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## **Coastal Colonies and the Collapse of Tiwanaku: The Coastal Osmore Valley, Perú**

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Bruce Owen

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**Abstract:** Although the Tiwanaku state (500 AD-1000 AD) is often said to have planted colonies in the coastal valleys of southern Peru and northern Chile, recent systematic survey and excavation in three potential colony sites finds no evidence of Tiwanaku state colonies in the coastal Osmore valley, not even at Loreto Viejo, a frequently cited "colony". Instead, immigrants from the Tiwanaku settlements in the middle Osmore valley moved to the coast as or after Tiwanaku collapsed. Radiocarbon dates, site descriptions, and excavated material support a preliminary reconstruction of the repercussions that Tiwanaku's collapse had on the southern Peruvian coast.

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In 1985, Elias Mujica confidently wrote that "...it is accepted that Tiwanaku access in coastal valleys was by colonies", citing six respected scholars to support his point. These coastal colonies were presumably established to produce exportable surpluses of coastal crops and marine products for exchange with the highland core of the Tiwanaku state. Whether this exchange was based on "verticality" relations as described by John Murra (1975) or state-level economic strategy, the supposed colonies defined important aspects of our reconstruction of the economics and politics of the late, "expansive" Tiwanaku state.

In 1991, I reported preliminary results of excavations in the coastal Osmore valley at three sites, including Loreto Viejo, which is one of the most often cited Tiwanaku coastal colonies. I concluded that at least in the coastal Osmore valley, there were no Tiwanaku coastal colonies. I suggested instead that people of the terminal Tiwanaku tradition in the middle Osmore valley moved into the coastal Osmore valley only after the Tiwanaku state broke up, and that these post-Tiwanaku immigrants played a role in the rise of the complex Chiribaya society of the Late Intermediate period.

Today I will describe additional data, including 13 new radiocarbon dates, a systematic site survey of the entire coastal valley, and new ceramic analyses, that both reinforce and significantly alter last year's conclusions.

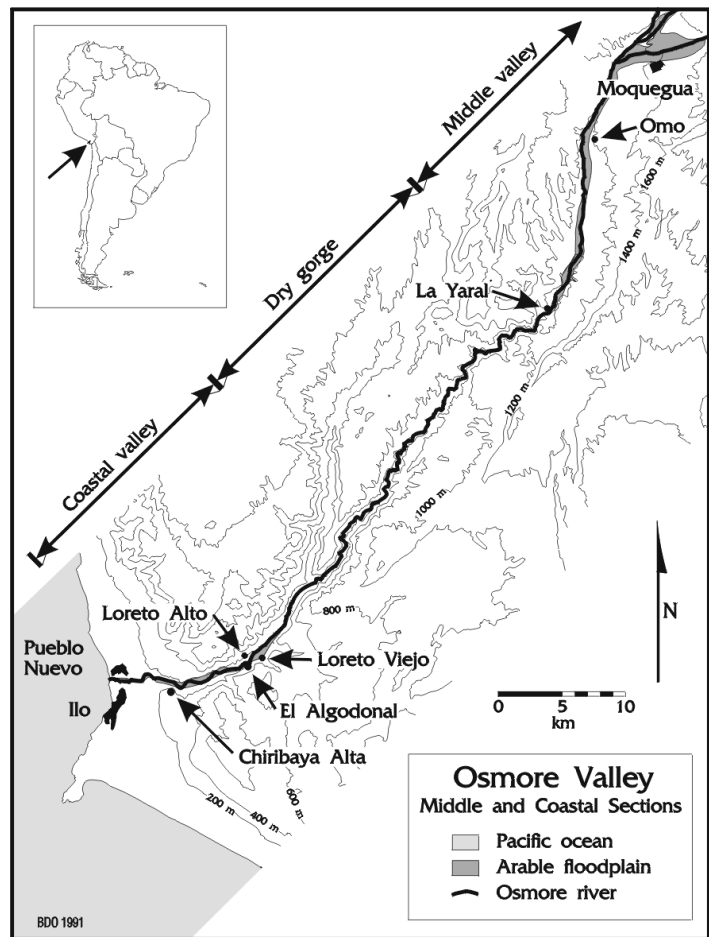
This is not a "cautionary tale", but before getting on to the substantive findings, I want to make two obvious but important methodological points. First, even though this valley had been repeatedly inspected by several competent archaeologists over a period of many years, I had to significantly change my reconstruction of the culture history of the region after doing a

systematic site survey. Whole chronological periods (including the preceramic, early ceramic and later Formative) were overlooked, a major occupation in the Tumilaca phase was recognized at only two sites, and entire areas such as the pampa north of the valley and the high valley margins were falsely assumed to be empty of sites. *Systematic site survey is not methodological window dressing. Conclusions based on excavations without supporting systematic survey data are likely to be wrong.*

Second, my chronology would have been wrong if I had not requested stable carbon isotope ratio measurements along with the radiocarbon dates. The isotopic correction is necessary mostly because people and other animals may eat unknown quantities of C4 plants such as maize. The difference between the average isotopic corrections for dates on animal material (camellid wool) and plant material (wood and charcoal, not maize) was 115 years, and the largest difference was 170 years. These corrections are two to three times the standard errors of the dates. At least on the Andean coast, and especially if human or other animal tissues are dated, *radiocarbon dates must be corrected according to the samples' stable carbon isotope ratios.*

The Osmore drainage is divided into several sections. The upper section includes several narrow, ramifying valleys with occasional irrigable slopes and arable valley bottoms. The middle section forms the Osmore's largest concentration of farmland, and reaches from where the upper valleys begin to broaden out, past their confluence around the modern city of Moquegua, past the Tiwanaku center of Omo, and down to the site of Yaral, where the river disappears into underground channels and the valley pinches off into a dry, rocky gorge. This inhospitable valley would have supported settlement and farming only in a few small pockets, if at all.

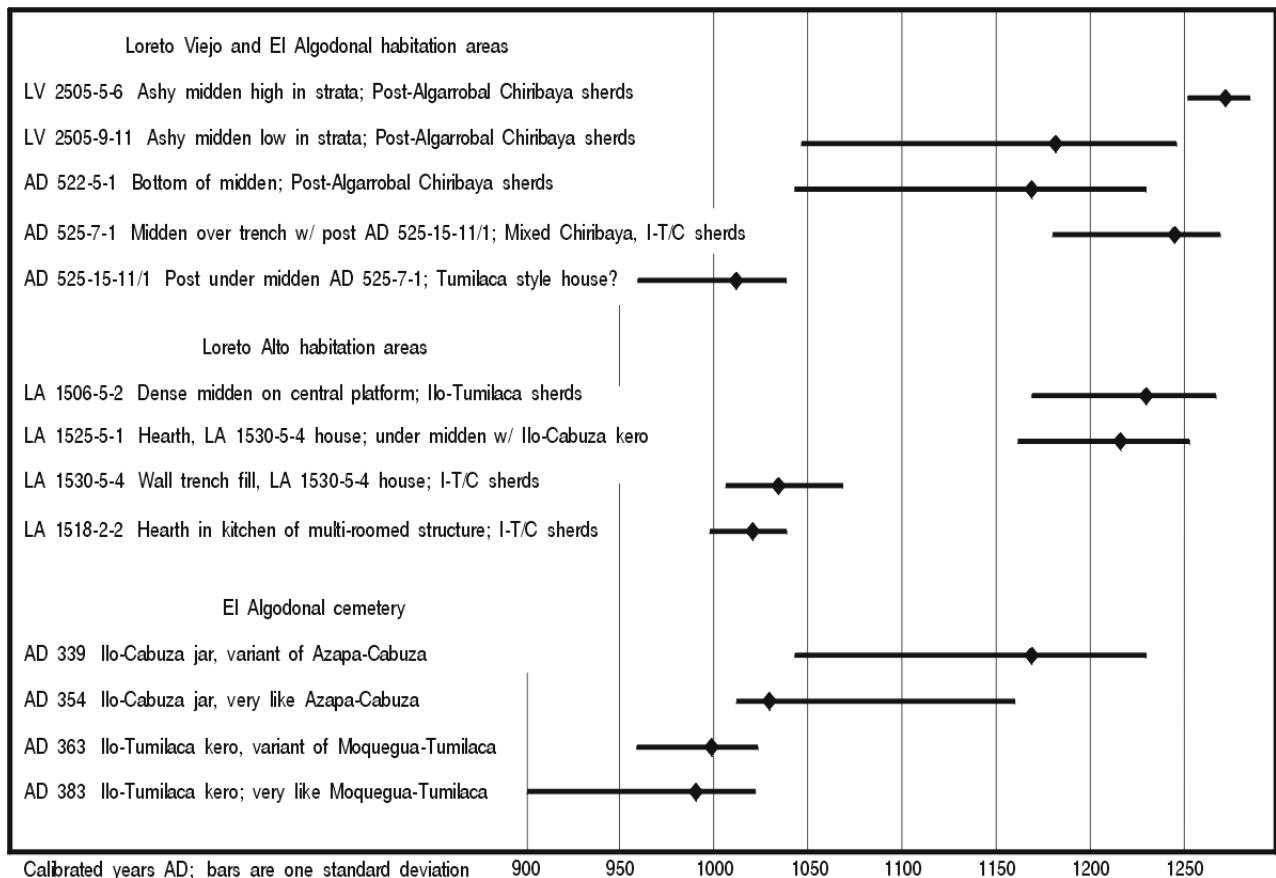
The coastal Osmore valley starts where the river reappears about 25 kilometers from the sea. The valley is deeply incised and extremely narrow. For the first 10 kilometers, the floodplain averages only 115 meters across, opening up to just 300 meters wide for the last 15 kilometers to the sea. Today, water flows in the coastal Osmore river for a only few days or weeks each year, and most of the desert outside the valley bottom is absolutely barren. Abundant archaeological remains indicate that the river used to flow



year-round, and within the last fifty years the climate is said to have been substantially wetter. The preservation of archaeological remains is extraordinary.

Paul Goldstein (1989a,b; Bermann *et al.* 1989) has shown that the middle Osmore valley became a fully integrated province of Tiwanaku during the Chen Chen phase, from about 725-950 AD (roughly equivalent to Tiwanaku V in the altiplano). Around 950 AD, the Tiwanaku state organization in the middle valley broke up into comparatively isolated groups of the Tumilaca phase, each with its own variant of the formerly homogenous Tiwanaku ceramic style. Some canals, farmland, and settlements in the middle valley were abandoned, as people moved up into formerly unexploited sierra drainages such as the Otorá valley (Bermann *et al.* 1989; Stanish 1985) and down into the coastal Osmore valley (Owen 1991).

The Tumilaca phase settlement of the coastal Osmore valley was clearly intrusive and evidently came from the middle Osmore valley. The settlers are identified archaeologically by ceramics of what I call the Ilo-Tumilaca/Cabuza tradition, which can sometimes be divided into an earlier part called Ilo-Tumilaca, and a later part called Ilo-Cabuza. Neither excavation nor survey has uncovered any local antecedents for the Ilo-Tumilaca styles of ceramics, textiles, wooden spoons, chert points, tomb construction, or domestic architecture, all of which are virtually identical to their Moquegua-Tumilaca analogues. The only exceptions are a very few artifacts from looted burials that might pertain to the Moquegua Chen Chen phase.



The earliest radiocarbon date from an Ilo-Tumilaca context is 991 AD, with 1-sigma error bars reaching from 900 to 1021 AD. (All the dates in this paper are calibrated to calendar years [Stuiver and Reimer 1987]). Another date centers on 999 AD, and four more fall within the next 40 years. Goldstein (1989a,b; Bermann *et al.* 1989) placed the end of the Chen Chen phase and the Tiwanaku state in the middle Osmore valley around 950 AD, so the six Ilo dates of 991 to 1035 AD put the movement of middle valley settlers into the coastal Osmore during or immediately after the breakup of the Tiwanaku state.

Although no less than six dates cluster tightly in the period of 990-1040 AD, because of the error bars of the dates and the probability that my excavations did not encounter remains of the very first Ilo-Tumilaca settlers, it is necessary to consider the possibility that some of them emigrated to the coastal Osmore valley as early as 950 or even 925 AD. In that case, the initial immigration to the coastal Osmore valley might represent a last-ditch effort of the tottering Tiwanaku state to resolve whatever problems were threatening its existence. The very few artifacts from the coastal Osmore that might be from the Chen Chen phase, such as a decorated ceramic kero and a tapestry shirt fragment, might relate to such a state colonization effort. But even if the settlements originally pertained to Tiwanaku, they did not function as Tiwanaku colonies for long, because they were almost immediately cut off by the disintegration of the state.

Last year I suggested that the Tumilaca phase settlement of the coastal Osmore was a matter of a small number of families, since only two domestic areas and one cemetery were known. Systematic site survey indicates that there was a substantial Ilo-Tumilaca/Cabuza occupation in the valley, with at least 15 habitation sites and 7 cemeteries. The habitation sites fall into two general types. The first type consists of relatively long terraces low on the valley wall or on large natural flats close to the floodplain. This type is typical of settlements from at least the Early Ceramic *olla sin cuello* phase through to modern times.

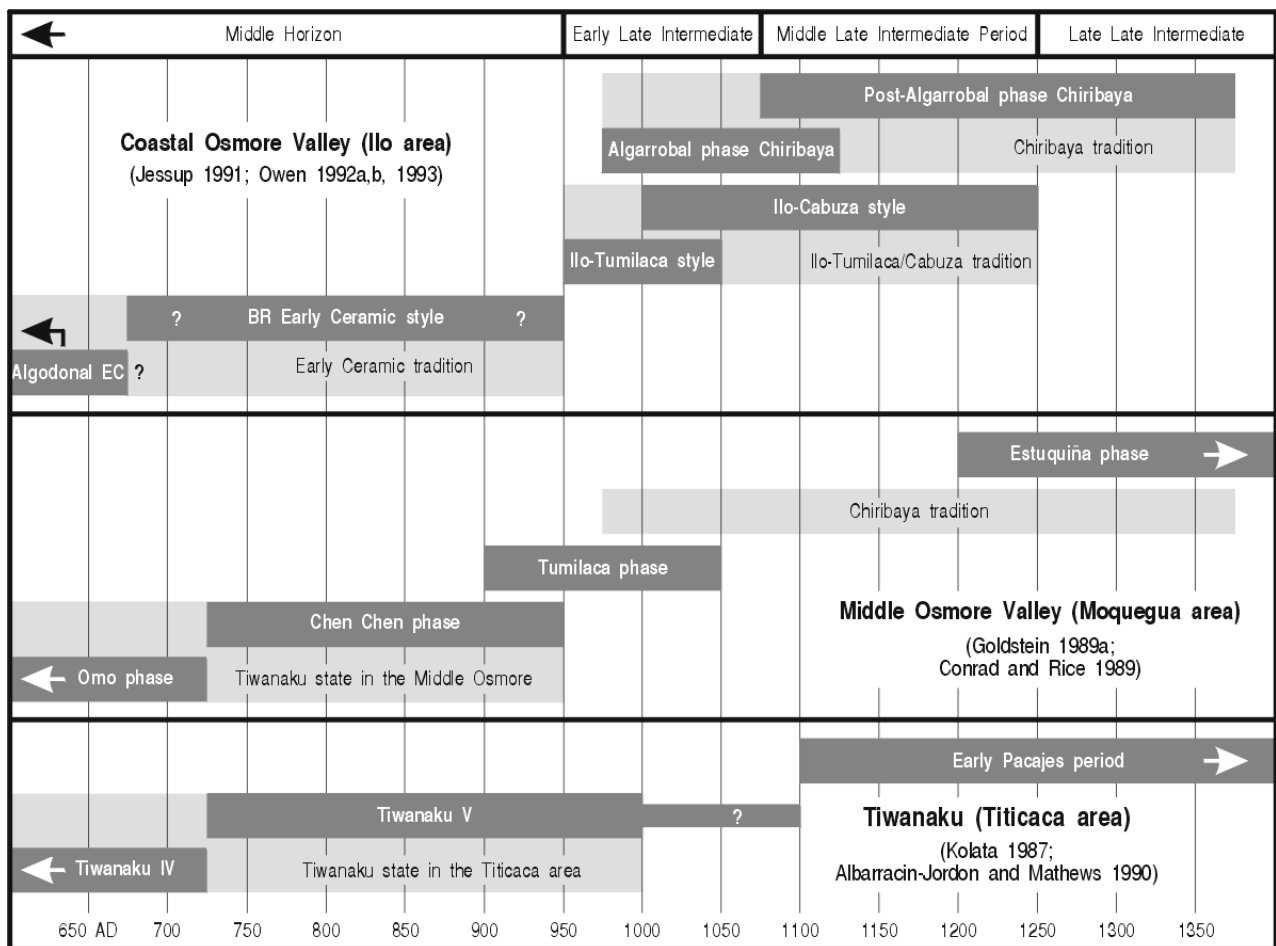
The second type consists of series of small terraces running up steep ravines high in the side of the valley, sometimes with a few small leveled areas on the ridgelines. One such site, Loreto Alto, was extensively excavated in 1989-90, and proved to be a domestic settlement with ceramics exclusively of the Ilo-Tumilaca/Cabuza tradition. The site survey turned up many more of these ladder-like sites, albeit none as large as Loreto Alto. Many of the terraces at these sites are too small for habitation, only one or two meters across, but they are identical to the smaller terraces at Loreto Alto. Their function is unknown. I suggest that all the sites of this type are probably like Loreto Alto, and pertain exclusively to the Ilo-Tumilaca/Cabuza tradition.

The Tumilaca phase settlers probably built the impressive canal and irrigated field systems on the north wall of the valley. Hydraulic systems in themselves are difficult to date, but two distinct associations of sites support this hypothesis. First, sites of the Loreto Alto type occur only on the valley wall immediately above areas of reclaimed fields; there are no sites of this type on the south valley wall, downstream of the distal end of the canal, upstream from the canal intake, or even along the canal in sections without reclaimed fields.

Second, three separate Ilo-Tumilaca/Cabuza cemeteries are located on the uphill side of the canal, in contact with the canal for considerable distances but not crossing over into the fields on the other side. There are no Ilo-Tumilaca/Cabuza cemeteries on the downhill side of the canal. The canal and fields evidently existed when the cemeteries were in use, defining their downhill borders. In addition, the fact that the Ilo-Tumilaca/Cabuza people placed three of their seven known cemeteries right along the canal and next to the fields suggests that they felt some sort of association with the hydraulic works and that they were not opposed in doing so.

Canals are sometimes dated according to the sites located at their intakes. In the coastal Osmore, the same types of sites are found along all of the upper part of valley; there is no notable difference at the canal intake. Some of the sites closest to the intake lack diagnostic ceramics, but in the general vicinity there are sites of all phases from the Early Ceramic phase through the Late Intermediate period. I suggest that the need to have a settlement right at a canal intake is dependent upon the perceived threat of someone damaging or blocking the intake, and as I will show, there is little evidence of threatened or real conflict in the coastal Osmore.

The radiocarbon dates indicate that the Ilo-Tumilaca/Cabuza tradition continued until around 1250 AD; two dates fall in the last 35 years of that span. These dates indicate a period of some 250 years during which the coastal Osmore valley was occupied not only by the Ilo-Tumilaca/Cabuza settlers, but also by another and probably more populous group, the Chiribaya.



The Chiribaya ceramic style has recently been divided into three chronological phases, first by Manuel Garcia (1988), and then more rigorously by David Jessup (1991), using both stylistic and stratigraphic evidence. For my purposes, I distinguish only Jessup's early, or Algarrobal, phase, from his later two phases, which I lump as post-Algarrobal phase. My four radiocarbon dates for post-Algarrobal phase Chiribaya fall between 1165 and 1275 AD; considering the error bars, published dates, and various other arguments, I place post-Algarrobal phase Chiribaya around 1075 to 1375 AD. Unfortunately, there are no definitely Algarrobal phase dates available, but the Algarrobal phase must be mostly earlier than the post-Algarrobal phase, and probably did not start much before the earliest published Chiribaya dates. I suggest that the Algarrobal phase lasted from about 975 to 1125 AD.

The Ilo-Tumilaca style and the Algarrobal phase Chiribaya style existed at the same time but at distinct sites in the coastal Osmore valley. The two styles have virtually identical ceramic technologies, including paste and temper, slip, paints, burnishing, and some forms, but they differ almost completely in their painted motifs. The Ilo-Tumilaca style is clearly derived from Tiwanaku models, while the Algarrobal phase Chiribaya motifs are quite distinct. I suspect that the Algarrobal phase Chiribaya style developed from the Ilo-Tumilaca style shortly after the settlers arrived in the coastal Osmore valley. In any case, the presence of two highly distinct decorative styles in virtually identical media at nearby, contemporary sites looks like a classic example of ethnic boundary maintenance (Hodder 1982), in which adjacent groups exaggerate identifying symbols in order to assert and maintain their distinctness.

This sharing of the coastal valley by two distinct groups also corresponds to what Murra (1975) called the "multi-ethnic character" of settlement under his model of economic "verticality". In fact, both the Tumilaca style and the Algarrobal phase Chiribaya style were also present in the middle Osmore valley, which suggests that each of the two coastal groups might have maintained separate contacts with their analogues in the middle valley. Murra noted a similar "multi-ethnic", "vertical" utilization of the same region by the Lupaqa and the Pacaxa a few hundred years later (Murra 1975:73), except that by then the system incorporated or even focussed on the altiplano. In contrast, at this earlier period, there is little evidence of Chiribaya settlement above the middle valley and none close to the altiplano, while Tumilaca phase settlement, though widespread, presently appears to be fragmented, rather than unified, along vertical lines.

A series of five radiocarbon dates associated with decorated ceramics from the Ilo-Tumilaca/Cabuza tradition suggests a trend from the Ilo-Tumilaca style, which is very similar to the fine Tiwanaku wares of the middle valley, to the Ilo-Cabuza style, which initially was similar to the Cabuza style of northern Chile, but eventually became even more cursory in its execution. (This dating of the Cabuza style is quite different from that used in northern Chile [Cartmell *et al.* 1991], which I believe to be incorrect.) At the very same time, Jessup's seriation has Chiribaya ceramics becoming more standardized, more carefully painted, more heavily slipped, and better burnished. Overall, both the motifs and the execution of the ceramic styles of the two groups increasingly diverged over time.

This stylistic divergence suggests the continued isolation of the two groups under conditions that caused them to emphasize their ethnic distinctness. My as yet unquantified impression from the site survey is that post-Algarrobal phase Chiribaya settlements dominate the valley, indicating a Chiribaya population explosion. This increasing population in a small valley could have created tensions over limited resources that would encourage boundary maintenance. In fact, it seems that the highest status Chiribaya tombs are generally the ones that contain bows, arrows, and axes, some of which are unusable emblems with wooden blades. The concentration of weapons and their likenesses with elites suggests that some element of force was involved in Chiribaya leadership.

These tensions apparently did not reach the level of actual or threatened intergroup conflict, however. The only fortified site in the valley is Chiribaya Alta, a walled center notable for its extensive high-status cemeteries outside the wall and its unusually large cane-walled domestic structures inside. Although the sites like Loreto Alto are in fact more defensible than valley-floor sites, they lack walls or other explicitly defensive features, and would have been dangerously vulnerable to attack from above. Weapons are completely unknown in burials of the Ilo-Tumilaca/Cabuza tradition and rare in Chiribaya tombs, and the dead of both groups have very low incidences of trauma. Radiocarbon dates clearly indicate that Ilo-Tumilaca/Cabuza people buried their dead at the cemetery of El Algodonal while Chiribaya people were living on terraces less than one hundred meters away. One of the few hints of warfare is an exceptionally high density of projectile points on the central terraces of Loreto Alto, but that could indicate anything from a battle to a family of avid birders.

It does seem that tension increased. The wall at Chiribaya Alta was built after the site had been occupied without fortifications for some time. Initially, high status individuals of both the Algarrobal phase Chiribaya *and* the Ilo-Tumilaca group were buried in the same cemeteries at Chiribaya Alta. I have not done a careful study of ceramics from the site, but my impression is that the later Ilo-Cabuza style ceramics are absent, suggesting that the increasingly numerous and sociopolitically complex Chiribaya eventually barred the Ilo-Cabuza elite from their high-status cemeteries. The Chiribaya eventually used the canal and reclaimed fields that I argue were built by the Ilo-Tumilaca/Cabuza group. If this transfer of control occurred while there were still Ilo-Tumilaca/Cabuza people in the valley, it would certainly have involved intergroup tensions.

As the Chiribaya population grew, so did Chiribaya social stratification as reflected in the variability in grave goods, until in late Chiribaya times there were true chiefly burials with large quantities of pottery, basketry, wood-, metal-, and featherwork items, and even human attendants. Increasing amounts of labor and skill were invested in highly decorated but increasingly standardized ceramic vessels, suggesting craft specialization or even organized ceramic workshops. Similar specialization may have occurred in other crafts such as wooden *kero* production and metalworking, as well as in non-craft activities, but is harder to document. Chiribaya population focussed on the enormous settlement of Chiribaya Baja, while the walled, high-status site of Chiribaya Alta may have served as a ceremonial and/or political center.

Meanwhile, the Ilo-Tumilaca/Cabuza population was not keeping pace, and probably declined. Burial data is limited, but there is no evidence of particularly rich Ilo-Tumilaca/Cabuza burials at any time, suggesting that the Ilo-Tumilaca/Cabuza group was never markedly stratified. Ilo-Tumilaca/Cabuza potters invested ever less labor in their vessels, dropping to a single and highly fugitive color of paint, progressively reducing the amount of burnishing, eventually eliminating slip altogether and neglecting to even smooth the contours of their vessels. Rather than playing an increasing role in a rising wealth economy, ceramic production among the Ilo-Cabuza people reverted to a minimal servicing of subsistence requirements. No large Ilo-Tumilaca/Cabuza settlement emerged, and after the group was apparently excluded from Chiribaya Alta, no obviously special site replaced it to serve as a ceremonial or political center. Eventually the Ilo-Tumilaca/Cabuza tradition disappeared, through accumulated defections to the Chiribaya, demographic attrition, or, least likely, emigration.

Why did these two contemporary groups, starting with virtually identical cultural roots and living together in the very same valley, follow such different developmental paths? Differential population growth clearly played a role, but as always, population growth could have been a cause, an effect, or both. Certainly the competitive but evidently peaceful relations between the two groups contributed, perhaps with some sort of positive feedback such that once one group got a little larger or controlled a greater portion of the resources, the difference tended to build on itself. If the Ilo-Tumilaca/Cabuza people initially controlled the canal and reclaimed fields, they were evidently not enough to save them in the long run. Continued research focussing especially on settlement patterns and detailed midden analysis will delineate the similarities and differences between the Ilo-Tumilaca/Cabuza and the Chiribaya groups, in order to constrain explanations of the complex repercussions in the coastal Osmore valley of Tiwanaku's collapse.

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