

PRECERAMIC ARCHITECTURAL AND SUBSISTENCE TRADITIONS¹

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Introduction

Recognition of the Peruvian Cotton Preceramic Period as a separate cultural and analytical unit took a long time, from Uhle's (*e.g.*, 1920) early work at the turn of the century through that of Junius Bird (*e.g.*, 1948a, 1948b, 1963; Bird *et al.* 1985; Bird and Bird 1980) in the 1930s and 40s to the studies in the 1960s of Frédéric Engel (*e.g.*, 1966, 1970), Edward Lanning (*e.g.*, 1966, 1967), Thomas Patterson (*e.g.*, Patterson and Lanning 1964), and their associates. Perhaps in part because of this struggle for recognition, attention has at times focused too strongly on the coast, at the expense of the contemporary highland occupations. This lack of attention to the Late Preceramic of the highlands was also furthered by a general pattern or mindset among Peruvianists that saw the coastal valleys as separate and distinct cultural units, both from other coastal valleys and from the highland occupations. Because of this atomistic view, relationships between areas, or even between parts of the same general area, have not been adequately considered. (Something of this attitude can be seen in the Virú Valley Project, which gave local phase names that differed from those used for the same pottery styles in the adjacent Moche Valley.)

To explain cultural developments on the coast, Lanning proposed a sequence of events tied to climatic factors, with an early coastal hunting and collecting occupation of the *lomas* shifting to the shoreline as a result of climatic changes. With the shift to the coast, the groups were able to exploit the rich marine resources and farm some newly-introduced domesticated plants, allowing sedentary occupations to develop (Lanning 1966). Under such a view, the sedentary coastal populations acquired the domesticated plants seemingly without contact with any highland groups. Lanning recognized some contact up and down the coast, such as in his postulated "Culebras Complex" in the Casma to Huarmey Valleys (Lanning 1967: 66-68), but even in that case there were not extensive contacts.

Moseley's work at Ancón, which grew out of Lanning's and Patterson's earlier studies, led to his explicit formulation of the "maritime foundations" hypothesis (Moseley 1968, 1972, 1975, 1978; Moseley and Feldman 1988). While this hypothesis led to an increased appreciation of the importance of coastal preceramic occupations in the rise of Peruvian civilization, it, too, focused almost entirely on the coast. As the hypothesis was first developed, it also concentrated on a single aspect of the subsistence economy: shellfish. (Fung P. [1972] correctly noted the dietary potential and importance of the *anchoveta*, as well as the simple technology needed to harvest these fish, but the restricted circulation of her work unfortunately limited its impact.) This emphasis on shellfish was due in part to excavation techniques that did not recover a representative sample of the smaller fish remains and to the ease of identifying shellfish species as opposed to fish species.

In the final analysis, the Maritime Foundations Hypothesis also slighted the plant remains that had been found in preceramic middens. Bird (1948a, 1948b; Bird *et al.* 1985) found beans, squash, *achira*, and *lúcuma* in the preceramic levels of Huaca Prieta; Moseley himself had found tubers (potato, sweet potato, *oca*, and *ulluco*, but unidentified at the time [Martins 1976]) and other food plant remains at Ancón. A careful reading of *The Maritime Foundations of Andean Civilization* (Moseley 1975) does show that the agricultural resources were considered in a more balanced presentation, yet the emphasis was first and foremost on marine resources, then secondarily on coastally grown "industrial

¹ This paper is a revised version of one originally given as part of the "Maritime Foundations" Symposium at the 51st Annual Meeting of the Society for American Archaeology, New Orleans, April 27, 1986. Revisions since May of 1987 have not been extensive. Interested readers should also consult Bonavia (1982) and Quilter (1991).

plants" (cotton and bottle gourds), and lastly on supplementary plant foods used in certain favored locations where both marine and riverine habitats could be exploited.

The "shellfish bias" (*e.g.*, Moseley and Feldman 1977) was picked up by Osborn (1977a, 1977b), who argued on theoretical grounds that shellfish resources could not have supplied the nutritional needs of the coastal dwellers. Parsons (1970) and later Wilson (1981) argued that disruptions of the marine environment caused by El Niño current reversals would have made marine resources too unstable to have supported the rise of civilization on the Peruvian coast. Wilson, however, misrepresented the effects of El Niño when he argued that it would lower the productivity of the coastal waters to that of the open ocean. He also neglected the new species of fish which come south to replace those dispersed by El Niño (Arntz 1986), making its effects on coastal dwellers seem worse than they were.

Countering Wilson's line of argument, both Quilter and Stocker (1983) and Moseley and Feldman (1988; also Moseley 1985) have stressed the problems of trying to farm the Peruvian desert coast and the effects that El Niño has on terrestrial resources, both of which make agriculture less attractive in actuality than it is in theory. If Moseley stated the extreme maritime position, then Wilson went to the opposite extreme and argued for a maize-based preceramic economy, which cannot be supported by the evidence (Fung P. 1972; Quilter and Stocker 1983; Moseley and Feldman 1988). He also misstated the maritime argument, creating a preceramic state as a straw man to attack (see Moseley and Feldman 1988).

The criticisms of Raymond (1981) are more plausible, because they note the evidence for tuber crops such as *achira*. Raymond also raised the important issue of differential preservation of tubers as opposed to fish bones or shellfish. On the other hand, Quilter and Stocker (1983) have argued that marine protein also might be underrepresented in coastal middens. Recent biological and chemical studies (Benfer 1986, 1990; Benfer *et al.* 1981) have shown, however, that whatever the biases in midden preservation might be, protein in the coastal diet came overwhelmingly from marine sources. These studies have been supported by the recent results of detailed analysis of midden from El Paraíso, the largest of the Late Preceramic centers (Quilter *et al.* 1991).

The wide geographical range over which *achira* and other cultivated tuber foods have been found (from Huaca Prieta in the north through Casma Valley sites to Aspero, Ancón, and south) certainly merits our close attention. Identification of sweet potato, *oca*, *ullucu*, and white potato among the plant remains Moseley excavated at Ancón did not come until 1976 (Martins 1976), and it was not until even later that these identifications came to Moseley's attention (via Pickersgill and Smith 1981). With these data in hand, Moseley began to recognize the importance of the interior regions in the coastal subsistence economy (Moseley 1985), for as Pickersgill and Smith (1981: 102) noted, "...trade networks must also have involved agricultural communities in the highlands, since the potatoes, *oca* and *ullucu* reported from Ancón (Martins [n.d.]) are highland crops which would not have grown successfully on the coast. . ."

Moseley is by no means the first to have argued for coast-highland interaction during the Preceramic Period. Lynch (1967, 1971) argued early on for seasonal movements. At the same time that Moseley published *The Maritime Foundations*, MacNeish, Patterson, and Browman (1975) argued for extensive small contacts and the exchange of produce and raw materials over a wide region of the Central Andes. More recently, Burger, through his work in the highlands and his writings (*e.g.*, Burger 1985), has forcefully argued for not just contacts but also interconnections. Attention is returning to the earlier findings of cultivated food plants and to the newly-discovered highland preceramic ceremonial structures. The pendulum swing of interpretations is heading back to a middle position, one that recognizes the importance of the coastal environment while acknowledging the contemporary achievements in the highlands and the interactions between these and other areas.

In light of the current recognition of interzonal contacts, it is time to evaluate the evidence dating to the late third millennium BC to see what the subsistence remains and architectural patterns can tell us about these contacts and the nature of the underlying cultural groups.

We will focus on two main architectural patterns that developed in Central Peru during the Late Preceramic Period,² a coastal pattern we can call the Paraíso Tradition and a highland pattern Burger and Salazar-Burger (1980) called the Kotosh Religious Tradition.³ The following sections of this paper will compare the Paraíso and Kotosh patterns and bring in another architectural tradition, that seen in Ecuador at the Valdivia village of Real Alto. Sites mentioned in the text are shown on Figure 1.

Subsistence

Valdivia Tradition

The accumulated evidence shows that the subsistence economy of Valdivia sites included not only exploitation of the resources of the mangrove swamps and littoral (Meggers *et al.* 1965; Porras 1973; Stothert 1976, 1992 [this volume]), but also of the agricultural potential of riverine localities (Norton 1977). Maize was cultivated (Zevallos M. 1971; Zevallos M. *et al.* 1977; Pearsall 1979) and was of ritual importance (Lathrap *et al.* 1975; Marcos *et al.* 1976). Judging from the numerous sites located adjacent to good arable land and the interpretation given to the quantities of deer bones found at inland Valdivia sites (that the deer were drawn to and feeding on fields of cultivated maize), maize was also dietarily significant (Marcos *et al.* 1976). Although hard evidence is lacking, it is reasonable to assume that at least some of the South American root crops, such as *achira* and possibly manioc, were also important cultigens (Pearsall 1979). Other plants exploited apparently included *Canavalia* beans (*ibid.*), coca, and psychoactive snuffs (Lathrap *et al.* 1975).

Highland Kotosh Religious Tradition

Little hard evidence exists on the role of plants in the subsistence economy of Kotosh Religious Tradition sites, but it seems reasonable that there was a mixed economy with animal husbandry, hunting, collecting, and some farming (Izumi and Sono 1963; Grieder and Bueno M. 1985; Grieder *et al.* 1988). The river valley locations of the major early highland sites argue for an orientation toward easily farmed lands along the stream courses.

Agriculture has a much longer record in the highlands than in other areas: legumes, presumably cultivated, go back to *circa* 10,000 B.P. (Kaplan *et al.* 1973; Lynch *et al.* 1985). Other evidence from the Ayacucho area (MacNeish *et al.* 1975) and from the upper Chilca drainage (Engel 1970) also argue for the considerable antiquity of plant use in the highlands, although these data are less secure (especially that of Engel; in this regard see Bonavia 1984). In addition, most of the Andean domesticates are native to the higher elevations, not to the coast, and would first have been used and

² The main part of the coastal area (Figure 1) runs from Asia in the south to Casma in the north, although it can be extended north to Chicama. The highland area includes the Callejón de Huaylas and its tributary valleys and the basins around the upper reaches of the Marañón and Huallaga River Valleys.

³ It is also evident that there was at least a third tradition in northern Peru (Cajamarca, Jequetepeque, and Zaña) characterized by low rectangular earthen platforms with a few summit rooms (Terada 1985; Ravines 1985; Dillehay and Netherly 1983; Dillehay *et al.* 1989). This northern complex shows some ties to the Kotosh Religious Tradition, but it appears to have been less influential than the first two complexes.

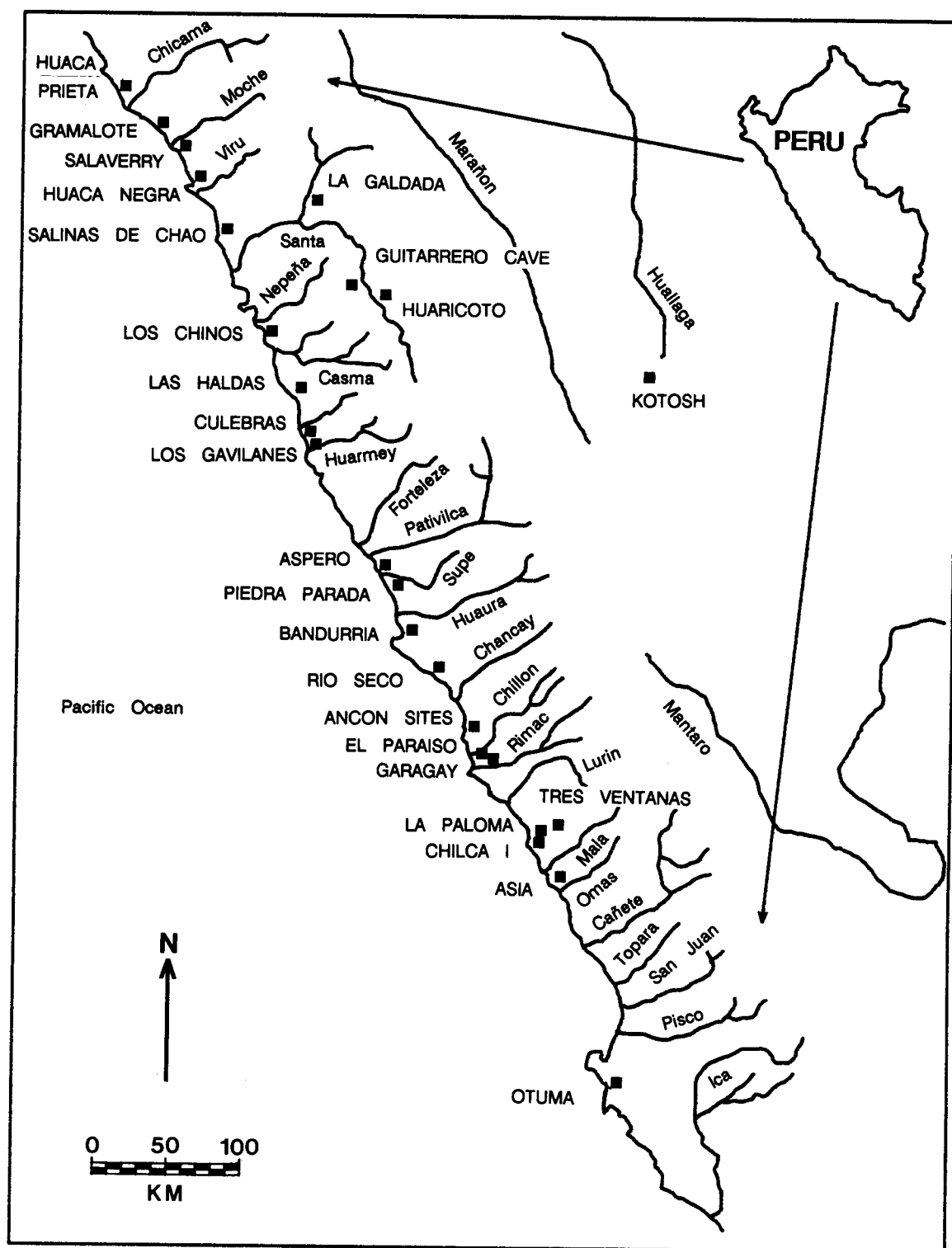


Figure 1. Major Preceramic and early Initial Period sites of the central Peruvian coast and highlands.

tended in the highlands (although some researchers argue for coastal origins for *achira* and some potatoes; see below).

While agriculture in some form has considerable antiquity in the highlands, that does not mean that all types of plants were utilized. In particular, the work of Burger and van der Merwe (1990) shows that maize was of minor importance (both during the Late Preceramic Period and subsequent Initial Period and Early Horizon times) while plants such as potatoes and *quinoa* were consumed in greater quantities.

Coastal Paraíso Tradition

We must recognize that subsistence patterns on the coast changed during the course of the Preceramic Period. The earlier littoral sites show a decided orientation toward marine resources. Bone isotope ratios from La Paloma, for example, indicate that marine protein made up an extremely large part of the diet before the third millennium B.C. (Benfer 1990; Benfer *et al.* 1981). In later sites the evidence is less direct, but shows that plant foods became increasingly more important.

Wild plant foods were eaten on the coast at an early date. Cattail was found in a coprolite from As8, a midden site near Aspero that dates to about 6,000 B.P., but fish bones and shell fragments made up much of the coprolite sample, as they did at La Paloma and Huaca Prieta (Popper 1978; Feldman 1980; Callen and Cameron 1960). Cattail and starchy wild sedge roots also were found at El Paraíso (Quilter *et al.* 1991). Wild or semidomesticated fruits, such as *pacae* (*Inga feuillei*), *guava* (*Psidium guajava*), *ciruela del fraile* (*Bunchosia armeniaca*), and *lúcuma* (*Lucuma biferá*) have been found at a number of Late Preceramic sites (Bird *et al.* 1985; Bonavia 1982; Cohen 1978; Feldman 1980; Pozorski and Pozorski 1979a; Quilter *et al.* 1991), but do not appear as early as the wild starchy plants.

Fish, mussels, and cucurbits were all present in coprolites from the lowest levels of Huaca Prieta (pit HP3), dated to more than 4,000 yr. B.P.; peppers and beans were found in slightly higher layers, but should be considered to be contemporary with the lower samples (Callen and Cameron 1960; Bird *et al.* 1985). Cucurbits and legumes, including cultivated beans, have been found at most coastal Cotton Preceramic sites and should be considered ubiquitous.

The next most commonly found food plant after the cucurbits and legumes, and one of potentially great importance (*vide* Raymond 1981) is probably *achira* (*Canna edulis*), which has been found at Huaca Prieta, Huaynuná (in the Casma Valley), Aspero, Ancón, and El Paraíso (Bird *et al.* 1985; Ugent *et al.* 1984; Feldman 1980; Moseley 1968; Engel 1966; Quilter *et al.* 1991). At Aspero, no identifiable tuber remains were found; rather, *achira* was identified from leaves that were placed in the figurine cache in Huaca de los Idolos (Feldman 1980). *Achira* is a plant that could be grown with little tending along the flood plains of the coastal rivers, and several authors have suggested that *achira* was first collected and domesticated on the Peruvian coast (Cohen 1978; Ugent *et al.* 1984).

Jicama (*Pachyrrhizus tuberosus*), a starchy-rooted plant like *achira*, is present in the plant sample from El Paraíso (Quilter *et al.* 1991) and Los Gavilanes (Bonavia 1982), where Bonavia notes that it appears late in the sequence.

Sweet potatoes (*Ipomoea batatas* Lam.) have been reported from preceramic sites in Ancón (Patterson and Lanning 1964; Martins 1976) and Casma (Ugent *et al.* 1981). Engel (1970) found sweet potato remains at Tres Ventanas Caves in the upper Chilca drainage in a level he dated to between 10,000 and 8,000 B.P. (but see Bonavia 1984). They were found along with remains identified as *Ullucus*, *Solanum*, and *Pachyrrhizus*. If we are to accept the antiquity of the cave occupations and the early context of the remains (which we have serious reason to doubt), we may still question, on the basis of size and morphology, whether the Chilca plants were domesticated (Yen 1974). On the other hand, the sweet potatoes from the other coastal sites appear to have been domesticated crops.

Potatoes (*Solanum* sp.) have also been found in preceramic contexts at El Paraíso (a non-specific identification; Quilter *et al.* 1991), Ancón (Martins 1976), and Casma (Huaynuná: Ugent *et al.* 1982). Moseley (1985) and Pickersgill and Smith (1981) interpret the Ancón specimens as evidence for exchange with the highlands, while Ugent and the Pozorskis (1982) lean toward a coastal origin, at least for those potatoes associated with later Initial Period occupations. While the tubers found at Tres Ventanas Caves were not specifically mentioned, MacNeish, Patterson, and Browman (1975) implied that they were also coastal in origin (definite evidence of coastal contacts--marine shells--was present in the cave). Some wild potatoes do occur in the coastal *lomas* (Cohen 1978), but most wild species are found at higher altitudes.

There is no *a priori* reason, such as weight or bulk (Murra 1985; Topic 1985), to assume that highland potatoes were not carried to the coast. Such transport receives support from the finding of *oca* and *ullucu* at Ancón (Martins 1976). On balance, it seems more likely that the early potatoes found on the coast were not grown there, but were brought down from higher elevations, though perhaps still in the western cordillera.

Remains of some food plants such as avocados and peanuts have been found in preceramic contexts (Pozorski and Pozorski 1979a), but they are not common until after the adoption of ceramics on the coast. Likewise, maize was not common on the coast until well into the ceramic stage. The maize found at Aspero by Willey (Willey and Corbett 1954) morphologically appears to be much more recent than other early samples (R. Bird, personal communication). More recently excavated cobs (Feldman 1980) were identified as Proto-Confite Morocho and Proto-Confite Chavinense (A. Grobman, personal communication), but they come from mixed or surficial contexts and cannot definitely be associated with the preceramic occupation.

Maize only appears in any quantity in later sites. At Huaca Prieta, it appeared in the Cupisnique levels (Bird and Bird 1980). The Moche Valley Initial Period site of Pampa Gramalote had maize, but it dated quite late, to about 1100 B.C. (S. Pozorski 1976, 1979; M. Moseley, personal communication). Farther south in the Casma Valley, S. Pozorski (1987) argues that maize did not appear there until the Early Horizon, when it was brought in by an invasion of outsiders associated with Chavín-style pottery.

The only real exception to this picture of maize's late arrival on the Peruvian coast is Los Gavilanes (Kelley and Bonavia 1963; Bonavia 1982; Bonavia and Grobman 1989), where a wide range of maize plant parts have been found. Bonavia has argued that the contexts from which the maize came are securely placed in the Late Preceramic Period, but others have questioned this placement (Bird 1990). Whatever the case was at Los Gavilanes, it remains an exception and the argument of Wilson (1981) that maize was a preceramic staple cannot be supported by the evidence (see Fung P. 1972).

There is no good evidence for the use of coca or psychoactive plants on the Peruvian coast during the Preceramic Period. None of the remains called "coca" in the literature were identified by competent botanists (Plowman 1984). When samples have been submitted for proper identification, they have proven not to be coca (T. Plowman, personal communication). Likewise, no remains of either coastal or tropical psychoactive plants have been positively identified.

Interzonal contacts and exchange

If the potatoes, *ullucu*, and *oca* found in coastal middens were grown in the highlands, what, we might ask, was going up from the coast in exchange for this highland produce? The most easily seen evidence comes in the shells of marine mollusks. Mussels are the most commonly found species, which probably correlates with the fact that they cannot be shucked raw, because the shell is too fragile and will shatter, so they must be transported in the shell (D. Sandweiss, personal communication). Mussel shells, especially the purple valves of *Choromytilus chorus*, have ritual uses, in effect being a poor-man's *Spondylus* (Sandweiss 1985). The upshot is that if other types of shellfish were being

exchanged, they could have been shucked and dried or smoked on the coast and would not necessarily leave identifiable remains in the highlands.⁴

Large fish were also transported into the highlands, presumably dried or salted (Engel 1970; Burger and Salazar-Burger 1985). Moseley (1985) suggested that another item was fish meal, which was part of a postulated protein-carbohydrate exchange system. Burger (1985) objected to the need and means for such exchanges, suggesting instead a trade in salt and other minor (in bulk) but important nutritional items (*e.g.*, iodine via seaweed). Salt extraction has indeed been suggested as the *raison d'être* of the Salinas de Chao site (Sandweiss *et al.* 1983). Masuda (1981, 1985) has presented convincing evidence of the importance of seaweed trade in late prehistoric and modern times, an importance that likely has great antiquity. (Moseley, in his published revision [1985: 39] of his original Dumbarton Oaks presentation, did add salt and seaweed to the protein-carbohydrate exchange network.) Still, as Murra's (1985) and Topic's (1985) comments indicate, we should not be so quick to assume that bulk food items would not have moved over long distances.

Exotic raw materials such as obsidian also have a long history of movement over considerable distances in the highlands (Burger and Asaro 1978; Burger 1984), and their transport networks might have facilitated exchange of food commodities. Toward the latter part of the Valdivia sequence, we find evidence in southern Ecuador of trade networks in exotic materials, such as *Spondylus* shell (Marcos 1977-78). These shells were gathered off the west coast of Ecuador and transported to sites in the southern highlands, such as Cerro Narrio (Collier and Murra 1943). A small amount of *Spondylus* moved into central Peru (*e.g.*, Aspero, El Paraiso, La Paloma), but we cannot assume a direct trade mechanism (Feldman 1980). Other Ecuadorian contacts existed with the north coast of Peru (as shown by the carved gourds found at Huaca Prieta [Bird 1963; Lathrap 1973]), but the evidence presented by Burger (1984) suggests that these contacts were not extensive or necessarily culturally important.

In Peru, we have evidence of contacts between the coast and highlands, with marine shells and/or fish bones found at Tres Ventanas Caves (Engel 1970), Huaricoto (Burger and Salazar-Burger 1980), and La Galgada (Grieder and Bueno M. 1985; Grieder *et al.* 1988). Other evidence of contact comes from stone beads found on the coast at Aspero (Feldman 1980) and Bandurria (R. Fung P., personal communication) and in the highlands at Huaricoto (Burger and Salazar-Burger 1985). Colored feathers found at La Galgada and Aspero might indicate more distant contacts with the eastern Andean slopes. The highland tubers (*oca*, *ullucu*) found at Ancón (Martins 1976) indicate that the movement of goods extended beyond "luxury" items to bulk foodstuffs.

Architecture

We will now turn to the architecture of the three traditions; Table 1 presents, in an abbreviated manner, a number of their features.

Kotosh Religious Tradition

The Kotosh Religious Tradition, described by Burger and Salazar-Burger (1980), had an emphasis on ceremonies involving ritual fires that took place in small structures that were built specifically for the ceremony and then "ritually entombed" when the ceremony was completed. The ceremonies, which might have been cyclically scheduled, "appear to have been restricted to a small number of participants and spectators" and to have had "a decided lack of emphasis on public iconography" (*ibid.*: 28), even at sites such as La Galgada, where there were substantial masonry structures. At Huaricoto, the temples were simple, with well-prepared ceremonial hearths but at times with only a minimal

⁴ The Otuma midden (Craig and Psuty 1971) is probably an example of a site where shellfish were shucked for transport to another site.

Table 1.

	COAST	HIGHLANDS	ECUADOR
FORM	Square corners	Rounded corners	Oval structures
NICHES	Wall	Wall and bench	?
FIRE PITS	Unventillated	Ventillated in major structures	Fires
COMPLEXITY	Multi-room, differentiated	Single room, repeated	Single room, one or two structures
LEVELS OF ACCESS	Graded access, public and restricted spaces	One level of access, private space	Two levels, public plaza and restricted room
ORIENTATION	Axial	Central	Bilateral
CONSTRUCTION SEQUENCE	Partial fill and re-building; bagged fill	Temple entombment	Complete rebuilding
BURIALS IN STRUCTURES	Present, but not common	Present at major sites	Present, possibly with sacrifices
PERMANENCE	Permanent structures	Both permanent and temporary	Same life time as houses
VILLAGES	Same location as temples; no apparent plan	Separate temple sites or with clustered houses	Structured village with ceremonial houses
SUBSISTENCE	Mixed, maritime with some legumes, tubers, and fruits	Mixed hunting and farming	Agricultural, with maize and probably tubers, marine exploitation at coastal sites

and perishable superstructure. At Kotosh, temples with masonry walls were built on top of an accretional mound. Some decoration was present, but it was on the interior walls of the temples, visible only to people in the room. La Galgada had structures similar to those at Kotosh, but the mound, although it grew on top of earlier temples, was elaborately faced with stone (Grieder and Bueno M. 1985; Grieder *et al.* 1988).

From the preservation of the hearths at Huaricoto, it is clear that some were constructed, used, and buried within one season, as they had not suffered rainy-season damage. The rooms at Kotosh and La Galgada might have been used for longer time periods, but they, too, were abandoned and filled in well before they began to suffer wear-and-tear. At La Galgada, some rooms were converted to gallery-like tombs; it is unclear if they were in use much prior to this conversion, but later some saw several separate burial episodes (Grieder *et al.* 1988). Entombment of the temple was a deliberate act and involved covering over the fire pit, as at Huaricoto. The fill used to entomb the earlier temples is generally free of artifacts or refuse.

Emphasis was on the individual temple room and the ceremony that took place there. As a result, the sites show multiple equivalent structures, with little or no hierarchical arrangement either in structures or in access (although this slowly changed over time). Grieder and Bueno M. (1985: 106; Grieder *et al.* 1988) note that the interior plan of the temples, with a central fire pit and benches against the walls, focuses attention on the fire rather than on any one of the participants, who occupy roughly equal positions around the periphery. Different structures might have had different importance, but their repetitive form, asymmetrical placement, and variable orientation suggests not.

At La Galgada and Kotosh, the temples appear to be associated with villages, but neither site had particularly dense occupations. No settlement was found associated with Huaricoto, which, accordingly, is interpreted as a temporarily and cyclically occupied ritual center serving a dispersed rural population (Burger and Salazar-Burger 1980).

Paraíso Tradition

In the coastal sites of what might be called the Paraíso Tradition (after the structure excavated and restored under Engel's direction), temples are multi-room, with apparent differentiation of function between rooms and between interior versus exterior spaces. Structures are substantial masonry constructions, designed to last for some time. Temple entombment took place to a lesser degree than in the Kotosh Religious Tradition sites: added fill did not bury a room, so that new walls often extended old ones rather than being separate new constructions. As a result, the architectural arrangement shows more continuity from level to level.

Less evidence of ritual activity has been found in the coastal temples than in the highland ones. Fill within the structures, although it is often contained in loose "net" bags of cattail, cane, or sedge, usually lacks artifacts or refuse content. Scattered individual offerings of textiles, sea shells, or birds have been found (Wendt 1964; Lanning 1967; Feldman 1980; Quilter 1985). A few small fire pits have been found (Feldman 1980), but they are less elaborate (lacking subfloor ventilators) and not as common as at highland sites.

Burials of individuals in or on the temple mound have been found at Aspero (Feldman 1980), but they were not as elaborately placed as at La Galgada, nor do they seem as common nor were they the motivation for building a new temple room.

Aspero and El Paraíso have an "axial" orientation, with a series of different rooms placed one behind the other; in front of the mound there can be additional terraces or plazas. The rooms show differentiation of functions, not duplication as in the Kotosh Religious Tradition.

Access to the inner rooms is first through the plaza, then through the outer rooms. At Aspero, several levels (both physically and socially) of group participation can be seen, ranging from the large, open, and public plaza spaces to the large but somewhat restricted entry room inward to small rooms

with restricted access. Unit I of El Paraíso does have two separate front entry stairs, but they lead not to duplicate temples, but to different arrangements of rooms with differing details that are part of one temple. The pattern is definitely one of a hierarchical order, with both public ceremonies and private, official rites.

The differentiation of rooms also extends to whole structures. Different patterns of rooms were seen on the two mounds tested at Aspero (Feldman 1980); even more distinct formal differences between structures can be seen in the different units at El Paraíso (Engel 1966; Quilter 1985). Because the differences, for the most part, do not appear chronological, one can argue that they reflect functional differences indicative of social divisions.

No clear evidence of public ornamentation has been found at the early coastal sites, but traces of red pigment on a wall in the entry room of Aspero's Huaca de los Idolos might have been from such decoration. A decorative clay frieze was present on the "outer" side of the divider wall in the inner rooms of Huaca de los Idolos, visible to people in the eastern room of the two (Feldman 1980, 1985).

The temples of the Paraíso Tradition are associated with occupations of substantial size and permanence. A year-round occupation would fit with the lack of evidence for "seasonality" in the temple construction (as was seen at Huaricoto).

Valdivia Tradition

The Ecuadorian or Valdivia Tradition (if we may call the architectural pattern at one site--Real Alto--a "tradition") has been equated with the ethnographically observed Tropical Forest pattern (Lathrap *et al.* 1975). Oval houses with pole supports and wattle and daub walls (similar to the Amazonian *maloca*) were arrayed around a large oval or sub-rectangular plaza that had two ceremonial structures. The latter were physically larger versions of the domestic house, although they differed functionally.

The two ceremonial structures at Real Alto have been called the "Fiesta House" and the "Charnel House," reflecting their contents and interpreted function (Marcos 1978). The former had ceramic evidence of *chicha* use and food remains suggesting feasting, while the latter contained a number of burials. Some of the burials appeared to be subordinate to others. The relation of the interred individuals to the community is not known, but both sexes were present, though segregated to different sides of the Charnel House.

The ceremonial houses show repeated rebuilding (as do regular houses), which involved adding a new clay floor and erecting a new superstructure. The many layers of floor gradually raised the house on a low mound, but the massive layers of fill seen in both coastal and highland Peruvian temples were not used. There is no evidence of a ceremonial cycle to the reconstructions, which have been interpreted more in the light of rebuilding necessitated by deterioration of the perishable superstructure.

If we can accept an analogy to modern tropical forest groups, the two ceremonial houses may have been the central focus of village ritual activity. While there may have been sexual or age-group prohibitions on access to the houses, participation in the ceremonies held inside them was probably open to all adult males. Some acquired status differences might have existed between people, as seen in some of the burials in the Charnel House. Still, one ceremonial structure of each type probably served the whole community, and although their opposition across the plaza might relate to a moiety division within in the society, they seem essentially egalitarian in nature.

Subsequent developments

The most difficult questions to answer have been and remain those related to the changes which took place during the time period when pottery use was adopted on the Peruvian coast. What impact did the early architectural and ceremonial traditions have on later cultures of the Central Andes? Did the introduction of pottery to the coast involve a new, intrusive population that either replaced or pushed aside the preceramic inhabitants? To try to answer these questions, we must look both at the subsistence and architectural patterns that existed before and after the change. At present, good data are scarce, but more work is being done (such as by Burger in the Lurín Valley, Quilter in the Chillón Valley, and the Pozorskis in the Casma Valley) that is now reaching the publication stage. Even with this new work, a serious gap in our knowledge remains the lack of excavated domestic architecture at sites both on the Peruvian coast and in the highlands.

The transition between the Cotton Preceramic Period and the Initial Period saw few if any qualitative changes in the diet of coastal peoples: the major domesticated food plants first appeared during the Preceramic Period. This is not to say that there were not major *quantitative* changes in the importance of agriculture. The changes, however, appear to have been gradual (S. Pozorski 1976; Pozorski and Pozorski 1979b). Maize, that magic plant to some, might not have come into common use on the coast until the Early Horizon (S. Pozorski 1987), long after the ascendancy of agriculture and the flowering of monumental coastal ceremonial architecture.

Two main Initial Period architectural traditions have been identified on the Peruvian coast: one characterized by the U-shaped mound and another by the circular plaza (Williams 1971, 1972, 1978-80, 1985; Feldman 1980; Ravines 1984; Moseley 1985). Both traditions have preceramic antecedents and continued in use at least up into the Chavín horizon.

The U-shaped mound complex, where a large central mound is fronted by two smaller mounds--one at each front corner--to form a rectangular plaza opening away from the main mound, is most common in the central coastal valleys, from the Lurín Valley to the Huaura Valley, although the distribution extends all the way north to the Jequetepeque Valley (Williams 1985; Ravines 1984). If one considers the two large wings of Units II and VI of El Paraíso to be part of a U-shaped complex (which Quilter [1985] does not), then the tradition can be carried back into the Late Preceramic Period; otherwise, most of the U-shaped complexes date to the Initial Period or Early Horizon. (A certain degree of U-shaping can be seen in the later levels at La Galgada [Grieder and Bueno M. 1985; Grieder *et al.* 1988], but on a single platform rather than as three separate mounds.)

The circular plaza complex, characterized by the presence of a sunken or semisunken circular room or plaza in front of a mound, is more northerly in its distribution. Circular plazas are found from the Moche Valley in the north to the Lurín Valley in the south, with the greatest concentration in the Supe-Pativilca-Fortaleza Valley complex on the northern edge of the Central Coast. The circular plaza complex has more secure preceramic associations than does the U-shaped complex, being found at the preceramic sites of Alto Salaverry (Moche Valley; Pozorski and Pozorski 1979a), Salinas de Chao (Chao Valley; Alva A. 1978, 1986; Cardenas M. 1977-78), and Piedra Parada (Supe Valley; Feldman 1980) on the coast and La Galgada (Santa/Tablachaca Canyon; Grieder and Bueno M. 1985; Grieder *et al.* 1988) in the highlands. At the two northern sites the circular plaza is not found directly associated with a mound structure as it is at Piedra Parada and La Galgada, but instead occurs slightly separated from, and without clear alignment to, groupings of walled rooms. Piedra Parada appears to be the most recent of the coastal sites (although it is undated), where the mound architecture is simplified and more formalized.

There is considerable variation at the Initial Period sites, but the circular plaza often is found within a square plaza that abuts the front of the mound; at times, a second mound is placed at right angles and to the right of the main mound (when looking forward from it), as at Pampa del Era del Pando (Kosok 1965: figure XXII-20). Circular plazas also occur in one or more of a line of square

plazas fronting a mound (*e.g.*, Las Haldas, Sechín Alto) and rarely within the wings of a U-shaped complex (Chavín de Huántar).

If we turn from the grand form of the architecture to details, we can note a number of interesting patterns. As mentioned above, the ventilated firepit--usually set in a sunken floor area--that is so common in the highlands is rare or absent on the coast. A second characteristic of the highland Kotosh Religious Tradition structures is the use of rounded corners. On the coast, we see rounded corners to a degree in structure A at Alto Salaverry (Pozorski and Pozorski 1979a), with its two hearths, and on the inland terraces at Salinas de Chao (Alva A. 1986; Cardenas M. 1977-78), two of the more northerly coastal preceramic sites, but we do not see them at Aspero or El Paraíso. Rounded corners do not become common on the coast until during the Initial Period, when we see them on a number of monumental structures such as Huaca de los Reyes (T. Pozorski 1976), Cerro Sechín, and Moxeke (Tello 1956). Interestingly, rounded corners are not found at Chavín de Huántar. This pattern in the use of rounded corners illustrates that there were both interconnections and independence between the coast and highlands, with different architectural traits being accepted or rejected individually and at different times.

Two early coastal architectural traits that continued strongly in the Initial Period and possibly the Early Horizon are the use of bagged fill and of upright stones interspersed with horizontal stones in exterior walls. In the Preceramic Period, we see both of these patterns at Aspero; the Initial Period constructions at Las Haldas show their continuity (Fung P. 1969; Grieder 1975).

While the functions of the U-shaped mounds and the circular plazas are still unclear (*cf.* Moseley 1985; Williams 1985), they both represent an elaboration of exterior or public rituals, rather than interior or private ones. More attention is given to large outside spaces where groups of people can observe the rituals and less attention is given to the rooms on top of the mound. This trend can be seen stratigraphically at La Galgada, where the upper levels have fewer temple structures and feature a lowered central court, open to the front of the mound (Grieder and Bueno M. 1985; Grieder *et al.* 1988). It has also been noted by Williams (1985) for the circular plaza complex, where in his sequence the plazas grow in importance relative to the mound they front. This trend toward simplification of plan and formalization of ritual can also be seen by comparing Aspero to Piedra Parada. In the latter site, the mounds have only a few large summit rooms, most commonly arrayed in a 3 rooms wide by 2 rooms deep pattern (Feldman 1980: figure 28), while Aspero has a multiplicity of small rooms and irregular corridors.

The trend toward public rituals can also be seen in the increased use of ornamentation in Initial Period sites, such as Huaca de los Reyes (T. Pozorski 1976), Pampa de las Llamas (Pozorski and Pozorski 1986), Garagay (Ravines 1975; Ravines and Isbell 1975), and Cardal (Burger 1986, 1987; Burger and Salazar-Burger 1991). All four of these sites have elaborate clay friezes on exterior walls facing their large plazas. This public ornamentation contrasts with the interior or "private" ornamentation at Aspero and Kotosh.

A parallel trend is an increase in the size of the ceremonial architecture, both in absolute terms and in comparison to the immediately adjacent domestic occupation, *e.g.*, the relative lack of domestic midden at Piedra Parada or El Paraíso in comparison to Aspero or Río Seco de León.⁵ Taken together, these trends seem to indicate an increase in the status differences between the leaders and the led. The leaders, backed (literally) by grand displays of conspicuous labor consumption, performed (partly in the theatrical sense) ceremonies for and in the presence of the "public," who were becoming separated from (in power, display, and to some extent residence) the leaders.

⁵ See Wendt (1964) for data on Río Seco de León.

Discussion

We can contrast the three sets of architectural and subsistence patterns presented above. The Valdivia pattern reflects an egalitarian village of settled agriculturalists with a tribal organization. Shamanic roles based on the use of hallucinogenic plants probably existed, but they did not confer an economic advantage. Ceremonies took place on the village level and, except for a few special burials in the Charnel House, took place with frequency.

The Kotosh pattern at first does not suggest much more social differentiation, although status roles increased with time. The ritual structures seem to have drawn adherents from an area beyond the immediate village, probably from scattered households or small communities of farmers and herders-gatherers. Favored sites drew labor from a wide area, which allowed them to expand and build large masonry structures. Some social differentiation is evident at these major sites in the form of the elaborate burials found within the ritually-abandoned temple rooms. The Kotosh Religious Tradition rituals appear to have been performed on a regular cycle, probably tied to the agricultural calendar, although other possibilities, such as rituals in response to El Niño/Southern Oscillation rains or droughts, may be suggested.

Communities on the coast were probably larger than in the highlands, but even if a dispersed highland group had an equal total size, highland residential density was less than that of the coast. High population density and residential permanence allowed the development of differentiated social roles and access to resources. The residents of the large, permanent coastal villages built ceremonial structures within the village area. Although these temples were surrounded by midden, they were kept clean of refuse until they were superseded and abandoned. The architectural differentiation within the structures reflects a more complex social organization than in the highland communities.

It is noteworthy that the Kotosh Religious Tradition sites remained occupied from the Preceramic Period into the Early Horizon, while many of the coastal sites were abandoned after the Preceramic Period. The coastal societies were gradually shifting from a maritime and riverine collecting economy to a mixed one including more cultivated plants. Environmental factors such as coastal uplift have been suggested as causal factors in the coastal subsistence shift (Feldman 1980), but more data are needed before environmental causes can be securely identified (Richardson 1981; Sandweiss *et al.* 1983).

Whatever the causes were, the subsistence shift took considerable time and resulted in major changes in the coastal settlement pattern. Ritual centers were moved inland, presumably to be more closely identified with irrigation and agricultural lands (Moseley 1974). Maritime resources were not abandoned, as the evidence shows that they continued to make a significant dietary contribution up through the Early Horizon (S. Pozorski 1976; Pozorski and Pozorski 1979b). A shift in subsistence comparable to that of the coast did not occur in the highlands, where changes were more quantitative than qualitative in nature.

Changes in coastal site locations make it more difficult to determine the degree of continuity in the evolution of the coastal ceremonial architecture. It is unfortunate that we do not have good chronological control over the spread of the circular plaza trait or of the U-shaped mound configuration, and cannot as yet identify them as "highland" (most likely from the Callejón de Huaylas) or "coastal" (probably from the Fortaleza-to-Supe zone) traits. Perhaps we should not even try to do so, for that would return us to the old coast versus highland dichotomy. (We note here that the Fortaleza-Pativilca-Supe zone is the southern outlet from the Callejón de Huaylas to the Pacific coast and an easy route of communication and interaction.) Similarly, the Casma Valley, also an area with an abundance of early ceremonial architecture of the circular plaza complex, is a coast-Callejón route.

Conclusions

If any conclusions can be drawn from the above, one would have to be that there was significant interaction between the coast and the highlands during the Preceramic Period, but we still lack much of the data needed to sort it out. The introduction of pottery to the coast and the shift there to an agricultural subsistence base appear to have caused greater dislocations of the existing pattern than in the highlands, but from the lack of synchronicity in the first occurrence of the various traits on the coast, it is highly unlikely that there was a population replacement.

I would suggest that one reason for the greater changes that occurred on the coast and for the flowering of monumental construction that took place there during the Initial Period was the more hierarchical organization that developed there during the Preceramic Period. The resources of the coastal zone fostered the stability and population density that were needed, but the spacial circumscription of these resources ultimately placed limits on growth.

A possible scenario is as follows. As pressures on the coastal resources mounted, the established maritime elite tightened their control over existing collecting zones. Non-elite groups then turned to the relatively unexploited potentials of agriculture. They then used existing organizational patterns, augmented by alliances with highland groups more experienced with farming and irrigation, to "outflank" the elites and advance their standing within the coastal power structure. These formerly lower-status groups became the new leaders, who then made highland architectural patterns possibly associated with agricultural rituals the new coastal standard for the Initial Period.

References

Alva A., Walter

- 1978 Las salinas de Chao: un complejo precerámico (resumen). In *III Congreso Peruano: El Hombre y la cultura andina*, edited by Ramiro Matos M., Tomo 1, pp. 275-276. Lima: Universidad Nacional Mayor de San Marcos.

- 1986 Las Salinas de Chao: asentamiento temprano en el norte del Perú. *Materialien zur Allgemeinen und Vergleichenden Archäologie* 34. Munich: Verlag C.H. Beck.

Arntz, Wolf

- 1986 The Two Faces of El Niño 1982-1983. *Meeresforschung* 31: 1-46.

Benfer, Robert A.

- 1986 Holocene Coastal Adaptations: Changing Demography and Health at the Fog Oasis of Paloma, Peru, 7,800-5,000 B.P. In *Andean Archaeology. Papers in Memory of Clifford Evans*, edited by Ramiro Matos M., Solveig A. Turpin, and Herbert H. Eling, Jr., pp. 45-64. *Institute of Archaeology, University of California at Los Angeles Monograph* 27.

- 1990 The Preceramic Period Site of Paloma, Peru: Bioindications of Improving Adaptation to Sedentism. *Latin American Antiquity* 1: 284-318.

Benfer, Robert A., James A. Vogt, and Steve Schlager

- 1981 Instrumental Neutron Activation Analysis of Ancient Peruvian Bone: The Effects of Soil, Strata, Demography, and Disease. Paper presented at the meetings of the Society for Archaeological Science, San Diego.

Bird, Junius B.

- 1948a America's Oldest Farmers. *Natural History* 17(7): 296-303.

- 1948b Preceramic Cultures of Chicama and Viru. In *A Reappraisal of Peruvian Archaeology*, edited by Wendall C. Bennett, pp. 21-28. *Memoirs of the Society for American Archaeology* 4.

- 1963 Pre-Ceramic Art from Huaca Prieta, Chicama Valley. *Nawpa Pacha* 1: 29-34.

Bird, Junius B., John Hyslop, and Milica D. Skinner

- 1985 The Preceramic Excavations at the Huaca Prieta, Chicama Valley, Peru. *Anthropological Papers of the American Museum of Natural History* 62(1).

Bird, Robert McK.

- 1990 What are the Chances of Finding Maize in Peru Dating Before 1000 B.C.?: Reply to Bonavia and Grobman. *American Antiquity* 55: 828-840.

Bird, Robert McK. and Junius B. Bird

- 1980 Gallinazo Maize from the Chicama Valley, Peru. *American Antiquity* 45: 325-332.

Bonavia, Duccio

- 1982 *Los Gavilanes. Mar, desierto y oasis en la historia del hombre*. Lima: Corporación Financiera de Desarrollo S.A.
- 1984 La importancia de los restos de papas y camotes de la época precerámica hallados en el valle de Casma. *Journal de la Société des Américanistes* 70: 7-20.

Bonavia, Duccio and Alexander Grobman

- 1989 Preceramic Maize in the Central Andes: A Necessary Clarification. *American Antiquity* 54: 836-840.

Burger, Richard L.

- 1984 Archaeological Areas and Prehistoric Frontiers: The Case of Formative Peru and Ecuador. In *Social and Economic Organization in the Prehispanic Andes*, edited by David L. Browman, Richard L. Burger, and Mario A. Rivera, pp. 33-71. *BAR International Series* 194.
- 1985 Concluding Remarks: Early Peruvian Civilization and its Relation to the Chavín Horizon. In *Early Ceremonial Architecture in the Andes*, edited by Christopher B. Donnan, pp. 269-289. Washington, DC: Dumbarton Oaks.
- 1986 Evaluating William's Hypothesis of Initial Period Agro-Religious Centers in Peru. Paper presented at the 51st Annual Meeting of the Society for American Archaeology, 1986. New Orleans, LA.
- 1987 The U-shaped Pyramid Complex, Cardal, Peru. *National Geographic Research* 3(3): 363-375.

Burger, Richard L. and Frank Asaro

- 1978 Obsidian Distribution and Provenience in the Central Highlands and Coast of Peru during the Preceramic Period. *Contributions of the University of California Archaeological Research Facility* 36. University of California, Berkeley.

Burger, Richard L. and Lucy Salazar-Burger

- 1980 Ritual and Religion at Huaricoto. *Archaeology* 33(6): 26-32.
- 1985 The Early Ceremonial Center of Huaricoto. In *Early Ceremonial Architecture in the Andes*, edited by Christopher B. Donnan, pp. 111-138. Washington, DC: Dumbarton Oaks.
- 1991 The Second Season of Investigations at the Initial Period Center of Cardal, Peru. *Journal of Field Archaeology* 18: 275-296.

Burger, Richard L. and Nikolaas J. van der Merwe

- 1990 Maize and the Origin of Highland Chavín Civilization. *American Anthropologist* 92: 85-95.

Callen, Eric O. and T.W.M. Cameron

- 1960 A Prehistoric Diet Revealed in Coprolites. *The New Scientist* 8(190): 35-40.

Cardenas M., Mercedes

- 1977-78 Obtención de una cronología del uso de los recursos marinos en el antiguo Perú. *Arqueologia PUC* 19-20: 3-26. Lima: Pontificia Universidad Católica del Perú.

Cohen, Mark Nathan

- 1978 Archaeological Plant Remains from the Central Coast of Peru. *Nawpa Pacha* 16: 23-50.

Collier, Donald and John V. Murra

- 1943 Survey and Excavations in Southern Ecuador. *Field Museum Anthropological Series* 35.

Craig, Alan K. and Norbert P. Psuty

- 1971 Paleoecology of Shellmounds at Otuma, Peru. *The Geographical Review* 61: 125-132.

Dillehay, Tom D. and Patricia J. Netherly

- 1983 Exploring the Upper Zaña Valley in Peru. *Archaeology* 35(4): 23-30.

- Dillehay, Tom D., Patricia J. Netherly, and Jack Rossen
 1989 Early Preceramic Public and Residential Sites on the Forested Slope of the Western Andes, Northern Peru. *American Antiquity* 54: 733-759.
- Engel, Frédéric-André
 1966 Le complexe précéramique d'El Paraiso (Pérou). *Journal de la Société des Américanistes* 55:43-96. Paris.
 1970 Exploration of the Chilca Canyon, Peru. *Current Anthropology* 11: 55-58.
- Feldman, Robert A.
 1980 *Aspero, Peru: Architecture, Subsistence Economy, and other Artifacts of a Preceramic Maritime Chiefdom*. Unpublished Ph.D. dissertation, Harvard University, Cambridge, MA.
 1985 Preceramic Corporate Architecture: Evidence for the Development of Non-Egalitarian Social Systems in Peru. In *Early Ceremonial Architecture in the Andes*, edited by Christopher B. Donnan, pp. 71-92. Washington, DC.: Dumbarton Oaks.
- Fung P., Rosa
 1969 Las Aldas: su ubicación dentro del proceso histórico del Perú antiguo. *Dédalo* 9-10. Sao Paulo, Brazil: Museo de Arte y Arqueología.
 1972 El temprano surgimiento en el Perú de los sistemas socio-políticos complejos: planteamiento de una hipótesis de desarrollo original. *Apuntes Arqueológicos* 2: 10-32. Lima.
- Griender, Terence
 1975 A Dated Sequence of Building and Pottery at Las Haldas. *Ñawpa Pacha* 13: 99-112.
- Griender, Terence, and Alberto Bueno M.
 1985 Ceremonial Architecture at La Galgada. In *Early Ceremonial Architecture in the Andes*, edited by Christopher B. Donnan, pp. 93-110. Washington, DC.: Dumbarton Oaks.
- Griender, Terence, Alberto Bueno M., C. Earle Smith, Jr., and Robert M. Malina
 1988 *La Galgada, Peru. A Preceramic Culture in Transition*. Austin, TX: University of Texas Press.
- Izumi, Seiichi, and Tochihiro Sono
 1963 Excavations at Kotosh, Peru, 1960. *Andes* 2. Tokyo: Kadokawa Publishing Company.
- Kaplan, Lawrence, Thomas F. Lynch, and C. Earle Smith, Jr.
 1973 Early Cultivated Beans (*Phaseolus vulgaris*) from an Intermontane Peruvian Valley. *Science* 179: 76-77.
- Kelley, David H., and Duccio Bonavia
 1963 New Evidence for Pre-Ceramic Maize on the Coast of Peru. *Ñawpa Pacha* 1: 39-42.
- Kosok, Paul
 1965 *Life, Land and Water in Ancient Peru*. Brooklyn, NY: Long Island University Press.
- Lanning, Edward P.
 1966 American Aboriginal High Cultures: Peru. *Actas y Memorias del XXXVI Congreso Internacional de Americanistas* 1: 187-191. Seville.
 1967 *Peru Before the Incas*. Englewood Cliffs, NJ: Prentice-Hall.
- Lathrap, Donald W.
 1973 The Antiquity and Importance of Long Distance Trade Relationships in the Moist Tropics of Pre-Columbian South America. *World Archaeology* 5: 170-186.
- Lathrap, Donald W., Donald Collier, and Helen Chandra
 1975 *Ancient Ecuador: Culture, Clay and Creativity 3000-300 B.C.* Chicago: Field Museum of Natural History.
- Lynch, Thomas F.
 1967 The Nature of the Central Andean Preceramic. *Idaho State University Occasional Papers* 21. Pocatello, ID.

- (Lynch, Thomas F.)
 1971 Preceramic Transhumance in the Callejón de Huaylas, Peru. *American Antiquity* 36: 139-148.
- Lynch, Thomas F., R. Gillespie, John A.J. Gowlett, and R.E.M. Hedges
 1985 Chronology of Guitarrero Cave, Peru. *Science* 229: 864-867.
- MacNeish, Richard S., Thomas C. Patterson, and David L. Browman
 1975 The Central Peruvian Prehistoric Interaction Sphere. *Papers of the Robert S. Peabody Foundation for Archaeology* 7. Andover, MA.
- Marcos, Jorge G.
 1977-78 Cruising to Acapulco and back with the Thorny Oyster Set. *Journal of the Steward Anthropological Society* 9(1/2): 99-132. Urbana, IL.
 1978 *The Ceremonial Precinct at Real Alto: Organization of Time and Space in Valdivia Society*. Unpublished Ph.D. dissertation, University of Illinois, Urbana.
- Marcos, Jorge G., Donald W. Lathrap, and James A. Zeidler
 1976 Ancient Ecuador Revisited. *Field Museum of Natural History Bulletin* 47(6): 3-8.
- Martins, Rena
 1976 *New Archaeological Techniques for the Study of Ancient Root Crops in Peru*. Unpublished Ph.D. dissertation, University of Birmingham, Birmingham, England.
- Masuda, Shozo
 1981 Cochayuyu, macha, camarón, y higos charqueados. In *Estudios etnográficos del Perú meridional*, edited by S. Masuda, pp. 173-192. Tokyo: University of Tokyo.
 1985 Algae Collectors and Lomas. In *Andean Ecology and Civilization*, edited by Shozo Masuda, Izumi Shimada, and Craig Morris, pp. 233-250. Tokyo: University of Tokyo Press.
- Meggers, Betty J., Clifford Evans, and Emilio Estrada
 1965 Early Formative Period of Coastal Ecuador: the Valdivia and Machalilla phases. *Smithsonian Contributions to Anthropology* 1. Washington, DC.
- Moseley, Michael E.
 1968 *Changing Subsistence Patterns: Late Preceramic Archaeology of the Central Peruvian Coast*. Unpublished Ph.D. dissertation, Harvard University, Cambridge, MA.
 1972 Subsistence and Demography: an Example of Interaction from Prehistoric Peru. *Southwestern Journal of Anthropology* 28:25-49.
 1974 Organizational Preadaption to Irrigation: the Evolution of Early Water-Management Systems in Coastal Peru. In *Irrigation's Impact on Society*, edited by Theodore E. Downing and McGuire Gibson, pp. 77-82. *Anthropological Papers of the University of Arizona* 25.
 1975 *The Maritime Foundations of Andean Civilization*. Menlo Park, CA: Cummings.
 1978 Pre-Agricultural Coastal Civilizations in Peru. *Carolina Biology Reader* 90. Burlington, NC: Carolina Biological Supply Company.
 1985 The Exploration and Explanation of Early Monumental Architecture in the Andes. In *Early Ceremonial Architecture in the Andes*, edited by Christopher B. Donnan, pp. 29-58. Washington, DC: Dumbarton Oaks.
- Moseley, Michael E. and Robert A. Feldman
 1977 Beginnings of Civilization along the Peruvian Coast. *Geoscience and Man* 18: 271-276. Baton Rouge: Louisiana State University.
 1988 Fishing, Farming, and the Foundations of Andean Civilisation. In *The Archaeology of Prehistoric Coastlines*, edited by Geoff Bailey and John Parkington, pp. 125-134. Cambridge: Cambridge University Press.
- Murra, John V.
 1985 Comments on: Staple Finance, Wealth Finance, and Storage in the Inka Political Economy, by Terence N. D'Altroy and Timothy K. Earle. *Current Anthropology* 26: 200.

Norton, Presley

- 1977 The Loma Alta Connection. Paper presented at the 42nd Annual Meeting of the Society for American Archaeology, New Orleans.

Osborn, Alan J.

- 1977a Prehistoric Utilization of Marine Resources in Coastal Peru: How Much Do We Understand? Paper presented at the 76th Annual Meeting of the American Anthropological Association, Houston.
- 1977b Strandloopers, Mermaids and other Fairy Tales: Ecological Determinants of Marine Resource Utilization--the Peruvian Case. In *For Theory Building in Archaeology*, edited by Lewis R. Binford, pp. 157-205. New York: Academic Press.

Parsons, Mary H.

- 1970 Preceramic Subsistence on the Peruvian Coast. *American Antiquity* 35: 292-304.

Patterson, Thomas C. and Edward P. Lanning

- 1964 Changing Settlement Patterns on the Central Peruvian Coast. *Ñawpa Pacha* 2: 113-123.

Pearsall, Deborah M.

- 1979 *The Application of Ethnobotanical Techniques to the Problem of Subsistence in the Ecuadorian Formative*. Ph.D. dissertation, University of Illinois, Urbana. Ann Arbor, MI: University Microfilms.

Pickersgill, Barbara and Richard T. Smith

- 1981 Adaptation to a Desert Coast: Subsistence Changes through Time in Coastal Peru. In *Environmental Aspects of Coasts and Islands*, edited by Don R. Brothwell and Geoffrey W. Dimbleby, pp. 89-115. *BAR International Series* 94.

Plowman, Timothy

- 1984 The Origin, Evolution, and Diffusion of Coca, *Erythroxylum* spp., in South and Central America. In *Pre-Columbian Plant Migration*, edited by Doris Stone, pp. 125-163. *Papers of the Peabody Museum of American Archaeology and Ethnology* 76.

Popper, Virginia

- 1978 Preliminary Report on Pollen Analysis of Coprolites from Aspero, Central Peru. Unpublished paper, Botany 492, University of Michigan, Ann Arbor.

Porrás, P. Pedro

- 1973 El Encanto--La Puná: un sitio insular de la fase Valdivia asociado a un conchero anular. *Ediciones Huancavilca* 5. Quito, Ecuador.

Pozorski, Shelia

- 1976 *Prehistoric Subsistence Patterns and Site Economics in the Moche Valley, Peru*. Ph.D. dissertation, University of Texas, Austin. Ann Arbor: University Microfilms.
- 1979 Prehistoric Diet and Subsistence of the Moche Valley, Peru. *World Archaeology* 11: 163-184.
- 1987 Theocracy vs. Militarism: the Significance of the Casma Valley in Understanding Early State Formation. In *The Origins and Development of the Andean State*, edited by Jonathan Haas, Shelia Pozorski, and Thomas Pozorski, pp. 15-30. Cambridge: Cambridge University Press.

Pozorski, Shelia G. and Thomas G. Pozorski

- 1979a Alto Salaverry: a Peruvian Coastal Preceramic Site. *Annals of Carnegie Museum* 48: 337-375.
- 1979b An Early Subsistence Exchange System in the Moche Valley, Peru. *Journal of Field Archaeology* 6: 413-432.
- 1986 Recent Excavations at Pampa de las Llamas-Moxe, a Complex Initial Period Site in Peru. *Journal of Field Archaeology* 13: 381-401.

Pozorski, Thomas G.

- 1976 *Caballo Muerto: a Complex of Early Ceramic Sites in the Moche Valley, Peru*. Ph.D. dissertation, University of Texas, Austin. Ann Arbor: University Microfilms.

Quilter, Jeffrey

1985 Architecture and Chronology at El Paraíso, Peru. *Journal of Field Archaeology* 12: 279-297.

1991 Late Preceramic Peru. *Journal of World Prehistory* 5: 387-438.

Quilter, Jeffrey, Bernardino Ojeda E., Deborah M. Pearsall, Daniel H. Sandweiss, John G. Jones, and Elizabeth S. Wing

1991 Subsistence Economy of El Paraíso, an Early Peruvian Site. *Science* 251: 277-283.

Quilter, Jeffrey and Terry Stocker

1983 Subsistence Economies and the Origins of Andean Complex Societies. *American Anthropologist* 85: 545-562.

Ravines, Rogger

1975 Garagay, un viejo templo en los Andes. *Textual* 10: 6-12. Lima: Instituto Nacional de Cultura.

1984 Sobre la formación de Chavín: imágenes y símbolos. *Boletín de Lima* 6(35): 27-45.

1985 Early Monumental Architecture of the Jequetepeque Valley, Peru. In *Early Ceremonial Architecture in the Andes*, edited by Christopher B. Donnan, pp. 209-226. Washington, DC: Dumbarton Oaks.

Ravines, Rogger, and William H. Isbell

1975 Garagay: sitio ceremonial temprano en el valle de Lima. *Revista del Museo Nacional* 41: 253-281. Lima.

Raymond, J. Scott

1981 The Maritime Foundations of Andean Civilization: a Reconsideration of the Evidence. *American Antiquity* 46: 806-821.

Richardson, James B., III

1981 Modeling the Development of Sedentary Maritime Economies on the Coast of Peru: a Preliminary Statement. *Annals of Carnegie Museum* 50: 139-150.

Sandweiss, Daniel H.

1985 *Choromytilus chorus* and *Spondylus* in Prehistoric Andean Ritual. Paper presented at the 4th Annual Northeastern Conference on Andean Archaeology and Ethnohistory, Albany.

Sandweiss, Daniel H., Harold B. Rollins, and James B. Richardson III

1983 Landscape Alteration and Prehistoric Human Occupation on the North Coast of Peru. *Annals of Carnegie Museum* 52: 277-298.

Stothert, Karen E.

1976 The Early Prehistory of the Sta. Elena Peninsula, Ecuador: Continuities between the Preceramic and Ceramic Cultures. *Actas del XLI Congreso Internacional de Americanistas* II: 88-98. Mexico.

1992 Early Economies of Coastal Ecuador and the Foundations of Andean Civilization. *Andean Past* 3: 43-54.

Tello, Julio C.

1956 *Arqueología del valle de Casma*. Lima: Editorial San Marcos.

Terada, Kazuo

1985 Early Ceremonial Architecture in Cajamarca. In *Early Ceremonial Architecture in the Andes*, edited by Christopher B. Donnan, pp. 191-208. Washington, DC: Dumbarton Oaks.

Topic, John R.

1985 Comments on: Staple Finance, Wealth Finance, and Storage in the Inka Political Economy, by Terence N. D'Altroy and Timothy K. Earle. *Current Anthropology* 26: 201-202.

Uhle, Max

1920 Los principios de las antiguas civilizaciones peruanas. *Boletín de la Sociedad Ecuatoriana de Estudios Históricos Americanos* 4: 448-458.

Ugent, Donald, Shelia Pozorski, and Thomas Pozorski

- 1981 Prehistoric Remains of the Sweet Potato from the Casma Valley of Peru. *Phytologia* 49: 401-415.
- 1982 Archaeological Potato Tuber Remains from the Casma Valley of Peru. *Economic Botany* 36: 182-192.
- 1984 New Evidence for Ancient Cultivation of *Canna edulis* in Peru. *Economic Botany* 38: 417-432.

Wendt, W. E.

- 1964 Die prakeramische seidlung am Rio Seco, Peru. *Baessler Archiv* 11(2): 225-275.

Willey, Gordon R. and John M. Corbett

- 1954 Early Ancon and Early Supe Culture: Chavin Horizon Sites of the Central Peruvian Coast. *Columbia University Studies in Archaeology and Ethnology* 3. New York: Columbia University.

Williams, Carlos

- 1971 Centros ceremoniales tempranos en el valle del Chillón, Rimac y Lurín. *Apuntes Arqueológicos* 1: 1-4. Lima.
- 1972 La difusión de los pozos ceremoniales en la costa peruana. *Apuntes Arqueológicos* 2: 1-9. Lima
- 1978-80 Complejos pirámides con planta en U, patrón arquitectónico de la costa central. *Revista del Museo Nacional* 44: 95-110. Lima.
- 1985 A Scheme for the Early Monumental Architecture of the Central Coast of Peru. In *Early Ceremonial Architecture in the Andes*, edited by Christopher B. Donnan, pp. 227-240. Washington, DC: Dumbarton Oaks.

Wilson, David

- 1981 Of Maize and Men: a Critique of the Maritime Hypothesis of State Origins on the Coast of Peru. *American Anthropologist* 83: 93-120.

Yen, D. E.

- 1974 The Sweet Potato and Oceania. *Bernice P. Bishop Museum Bulletin* 236. Honolulu, HI.

Zevallos M., Carlos

- 1971 *La agricultura en el Formativo Temprano del Ecuador (Cultura Valdivia)*. Guayaquil, Ecuador: Casa de la Cultura Ecuatoriana.

Zevallos M., Carlos, Walton C. Galinat, Donald W. Lathrap, Earl R. Leng, Jorge G. Marcos, and Kathleen M. Klumpp

- 1977 The San Pablo Corn Kernel and its Friends. *Science* 196: 385-389.