in Middle America." In *The Maya and Their Neighbors*. C. L. Hay, et al., eds.

Kirkby, Anne V. T.
1973 The Use of Land and Water Resources in the Past and Present Valley of Oaxaca. In *Prehistory and Human Ecology of the Valley of Oaxaca, I*. Kent V. Flannery, ed.

Klein, Otto
1967 *La Ceramica Mochic: Carácteres Estilisticos y Conceptos*. La Universidad Tecnica "Federico Santa Maria," Valparaiso.

Kosok, Paul
1965 *Life, Land and Water in Ancient Peru*. Long Island University Press, New York.

Krickeberg, Walter, Hermann Trimborn, Werney Müller and Otto Zerries
1968 *Pre-Columbian American Religions*. Translated by Stanley Davis from the 1961 edition. George Weidenfeld and Nicholson, Ltd., London.

Kroeber, A. L.
1925 "The Uhle Pottery Collections from Moche," *University of California Publications in American Archaeology and Ethnology* 21:191-234.

Kutscher, Gerdt
1950 "Iconographic Studies as an Aid in the Reconstruction of Early Chimú Civilization," *Transactions of the New York Academy of Sciences*, series II, 12:194-203.

Lanning, Edward P.
1963 "Olmec and Chavín: Reply to Michael D. Coe," *American Antiquity* 29:99-101.

Larco Hoyle, Rafael
1938 *Los Mochicas*. Tomos I and II. "la Cronica" y "Vaiadades," S.A. Ltd., Lima.

1944 "A Culture Sequence for the North Coast of Peru." In *Handbook of South American Indians, II*. Julian H. Steward, ed.

1945 *Los Mochicas*. Sociedad Geográfica Americana, Buenos Aires.

1948 *Cronología Arqueológica del Norte del Perú*. Sociedad Geográfica Americana, Buenos Aires.

1966 *Peru*. Translated by James Hogarth. Nagel Publ., Geneva.

Lenz, Lee Wayne
1948 "Comparative Histology of the Female Inflorescence of *Zea mays* L.," *Annals of the Missouri Botanical Garden* 35:353-377.

Linares, Olga F., Payson D. Sheets and Jane E. Rosenthal
1975 "Prehistoric Agriculture in Tropical Highlands," *Science* 187:137-145.

Linné, S.
1925 *South American Ceramics*. K. Vet. O. Vitterhets-Sammhalles Handlingar, vol. 29. Göteborg, Sweden.

1938 *Zapotecan Antiquties and the Paulson Collection in the Ethographical Museum of Sweden*. New Series Publ. No. 4, Stockholm.

Lothrop, Samuel K.
1932 "Aboriginal Navigation off the West Coast of South America," *Journal of the Royal Anthropological Institute* 62:229-256.

1936 *Zacualpa: A Study of Ancient Quiché Artifacts*. Carnegie Institution of Washington Publ. 472.

1937 *Coclé: An Archaeological Study of Central Panama.* Memoirs of the Peabody Museum of Archaeology and Ethnology 7. Harvard University.

1972 *The Treasures of Ancient America.* Editions d'Art Albert Skira, Geneva.

Loven, Sven
1935 *Origins of the Tainan Culture, West Indies.* Elanders boktryckeri aktiebolag, Göteborg.

Lumbreras, Luis G.
1974 *The Peoples and Cultures of Ancient Peru.* Translated by Betty J. Meggars from the 1969 edition. Smithsonian Institution Press, Washington, D.C.

MacNeish, Richard Stockton, Antoinette Nelken-Terner and Angel García Cook
1970 *Second Annual Report of the Ayacucho Archaeological-Botanical Project.* Robert S. Peabody Foundation for Archaeology, Andover.

Mangelsdorf, Paul C.
1974 *Corn: Its Origin, Evolution and Improvement.* Belknap Press, Cambridge.

Mangelsdorf, Paul C., Herbert W. Dick and Júlian Cámara-Hernández
1967 "Bat Cave Revisited," *Harvard University, Botanical Museum Leaflets* 22:1-31.

Mangelsdorf, Paul C. and Robert H. Lister
1956 "Archaeological Evidence of the Evolution of Maize in Northwestern Mexico," *Harvard University, Botanical Museum Leaflets* 17:151-196.

Mangelsdorf, Paul C., Richard S. MacNeish and Walton C. Galinat
1956 "Archaeological Evidence on the Diffusion and Evolution of Maize in Northeastern Mexico," *Harvard University, Botanical Museum Leaflets* 17:125-150.

1976a "Prehistoric Maize, Teosinte, Tripsacum from Tamaulipas, Mexico," *Harvard University, Botanical Museum Leaflets* 22:33-63.

1967b "Prehistoric Wild and Cultivated Maize." In *Prehistory of the Tehuacán Valley, I.* Douglas S. Byers, ed.

Mangelsdorf, Paul C. and Gordon C. Pollard
1975 "Archaeological Maize from Northern Chile," *Harvard University, Botanical Museum Leaflets* 24:49-64.

Mangelsdorf, Paul C. and R. G. Reeves
1938 "The Origin of Maize," *Proceedings of the National Academy of Sciences* 24:303-312.

1939 *The Origin of Indian Corn and Its Relatives*. Texas Agricultural Experiment Station Bulletin 574.

Mangelsdorf, Paul C. and C. Earle Smith, Jr.
1949 "New Archaeological Evidence on Evolution in Maize," *Harvard University, Botanical Museum Leaflets* 13: 213-247.

Mangelsdorf, Paul C. and Mario Sanoja O.
1965 "Early Archaeological Maize from Venezuela," *Harvard University, Botanical Museum Leaflets* 21:105-112.

Martinez Hernández, Juan, ed.
1929 *Diccionario de Motul Maya Español atribuido a Fray Antonio de Ciudad Real*. Talleres de la Compañia Tipográfica Yucateca, S.A. Mérida, Yucatán.

Mason, J. Alden
1929 "Zapotec Funerary Urns from Mexico," *The Museum Journal* 20:176-178. Philadelphia.

1938 "The Languages of South American Indians." In *Handbook of South American Indians, VI*. Julian H. Steward, ed.

McDougall, D. J., ed.
1968 *Thermoluminescence of Geological Materials*. Academic Press, London.

Meggars. Betty J.
1966 *Ecuador*. Thames and Hudson, London.

Meggars, Betty J. and Clifford Evans, eds.
1955 *New Interpretations of Aboriginal American Culture History*. Anthropological Society of Washington 75th Anniversary volume.

Meighan, Clement W.
1969 "Cultural Similarities between Western Mexico and Andean Regions." In *Precolumbian Contact within Nuclear America*. J. Charles Kelley and Carroll L. Riley, eds.

Mendizabal, Miguel O. de
1928 *Influencia de la Sal en la Distribucion Geográfica de los Grupos Indígenas de México*. Museo Nacional de Arqueología, Historia y Etnografía, México.

Mountjoy, Joseph B.
1969 "On the Origin of West Mexican Metallurgy." In *Precolumbian Contact within Nuclear America*. J. Charles Kelley and Carroll L. Riley, eds.

Munson, Patrick J.
1966 "An Annotated Bibliography of Archaeological Maize in Eastern North America," *Pennsylvania Archaeologist* 36:50-65.

Murphy, Robert Cushman
1941 "The Earliest Spanish Advances Southward from Panama Along the West Coast of South America," *Hispanic American Historical Review* 21:2-28.

Nicholson, G. Edward
1960 "Chicha Maize Types and Chicha Manufacture in Peru," *Economic Botany* 14:290-299.

Nickerson, Norton H.
1953 "Variation in Cob Morphology Among Certain Archaeological and Ethnological Races of Maize," *Annals of the Missouri Botanical Garden* 40:79-111.

Nickerson, Norton H. and Alan P. Covich
1967 "A Collection of Maize from Darién, Panama," *Economic Botany* 20:434-440.

Oviedo y Valdés, Gonzalo Fernández de
1851-1855 *Historia general y natural de las Indias*. 4 vols. Real Academia de la Historia, Madrid.

Paddock, John, ed.
1970a *Ancient Oaxaca*. Stanford University Press, Stanford.

1970b "Oaxaca in Ancient Mesoamerica." In *Ancient Oaxaca*. John Paddock, ed.

Parson, Lee A.
1962 "An Examination of Four Moche Jars from the Same Mold," *American Antiquity* 27:515-519.

Pickersgill, Barbara
1972 "Cultivated Plants as Evidence for Cultural Diffusion," *American Antiquity* 37:97-104.

Porras Berrenechea, Raúl
1937 *Las Relaciones Primitivas de la Conquista del Perú*. Paris.

Porter, Muriel N.
1953 *Tlatilco and the Pre-Classic Cultures of the New World.* Viking Fund Publications in Anthropology No. 19.

Rabin, Emily
1970 "The Lambityeco Friezes," *Bulletin of Oaxacan Studies* No. 33.

Ramírez E., Ricardo, David H. Timothy, Efraín Díaz B. and U. J. Grant in collaboration with G. Edward Nicholoson Calle, Edgar Anderson and William L. Brown
1960 *Races of Maize in Bolivia.* National Academy of Sciences Publ. 747. National Research Council, Washington, D.C.

Rands, Robert L. and Robert E. Smith
1965 "Pottery of the Guatemalan Highlands." In *Handbook of Middle American Indians, II, pt. 1.* Robert Wauchope, ed.

Reichel-Dolmatoff, Gerardo
1965 *Colombia.* Thames and Hudson, London.

Reiss, Wilhelm and Alphons Stübel
1880-1887 *The Necropolis of Ancón in Peru.* 3 vols. Berlin.

Rickards, Constantine George
1938 "Monograph on Ornaments on Zapotec Funerary Urns," *Journal de la Société des Américanistes*, N.S. 30: 147-165. Paris.

Rivero, Mariano Edward and John James von Tschudi
1855 *Peruvian Antiquities.* Translated by Francis L. Hawks. A. S. Barnes and Co., New York.

Roberts, L. M., U. J. Grant, Ricardo Ramírez E., W. H. Hatheway and D. L. Smith in collaboration with Paul C. Mangelsdorf
1957 *Races of Maize in Colombia.* National Academy of Sciences Publ. 510. National Research Council, Washington, D.C.

Rowe, John Howland
1948 "The Kingdom of Chimor," *Acta Americana* 6:26-59.

1962 *Chavín Art: An Inquiry into Its Form and Meaning.* Museum of Primitive Art, New York.

Safford, William Edwin
1917 "Food-Plants and Textiles of Ancient America," *Proceedings of the 19th International Congress of Americanists* 29:12-30.

Saville, Marshall H.
1899 "Exploration of Zapotecan Tombs in Southern Mexico," *American Anthropologist* N.S. 1:350-362.

1904 "Funeral Urns from Oaxaca," *American Museum Journal* 4:51-60.

1913 "Precolumbian Decoration of the Teeth in Ecuador," *American Anthropologist* N.S. 15:377-394.

Sawyer, Allan R.
1966 *Ancient Peruvian Ceramics: The Nathan Cummings Collection*. Metropolitan Museum of Art, New York.

1968 *Mastercraftsmen of Ancietn Peru*. Solomon R. Guggenheim Foundation, New York.

Schaedel, Richard P.
1951 "Mochica Murals at Pañamarca," *Archaeology* 4:145-154.

Schmidt, Max
1929 *Kunst und Kultur von Peru*. Imbropylaen Verlag, Berlin.

Scholes, France V. and David Warren
1965 "The Olmec Region at Spanish Contact." In *Handbook of Middle American Indians, III, pt. 2*. Robert Wauchope, ed.

Schuler-Schömig, Immina v.
1970 *Figurenfässe aus Oaxaca*. Museum für Völkerkunde, Berlin.

Shaplin, Philippa Dunham
1975 *An Introduction to the Stylistic Study of Oaxacan Urns*. M.A. thesis. Wellesley College, Wellesley.

Shook, Edwin M.
1965 "Archaeological Survey of the Pacific Coast of Guatemala." In *Handbook of Middle American Indians, II, pt. 1*. Robert Wauchope, ed.

Spinden, Herbert J.
1917 "The Origin and Distribution of Agriculture in America," *19th International Congress of Americanistes, Proceedings*:269-276.

Sprague, C. F., ed.
1977 *Corn and Corn Improvement*. Crop Science Society of America.

Stadelman, Raymond
1940 "Maize Cultivation in Northwestern Guatemala." *Carnegie Institute of Washington* Publ. 523:82-263. *Contributions to American Anthropology* No. 33.

Steward, Julian, ed.
1944 *Handbook of South American Indians, II. The Andean Civilizations.* Smithsonian Institution, Bureau of American Ethnology Bulletin 143.

1948 *Handbook of South American Indians, VI. Physical Anthropology, Linguistics and Cultural Geography of South American Indians.* Smithsonian Institution, Bureau of American Ethnology Bulletin 143.

Strong, William Duncan
1943 "Cross-sections of the New World Prehistory." *Smithsonian Miscellaneous Collections* 104.

Strong, William Duncan and Clifford Evans, Jr.
1952 Cultural Stratigraphy in the Virú Valley, Northern Peru: The Formative and Florescent Epochs. *Columbia Studies in Archaeology and Ethnology* 4. New York.

Thompson, Donald E.
1963 "A Mold Matrix from Peru," *American Antiquity* 28: 545-547.

Thompson, Raymond H., ed.
1958 *Migrations in New World Culture History.* University of Arizona Bulletin 29. Social Science Bulletin 27.

Timothy, David H., William H. Hatheway, Ulysses J. Grant, Manuel Torregroza C., Daniel Sarria V. and Daniel Varela A.
1963 *Races of Maize in Ecuador.* National Academy of Sciences Publ. 975. National Research Council, Washington, D.C.

Timothy, David H., Bertulfo Peña V., Ricardo Ramírez E. in collaboration with William L. Brown and Edgar Anderson
1961 *Races of Maize in Chile.* National Academy of Sciences Publ. 847. National Research Council, Washington, D.C.

Towle, Margaret Ashley
1952a "Descriptions and Identifications of the Virú Plant Remains." In *Cultural Stratigraphy in the Virú Valley, Northern Peru.* William Duncan Strong and Clifford Evans, Jr.

1952b "Plant Remains from a Peruvian Mummy Bundle," *Harvard University, Botanical Museum Leaflets* 15:223-246.

1954 "Plant Remains." In *Early Ancón and Early Supe Cultures*. Gordon R. Willey and John M. Corbett.

1961 *The Ethno-Botany of Pre-Columbian Peru*. Viking Fund Publications in Anthropology No. 30. Aldine Publ. Co., Chicago.

Trimborn, Hermann
1968 "South Central America and the Andean Civilizations." In *Pre-Columbian Religions*. Walter Krickeberg, et al.,

Uhle, Max
1889 "Ausgewählte Stücke des K. Museums für Völkerkunde zur Archäologies Americas," *Museum für Völkerkunde Veroffentlichungen I*. Berlin.

1913 "Die Ruinen von Moche," *Société des Américanistes de Paris* 10:95-117.

Vargas C., César
1962 "Phytomorphic Representations of the Ancient Peruvians," *Economic Botany* 16:106-115.

Ville de Genève
1943 *Les Collections Précolombiennes: L'Empire des Incas*. Musée d'Ethnographie, Genève.

Von Hagen, Victor W.
1952 "The Search for the Gilded Man," *Natural History* 61: 312-321 ff.

Wardle, H. Newell
1940 "Fictile Art of the Mochicas," *University Museum Bulletin* 8:15-24. Philadelphia.

Wauchope, Robert, ed.
1955 *Seminars in Archaeology*. Memoirs of the Society for American Archaeology 11.

1965a *Handbook of Middle American Indians, II. Archaeology of Southern Mesoamerica, Pt. 1*. University of Texas Press, Austin.

1965b *Handbook of Middle American Indians, III. Archaeology of Southern Mesoamerica, Pt. 2*. University of Texas Press, Austin.

1971 *Handbook of Middle American Indians, X. Archaeology of Northern Mesoamerica, Pt. 1*. University of Texas Press, Austin.

Weatherwax, Paul
1954 *Indian Corn in Old America*. Macmillan, New York.

Weaver, Muriel Porter
1972 *The Aztecs, Maya, and Their Predecessors*. Seminar Press, New York.

Wellhausen, E. J., Alejandro Fuentes O., Antonio Hernández Corzo in collaboration with Paul C. Mangelsdorf
1957 *Races of Maize in Central America*. National Academy of Sciences Publ. 511. National Research Council, Washington, D.C.

Wellhausen, E. J., L. M. Roberts, E. Hernández X. in collaboration with Paul C. Mangelsdorf
1952 *Races of Maize in Mexico*. The Bussey Institution of Harvard University.

West, Robert C.
1961 "Aboriginal Sea Navigation between Middle and South America," *American Anthropologist* 63:133-135.

Wilkinson, Richard G.
1975 "Techniques of Ancient Skull Surgery," *Natural History Magazine* 84:94-101.

Willey, Gordon R.
1947 "Ecuadorean Figurines and the Ceramic Mold in the New World," *American Antiquity* 13:85-86.

1955 "The Interrelated Rise of the Native Cultures of Middle and South America." In *New Interpretations of Aboriginal American Culture History*. Betty J. Meggars and Clifford Evans, eds.

1966 *An Introduction to American Archaeology, I. North and Middle America*. Prentice-Hall, Inc., Englewood Cliffs, N. J.

1971 *An Introduction to American Archaeology, II. South America*. Prentice-Hall, Inc., Englewood Cliffs, N. J.

Willey, Gordon R. and John Corbett
1954 Early Ancón and Early Supe Cultures. *Columbia University Studies in Archaeology and Ethnology* 3. New York.

Willey, Gordon R. and Philip Phillips
1958 *Method and Theory in American Archaeology*. University of Chicago Press.

Yacovleff, E. and F. L. Herrera
1934 "El Mundo Vegetal de los Antiguos Peruanos," *Revista del Museo Nacional* 3:243-322. Lima.

Yarnell, Richard A.
1965 "Descriptive Data from the Upper Great Lakes," *Proceedings of the 21st Southeastern Archaeological Conference Bulletin* 3:30-31. Cambridge.

Zevallos Quinoñes, Jorge
1946 "Un Diccionario Yunga," *Revista del Museo Nacional* 15: 163-188. Lima.

Plate 1. Two-part maize mold, excavated in the Chancay Valley.

Museo Amano 128

Fabric: gray

Dimensions: l. 0.160 m, diameter 0.465 m.

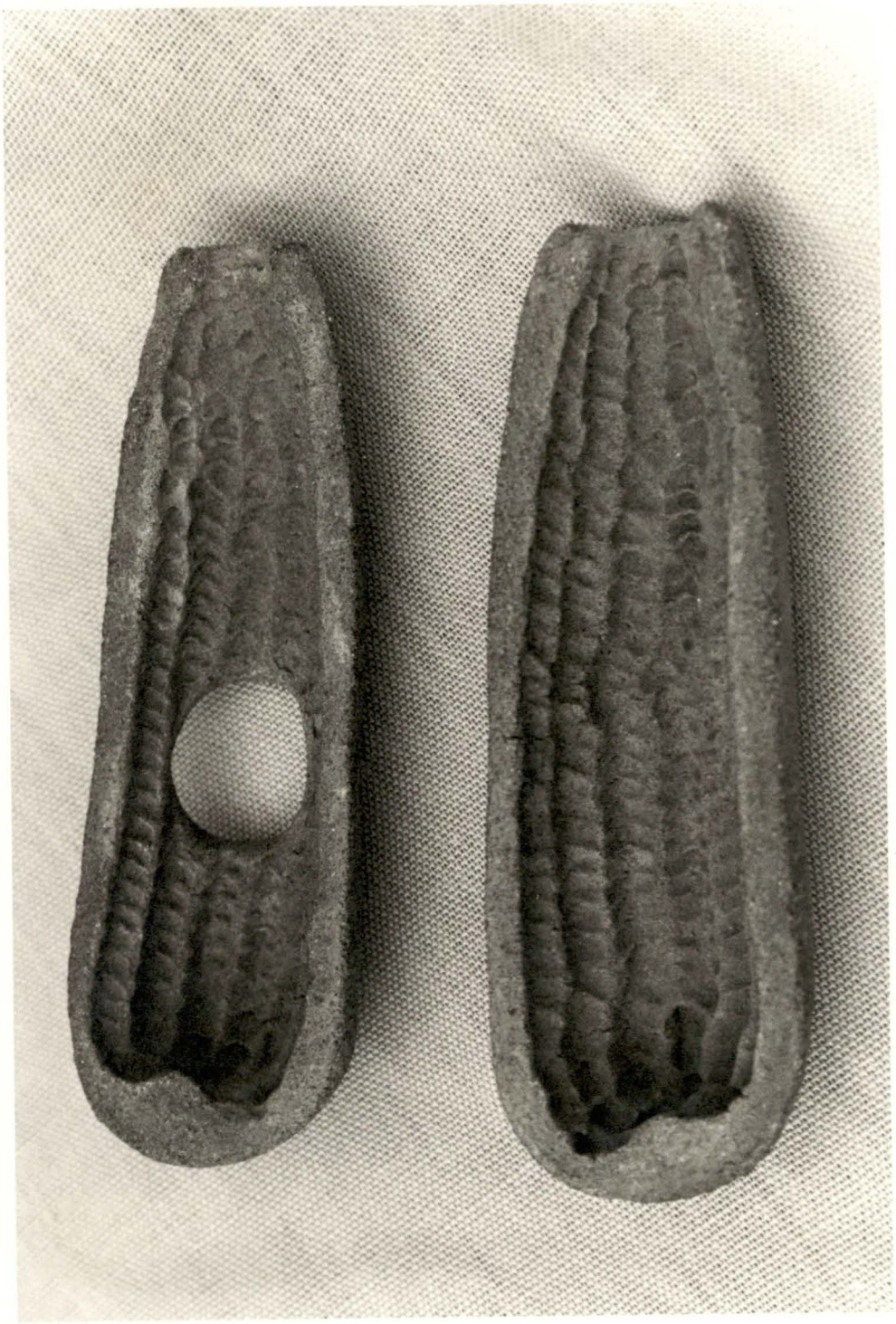

Plate 2. Zapotec urn, provenience unknown.

Museo Frissell de Arte Zapoteca 8269

Fabric: orange and cream

Dimensions: ht. 0.163 m, width 0.125 m.

Race of maize: Chapalote

The pairing of the kernel rows and zigzag pattern between paired rows are well illustrated by this specimen.

Plate 3. Stirrup-spout jar, provenience unknown.

Museo "Rafael Larco Herrera" 2270

Fabric: red and white

Stylized maize ears with incised kernels.

Plate 4. Stirrup-spout jar, excavated in the Lambayeque Valley.

Museo Nacional de Antropología y Arqueología 42,264

Fabric: red

Dimensions: ht. 0.200 m, width 0.132m.

The stylized ears of maize on this jar have kernels which are applied clay pellets, and every kernel row is alternating.

Plate 5. P-1. Plain jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología KK/16583

Fabric: red and white

Dimensions: ht. 0.215 m, width 0.137 m.

Race of maize: Karapampa

Plate 6. P-1. Rear view of plain jar in Plate 5.

Plate 7. P-2. Plain jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 158

Fabric: red and white

Dimensions: ht. 0.202 m, width 0.132 m.

Race of maize: Karapampa

Plate 8. P-3. Plain jar, provenience unknown.

Museum of the American Indian 23/296

Fabric: red and white

Dimensions: ht. 0.163 m, width 0.131 m.

Race of maize: Confite Morocho

Plate 9. P-4. Plain jar, provenience unknown.

Museo "Rafael Larco Herrera" J-432

Fabric: red and white

Race of maize: Pollo

Plate 10. P-5. Plain jar, provenience unknown.

Museo Nacional de Antropología y Arqueología 1/027

Fabric: red and white

Dimensions: ht. 0.28 m, width 0.195 m.

Race of maize: Clavo

Plate 11. P-6. Plain jar, excavated in the Lambayeque Valley.

Museo Nacional de Antropología y Arqueología KK/16591

Fabric: red

Dimensions: ht. 0.28 m, width 0.172 m.

Race of maize: Mochero

Plate 12. P-6. Side view of plain jar in Plate 11.

Plate 13. P-7. Plain jar, excavated in the Lambayeque Valley.

Museo Nacional de Antropología y Arqueología 2/4756

Fabric: red

Dimensions: ht. 0.23 m, width 0.167 m.

Race of maize: Polulo

Plate 14. P-7. Side view of plain jar in Plate 13.

Plate 15. Plain jar, provenience unknown.

Museo "Rafael Larco Herrera" 2295

Fabric: red and white

Race of maize: Kcello

Plate 16. P-9. Plain jar, provenience unknown.

Museo "Rafael Larco Herrera" 2995

Fabric: red

Race of maize: Kcello

Plate 17. P-10. Plain jar, provenience unknown.

Museo Amano 59

Fabric; red and white

Dimensions: ht. 0.27 m, width 0.18 m.

Race of maize: Kcello

Plate 18. P-11. Plain jar, excavated in the Lambayeque Valley.

Museo Nacional de Antropología y Arqueología KK/16624

Fabric: red and white

Dimensions: ht. 0.31 m, width 0.184 m.

Race of maize: Mochero

Plate 19. P-11. Rear view of plain jar in Plate 18.

Plate 20. P-12. Plain jar, provenience unknown.

Brooklyn Museum 1890

Fabric: red and white

Dimensions: ht. 0.31 m, width 0.20 m.

Race of maize: Mochero

Plate 21. P-13. Plain jar, provenience unknown.

Museo "Rafael Larco Herrera" 2300

Fabric: red and white

Race of maize: Pollo

Plate 22. P-13. Side view of plain jar in Plate 21.

Plate 23. P-14. Plain jar, provenience unknown.

Brooklyn Museum 41.1275-74

Fabric: red, black and white

Dimensions: ht. 0.22 m, width 0.13 m.

Race of maize: Enano

Plate 24. P-15. Stirrup-spout jar, excavated in Huanchaco.

Museo "Rafael Larco Herrera " J-30839

Fabric: red, black and white

Race of maize: Confite Iqueño

Plate 25. P-15. Side view of stirrup-spout jar in Plate 24.

Plate 26. P-16. Stirrup-spout jar, provenience unknown.

Museo "Rafael Larco Herrera" 3993

Fabric: black

Race of maize: Guaribero

Plate 27. P-17. Stirrup-spout jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 1/2865

Fabric: red and white

Dimensions: ht. 0.194 m, width 0.184 m.

Race of maize: Chococeño

Plate 28. P-17. Side view of stirrup-spout jar in Plate 27.

Plate 29. P-18. Stirrup-spout jar, provenience unknown.

University Museum, University of Pennsylvania 67-36-1

Fabric: red and white

Dimensions: ht. 0.224 m, width 0.152 m.

Race of maize: Pollo

Plate 30. P-19. Stirrup-spout jar, provenience unknown.

Museum of the American Indian 5/1741

Fabric: red and white

Dimensions: ht. 0.190 m, width 0.138 m.

Race of maize: Pira

Plate 31. P-20. Stirrup-spout jar, provenience unknown.

Museo "Rafael Larco Herrera" 2281

Fabric: red

Race of maize: Huancavelicano

Plate 32. P-21. Stirrup-spout jar, provenience unknown.

Museum of the American Indian 4/8898

Fabric: red and white

Dimensions: ht. 0.206 m, width 0.119 m.

Race of maize: Pira

Plate 33. P-22. Stirrup-spout jar, provenience unknown.

Museo Arqueológico "Bruning" de Lambayeque B-99

Fabric: black

Race of maize: Confite Morocho

Plate 34. P-22. Side view of stirrup-spout jar in Plate 33.

Plate 35. P-23. Stirrup-spout jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología KK/16602

Fabric: red and white

Dimensions: ht. 0.195 m, width 0.165 m

Race of maize: Perla

Plate 36. P-24. Stirrup-spout jar, provenience unknown.

Duke University Museum of Art 73.1.507

Fabric: red and white

Dimensions: ht. 0.188 m, width 0.175 m.

Race of maize: Perla

Plate 37. P-25. Stirrup-spout jar, excavated in the Moche Valley.

Metropolitan Museum of Art 67.167.19

Fabric: red and white

Dimensions: ht. 0.281 m, width 0.206 m.

Race of maize: Pollo

Plate 38. P-26. Stirrup-spout jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 1/1681

Fabric: red

Dimensions: ht. 0.208 m, width 0.150 m.

Race of maize: Perlilla

Plate 39. P-27. Stirrup-spout jar, provenience unknown.

Museo "Rafael Larco Herrera" 4677

Fabric: red

Race of maize: Güirua

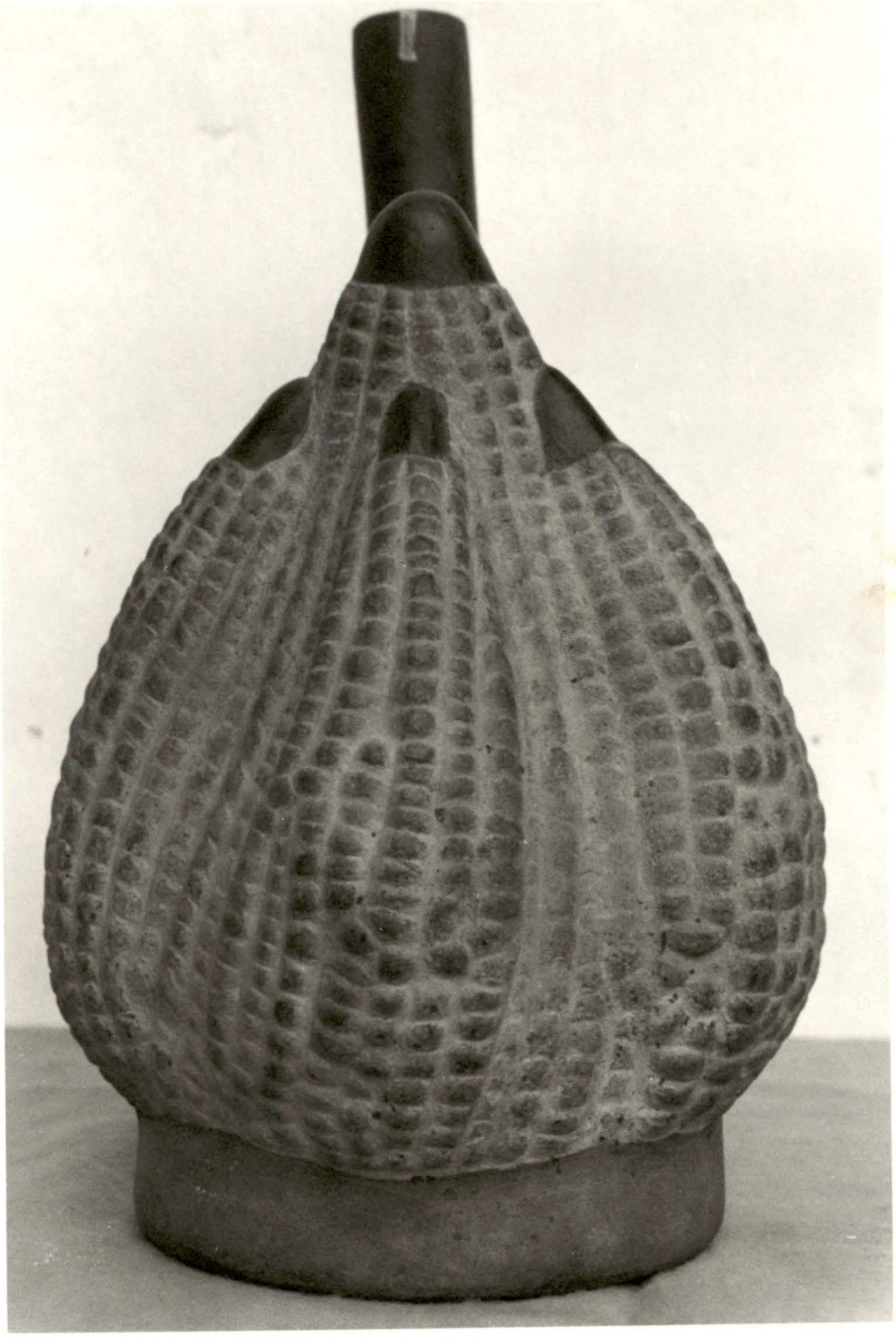

Plate 40. P-28. Stirrup-spout jar, provenience unknown.

Museo "Rafael Larco Herrera" S-39160

Fabric: red and white

Race of maize: Güirua

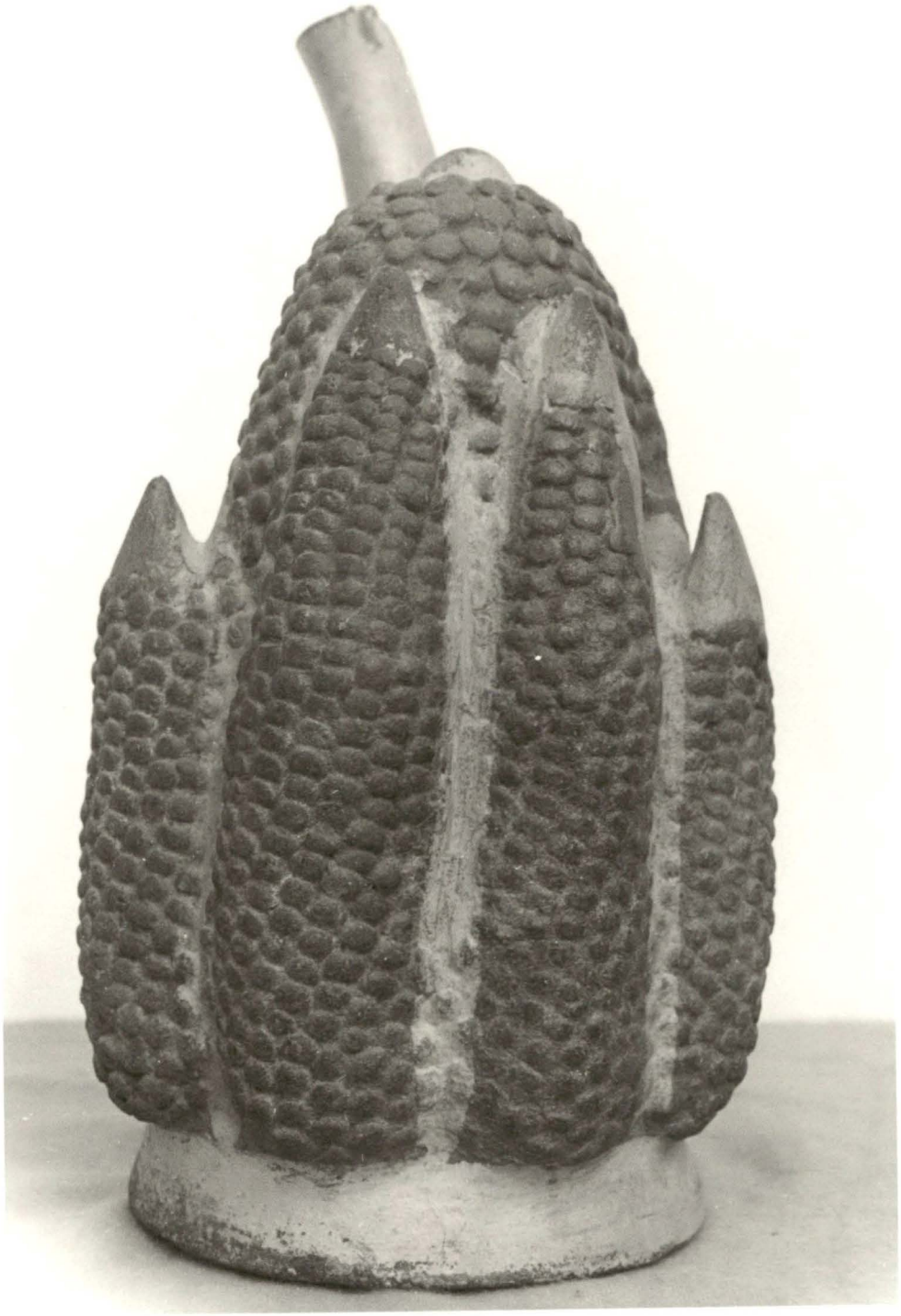

Plate 41. P-29. Stirrup-spout jar, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 1/1680

Fabric: red and white

Dimensions: ht. 0.197 m, width 0.180 m.

Race of maize: Güirua

Plate 42. P-30. Bowl of maize, excavated in the Virú Valley.

Museo Nacional de Antropología y Arqueología 1/2609

Fabric: red

Dimensions: ht. 0.107 m, diameter 0.170 m.

Race of maize: Imbricado

Plate 43. P-30. Frontal view of bowl of maize in Plate 42.

Plate 44. P-31. Olla, provenience unknown.

Museo Arqueológico "Bruning" de Lambayeque 7761

Fabric: black

Race of maize: Huancavelicano

Plate 45. P-32. Olla, provenience unknown.

Museo Arqueológico "Bruning" de Lambayeque B-1918

Fabric: black

Race of maize: Huancavelicano

Plate 46. P-33. Olla, provenience unknown.

Museo Arqueológico :Bruning" de Lambayeque B-1917

Fabric: black

Race of maize: Pollo

Plate 47. P-33. View of olla in Plate 46 from above.

Plate 48. P-34. Olla, provenience unknown.

Museo Arqueológico "Bruning" de Lambayeque

Fabric: red and black

Race of maize: Huancavelicano

Plate 49. P-35. Olla, provenience unknown.

Museo Nacional de Antropología y Arqueología 36/1376

Fabric: red and white

Dimensions: ht.0.15 m, diameter 0.21 m.

Race of maize: Huancavelicano

Plate 50. P-36. Olla, provenience unknown.

Duke University Museum of Art 73.1.408

Fabric: red and dark brownish red

Dimensions: ht. 0.106 m, diameter 0.175

Race of maize: Pagaladroga

Plate 51. P-37. Olla, provenience unknown.

Museum of the American Indian 7/2734

Fabric: black

Dimensions: ht. 0.163 m, diameter 0.125 m.

Race of maize: Kculli

Plate 52. Z-1. Urn of God of Glyph "L", excavated at Miahuatlán.

Museo Nacional de Antropología 6-5421

Fabric: buff

Dimensions: ht. 0.296 m, width 0.168 m.

Period: Monte Albán IIIB

Race of maize: Nal Tel

Plate 53. Z-2. Urn of God of Glyph "L", excavated in Zaachila.

Museo Nacional de Antropología

Fabric: dark gray

Dimensions: ht. 0.267 m, width 0.194 m.

Period: Monte Albán IV

Race of maize: Nal Tel

Plate 54. Z-3. Urn of Cocijo, excavated in Zaachila.

Museo Nacional de Antropología 6-6672

Fabric: gray

Dimensions: ht. 0.374 m, width 0.403 m.

Period: Monte Albán IV

Race of maize: Nal Tel

Plate 55. Z-4. Urn of Cocijo, excavated in Zaachila.

Museo Frissell de Arte Zapoteca 4279

Fabric: dark reddish-brown

Dimensions: ht. 0.106 m, width 0.850 m.

Period: Monte Albán IV

Race of maize: Nal Tel.

Plate 56. Z-5. Urn of God with the Ear of Maize in His Headdress, excavated in Ejútla.

Museo Frissell de Arte Zapoteca 4889

Fabric: Black with buff traces

Dimensions: ht. 0.135 m, width 0.750 m.

Period: Monte Albán IV

Race of maize: Nal Tel

Plate 57. Z-6. Urn of Goddess "2 J", excavated in Chicomézuchil.

National Museum of Natural History 115033

Fabric: gray with white traces

Dimensions: ht. 0.159 m, diameter 0.190 m.

Period: Monte Albán IV

Race of maize: unidentified dent corn

Plate 58. Z-7. Vessel encircled with ears of maize, provenience unknown.

Museo Nacional de Antropología 6-6012

Fabric: gray

Dimensions: ht. 0.158 m, diameter 0.217 m.

Period: Monte Albán IV

Race of maize: Dzit-Bacal

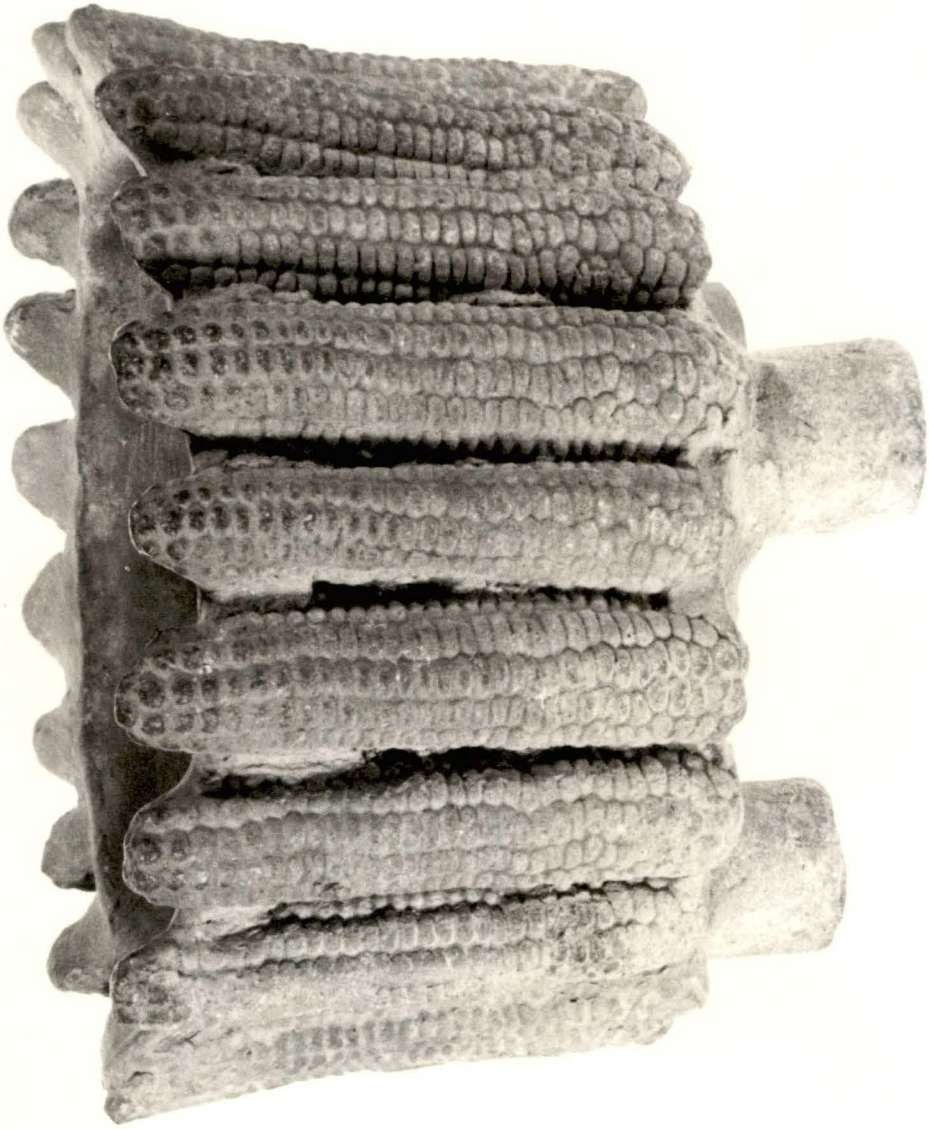

Plate 59. Z-8. Vessel encircled with ears of maize, excavated at Monte Albán.

Middle American Research Institute 35-5796

Fabric: gray

Dimensions: ht. 0.15 m, diameter 0.14 m.

Period: Monte Albán IIIB

Race of maize: Nal Tel

Plate 60. Z-9. Ears of maize from an urn, excavated at Mitla.

Middle American Research Institute 35-6004

Fabric: gray

Dimensions: ht. 0.175 m, width 0.090 m.

Race of maize: Güirua

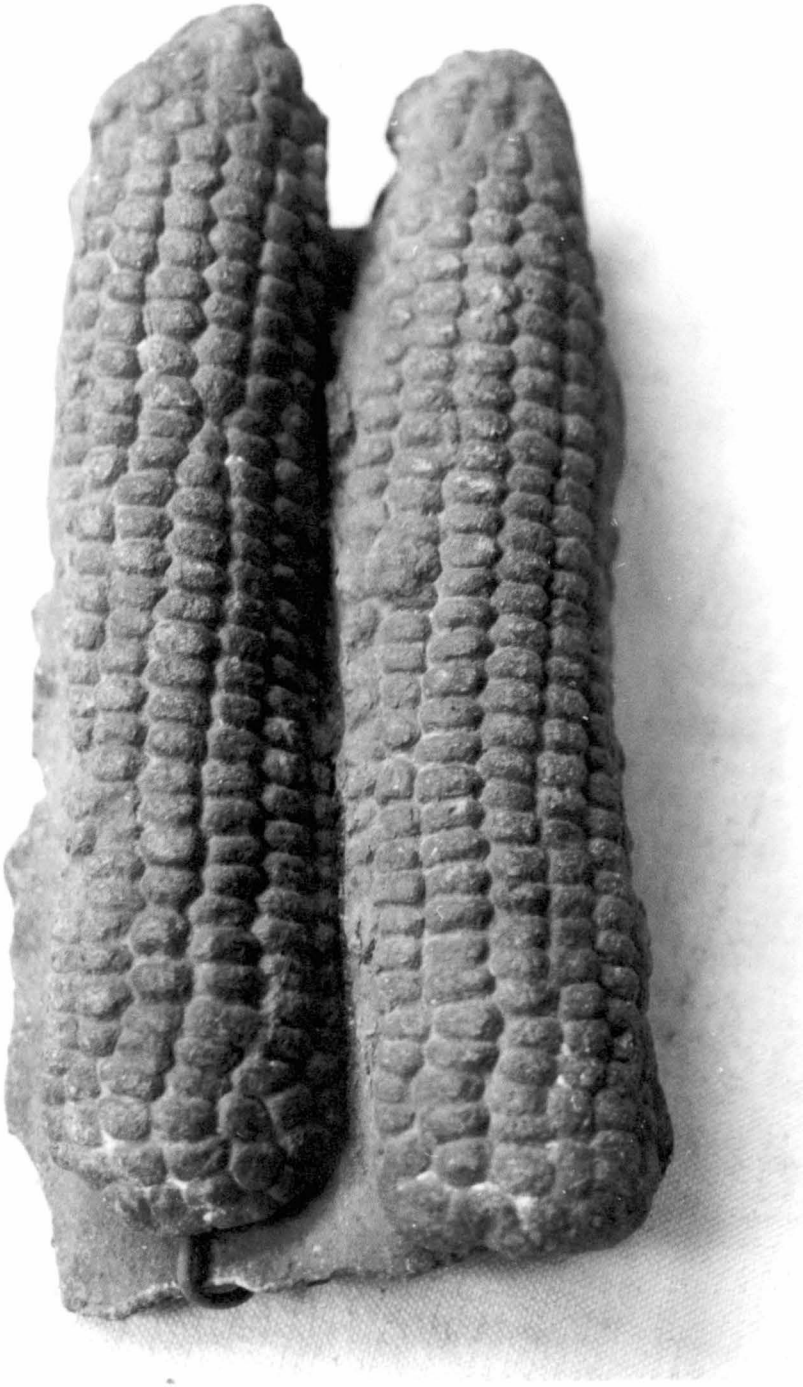

Plate 61. Z-10. Urn of God of Glyph "L", provenience unknown.

University Museum, University of Pennsylvania NA-2141

Fabric: gray

Dimensions: ht. 0.28 m, width 0.18 m.

Period: Monte Albán IIIB

Race of maize: Chapalote

Plate 62. Mazorca sherd, excavated in Zacatepechi, Morelos.

Senter U5/4552

Fabric: orange

Dimensions: length 0.83 m, diameter 0.32 m.

Period: Early Postclassic, A.D. 900-1100

Race of maize: Canguil