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CERAMIC DEPICTIONS OF MAIZE: A BASIS FOR CLASSIFICATION OF PREHISTORIC RACES

Mary Eubanks Dunn

An investigation of ceramic models of maize is reported. Nineteen races are identified on 35 Moche jars. A review of the literature is presented. Methodological considerations and problems in the classification of archaeological maize are discussed. The maize races depicted are described and discussed in terms of their archaeological significance. The findings indicate that by A.D. 800, the north coast of Peru was a center of cultural exchange among diverse groups from a wide geographical area.

In this archaeobotanical study, races of maize, *Zea mays* L., are identified on effigy jars from the north coast of Peru. The subject of investigation is ceramic maize replicas impressed from molds that were formed from actual botanical specimens. These positive casts are displayed on pottery in relief. The facsimiles duplicate in precise detail the external morphology of the maize ears from which they were modeled.

These replicas provide a unique and valuable source of information about prehistoric maize. It has been observed that races of maize are potentially good indicators of trade and migration because they are distinct and tend to be local in distribution (Pickersgill 1972:99). A maize race, by definition, is cultivated in a limited geographical area, and the occurrence of that race outside that area is evidence for cultural contact. For this reason, races of maize may ultimately provide data for a better understanding of cultural movements. The value of these data as evidence for or against cultural contacts has been limited by the nature of archaeological materials. Finds of maize have been numerous, but they consist primarily of cobs, which rarely have kernels in place or in direct association. The only exceptions are a few sites where well-preserved, complete ears have been found—in a dry cave in New Mexico (Cutler 1952), for example, and at several sites in the coastal desert of Peru (Reiss and Stübel 1880-1887; Yacovleff and Herrera 1934; Grobman et al. 1961).

It has been estimated that 90% of all maize material in archaeological collections is cobs (Lenz 1948:353). Consequently, prehistoric maize classification depends largely upon a special set of cob characters. 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 cob characters observable on archaeological specimens are significant for racial identifications is not known. There have been no tests to determine the relative importance of genotype, environment, their in-

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teraction, and sampling error on expression of characters (Bird 1976). Furthermore, there may be ambiguity in racial identifications of cobs as noted by Mangelsdorf et al. (1967) 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" (1967:188). The ceramic replicas provide corroborative evidence for identification of archaeological maize remains. They also permit a better understanding of prehistoric distributions and relationships of maize races and may yield information regarding the chronology of maize evolution.

PREVIOUS STUDIES

The use of molds by Peruvian artisans to depict fruits and vegetables in their natural forms was first described by Hébert (1902). Safford expanded on Hébert's observation by noting the use of molds for fashioning naturalistic representations on Oaxacan urns, as well as Peruvian vessels, and by pointing 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 horticultural 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), Yacovleff and Herrera (1934), Sauer (1951), Weatherwax (1954), Friedburg (1958), and Mangelsdorf (1974).

Safford recognized that specific botanical varieties were represented, and Mangelsdorf and Reeves (1938) employ this observation in support of their hypothesis that podcorn is the ancestor of cultivated maize. They point out that a ceramic specimen of podcorn in the Yale University Peabody Museum shows that this type of maize was present in South America in prehistoric times. In 1939, these authors illustrated a number of pottery objects depicting maize and discussed the representations as archaeological evidence bearing on the evolution of maize.

Wellhausen et al., in their important work on the classification of modern races of maize in Mexico (1952), identify mold-made maize on several artifacts. An in-depth study of maize representations on Mexican pottery has been made by the author (Eubanks 1973; Dunn 1975).

In their work on modern mize, Grobman et al. (1961) identify ten "proto" races on effigy jars from museums and private collections in Peru. They were the first to supplement identifications of pottery specimens with data consisting of measurements from mold-made replicas. The findings of an in-depth study of maize representations on Peruvian pottery (Dunn 1977) are reported here and discussed in terms of possible contributions to archaeology.

METHODOLOGICAL CONSIDERATIONS

There are four basic assumptions in this study of ceramic maize models: (1) the pottery specimens were impressed from molds; (2) the molds were formed from real maize ears; (3) the mold-made replicas can be distinguished from stylized or conventionalized forms; (4) the maize race represented can be reasonably well identified.

Two molds found near Chancay (Figure 1) provide concrete evidence for the use of this technique on the Peruvian coast. One is in the Museo Amano, Lima (Figure 2), the other is in the University of California Lowie Museum of Anthropology, Berkeley.

Evidence that molds were formed from real ears is provided by a unique botanical trait, the pairing of kernel rows. Straight rows are formed by an even number of paired rows, and a spiral pattern is generally produced by an odd number of paired rows (Nickerson 1953:79). This characteristic, along with the size and shape of ears and kernels, makes mold-made specimens clearly distinguishable from stylized ones. Conventionalized representations of maize are depicted either with all rows evenly aligned or with all rows alternating (Figure 3). In stylized representations, kernels appear uniformly shaped. Natural kernel shapes are more variable.

The systematic description and classification of over 300 races of maize from Latin America in

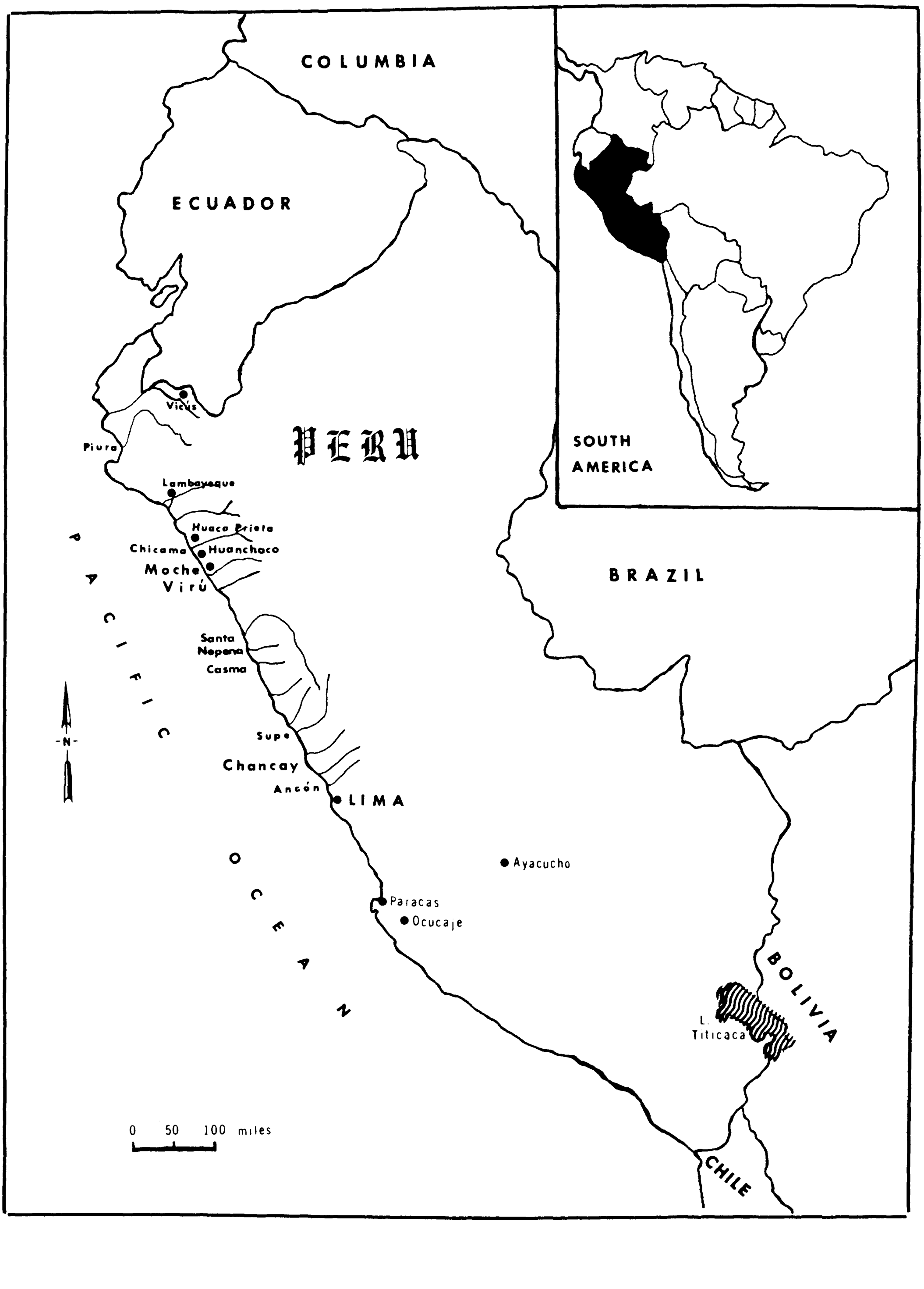

Figure 1. Map of Peru.

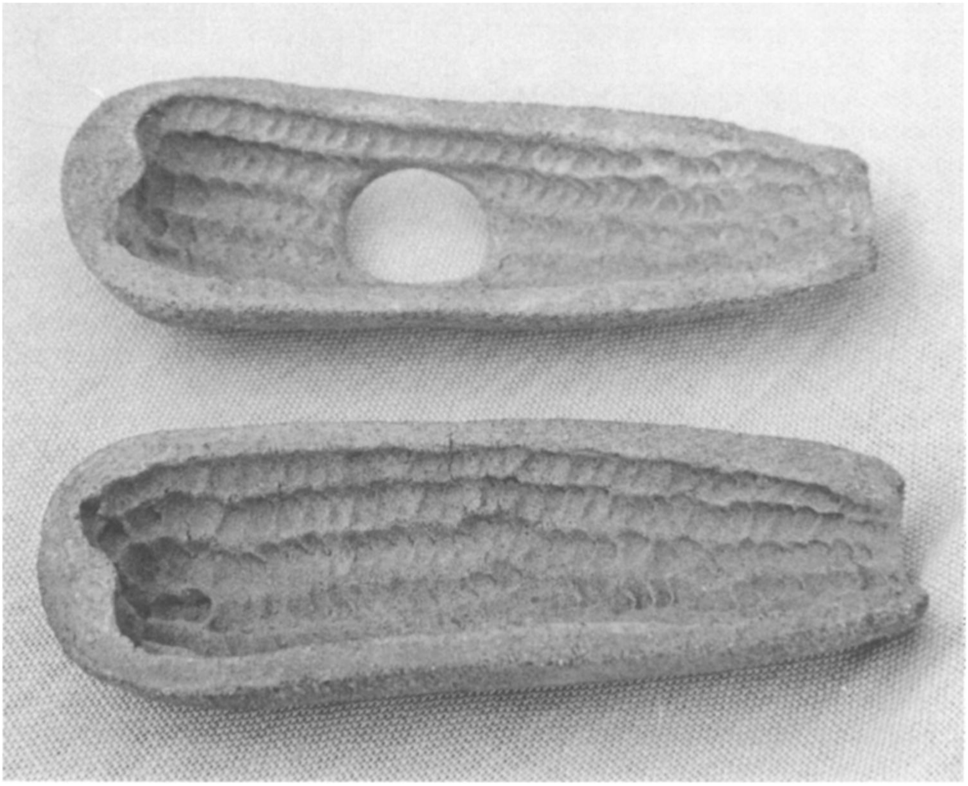

Figure 2. Two-part maize mold. Museo Amano 128. Provenience: Chancay Valley. Fabric: gray. Dimensions: length 0.160 m, diameter 0.0465 m.

11 monographs published by the National Academy of Sciences–National Research Council and 1 monograph published by Harvard University's Bussey Institute have made large amounts of comparative data on extant races available. On the basis of observed characteristics of ear and kernel shapes, the ceramic replicas were grouped into types which were then correlated with modern races on the basis of published data from the "Races of Maize" monographs. Comparisons with archaeological specimens were also made on the basis of published data. 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 has observed that races "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). Therefore, when a race depicted on pottery could not be identified among the living races of Peru, identifications were sought among maize races from other countries.

In *Zea mays*, selection has been largely for the ear, and its characters are central to classification of maize races (Mangelsdorf 1974:102). The shape and size of both the ear and the kernels are characters that have a broad genetic base and are thus important diagnostics (Anderson and Cutler 1942:72). Kernel row number, which is relatively constant within a race, is another important diagnostic (Cutler 1946:275). The traits of length and diameter of the ear, width and thickness of kernels, and kernel row number are observable on ceramic facsimiles, and they were measured and recorded for subsequent comparison with data for living races.

Since measured data for external ear characters are central to racial identification, it is important to know how much shrinkage occurs during firing in order to gauge how closely the ceramic data approximate the actual sizes of botanical specimens. Hence the author experimented with making ceramic facsimiles of maize and found that the amount of shrinkage is less than 1%.

Figure 3. Stirrup-spout jar. Museo Nacional de Antropología y Arqueología 42.264. Provenience: Lambayeque Valley. Fabric: red. Dimensions: height 0.200 m, width 0.132 m. The stylized maize ears have kernels of applied clay pellets. Every row is alternating.

Therefore, in addition to showing precise ear and kernel shape, these pottery casts closely approximate the actual size of the original botanical specimens.

Another factor to be considered in racial identifications is intraspecific variability. In maize, variability is influenced by cross-fertilization and environmental factors. Because reliable methods for measuring ranges of variation have not been developed and tested, there are no data available with which to compare the data presented here. Only Goodman and Paterniani (1969) have studied variability in maize. Using numerical taxonomy, they demonstrate that environmental factors cause less variation in ear and kernel characters than in other vegetative parts.

On the basis of evidence presented herein, it is suggested that measures of variability for modern races may not be applicable to prehistoric maize populations. In remote areas today, Indians use different races for different purposes, and special varieties are carefully maintained as pure types. Cutler observed that the reason "more races have not arisen is probably the result of rigid and constant selection toward definite standards" which "are often regulated by traditions and religious beliefs" (1946:258–259). In his work in Guatemala, Anderson observed that variability in maize populations grown by Indians was considerably less than that in maize cultivated by modern methods (1947).

Precise information regarding the geographical distinctiveness and variability range of prehistoric maize populations may ultimately be provided by a careful comparative analysis of the large numbers of maize remains in the archaeological record. Since 90% of the remains consists of cobs, such analysis awaits the development of an accurate method for distinguishing those cob characters that may be reliable indicators for taxonmic classification. In addition to the need for a better method for analyzing archaeological maize, there is a need for improved recovery and preservation techniques and for accurate, detailed descriptions. Furthermore, archaeologists should be careful to specify cultural context and to consider any possibility of intrusion or contamination of materials (Dunn 1978). The importance of this has been dramatized by a published report of corn at a Middle Woodland site in Michigan. The specimen was subsequently radiocarbon dated A.D. 1950! (Munson 1966:64).

ARCHAEOLOGICAL CONTEXT

The mold method of realistically depicting maize occurs primarily on the pottery of two highly developed, contemporaneous, Precolumbian cultures: the Moche of the north coast of Peru, and the Zapotec of the Oaxaca Valley in southern Mexico. The subject of this report is maize depicted on Moche pottery.

The Moche occupied an area on the north coast of Peru that extended from the Piura Valley in the north near the border of Ecuador to the Casma Valley in the south. This area is in 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 and has 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. In contrast with the barren desert, the ocean along the coast is one of the world's richest commercial fishing areas. Fish, marine animals, and shore birds are an important subsistence source (Moseley 1975).

Moche culture is marked by a period of intense activity in building and ceramic production. The first large cities on the coast appeared at this time. The first valley-wide irrigation systems were constructed. There was extensive warfare. The complex, stratified society was composed of many specialists, including highly skilled artisans. Lanning (1967) describes this as the Early Intermediate period, whereas Lumbreras (1974) refers to it as the Regional Developmental period. Chronologically, it dates circa A.D. 100–800.

An outstanding feature of Moche material culture is the pottery. The beautiful vase paintings and the excellent quality of the modeled forms depict all aspects of Moche life with realism unparalleled by art forms of other Precolumbian cultures, and they are a rich, valuable source of information about Moche life. Many popular forms and decorative motifs had local antecedents. Features carried over from the earlier Cupisnique, Gallinazo, and Salinar ceramics include the stirrup-spout jar, the fanged deity, snakes, use of molds, and geometrical designs painted in red, white, and sometimes black on orange (Strong and Evans 1952).

Molding was a basic technique and played a part in the manufacture of most Moche pottery. Many of the fired clay molds were formed over actual objects, such as an ear of maize, and then moist clay was pressed into the molds to produce positive casts of desired forms (Donnan 1965:117–118). The use of this technique is documented by excavated finds of molds (Uhle 1889; Kroeber 1925; Strong and Evans 1952; Thompson 1963), visible joining seams on jars, and repeated occurrences of identical pots (Parsons 1962).

Information regarding the actual contexts of the maize effigy jars described herein was not available. Finds of highly decorative pottery in the refuse of habitation sites indicate that such jars were not used exclusively for grave goods and ceremonial purposes (Donnan 1973:128), but since the primary offerings in Moche burials *were* elaborate ceramic vessels, it is assumed that most of the objects were grave goods. In Moche burial practices, the dead were placed in rectangular graves that were often lined with stones, cane, or adobes. Vessels, along with food and other goods, were placed around the body and in niches inside graves (Larco Hoyle 1944:170; Donnan and Mackey 1978). The excavation of a modeled jar with maize depictions from a site at Pampa Blanca in the Santa Valley confirms the assumption that maize effigy jars were placed in burials (Donnan 1973:133).

Shapes of vessels with maize depictions include stirrup-spout jars, spout-and-handle bottles, and modeled jars. The stirrup spout is composed of two arched tubes which meet in a single, cylindrical spout. The main body is spherical with a flat or annular base. A variant of this form has a curved handle attached to the spout at one end and the vessel chamber at the other. The modeled jars have a spherical body with a prominent, slightly flaring neck. These jars have decorative designs in relief on the chamber and sometimes on the neck (Donnan 1973). A variant of the modeled jar is a wider, flatter olla-shaped jar. The ollas have flat bases and short, constricted necks. Some have small loop handles on either side of the spout. These probably served as strap handles.

The study corpus includes 35 jars with maize depictions. Twenty-two represent an anthropomorphic deity (Figure 4) with a human face and a double-fanged mouth; all but one of these figures have a pointed terminus of the head. This latter feature may represent the tip of a maize ear; on some examples, the point is shown completely covered with embossed kernellike elements, whereas on others, it is void of kernel motifs, as if to represent an ear on which kernels did not form over the tip of the cob, a characteristic of tripsacoid maize. Other features of these figures include snake-head ear ornaments, bead necklaces, bracelets or arm bands, and two smaller companion figures (Figure 5). The motifs on other jars include a rodent eating maize (Figure 6), a mound of maize, and a maize plant with a bird perched in the tassels (Figure 7).

Figure 4. Modeled jar. Museo Nacional de Antropología y Arqueología KK/16583. Provenience: Virú Valley. Fabric: red and white. Dimensions: height 0.215 m, width 0.137 m. Race of maize: Karapampa.

Figure 5. Modeled jar. Museo Nacional de Antropología Arqueología KK/16624. Provenience: Lambayeque Valley. Fabric: red and white. Dimensions: height 0.310 m, width 0.184 m. Race of maize: Mochero.

BOTANICAL FINDINGS

Nineteen races of maize have been tentatively identified on 35 Peruvian jars (Table 1). There is diversity in the different kinds of maize, the different kinds of climates and environments in which these races are grown today, and the various countries in which modern collections have been made (Table 2). This diversity indicates that many races had a wider geographic distribution in prehistoric times than they have at present, and Peru appears to have been a center for contact and exchange between divergent cultural groups from a wide geographical area. The different types of maize include pop corns, flint varieties, flour corns, particular types used in making *chicha*, and a dye corn.

Races that have been previously identified among archaeological collections are Pagaladroga, Pollo, Huancavelicano, Perlilla, Polulo, Confite Iqueño, Confite Morocho, and Kculli. A race closely related to Kcello, Kcello Ecuatoriano, has been identified from a site in Ecuador (Zevallos M. et al. 1977). In excavations that were part of the Chan Chan-Moche Valley Project, large numbers of kernels and cobs were excavated in eight sites. The reported data give cob size and row number for some of the specimens (Pozorski 1976). Sufficient data for correlating this excavated material with the ceramic replicas is lacking. However, future, careful analysis of the excavated material compared with the findings from the ceramic replicas may yield further insights into the evolution of maize on the north coast.

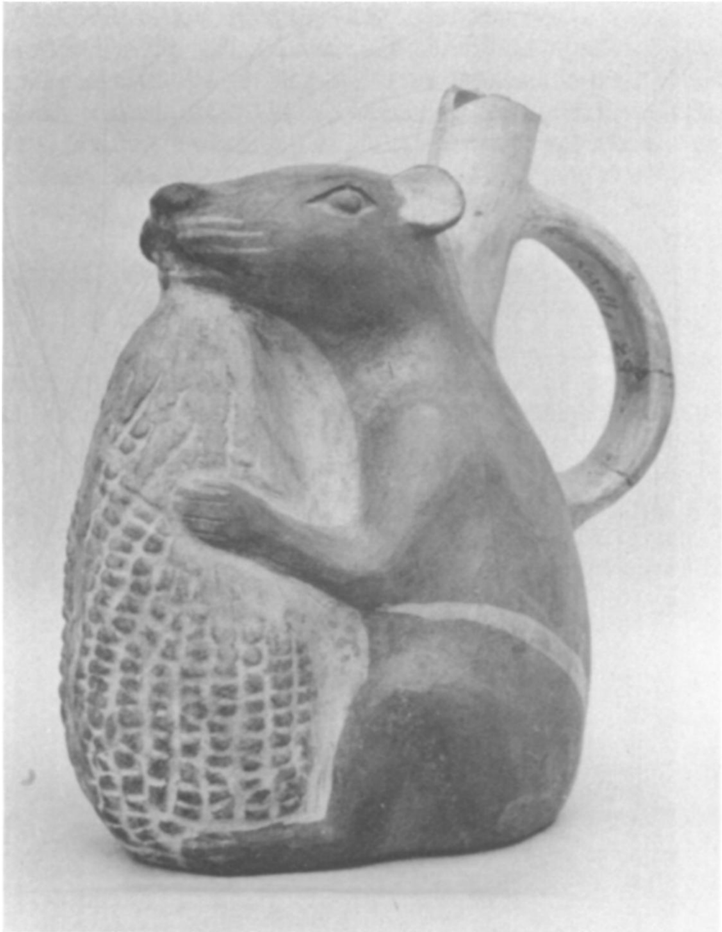

Figure 6. Spout-and-handle bottle. Museo Nacional de Antropología y Arqueología KK/16602. Provenience: Virú Valley. Fabric: red and white. Dimensions: height 0.195 m, width 0.165 m. Race of maize: Perla.

Other races identified on the pottery include the highland races Karapampa, Güirua, and Imbricado. Two races, Pira and Clavo, are adapted to growth at intermediate elevations. Also included are the lowland races Enano, Mochero, Guaribero, Chococeño, and Perla.

ARCHAEOLOGICAL SIGNIFICANCE

Findings from the ceramic replicas complement present knowledge about the evolution of maize based on the archaeological record. On the basis of this study, it is hypothesized that prior to A.D. 800 a wide variety of maize races had already appeared on the coast of Peru. This shows the early evolution of these races and brings evidence to bear on questions of early connections between different cultural groups. Many races identified are found today only outside Peru. Some are highland races that cannot grow on the coast. Maize does not have a natural mechanism for seed dispersal; it is dependent on man for its survival. Ergo, the best explanation for maize races outside geographical areas of adaptation is transportation by man.

This is significant for archaeology because knowledge about cultural diffusion is vital to any study of sociocultural systems. Origins and histories of cultural groups, technologies, artistic styles, ideologies, trade routes, and patterns of exchange cannot be fully understood without knowledge of cultural contacts that link different geographical areas. Maize is a cultivar from

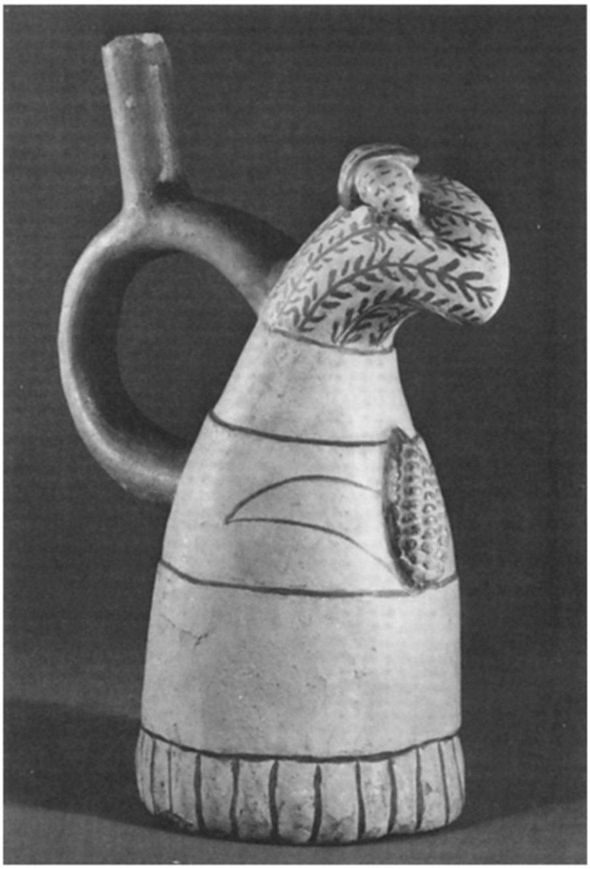

Figure 7. Stirrup-spout jar. Metropolitan Museum of Art 67.167.19. Provenience: Moche Valley. Fabric: red and white. Dimensions: height 0.281 m, width 0.206 m. Race of maize: Pollo.

which insights about such contacts may be gained. There are cultural reasons, as well as botanical reasons, why this is so.

In addition to its importance as food, maize had important symbolic and religious connotations. *Chicha*, a fermented beverage made from maize, was an important ritual drink in South America and Mesoamerica (Oviedo y Valdés 1851–1855). Votive offerings of maize were placed in shrines in ceremonial centers. It was realistically depicted on effigy jars from Mexico and Peru in association with important deities. It was placed in graves as offerings for the dead, and in Peru maize kernels were placed in the mouth and nostrils of the dead (Towle 1952:227).

In addition to its use as food, for propitiatory sacrifices, and as an object of worship and veneration, certain types of maize had special medicinal uses (Cobo 1890–1895). There is ethnological evidence from which it can be inferred that the use of maize for treating certain illnesses had its origin in Precolumbian times. Among the Callahuayo Indians of the Bolivian highlands, there is a group of medicine men who travel throughout South America and into Central America to treat patients at great distances. Included among their medicines is podcorn, a primitive type of maize in which kernels are individually enclosed in separate glumes or husks. Podcorn is almost extinct, but it has probably survived extinction because of Indian beliefs in its curative powers when used in treating certain lung ailments (Cárdenas 1943). It is inferred that these Indians are practitioners of ancient medicine because they characteristically carry a *quena*, a reed flute of Precolumbian origin (Cutler 1944:293).

Table 1. Average Measures for External Characters of the Maize Ear Compared with Data for Moche Ceramic Specimens.

	Length/cm	Diam/cm	Row no.	Kernel Characters: Width/mm	Kernel Characters: Thickness/mm	Kernel Characters: W/T Index
Race						
Chococeño (Ecuador)[a]	12.4	4.08	19.6	6.60	4.20	1.57
Chococeño (Colombia)[b]	11.0	3.65	17.2	6.47	4.10	1.57
Specimen						
MNAA 1/2865	11.0	4.00	16.0	6.00	3.10	1.73
Race						
Clavo (Colombia)[b]	20.0	3.22	11.1	8.32	5.15	1.62
Specimen						
MNAA 1/027	10.2	3.40	10.0	7.50	4.65	1.61
Race						
Confite Iqueño (Peru)[c]	5.7	2.44	16.8	4.70	4.50	1.04
Specimen						
Larco J-30839	6.5	2.80	14.0	4.70	4.75	.99
Larco J-30839	3.5	2.00	12.0	4.70	4.75	.99
Race						
Confite Morocho (Peru)[c]	6.7	2.30	10.6	5.87	4.55	1.29
Specimen						
Brüning 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
Race						
Enano (Peru)[c]	7.2	2.30	16.0 (Irr)	5.30	3.70	1.43 (Irr)
Enano (Bolivia)[d]	6.9	2.73	16.4	4.79	3.30	1.45
Specimen						
Brooklyn 41.1275-74	6.6	2.80	14.0	5.00	4.10	1.22
Race						
Guaribero (Venezuela)[e]	11.7	3.64	15.5	7.00	3.80	1.84
Specimen						
Larco 3993	8.4	3.00	14.0	6.40	3.68	1.73
Race						
Güirua (Colombia)[b]	16.2	3.41[f]	12.2	7.97	4.88	1.63
Specimen						
Larco 4677	12.9	4.50	12.0	7.50	4.80	1.56
Larco S-39160	10.3	3.90	14.0	7.00	4.36	1.61
MNAA 1/1680	10.7	3.80	14.0	6.50	4.50	1.44
Race						
Huancavelicano (Peru)[c]	11.45	4.50	8.8	11.60	6.20	1.87
Specimen						
Larco 2281	9.00	2.90	8.0	7.50	4.00	1.88
Brüning 7761	5.60	1.80	6.0	6.70	3.50	1.91
Brüning MB-1918	5.60	1.80	6.0	6.70	3.50	1.91
Brüning MB-1927	7.50	2.65	8.0	7.50	3.50	2.14
Brüning MB-1927	5.90	2.35	8.0	7.50	3.50	2.14
MNAA 36/1376	6.70	2.60	8.0	7.50	3.25	2.31
Race						
Imbricado (Colombia)[b]	11.0	3.80	14.3	7.23	5.26	1.37
Specimen						
MNAA 1/2609	14.6	3.70	12.0	7.40	5.25	1.35
Race						
Karapampa (Bolivia)[d]	12.2	1.90	8.8	7.86	4.00	2.37
Specimen						
MNAA KK/16583	8.2	2.20	8.0	7.50	4.00	1.88
MNAA 158	8.2	2.20	8.0	7.50	4.00	1.88

Table 1. (continued).

	Length/cm	Diam/cm	Row no.	Kernel Characters Width/mm	Thickness/ mm	W/T Index
Race						
Kcello (Bolivia)[d]	11.9	3.72	10.0	9.52	4.14	2.30
Specimen						
Larco 2295	6.5	2.35	8.0	7.00	3.50	2.00
Larco 2995	7.5	2.65	8.0	7.47	3.75	1.99
Amano 59	8.2	2.80	8.0	7.60	3.90	1.95
Race						
Kculli (Peru)[c]	9.2	4.71	12.0	10.27	6.01	1.71
Specimen						
MAI 7/1734	7.7	2.30	10.0	6.50	3.60	1.81
Race						
Mochero (Peru)[c]	9.3[f]	4.13	—(Irr)	7.60	4.50	1.69
Specimen						
MNAA KK/16591	8.5	2.50	10.0	6.40	4.00	1.61
MNAA KK/16624	7.5	2.20	8.0	6.00	3.20	1.88
Brooklyn 1890	8.0	2.70	10.0	6.50	3.47	2.03
Race						
Pagaladroga (Peru)[c]	14.3	4.19	15.0	7.80	4.10	1.90
Specimen						
Duke 73.1.408	8.6	2.80	10.0	7.00	3.80	1.84
Race						
Perla (Peru)[c]	18.4	4.50[f]	15.6	8.80	5.00	1.76
Specimen						
MNAA KK/16602	13.5	5.50	22.0	7.50	4.50	1.67
Duke 73.1.507	12.3	5.70	22.0	7.50	5.20	1.44
Race						
Perlilla (Peru)[c]	11.1	4.17	14.0	6.62	4.96	1.33
Specimen						
MNAA 1/1681	11.8	3.50	12.0	6.00	4.85	1.24
Race						
Pira (Venezuela)[e]	10.9	2.56	10.8	5.80	3.00	1.93
Pira (Colombia)[b]	11.2	2.50	11.0	6.49	3.58	1.81
Specimen						
MAI 5/1741	7.5	2.40	10.0	6.00	3.60	1.67
MAI 4/8898	8.8	2.30	10.0	6.00	3.50	1.71
Race						
Pollo (Venezuela)[e]	11.2	3.67	9.8	9.70	5.20	1.87
Pollo (Colombia)[b]	8.8	2.93	10.0	7.94	4.96	1.60
Specimen						
Brüning B-1917	8.0	2.20	8.0	8.25	4.23	1.95
Larco 2300	7.0	2.30	8.0	7.00	4.60	1.52
Larco J-432	8.9	3.00	10.0	6.25	3.35	1.87
MMA 67.167.19	6.2	2.70	10.0	6.50	4.00	1.63
UM 67-36-1	10.4	2.60	10.0	7.00	3.70	1.89
Race						
Polulo (Chile)[g]	9.6	2.37	12.0	5.25	3.47	1.51
Specimen						
MNAA 2/4756	11.4	2.50	10.0	5.00	4.00	1.25
MNAA 2/4756	4.7	2.30	10.0	5.00	4.10	1.21

[a] Timothy et al. 1963.
[b] Roberts et al. 1957.
[c] Grobman et al. 1961.
[d] Brieger et al. 1958.
[e] Grant et al. 1963.
[f] Major M. Goodman, personal communication.
[g] Timothy et al. 1961.

Evidence indicates that different types of maize, adapted to specific geographical areas and environmental conditions, were valued for special uses and were important exchange commodities. This is documented by Díaz del Castillo's sixteenth-century report of Indian trade in maize along the northwestern coast of South America (1934:178).

CONCLUSIONS

Nineteen races of maize have been identified on Moche jars. Nine of these include the Peruvian races Confite Iqueño, Confite, Morocho, Kculli, Enano, Perla, Mochero, Pagaladroga, Huancavelicano, and Perlilla. Their identifications indicate that these races had evolved by A.D. 800.

Ten races identified are found today only outside Peru. They represent races from Chile, Colombia, Ecuador, and Venezuela. This dispersal suggests that the prehistoric ranges of these races were wider than their present-day ranges.

The identification of the race Polulo corroborates its identification from archaeological remains, and indicates that there may have been contact between cultures on the coast of Chile and the north coast of Peru.

The identification of the Colombian races Pira, Clavo, Pollo, Imbricado, and Güirua establishes the existence of these races by A.D. 800 and points to cultural relationships between highland Colombia and the north coast of Peru. Identifications of Güirua and Pollo, races which have counterparts in Central America, suggest cultural contacts as far away as Central America. The measurements of maize on several specimens conservatively identified as Pollo are quite close to metric data for Nal Tel and Chapalote. Pollo is believed to be closely related to the ancient, indigenous Mexican races Nal Tel and Chapalote. Evidence here supports the close relationship of these three races as proposed by Mangelsdorf (1974). It is suggested that systematic, comparative studies of archaeological remains identified as Pollo, Nal Tel, and Chapalote will demonstrate that these races are derived from the same lineage, and that Pollo is a manifestation of the southward diffusion of Mexican Nal Tel.

The identification of the highland Bolivian races Kcello and Karapampa suggests that these races were once more widespread and that they may have been items of exchange between the highlands and the coast.

The identification of Guaribero, a Venezuelan race found today in areas along established Arawak trade routes which Chard (1950) describes as having extended as far as Colombia, indicates those routes may have extended as far as the north coast of Peru and may have been established as early as A.D. 800.

This study of maize replicas on Moche pottery shows that most races identified had a wider geographical distribution prehistorically than they have today. It is proposed that ceramic maize replicas on Moche jars provide evidence demonstrating that the north coast of Peru was a major center for cultural exchange, connecting distant areas of South America, perhaps extending as far as Central America. Other archaeological evidence showing Moche influences beyond north coast cultural boundaries has been found (Donnan 1976). Such influences, however, have received limited attention from archaeologists because of lack of diagnostic artifacts from controlled excavations.

It has been said: "the more fully we understand the relationships of the various races and subraces 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). There are still a large number of unstudied Peruvian and Mexican sources depicting mold-made maize in museum collections. Present findings indicate that an exhaustive comparative investigation of those objects would: (1) add weight by quantification to the validity of these racial identifications; (2) contribute further to knowledge about prehistoric distributions and the evolution of maize; and (3) provide further evidence for diffusion among Precolumbian cultures. Such a large data base, in conjunction with a systematic, in-depth study of maize in archaeological collections, could ultimately provide necessary information for mapping out prehistoric routes for the spread of maize. Knowledge about prehistoric rela-

Table 2. Description of Maize Races Represented in this Collection.

Race	Type	Country	Elevation	Ear Shape	Kernel Shape	Row No.	Maturity	Comment
Karapampa[a]	Pop	Bolivia	High	Slender, cylindrical	Tapering	8 (ave)	Early	
Confite Morocho[b]	Pop	Peru	Middle to high	Slender, short, cylin-droconical	Imbricated to rounded	10 (ave)	Very early	Prized by Indians for its popping quality. Identified among archaeological specimens.[b]
Kculli[b]	Dye	Peru	High	Short, sphero-conical	Imbricated to rounded	12 (ave)	Early	Food coloring. Identified among archaeological remains from the south coast of Peru.[b]
Enano[a,b]	Pop	Bolivia, Peru	Low	Small, stubby spheroconical	Small, rounded	16–18 (irreg)	Very early	
Pollo[c,d]	Popflint	Colombia, Venezuela	Intermediate to high	Small, short, conical	Medium thickness & width, rounded	8–10 (irreg)	Early	Identified among archaeological remains from Venezuela.[e] Distributed in former habitation area of Chibcha culture. Its Guatemalan counterparts are Nal Tel Tierra Alta and Quicheño Precoz.
Pira[c,d]	Pop	Colombia, Venezuela	Intermediate	Short, slender, slightly tapered	Small, rounded	10–12	Early to intermediate	
Huancavelicano[b]	Flour-flint	Peru	High	Small, cylin-droconical, slightly globose	Long, wide, thin, pointed	8–10	Intermediate	Identified among archaeological specimens from Chancay.[b]
Mochero[b]	Flour	Peru	Low	Short, stubby, cylindrical	Short, poly-hedrical	14 (irreg)	Very early	Used in making *chicha*. Drought resistant.
Pagaladroga[b]	Flour	Peru	Low	Slender, cylindrical	Small, slightly imbricated	12–16 (irreg)	Early to intermediate	Used for making *chicha*. Almost extinct. Present among archaeological maize collections.[b]
Kcello[a]	Flint	Bolivia	High	Slightly tapered	Medium size	10–12 (irreg)	Early	
Clavo[c]	Pop	Colombia	Intermediate	Long, slender tapering	Medium size	8–10	Early	

Table 2. (continued).

Race	Type	Country	Elevation	Ear Shape	Kernel Shape	Row No.	Maturity	Comment
Güirua[c]	Flour	Colombia	Intermediate to high	Long, slender, tapering or short, thick, conical	Medium size, well rounded	12 (ave)	Early	Name of Indian origin; meaning unknown. Found only in Sierra Nevada de Santa Marta, area of former Tairona culture.
Guaribero[d]	Pop	Venezuela	Low	Short, thick, slightly tapered	Small, round	16–20	Intermediate to late	Present distribtion in former Carib area southeast of Caracas.
Chococeño[c,f]	Popo	Colombia, Ecuador	Low	Thick, short, conical	Narrow, short, thin	17 (ave)	Late	Primitive method of cultivation, seed sown above ground. Grown in area of very high rainfall. Highly tripsacoid.
Imbricado[b,c,f]	Pop	Peru, Colombia Ecuador	High	Short, thick, conical, rows spiraling	Narrow, imbricated	14 (ave)	Relatively early	
Perla[b]	Flint	Peru	Low	Cylindroconical	short, narrow, medium thickness	15.6 (ave)	Late	One of the most productive Peruvian coastal races.
Perlilla[b]	Flint	Peru	Low	Cylindrical	Small, round	14 (irreg)	Very late	Among archaeological collections from Huanúco, Peru,[b] and northern Chile.
Pololo[h]	Pop	Chile	High	Slender, finger-shaped	Small, imbricated	10–16	Early	Among archaeological specimens from northern Chile.[g]
Confite Iqueño[b]	Pop	Peru	Low	Short, spherical	Round, almost isodiametrical	12–24		This race has been named and classified strictly on the basis of archaeological remains from the Los Cerillos site in the Ica Valley on the south coast of Peru.[b]

[a] Ramírez et al. 1960.
[b] Grobman et al. 1961.
[c] Roberts et al. 1957.
[d] Grant et al. 1963.
[e] Mangelsdorf and Sonója 1965.
[f] Timothy et al. 1963.
[g] Mangelsdorf and Pollard 1975.
[h] Timothy et al. 1961.

tionships of maize promises to aid culture historians in developing a clearer conceptual framework for understanding the evolution of New World civilizations.

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