Understanding Tiwanaku: Conquest, Colonization, and Clientage in the South Central Andes

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FROM THE PERSPECTIVE of the south central and southern Andes, a reconsideration of the horizon concept and its meaning could not, perhaps, have come at a better time. Only a few years ago there would have been precious little new data concerning the nature and impact of Tiwanaku in the cultural history of the Andes. Today that situation is changing dramatically.

Although the archaeology of Tiwanaku has been discussed and commented upon continuously since the days of Max Uhle, the number of substantive field projects designed to explore systematically the nature of the Tiwanaku polity is unfavorably disproportionate to the slew of speculation that currently passes for our understanding of that ancient state. It seems that Tiwanaku has been admired, remarked upon, and then subtly, if, at times, unwittingly, dismissed, simply because there was nothing new to say.

However, the past ten years have witnessed a renaissance of interest and of scholarly work on the complex phenomenon that was Tiwanaku. Recent field projects in southern Peru, northern Chile, and western Bolivia promise to alter radically current perceptions regarding Tiwanaku's role in the geopolitics of the ancient Andean world. Fresh, compelling interpretations of the political economy of Tiwanaku are forthcoming and, for the first time in a very long time, these interpretations will be embedded in conceptual frameworks supported by a newly generated corpus of primary field data.

Within the limited scope of this paper, I can only characterize in summary fashion the nature of these new data, and outline, in schematic form, the general contours of these emerging interpretive frameworks. Together this material speaks directly to the theme of this volume: what precisely do horizons and horizon styles signify, and, more specifically, how will our new understanding of Tiwanaku clarify the current puzzling historical processes that seem to underlie the phenomenon we refer to as the Andean Middle Horizon?

TIWANAKU AND THE HORIZON CONCEPT

Before proceeding to a discussion of the substantive new data on Tiwanaku that will, in my mind, force a thoroughgoing revision in our understanding of that culture and its transformations, it is appropriate to locate briefly the critical role of Tiwanaku in the intellectual history of the horizon concept and to define the fundamental identifying characteristics of Tiwanaku as a horizon style. In this way, we may gain an initial appreciation for the definition, utility, and limitations of the horizon concept within the context of the investigation of native Andean civilization.

Tiwanaku can rightfully take its place as one of the two principal cultural phenomena (the Inca, of course, being the other) that inspired the development of the horizon concept in Andean studies. Just prior to the turn of the last century, Max Uhle, working in Germany with photographs, drawings, and notes compiled primarily by Alfons Stübel, began his analysis of the monumental stone sculpture and architecture at the site of Tiwanaku. This work culminated in the impressive descriptive monograph, *Die Ruinenstaette von Tiahuanaco im Hochlande des alten Perú* (Stübel and Uhle 1892), which essentially defines Uhle's understanding of the form and content of the Tiwanaku sculptural style.

Perhaps more importantly for the genesis of the horizon concept, Uhle's investigations of selected aspects of Tiwanaku and Inca material culture in Europe inspired him to engage in primary field work with the apparently explicit intention of sorting out the broad temporal and spatial relationships of various archaeological cultures of the ancient Americas. As Uhle (1902: 754) himself described his objectives in an article written for *American Anthropologist* in 1902:

> Our ideas concerning the degree of civilization in Pre-Columbian times by the inhabitants of the older American countries are not yet entirely freed from the prejudiced notion of generally regarding the various types of ancient culture as merely local styles, each being ascribed in some ways to a different geographic area and to a different tribe;—we are still prone to see in them purely ethnical divisions and individual local types. In observing these types of culture we should pay attention particularly to their succession in time; for their importance as stylistic strata which succeeded and covered each other (and, for the greater part, covered a coextensive area) is far beyond that which they may possess as local types. We must introduce into the archaeology of the countries of America the leading points of view which enabled students to distinguish in European prehistory the successive Hallstadt, La Tene, German Conquest, and Merovingian periods.

Uhle first incorporated this scholarly objective of isolating "stylistic strata" and their "succession in time" into his field work during his excavations at the great Peruvian coastal site of Pachacamac in 1896. There, Uhle noted (1902: 754), he applied the successful method developed by Flinders Petrie in Egypt of establishing "the succession of styles by the gradually changing character of the contents of graves differing in age. . . ." Applying basic principles of stratification to grave lot material (principally ceramics), Uhle (1902: 756) recognized five temporally distinct stylistic units that he characterized from the oldest to more recent as: (1) "that of the classical style of Tiahuanaco," (2) "that of a local epigonal development of the same style," (3) "the period of the vessels painted white, red, and black," (4) "the period characterized by certain black vessels," and (5) "the period of the style of the Incas."

This sequence was elaborated in greater detail in Uhle's (1903) monograph on Pachacamac. During subsequent work in the Moche Valley and in other important Peruvian and Chilean coastal valleys, Uhle consistently encountered ceramics that, in his judgment, were related in form, motif, color scheme, and other such attributes to the "classical Tiahuanaco style" or to the variant of the "epigonal Tiahuanaco" style that he had isolated at Pachacamac (Uhle 1913, 1915, 1919).

Uhle's familiarity with the highland-coastal distribution of Inca material culture, and with the presumptive historical descriptions of the Inca as an expansive imperial state, led him ineluctably to the conclusions that the Bolivian site of Tiwanaku was the ultimate source of a distinctive and broadly distributed art style, and, by implication, that the city was the capital of an Andean empire similar in structure, if not in geographical scope, to the Inca. Although Uhle did not employ the language of cultural horizon, or horizon style, the basic concepts were implicit in his notation of "stylistic strata" and their "succession in time."

Even from its inception, however, the characterization of Tiwanaku as a historically unified stylistic and cultural stratum in the south central Andes was being eroded by the realization that many of the regional coastal variants of the Tiwanaku style were, in fact, substantially different from the "classic" Tiwanaku style, expressed most essentially in the corpus of stone sculptures from Tiwanaku and its proximal affiliated settlements around the southern shores of Lake Titicaca (Figs. 1–5). Uhle (1903: 24) himself recognized this stylistic divergence between *altiplano* and coastal materials, but seems not to have explored in any depth the potential social implications of this distinction. Somewhat later, Alfred Kroeber (1927) explicitly distilled Tiwanaku material culture into two readily distinguishable stylistic units: "Coast Tiahuanaco" and "Highland Tiahuanaco." Kroeber (1944, 1948, 1951) nevertheless continued to conceptualize the

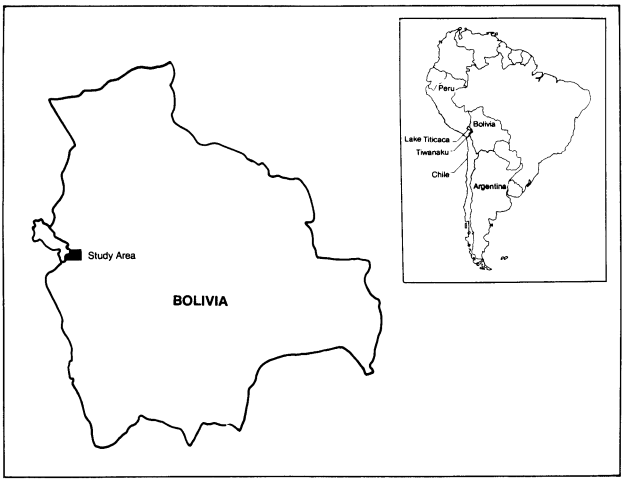

Fig. 1. Location map for Bolivia, Tiwanaku, and the study area of intensive agricultural production discussed in the text (after Kolata 1986: fig. 1)

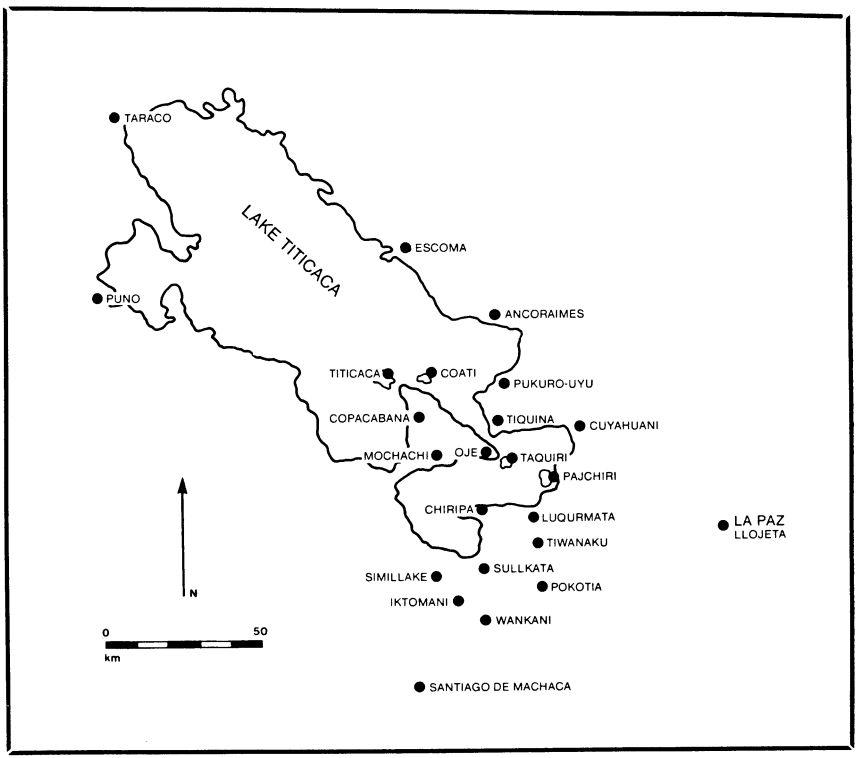

Fig. 2. Distribution map of some important Tiwanaku sites around Lake Titicaca

Fig. 3. Detail of the "Ponce Monolith" from the Kalasasaya temple at Tiwanaku

phenomenon of Tiwanaku as a cultural configuration within the frame work of a broad horizon style, an interpretation further elaborated by Gordon Willey (1945, 1948).

By the early 1940s, however, even the most vocal proponents of the horizon concept, who were engaged by its utility as a vehicle for organizing the space-time systematics of Andean culture history, began to appreciate that the actual historical situation in the south central Andes during the epoch of Tiwanaku emergence and florescence was dramatically more complex than might be accounted for by a single Inca-style regime of conquest

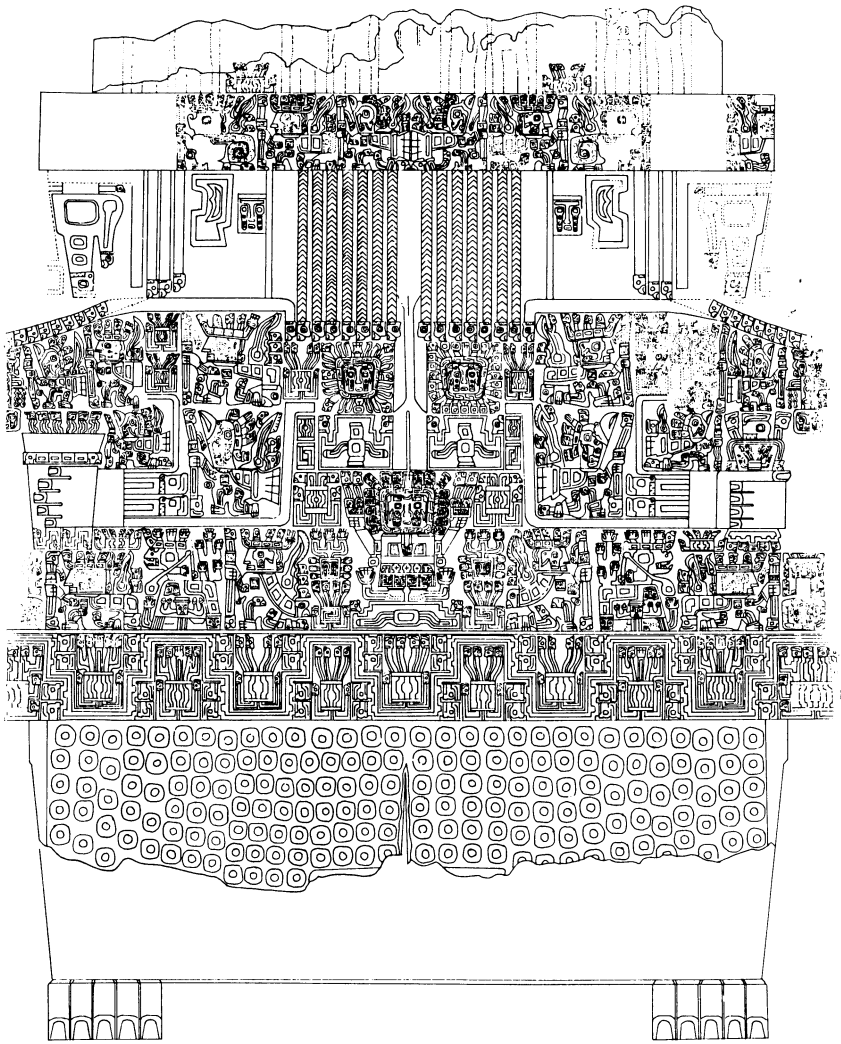

Fig. 4. Roll-out drawing of the incised designs on the "Bennett Monolith" from the Semi-subterranean Temple at Tiwanaku (redrawn from Posnansky 1945 I (2): fig. 117)

and territorial incorporation. Luis Valcarcel's (1932a, 1932b, 1935) publication of ceramic and stone sculptures from Pukara sites on the northern shore of Lake Titicaca brought into sharp relief the presence of a culture which possessed a vigorous art style that shared a substantial set of conventions and iconographic canons with Tiwanaku but was nevertheless clearly of autochthonous origin.

Fig. 5. Stone architectural element from Tiwanaku, possibly an architrave fragment, with a figure carved in high relief holding scepters, or staffs, and portrayed standing on a stepped-terrace temple mound. Traces of pigment still adhere to the sculpture, suggesting that this, and quite likely other Tiwanaku stone sculptures, were painted. The piece, 44 cm tall, is in the collections of the Museum für Völkerkunde, Dahlem, Berlin, catalogued as VA 10882, and was collected by Hettner, 1890 (photo: courtesy of Dieter Eisleb and the Museum für Völkerkunde, Dahlem, Berlin)

Alfred Kidder's (1943) subsequent excavations at Pukara in 1939, followed by archaeological survey in 1941, confirmed the essential independence of Pukara, and prompted him to remark (Kidder 1943: 40):

> It may be beating a dead horse, however, to raise the point here, but the demonstrated lack of Tiahuanaco extension in pure form to the northern Collao should lay the ghost of the "megalithic," or "Tiahuanaco" "empire" for good and all.

Farther to the north in the Ayacucho basin, Julio Tello's discovery of the extensive settlement at Wari (first published by Rowe, Collier, and Willey 1950), followed by the recovery in 1942 of elaborately painted ceremonial urns in a clearly Tiwanaku-related style from the Conchopata district of Ayacucho, altered archaeological perception of the source of Kroeber's old "Coast Tiahuanaco" material (Menzel 1968: 6; Wallace n.d.; see also Willey's 1948 article on horizon styles). A new orthodoxy began to emerge that identified Wari, and not Tiwanaku, as the true center of imperialistic expansion and the intellectual parent of the coastal Tiwanaku manifestations.

In this world view, Tiwanaku was no longer perceived as the sole, or, for that matter, even the principal distributive force behind the newly, if somewhat nebulously conceived "international style" now termed Wari-Tiwanaku. Most interpretations of the relationship between these two urban centers and their respective spheres of influence in the south central and southern Andes began to portray Tiwanaku as an essentially passive donor of a developed religious cult focused iconographically on the figure of the so-called Gateway, or "Staff God," together with its attendant symbols (Fig. 6; see Cook 1983 for other designations for this figure). These interpretations envisioned (unspecified) commercial interactions between Wari and Tiwanaku, brokered by merchant-missionaries who were instrumental in introducing the cult to Wari. There the cult of the "Staff God" became the catalyst for the formulation of a consciously fostered imperial ideology that was subsequently imposed by force of arms throughout the central Andes (Menzel 1964, 1968; Lumbreras 1974).

Subsequently, over the past decade, a number of other speculative reconstructions of the relationships, both between Tiwanaku and Wari specifically, and among Tiwanaku, Wari, and Pukara more generally, have been elaborated (Browman 1978, 1980, 1981; Isbell 1983; Cook 1983). Nevertheless, despite a growing data base for each of these three urban settlements (Pukara: Mujica 1978, 1985; Wari: Isbell 1977, 1980, 1986; Anders 1986; Spickard 1983; Brewster-Wray 1983; McEwan 1991; Tiwanaku: Ponce 1976, 1981a, 1981b; Kolata 1983, 1986, 1989), the precise nature of these relationships still remains a central problem in Andean culture history.

It is not my intention to contribute another leaf to the book of speculation concerning this admittedly important, but, to my mind, presently unresolv-

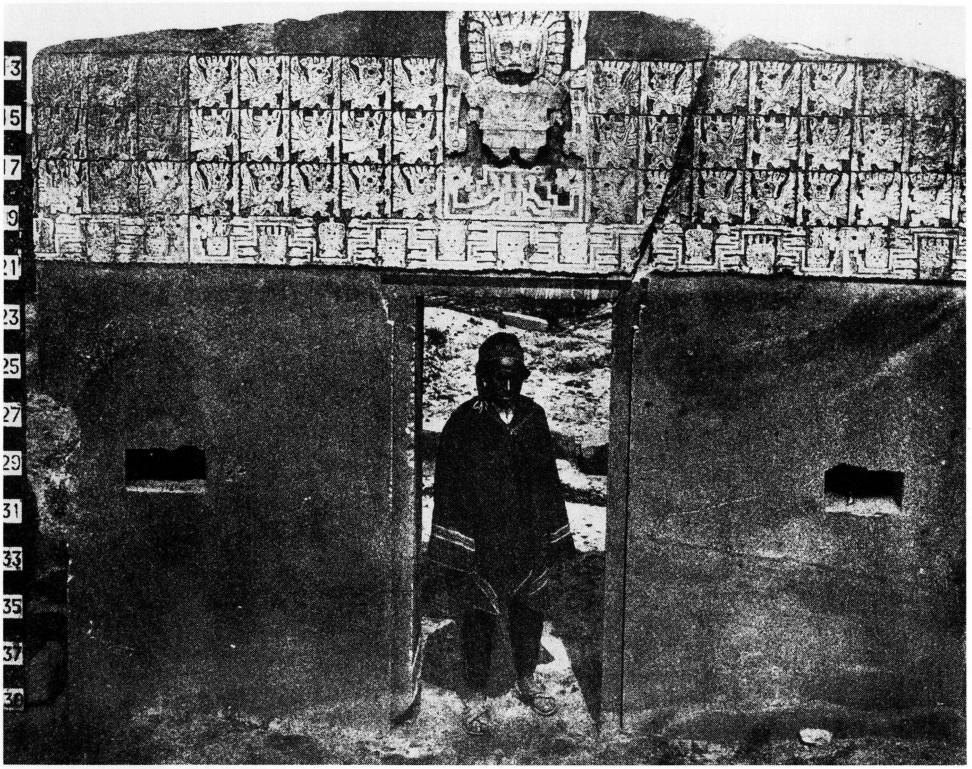

Fig. 6. Photograph (1908) of the "Gateway of the Sun" standing in its current location in the northwest corner of the Kalasasaya Temple (after Posnansky 1945: pl. XLV)

able problem. There remains a long row to hoe, particularly concerning the nature of the Tiwanaku polity, before any truly substantive and testable propositions are generated with respect to this now elusive problem of spatial, temporal, and cultural relationships. Therefore, my strategy here will be to reassess our current understanding of the structure of political economy in the Tiwanaku state. By focusing on the nature of Tiwanaku's endogenous and exogenous patterns of production, we will gain new insight into its perduring cultural influence in the ancient Andean world, and perhaps, a sharper and more complete perspective on the role of Tiwanaku in the evolution of the native Andean state.

As noted below, Tiwanaku cultural, political, and economic presence takes different forms in different geographic settings, both inside and outside of its heartland on the high plateau. In general, we may define three principal contexts for the expression of Tiwanaku cultural influence: (1) the

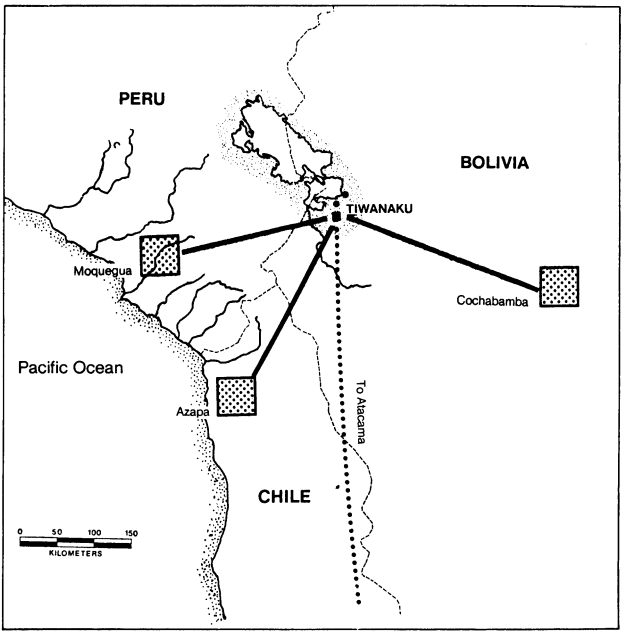

Fig. 7. Map of the Tiwanaku state's political geography. Shaded area in circum-Lake Titicaca basin illustrates distribution of the core, *altiplano* agricultural territory. Boxed areas represent agricultural colonies in lower altitude valleys. Dotted line indicates schematically llama caravan routes to the San Pedro de Atacama oasis discussed in the text

mountain slopes and *altiplano* of the Lake Titicaca basin; (2) the lower, warmer *yungas* zones that lie both to the east and west of the *altiplano* in the mesothermic valleys of Bolivia such as Cochabamba and in the coastal valleys of Peru and Chile such as Moquegua and Azapa; and (3) the vast, high plains to the south of the Titicaca basin in southern Bolivia and along the border of Chile such as in the San Pedro de Atacama region (Fig. 7). In each of these three sharply differentiated environmental zones, Tiwanaku material culture assumes varying forms and intensities of expression.

In the Lake Titicaca basin, we see the full panoply of Tiwanaku state action: an integrated network of densely populated, internally differentiated settlements distributed strategically across the landscape with the capacity of exploiting a variety of production zones. In the lower *yungas* region, Tiwanaku appears in many valleys in the form of large-scale colonizing populations, which, to judge by the scope and long-term persistence of occupation, were clearly established as permanent residences. Finally, in the more distant southerly reaches of the Tiwanaku sphere of influence, such as the high Atacama Oasis of Chile, its physical presence appears most prominently in elite mortuary and domestic contexts, suggesting a more specialized, fluid, and transactional quality to the relationship between the *altiplano* state and its local counterparts.

The fundamental identifying characteristics of Tiwanaku as a horizon style and its apparent spatial and chronological distribution will emerge in greater detail throughout the following discussion. However, those who wish to enhance their understanding of the essential elements of the Tiwanaku style should consult the remarkable two-volume graphic compendium of Tiwanaku material culture published by Arthur Posnansky (1945), along with Dwight Wallace's (n.d.) perceptive and still thought-provoking analysis of the relationship among the "Tiahuanaco horizon styles" (i.e., Tiwanaku, Wari, and Pukara).

POLITICAL ECONOMY AND HORIZON STYLES

Before embarking on my analysis of political economy in the Tiwanaku state, for the sake of clarity, I would like to characterize briefly some of my thoughts concerning the essential social, political, and cultural content of what we have called horizons, or horizon styles. The definition of a cultural horizon that I suggest here is, perhaps, unorthodox, and certainly differs from that employed by most contributors to this volume. If there is a fatal flaw in the concept of a cultural horizon, it resides precisely in a lack of specificity with respect to the kinds of social processes that generate and maintain identities, or at least non-random similarities, in material culture over space and time.

The first order assumption I make is that cultural horizons are intimately related to the political economy of states. From this perspective, a cultural horizon emerges as the direct result of shared participation in a single economic system. This does not imply, in some rigid fashion, a lack of ethnic differentiation or an absence of diversity in basic forms of production and exchange. Rather, the authentic cultural horizon reflects a systematic interaction of producers, consumers, managers, and economic intermediaries distributed over a relatively broad geographic area. The state, as the supraordinate form of political organization, provides the most efficient armature for this complex network of interaction, insuring through well-developed mechanisms of centralized control the survivability and long-term stability of the essential modes of economic and social production and reproduction.

However, within the ambit of the state's economic order, one can envision various degrees of participation. In the context of the preindustrial state, the essential wealth of nations was grounded in intensive agricultural production, most often centered in a core region under direct control of the central government. Frequently, although not invariably, this centralized control was expressed through a nested, hierarchical set of administrative and productive settlements. It is probably reasonably accurate to suggest that this core region of production consisted principally of an ethnically homogeneous base of peasant agriculturalists, who shared a common lan-

guage, and participated in a mutually intelligible folk culture. This peasant base also shared a third characteristic: political and cultural domination by a ruling elite.

Again this is not to imply that core productive regions of preindustrial states entirely lacked ethnic diversity. The non-Aymara speaking, occupationally specialized Uru groups who lived along what Nathan Wachtel (1986) referred to as the "aquatic axis" within the heartland of the post-Tiwanaku Aymara kingdoms of the Lake Titicaca Basin are a trenchant case in point. Nevertheless, the principal productive force of these kingdoms resided in the Aymaraphone agriculturalists and pastoralists of the high *puna*.

The core region of production, then, reflects the most profound degree of participation in the state's economic order. In fact, its productive forces are so tightly bound to the economic order of the state that they may be considered isomorphic, or perhaps even constitutive of it.

At somewhat further remove, most agrarian states attempt to gain control of essential resources concentrated outside their primary core region. This is particularly true in the Andean region where the natural environment is characterized simultaneously by highly variable and remarkably compressed economic landscapes. The exploitation of peripheral zones takes two general forms: (1) direct colonization or expropriation of desired land or other resources, and (2) more indirect means of interregional exchange or trade, generally mediated by a professional class of merchants.

The first method of gaining access to these desired resources, of course, necessarily implies some form of coercive power exerted by the core region or its agents on the peripheries. The implicit threat of coercion may frequently be masked by the consciously fostered perception that the intrusive state and local populations are engaged in a mutually beneficial exchange of services and product or by the inculcation of a shared ideology that entails mass participation in public rituals, thereby embedding a notion of mutual interdependence and solidarity (Godelier 1977, 1978). In either case, or both taken together since in practice they are often conjoined, the end result will be to diffuse the social and economic tensions generated between the alien, intrusive state and the indigenous populations. The status quo of centralized control over labor, land, and production is thus affirmed at relatively low (from the perspective of the state) cost.

The second, more indirect method of gaining access to desired resources, although it may contain implicit elements of coercion, generally results from a relatively free and mutually beneficial exchange of information and goods. Here arrangements of status and power between state agents and authorities of local polities are more nearly equivalent, and the valuation of services and commodities in exchange transactions proceeds in a more flexible environment of negotiation rather than imposition.

THE POLITICAL ECONOMY OF THE TIWANAKU STATE

If we are to understand Tiwanaku, then, particularly from the analytical perspective of a cultural horizon, we must be able to reconstruct the nature and organization of both the endogenous and exogenous elements of that state's political economy. I begin my analysis of the political economy of the Tiwanaku state with the perhaps controversial proposition that Tiwanaku, like some of its contemporaneous counterparts in Peru, was a dynamic, expansive state, based squarely on an effective, surplus-producing system of intensive agriculture. This interpretation of Tiwanaku's political and economic system contradicts the perspective of Tiwanaku that, in the past two decades, has become a kind of orthodoxy in the archaeological literature in the United States and Peru. Here the settlement system of the Tiwanaku polity has been portrayed as a series of loosely linked ceremonial centers that lacked resident populations but that served as the focus of periodic pilgrimages from throughout the southern and central Andes (Lumbreras 1974).

From this perspective, Tiwanaku is distilled into a simple religious and artistic tradition that gradually diffused throughout the Andes through the activities of merchant-missionaries. Serious consideration that Tiwanaku might have played a forceful, independent, political role in the Andes during the Early Intermediate Period and the Middle Horizon was subsumed under the burden of the theory that the city of Wari was the only true political capital of empire in the Andes at this time (Menzel 1964, 1968). As Thomas Lynch (1983: 1) remarked, "the portrayal of Tiwanaku looks a bit like Central Andean chauvinism."

Even the most sophisticated reconstructions of Tiwanaku's political and economic impact on Andean culture history stress the primacy of long-distance exchange (of commodities and of ideologies) in integrating the Tiwanaku polity (Núñez and Dillehay 1979; Browman 1978, 1981). Because the appropriate data are only now beginning to emerge, none of these interpretations address the remarkable scale and complexity of Tiwanaku's indigenous agrarian system or the intensity of concern for massive agricultural reclamation evinced by the rulers of the Tiwanaku state in the Lake Titicaca basin and adjacent lands at lower elevations. How, then, can we reconcile the contradictions inherent in these apparently different models of Tiwanaku's political economy: one that emphasizes intensive agricultural production as a fundamental endogenous source of wealth for the nation, and the others that stress essentially exogenous sources of wealth such as long-distance exchange and religious pilgrimage?

By redefining our notion of the geopolitical boundaries of the old Tiwanaku state and by somewhat altering our perception of the nature of Tiwanaku exchange networks, the superficial tension between these different interpretations dissolves, and they may be seen to be essentially comple-

mentary. To this end, I believe that we can best conceptualize the essential contours of Tiwanaku political economy in terms of the long-term interaction among distinct production zones in core and periphery regions. First, I would argue that the essential geopolitical core of the Tiwanaku state consisted of a politically and economically integrated agricultural heartland reclaimed from the flat, marshy lands that ring Lake Titicaca. The fields in this core area provided the bulk of the state's considerable subsistence needs and accommodated the natural expansion of its demographic base (Kolata 1986, 1987, 1989). Large-scale herding of camelids in the adjacent high reaches of the *puna* complemented intensive tuber and grain agriculture in the lacustrine flatlands, creating a powerful core productive system capable of sustained yields (Yamamoto 1985; Tomoeda 1985). Although difficult to quantify precisely given the present lack of systematic research, it is evident from Tiwanaku middens tested to date that intensive exploitation of the lacustrine environment was a substantial, self-sustaining element of this pivotal productive system (Kolata 1986, 1989; Browman 1981). Lake Titicaca itself, and its smaller counterparts, provided fish, water fowl, edible aquatic plants, and abundant algae, which was used as a form of green manure to fertilize adjacent fields and, potentially, as fodder for camelids, as it is used today for cattle.

Secondly, the Tiwanaku state subsistence economy, although grounded in intensive *altiplano* agropastoralism, was not restricted to the food crops and camelid herds that can be produced and managed at high altitude. A key element of Tiwanaku state economic policy was colonization and subsequent control over regions ecologically distinct from that of the *altiplano*. The direct effect of this policy was the establishment of agricultural provinces in *yungas* zones through which the residents of Tiwanaku settlements on the high plateau enjoyed unmediated access to large quantities of important warm-land crops, such as maize and coca.

Finally, a third element played a critical role in the economic success and integration of the Tiwanaku polity: long-distance exchange through the medium of organized llama caravans. The most recent advances in the archaeology of Tiwanaku settlement and economy, however, have not concerned that state's presumptive long-distance exchange networks organized around caravan trade. Large-scale projects initiated within the past two years have begun to generate new, primary field data regarding the organization of agricultural production within the core of the Tiwanaku state in the high plateau of Bolivia, and in that state's agricultural provinces on the western slopes of the Andes in Peru and Chile. In short, the focus of current research has shifted from the exogenous to the endogenous elements of Tiwanaku political economy.

AGRICULTURAL PRODUCTION IN THE TIWANAKU STATE

For the past six years, my colleagues and I have been exploring the social and environmental dimensions of large-scale agricultural production in the sustaining hinterland of the city of Tiwanaku (Kolata 1989; Kolata and Ortloff 1989; Ortloff and Kolata 1989; Kolata 1991). In addition to fossil field systems and their associated features, we are currently excavating large areas of elite and commoner domestic residences at Tiwanaku and the poorly understood ritual and administrative centers of Lukurmata, Pajchiri, and Khonko Wankane. I believe that, even at this early juncture in the research, the results generated to date will require us to reassess the nature, structure, and organization of Tiwanaku, and its secondary centers in the *altiplano,* and thereby the impact of Tiwanaku in the geopolitical landscape of the Andean Middle Horizon.

For instance, we have demonstrated, through a systematic program of topographic mapping, intensive surface collection, and excavation that the site of Lukurmata was of a scale substantially larger than Wendell Bennett's sketch map from the 1930s would lead one to believe (Stanish 1989). The settlement extends far beyond the central acropolis of public architecture explored by Bennett to include extensive zones of domestic architecture, middens, agricultural fields, and storage structures (Fig. 8). We now estimate that the core settlement incorporates a minimum area of 2 km^2. Outlying habitation reflected in surface distributions of artifactual material extends to the east and west of the settlement.

The site itself is not an isolated temple complex, or a simple "vacant" ceremonial center. On the contrary, we may now state with confidence that this Tiwanaku regional secondary center was characterized by a dense population living in a variety of domestic settings distinguished by differences in status and occupation (Bermann 1989; Fig. 8 summarizes my current interpretation of internal community organization at Lukurmata). The presence of storage facilities within residences and the proximity of the massive raised field complexes of the adjacent Pampa Koani that I have previously associated with a Tiwanaku IV–V occupation (Kolata 1985, 1986, 1987, 1991) suggests an important administrative function for Lukurmata. The fact that Lukurmata is linked directly to the raised field complexes of the Pampa Koani by elevated roadbeds, or causeways, as well as to its companion secondary center of Pajchiri, and to Tiwanaku itself, enhances the viability of a reconstructed regional settlement system that emphasizes a structure characterized by hierarchy and centralized control (Fig. 9).

Even though our work at Pajchiri is still in its preliminary phases, survey operations have revealed that this settlement rivaled Lukurmata in size and complexity of architectural development, in both its public and domestic components. Our current estimate of maximum settlement size approaches 3.5 km^2 of public architecture, residences, and domestic terraces analogous

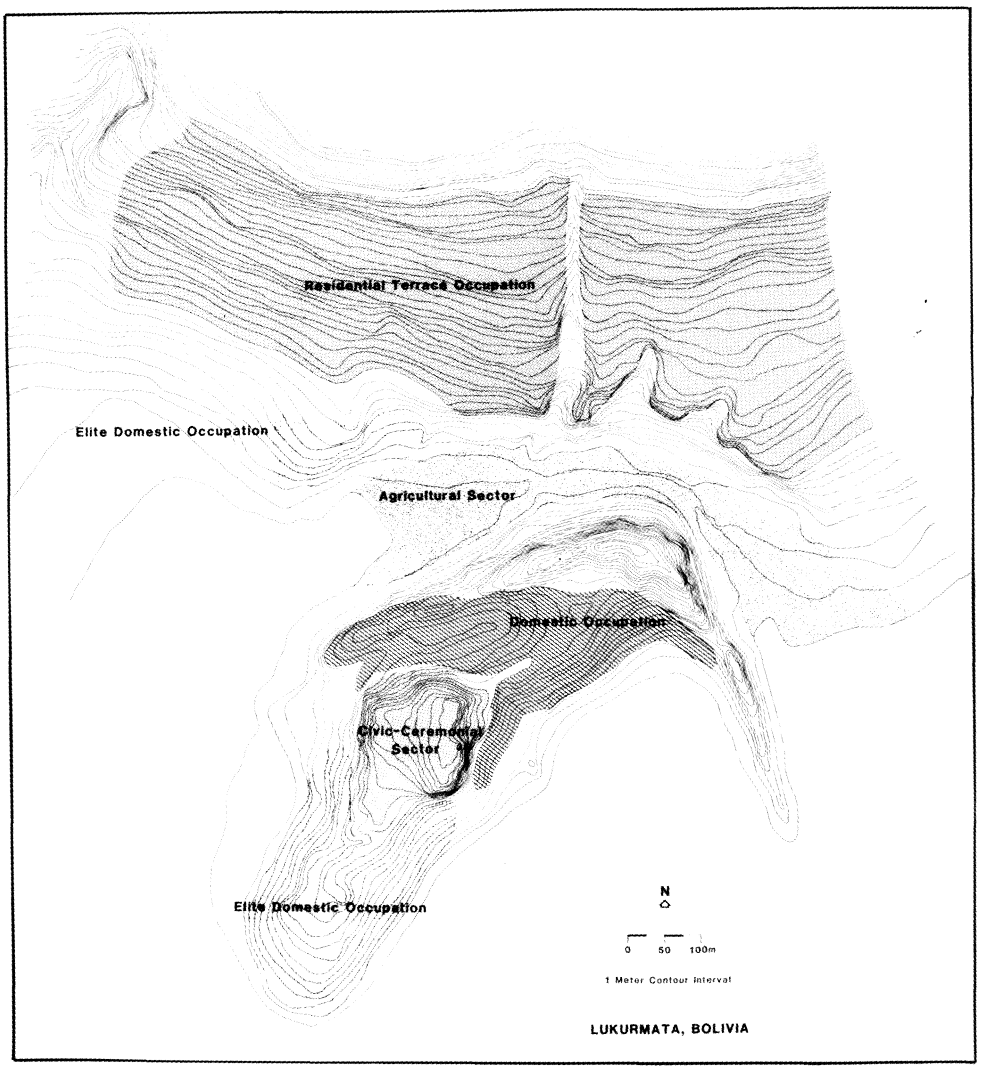

Fig. 8. Map of the Tiwanaku secondary urban center of Lukurmata (cf. Fig. 2). The map illustrates the distribution of general functional areas within the site. (See Kolata 1989, for a more detailed discussion of recent archaeological investigations at Lukurmata)

to those at Lukurmata. Moreover, Pajchiri, like Lukurmata, was supported by an elaborate, on-site sector of agricultural constructions (Ortloff and Kolata 1989). In the case of Pajchiri, these constructions are even more complex than those at Lukurmata, consisting of an interlinked set of aque-

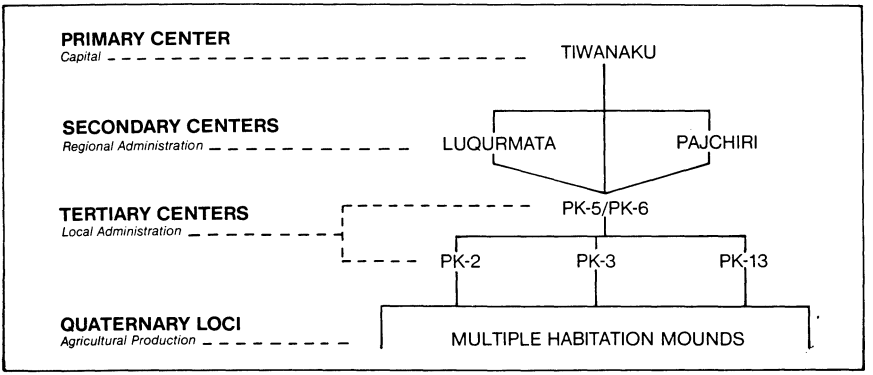

Fig. 9. Schematic representation of Tiwanaku's hierarchical settlement network (after Kolata 1986: fig. 8)

ducts, raised fields set on artificial, stepped terreplains, and a large, freshwater reservoir connected to the aqueduct uptakes by a canal (Ortloff and Kolata 1989). The entire system may have functioned to mitigate the problem of hypersalinization in lake-edge fields, and thereby maintain optimal production for the support of this pivotal administrative center, by permitting periodic fresh water flushing of the terreplains from small diversion structures set along stone-lined canals running on top of the aqueduct. We anticipate encountering sequential vertical construction of raised fields at Pajchiri similar to the three sets of superimposed, buried agricultural fields discovered in extensive excavations in the agricultural sector of Lukurmata (Kolata and Ortloff 1989).

In short, it is now very likely that Pajchiri, like Lukurmata, will be recharacterized as a densely populated, variegated settlement that performed important bureaucratic and administrative functions for the state, acting, in essence, as a local surrogate for the capital city of Tiwanaku. The principal political role of these secondary centers, located on either side of the Pampa Koani, was to manage the construction and maintenance of the impressive agricultural landscape that constituted the core productive zone for the capital.

I suspect that forthcoming excavations at the analogous regional Tiwanaku center of Khonko Wankane will reveal a similar demographic and functional profile as that of Lukurmata and Pajchiri. Given the size and functional complexity of these centers, I think it would not be inappropriate to speak of the Tiwanaku IV–V settlement pattern in the southern Titicaca basin as one articulated by a closely interacting network of cities centered in optimal lacustrine agricultural zones dominated by the apical center of Tiwanaku itself.

Yet Tiwanaku's interest in reclaiming agricultural land was not restricted to the immediate sustaining hinterland of the capital. A pattern of strategi-

cally located, state-built administrative centers near zones of potentially arable land, similar to that which has been documented for the Pampa Koani, may be perceived in the entire circum-Titicaca region during Tiwanaku phases III–V. Most of the known Tiwanaku satellite settlements of this type, such as Mocachi, Puente Yayes, Khonko Wankane, and the like, are situated along the southern and eastern rim of the lake. But there is clear evidence for intrusive Tiwanaku sites in the northern Titicaca basin as well, near Puno and on the island of Estevez (Núñez and Paredes 1978). In addition, Tiwanaku ceramics dating to phases III–V are documented for a wide area of Puno, which, certainly not coincidentally, encompasses a broad zone of fossil raised fields (Lennon n.d.; Erikson 1984, 1985; Charles Stanish, personal communication). This distinctive settlement pattern, when assessed against our new knowledge of the Pampa Koani rural zone, strongly implies that the state of Tiwanaku imposed a regional political unification of the Titicaca basin with an eye toward expanding its agricultural production, and thereby its fundamental sources of wealth, economic vitality, and political power.

Tiwanaku state expansion, intimately associated with the reclamation of agricultural land, proceeded well beyond the confines of the heartland in the high plateaus of the Titicaca basin. There is substantial and growing evidence that Tiwanaku directly colonized and subsequently controlled key economic resources of certain regions, such as the Cochabamba Valley of Bolivia, and the Azapa Valley of northern Chile, among others, which were ecologically distinct from the *altiplano*. One important region that we may identify as just such an economic province of the Tiwanaku state during its Tiwanaku IV–V florescence was the Moquegua Valley of southern Peru.

THE MOQUEGUA VALLEY: A TIWANAKU ECONOMIC PROVINCE

Recent research in the Moquegua Valley under the auspices of the *Programa Contisuyu* has begun to clarify the nature and extent of Tiwanaku state expansion from the *altiplano* to the western Andean slopes and coastal zones of southernmost Peru (Rice et al. 1989). Aridity and broken, difficult terrain severely constrain agriculture in the 140-km long drainage area of the Moquegua Valley. Although this drainage system rises above 5000 m, less than 20% of the catchment area lies within the zone of seasonal rainfall. Consequently, cultivation requires artificial, canal-based irrigation. Not surprisingly, the utilization of the scarce runoff is itself subject to topographic constraints that divide Moquegua agriculture into four ascending zones (Fig. 10). The second zone, which lies at the heart of the mid-valley, contains the largest expanse of arable land, composed of fertile flatlands formed around the confluence of the three major valley tributaries. This zone was the focus of heavy and long-term Tiwanaku occupation.

The Tiwanaku occupation of the Moquegua Valley was the subject of preliminary work in the 1960s (Disselhoff 1968; Ravines 1965). Current

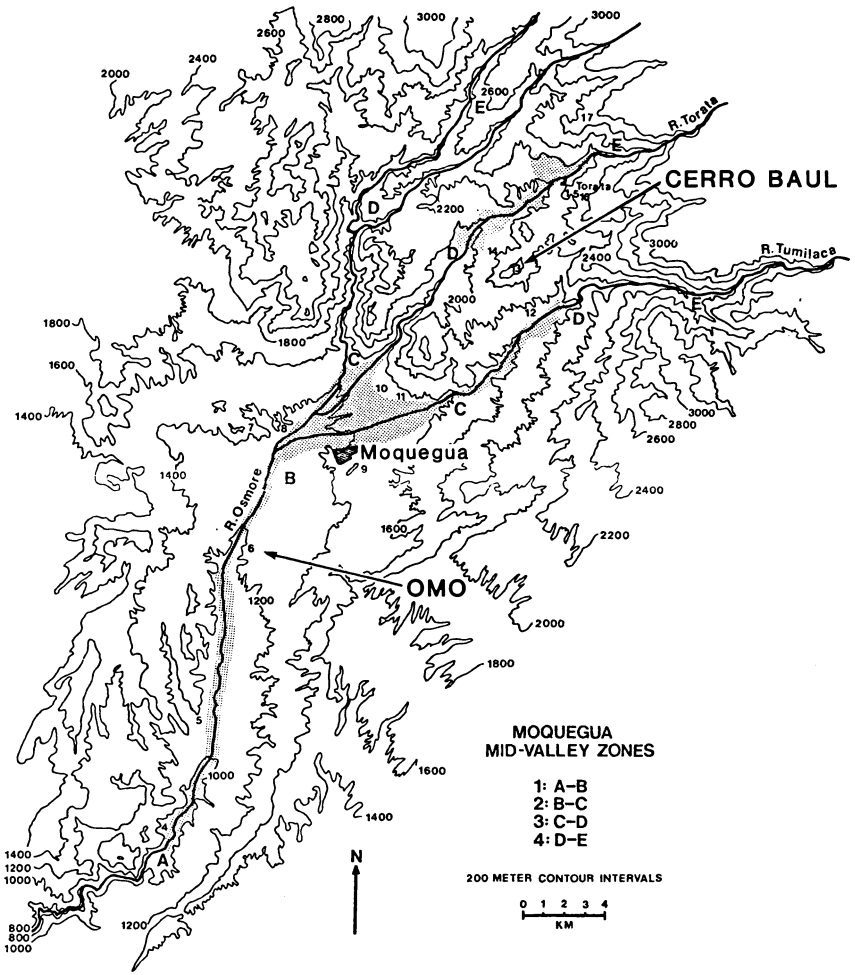

Fig. 10. Map of the middle Moquegua Valley, southern Peru, illustrating the distribution of arable land along the floodplains of the Osmore, Torata, and Tumilaca rivers and the location of Tiwanaku sites at Omo and at the base of Cerro Baul (redrawn from Moseley, Feldman, Goldstein, and Watanabe 1991: fig. 3; original base map courtesy of Robert A. Feldman)

studies by Michael Moseley, Robert Feldman, Paul Goldstein, Garth Bawden, and others have identified more than a dozen sites (Rice et al. 1989; Moseley et al. 1991). Tiwanaku sites are concentrated in the lower agricultural zones where farming was supported by canal systems that reclaimed relatively flat land (see Fig. 10). Associated settlements range from multiroom farmsteads or hamlets to nucleated communities of several hundred

structures grouped around plazas. There are special-purpose sites such as the extensive settlement of Omo, where massive adobe architecture and formal, stepped terrace layout imply an administrative function (Goldstein n.d.). Other specialized sites include two mid-valley hills with large adjoining settlements that were heavily fortified with formidable masonry perimeter walls, and an exceptionally large cemetery that apparently served as the central burial ground for the mid-valley population (Chen Chen).

Three 50–150-room Tiwanaku settlements are situated at the base of Cerro Baul immediately adjacent to irrigated bottom lands of the Torata and Tumilaca rivers. However, there appears to be little or no Tiwanaku association with agricultural terraces at higher elevations. Additional Tiwanaku settlements and cemeteries cluster along the coast and in the lower reaches of the Rio Osmore, where Loreto Viejo has served as the type site defining the late Tiwanaku ceramic style of far southern Peru and northern Chile. Loreto Viejo, Chen Chen, and the other mid-valley sites have abundant decorated ceramics stylistically associated with Phase V of the Tiwanaku sequence. Local radiocarbon dates on this material range between ca. A.D. 900 and 1200. Tiwanaku IV material occurs less commonly than that of the later phase but is present in quantity at the large, but poorly understood site of Omo (Goldstein n.d.; Mosley et al. 1991). Unfortunately, at present, we have no local radiocarbon dates for the presumptive Tiwanaku IV material, but elsewhere this phase has been estimated to have begun after A.D. 400. (Ponce 1972; Kolata 1983, 1989).

In recent years, both ethnographic and archaeological research has demonstrated that ethnic groups of *altiplano* affiliation have periodically colonized or otherwise occupied key resource-bearing lands in the Osmore and other drainages to the south (Mujica 1985; Julien 1985). Preliminary evidence from work completed over the past two years strongly supports the interpretation that ethnic *altiplano* occupation in the Moquegua region was an ancient and profoundly influential geopolitical pattern (Mujica 1978). Both survey and tomb excavations have revealed substantial quantities of early *altiplano* ceramic materials including classic Pukara pottery from the northern Titicaca basin, and the fiber tempered wares characteristic of the Chiripa sites of the southern Titicaca basin.

If we combine this evidence with the history of Tiwanaku occupation outlined above, it is very difficult to escape the conclusion that, at various times, the Moquegua Valley was the object of resource-hungry *altiplano* ethnic groups wishing to expand their economic base. During the Tiwanaku regime, if not earlier, we can surely speak of Moquegua as an integrated economic province of an *altiplano* state.

I would not necessarily suggest, however, that the agriculturally oriented mid-valley region of the Osmore drainage was organized by the state administration of Tiwanaku in the same hierarchical fashion as in the Pampa Koani

sustaining zone. Rather I would envision a more symbiotic relationship between state and provincial governments that encouraged a stronger measure of local autonomy in the organization of production. In contrast to the situation on the Pampa Koani where labor for reclaiming and maintaining productive agricultural lands was non-local (i.e., explicitly brought in by state government for that purpose) all evidence indicates that in the Moquegua Valley the land was worked by the local resident populations in part for their own benefit and secondarily for the benefit of the reigning political power from the *altiplano*. In return for a portion of the labor and product of the local Moquegua populations, the Tiwanaku state would have provided both a measure of political security and perhaps the technological and administrative expertise in developing massive reclamation projects that had been gained through centuries of creating analogous hydraulic works around the edges of the Lake Titicaca homeland.

In my historical reconstruction, then, the strategy of Tiwanaku state economic expansion entailed first developing a solid core of tightly controlled agricultural zones of which the Pampa Koani, as the immediate sustaining area of the capital city itself, was one of the most important. This agrarian core was engaged in the production of staple *altiplano* crops such as potato, oca, quinoa, and the like, and, in time, came to encompass the entire circum-Lake Titicaca region. This core of reclaimed land was the direct result of and dependent upon the actions of the Tiwanaku state government, or, more precisely, upon the actions of the elite classes that constituted supra-community government in the Tiwanaku polity.

The second critical element of Tiwanaku economic expansion entailed the movement into *yungas* regions of lower altitude, such as the Moquegua, Azapa, and Cochabamba Valleys, where important warm land crops such as maize, coca, and aji could be grown. Here state intervention was more indirect and local autonomy may not have been completely abrogated as in the case of the Pampa Koani. Nevertheless, despite its significant organizational differences from the core agricultural zones such as the Pampa Koani, the Moquegua region and its counterparts were in a real sense politically, economically, and to some degree, culturally embedded in an influential social matrix of *altiplano,* particularly Tiwanaku, origin. If he had been on the scene, Niccolo Machiavelli, author of the great Renaissance manual of statecraft, *The Prince,* would have admired the machinations of the state of Tiwanaku, for he has this to say about the most effective strategies of state expansion:

> plant colonies in one or two of those places which form as it were the keys of the land, for it is necessary either to do this or to maintain a large force of armed men. . . . but by maintaining a garrison instead of colonists, one will spend much more, and consume all of the revenues of the state in guarding it, so the acquisi-

> tion will result in a loss. . . . In every way, therefore, a garrison is as useless as colonies are useful. (Machiavelli [1532], 1952: 37–38).

In this regard, the lords of Tiwanaku might have been the New World archetype for Machiavelli's prince. They were sensitive to the need to establish alliances with the local populations, perhaps even to inculcate a sense of loyalty and identification with the prestige and power of the state. Accordingly, they founded substantial colonies in the Moquegua region and elsewhere, creating in the process a pluralistic, multi-ethnic state.

CARAVANS AND CLIENTS: TIWANAKU EXCHANGE SYSTEMS

To complete this analysis of Tiwanaku state political economy, reference must be made to the third element of the economic system shaped by this *altiplano* polity: long distance exchange through the medium of organized llama caravans. This is the element of economic activity stressed so forcefully by David Browman (1978,.1981), who envisions Tiwanaku as a pilgrimage center of great ritual prestige that became the nexus of multiple, far-flung caravan routes operated by loosely confederated ethnic groups. Although I cannot agree with Browman's characterization of Tiwanaku as a weak confederation of ethnic groups bound solely by economic mutualism rather than by political imperative, I would agree that in the far reaches of Tiwanaku influence, in the area of San Pedro de Atacama, the central Chilean valleys, the Quebrada de Humahuaca in northwestern Argentina, the nature of the interaction between the *altiplano* polity and local populations was more attenuated than in the core regions of the Lake Titicaca basin and adjacent lands. This attenuation of direct state action, of course, is reflected in material culture: here Tiwanaku-related artifacts are concentrated disproportionately in elite domestic and mortuary contexts and consist principally of portable art associated with Tiwanaku state cult and belief systems.

I hypothesize that this long distance exchange was organized along the lines of a clientage relationship, in which the local elites of these distant lands maintained personal relationships with the lords of Tiwanaku, managing the production and exchange of desired commodities, and, simultaneously, appropriating emblems of status and authority from their *altiplano* patrons. Such a clientage relationship would account for the selective distribution of elite Tiwanaku material culture from tombs in these regions distant from the Tiwanaku homeland, particularly the heavy occurrences of textiles, elements of costume, and paraphernalia associated with the consumption of hallucinogenic drugs. More basic cultural patterns of settlement and local subsistence do not seem to have been altered directly by the interaction with the *altiplano* state.

I suspect that at least some of the far-ranging pack trains of llamas that articulated this mercantile element of Tiwanaku political economy were more highly organized and centrally administered than either Browman

(1980) or Núñez and Dillehay (1979) currently believe. Specifically, the main trunk route to the San Pedro de Atacama oasis may have been monopolized and forcefully administered by the state of Tiwanaku (see Fig. 7). The Atacama oasis probably served as an entrepôt, or transshipment point for other independent caravan traders who brought goods for exchange and distribution with established trading partners. Recent analyses of mortuary textiles in the San Pedro de Atacama oasis indicate the presence of substantial colonies of *altiplano* populations, most likely from the Tiwanaku core region around Lake Titicaca (A. Oakland-Rodman, personal communication). Such colonization, or enclaving of populations, emphasizes the geopolitical importance of the Atacama oasis to the lords of Tiwanaku.

From my perspective, the Tiwanaku state formalized key routes in the network of interregional communication maintained through llama caravans. In regions relatively close to the Titicaca basin (southern Peru, Cochabamba, northern Chile, Atacama), Tiwanaku founded substantial economic colonies that were linked directly to the capital and its satellite cities by state-managed caravans. In regions at further remove (Valliserrana, Quebrada de Humahuaca, western Puna of Argentina), the state operated more indirectly, through a clientage relationship, in which politically independent, and perhaps ethnically diverse caravan traders were funneled into the Atacama entrepôt.

ZONAL COMPLEMENTARITY AND POLITICAL ECONOMY IN THE TIWANAKU STATE

To what extent is the foregoing reconstruction of Tiwanaku political economy consonant with or reflective of the general model of "verticality," or, more broadly, economic complementarity in the Andes first explicitly formulated by John Murra (1964, 1968, 1972, 1985a, 1985b)? The model itself argues that highland Andean ethnic groups and polities persistently attempted to exert control over a maximum number of distinct, altitudinally stratified ecological zones in order to enhance and diversify agricultural production and to insure direct, unmediated access to other strategic resources (minerals [Shimada 1985], guano [Julien 1985], *cochayuyo* [Masuda 1985], etc.). Functionally equivalent analyses of "vertical control" have been applied to Andean societies across the continuum of sociopolitical complexity, from single villages in which reciprocal obligations among consanguinal and affinal kinsmen and their allies structured relations of production of relatively low energetic value, to large-scale colonizing states engaged in patterns of intensive production, labor allocation, and redistribution of surplus.

Over the past decade, driven by the stimulus of Murra's contribution, concepts of multi-ethnic exploitation of economic islands arrayed in "vertical archipelagos," large-scale colonization by highland societies of multiple, low-lying ecological "floors" or niches (Murra 1972), "compressed," "extended," (Brush 1976), and "micro" verticality (Salomon 1980), direct and

indirect economic complementarity (Mujica 1978, 1985), "discontinuous territoriality" (Cock 1976) and even "horizontal archipelagos" (Shimada 1985) have all gained currency in the general explanatory frameworks that seek to link economy and polity in the Andes. It would not be an exaggeration to suggest, in fact, that models of verticality and zonal economic complementarity have become pervasive, influential, and, in the case of the south central Andes at least, dominant features of the intellectual landscape of Andean studies (see, for instance, the symposium papers compiled in Flores Ochoa 1978 and Masuda, Shimada, and Morris 1985).

However, even as the analytical perspective engendered by general models of zonal complementarity received increasingly broad, more inclusive, and perhaps at times, uncritical application, Murra (1985a) was cautioning that the notion of the "vertical archipelago" required careful, context-specific verification and that Andean scholars should not simply accept the verticality model as axiomatic. Murra (1985a) himself described some demographic and political conditions under which "vertical archipelagos" were not likely to emerge, or under which specific structural transformations of a given society's political economy would be anticipated (Murra 1985a: 18):

> [U]pon the expansion of the population which it controlled, the growth of the power of the authorities, the increasing difficulty of exercising effective control over rights maintained at the center by inhabitants settled in the "islands," the archipelago changes structurally. Contradictions appear between the interest of the lords and the *mitmaqkuna;* the relations of reciprocity and redistribution are weakened.

In situations of sustained demographic growth and increasing concentration of political power in the hands of elite interest groups such as hypothesized by Murra, we might anticipate that the previously symmetrical relationships between highland lords and outlying colonists through which the property and jural rights of the latter in their homeland were acknowledged and maintained would begin to change. I would suggest that the inevitable direction of this change could be toward increasing peripheralization of colonial enclaves. By this I do not mean that the political and economic relations between principal lords and their colonial subjects weakened. Quite the contrary: these social linkages, in fact, would have been strengthened. However, the intensification of these relations would not follow traditional lineaments characterized by reasonably balanced reciprocal rights and obligations between lord and subject. Rather, the essential character of these linkages, formerly embedded in the metaphor of kinship, would be "depersonalized," and reconstructed as asymmetrical relations of extraction in which the colonial enclaves and their inhabitants become little more than sources of surplus raw materials and labor for the state.

The transformation of discontinuously distributed, formerly kin-bonded colonial enclaves into true economic provinces of a centralized state characterizes the emergence of the Tiwanaku macro-polity between ca. A.D. 400 and 1000. If, after evaluating the data from regions such as the Moquegua, Azapa, and Cochabamba Valleys, we accept that this transformation occurred in the south central Andes during this time, it is clear that the vertical archipelago model developed by Murra (1968, 1972) in describing the Lupaqa polity's apparently non-coercive mechanisms of interzonal economic exchange is inappropriate when applied to the mature Tiwanaku state.

Rather I think we can more effectively frame the question of the nature of Tiwanaku's political economy in terms of interlocking sets of core-periphery relationships structured around multiple forms of complementary interactions: direct and indirect, centralized and decentralized, administered and autonomous (see Salomon 1985: 520, for a comprehensive diagram of institutions of Andean economic complementarity). The Tiwanaku state manipulated various institutional forms of both coercive and consensual economic complementarity (large-scale regional colonization, selective enclaving of populations, administered trade, clientage, barter) to intensify production, as well as to enhance its own political integration, following a principle of context-specific structuring of the relationships between the state and local populations.

Such a perspective on the nature of Tiwanaku political economy, as contrasted with a mechanical application of the vertical archipelago concept modeled along the lines of the Lupaqa colonizing state, affords a more convincing explanation of the high regional variability in Tiwanaku settlement patterns and material culture. Such a perspective also acknowledges that as states expand they incorporate a multiplicity of local populations possessing divergent demographic, political, and economic potentials. For instance, it is likely that some of the regions in the Lake Titicaca basin into which the Tiwanaku state expanded, such as the heartland of the old Pukara polity, contained nucleated settlements with high population density, large investment in labor-intensive systems of production, class stratification, and well-developed mechanisms for allocating and redistributing economic surplus. Other areas, however, such as the high *puna* of the Atacama, were characterized by relatively small-scale, widely distributed, kin-based communities that emphasized local community autonomy, with more inclusive economic relationships restricted to exchange based on principles of reciprocity. It is evident that an expansive state confronted with such social, economic, and behavioral heterogeneity would need to generate multiple, context-sensitive strategies to adjust the relationship between centrally imposed tributary modes of production and locally self-sustaining communal modes of production. In short, Tiwanaku as a state formation may be

conceptualized as a dynamic, heterogeneous mosaic of populations linked (perhaps at times imperfectly) by a mosaic of policies focused on the economy of extraction which were devised by elite interest groups in the core polity of the Lake Titicaca basin.

TIWANAKU AS A CULTURAL HORIZON

Given the foregoing reflections on Tiwanaku political economy, what conclusions may we draw with respect to Tiwanaku as a cultural horizon, and more generally, to the utility of the horizon concept as an explanation of the archaeological distribution of Tiwanaku material culture? The answers to these questions essentially depend upon which spatial and temporal frames of reference one chooses to approach the problem.

That is, if we consider Tiwanaku from the frame of reference of its core region in the Lake Titicaca basin during the first millennium, there is little question that it constituted an authentic cultural horizon as an integrated, politically centralized state. If we analyze Tiwanaku from the frame of reference of its colonized agricultural provinces such as Moquegua, Cochabamba, and Azapa, we should consider it as a cultural horizon, but most likely only during the Tiwanaku IV and V phases and not earlier. Furthermore, as I have indicated, the essential content of this cultural horizon, even though in a contemporaneous context, may be very different in geographically separate regions: for instance, the precise forms of the sociology and organization of agricultural production in core and colonial regions was probably quite distinct.

Finally, if we consider Tiwanaku from the frame of reference of the distant regions of central Chile, and northwestern Argentina, we can legitimately use the horizon concept only in its incarnation as a strict chronological marker, methodologically binding style, time, and place. In these regions, the interaction with Tiwanaku cannot be conceptualized as pervasive, or something that dramatically alerted local patterns of subsistence and social organization. In short, a clientage relationship will not constitute a cultural horizon as I have defined it. Used in this flexible, context-specific manner, the concept of horizon retains vitality and describes, in essence, the political and economic actions of expansive state formations.

BIBLIOGRAPHY

ANDERS, MARTHA

1986 Wari Experiments in Statecraft: A View from Azangaro. In *Andean Archaeology: Papers in Memory of Clifford Evans* (Ramiro Matos M., Solveig A. Turpin, and Herbert Eling, Jr., eds.): 201–224. Monograph 27, Institute of Archaeology. University of California, Los Angeles.

BERMANN, MARC

1989 Una visión de las casas del período Tiwanaku en Lukurmata. In *Arqueología de Lukurmata,* 2 (Alan L. Kolata, ed.): 113–152. Instituto Nacional de Arqueología y Ediciones Puma Punku, La Paz, Bolivia.

BREWSTER-WRAY, CHRISTINE

1983 Spatial Patterning and the Function of a Huari Architectural Compound. In *Investigations of the Andean Past: Papers of the First Annual Northeast Conference on Andean Archaeology and Ethnology* (Daniel Sandweiss, ed.): 122–135. Latin American Studies Program. Cornell University, Ithaca, New York.

BROWMAN, DAVID

1978 Toward the Development of the Tiahuanaco (Tiwanaku) State. In *Advances in Andean Archaeology* (David Browman, ed.): 327–349. Mouton, The Hague, The Netherlands.

1980 Tiwanaku Expansion and Altiplano Economic Patterns. *Estudios Arqueológicos* 5: 107–120. Universidad de Chile, Antofagasta.

1981 New Light on Andean Tiwanaku. *American Scientist* 69 (4): 408–419.

BRUSH, STEPHEN

1976 *Mountain, Field and Family: The Economic and Human Ecology of an Andean Valley.* University of Pennsylvania Press, Philadelphia.

COCK, GUILLERMO

1976 La visita de los Conchucos por Cristobal Ponce de Leon, 1543. *Historia y Cultura* 10: 23–45.

COOK, ANITA

1983 Aspects of State Ideology in Huari and Tiwanaku Iconography: The Central Deity and Sacrificer. In *Investigations of the Andean Past: Papers of the First Annual Northeast Conference on Andean Archaeology and Ethnology* (Daniel Sandweiss, ed.): 161–185. Latin American Studies Program. Cornell University, Ithaca, New York.

DISSELHOFF, H.D.

1968 *Oasenstadte und Zaubersteine im Land der Inka.* Safari-Verlag, Berlin.

ERICKSON, CLARK

1984 Waru-waru: una tecnología agrícola del altiplano prehispánico. *Boletín del Instituto de estudios Aymaras,* ser. 2, 18: 4–37.

1985 Applications of Prehistoric Andean Technology: Experiments in Raised Field Agriculture, Huatta, Lake Titicaca 1981–1982. In *Prehistoric Inten-*

sive Agriculture in the Tropics (Ian Farrington, ed.): 209–232. BAR International Series, 232(i). Oxford.

FLORES OCHOA, JORGE (ED.)

1978 Organización social y complementariedad económica el los Andes Centrales. *Actes du 42e Congrès International des Américanistes* 4: 7–156. Paris.

GODELIER, MAURICE

1977 *Perspectives in Marxist Anthropology*. Cambridge University Press, Cambridge.

1978 Infrastructures, Societies and History. *Current Anthropology* 19: 763–771.

GOLDSTEIN, PAUL

n.d. *Omo, A Tiwanaku Provincial Center in Moquegua, Peru*. Ph.D. dissertation, University of Chicago, Chicago, Illinois, 1989.

ISBELL, WILLIAM

1977 *The Rural Foundation for Urbanism*. University of Illinois Press, Urbana.

1980 La evolución del urbanismo y del estado en el Peru Tiwanakoide. *Estudíos Arqueológicos* 5: 121–132. Universidad de Chile, Antofagasta.

1983 Shared Ideology and Parallel Political Development: Huari and Tiwanaku. In *Investigations of the Andean Past: Papers of the First Annual Northeast Conference on Andean Archaeology and Ethnology* (Daniel Sandweiss, ed.): 186–208. Latin American Studies Program. Cornell University, Ithaca, New York.

1986 Emergence of City and State at Wari, Ayacucho, Peru during the Middle Horizon. In *Andean Archaeology: Papers in Memory of Clifford Evans*. (Ramiro Matos M., Solveig A. Turpin, and Herbert Eling, Jr., eds.): 189–200. Monograph 27, Institute of Archaeology, University of California, Los Angeles.

JULIEN, CATHERINE

1985 Guano and Resource Control in Sixteenth-Century Arequipa. In *Andean Ecology and Civilization* (Shozo Masuda, Izumi Shimada, and Craig Morris, eds.): 185–231. University of Tokyo Press, Tokyo.

KIDDER II, ALFRED

1943 *Some Early Sites in the Northern Titicaca Basin*. Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University 27 (1). Cambridge, Mass.

KOLATA, ALAN L.

1983 The South Andes. In *Ancient South Americans* (Jesse Jennings, ed.): 241–284. W. H. Freeman & Co., San Francisco.

1985 El papel de la agricultura intensiva en la economía politíca del estado de Tiwanaku. *Diálogo Andino* 4: 11–38. Universidad de Tarapacá, Arica.

1986 The Agricultural Foundations of the Tiwanaku State: A View from the Heartland. *American Antiquity* 51: 748–762.

1987 Tiwanaku and its Hinterland. *Archaeology* 40 (1): 36–41.

1989 *Arqueología de Lukurmata*, 2 (Alan L. Kolata, ed.). Instituto Nacional de Arqueología y Ediciones Puma Punku, La Paz, Bolivia.

1991 The Technology and Organization of Agricultural Production in the Tiwanaku State. *Latin American Antiquity* 2 (2): 99–125.

KOLATA, ALAN L., AND GRAY GRAFFAM

1989 Los campos elevados de Lukurmata, Bolivia. In *Arqueología de Lukurmata,* 2 (Alan L. Kolata, ed.): 173–212. Instituto Nacional de Arqueología y Ediciones Puma Punku, La Paz, Bolivia.

KOLATA, ALAN L., AND CHARLES ORTLOFF

1989 Thermal Analysis of Tiwanaku Raised Field Systems in the Lake Titicaca Basin of Bolivia. *Journal of Archaeological Science* 16: 233–263.

KROEBER, ALFRED

1927 Coast and Highland in Prehistoric Peru. *American Anthropologist* 29: 625–653.

1944 *Archaeology in Peru in 1942.* Viking Fund Publications in Anthropology 4. New York.

1948 Summary and Interpretations. In *A Reappraisal of Peruvian Archaeology* (Wendell Bennett, ed.): 113–121. Memoirs of the Society for American Archaeology 4, Supplement to American Antiquity 13 (4), pt. 2.

1951 Great Art Styles of Ancient America. In *The Civilizations of Ancient America* (Sol Tax, ed.). Selected Papers of the 29th International Congress of Americanists, 1. University of Chicago Press, Chicago.

LENNON, THOMAS J.

n.d. *Raised Fields of Lake Titicaca, Peru: A Prehispanic Water Management System.* Ph.D. dissertation, University of Colorado, Boulder, 1982.

LUMBRERAS, LUIS

1974 *Peoples and Cultures of Ancient Peru* (Betty Meggers, trans.). Smithsonian Institution, Washington, D.C.

LYNCH, THOMAS

1983 Camelid Pastoralism and the Emergence of Tiwanaku Civilization in the South-Central Andes. *World Archaeology* 15 (1): 1–14.

MACHIAVELLI, NICCOLO

1952 *The Prince* ([1532]; Luigi Ricci, trans.). New American Library of World Literature, Mentor, New York.

MASUDA, SHOZO

1985 Algae Collectors and Lomas. In *Andean Ecology and Civilization* (Shozo Masuda, Izumi Shimada, and Craig Morris, eds): 233–250. University of Tokyo Press, Tokyo.

MASUDA, SHOZO, IZUMI SHIMADA, AND CRAIG MORRIS (EDS.)

1985 *Andean Ecology and Civilization.* University of Tokyo Press, Tokyo.

MCEWAN, GORDON

1991 Investigations at the Pikillacta Site: A Provincial Huari Center in the Valley of Cuzco. In *Huari Administrative Structure: Prehistoric Monumental Architecture and State Government* (William Isbell and Gordon McEwan, eds.): 93–119. Dumbarton Oaks, Washington, D.C.

MENZEL, DOROTHY

1964 Style and Time in the Middle Horizon. *Ñawpa Pacha* 2: 1–105.

1968 New Data on the Huari Empire in the Middle Horizon Epoch 2A. *Ñawpa Pacha* 6: 47–114.

MOSELEY, MICHAEL, ROBERT FELDMAN, PAUL GOLDSTEIN, AND LUIS WATANABE

1991 Colonies and Conquest: Tiahuanaco and Huari in Moquegua. In *Huari Administrative Structure: Prehistoric Monumental Architecture and State Government* (William Isbell and Gordon McEwan, eds.): 121–140. Dumbarton Oaks Research Library and Collections, Washington, D.C.

MUJICA, ELIAS

1978 Nueva hipótesis sobre el desarrollo temprano del altiplano del Titicaca y sus áreas de interacción. *Arte y Arqueología* 5–6: 285–308. Revista del Instituto de Estudios Bolivianos, La Paz.

1985 Altiplano-Coast Relationships in the South-Central Andes: From Indirect to Direct Complementarity. In *Andean Ecology and Civilization* (Shozo Masuda, Izumi Shimada, and Craig Morris, eds.): 103–140. University of Tokyo Press, Tokyo.

MURRA, JOHN

1964 Una apreciación etnológica de la visita. In *Visita hecha a la provincia de Chucuito por Garci Diez de San Miguel en el año 1567*. Documentos Regionales para la Etnología y Etnohistoria Andina 1: 421–444. Ediciones de la Casa de la Cultura del Perú, Lima.

1968 An Aymara Kingdom in 1567. *Ethnohistory* 15 (2): 115–151.

1972 El "control vertical" de un máximo de pisos ecológicos en la economía de las sociedades andinas. In *Visita de la Provincia de León de Huánuco en 1562* (John Murra, ed.): Documentos para la Historia y Etnología de Huánuco y la Selva Central 2: 427–476. Universidad Nacional Hermilio Valdizán, Huánuco.

1985a[1976] The Limits and Limitations of the "Vertical Archipelago" in the Andes. In *Andean Ecology and Civilization* (Shozo Masuda, Izumi Shimada, and Craig Morris, eds.): 15–20. University of Tokyo Press, Tokyo.

1985b "El Archipielago Vertical" Revisited. In *Andean Ecology and Civilization* (Shozo Masuda, Izumi Shimada, and Craig Morris, eds.): 3–13. University of Tokyo Press, Tokyo.

NÚÑEZ, LAUTARO, AND THOMAS DILLEHAY

1979 *Movilidad giratoria, armonía social y desarollo en los Andes meridionales: Patrones de tráfico e interacción económica*. Universidad del Norte, Antofagasta.

NÚÑEZ, MARIO, AND ROLANDO PAREDES

1978 Estevez: Un sitio de ocupación Tiwanaku. In *III Congreso Peruano del Hombre y Cultura Andina*, 2 (Ramiro Matos, ed.): 757–764. Lima.

ORTLOFF, CHARLES, AND ALAN L. KOLATA

1989 Hydraulic Analysis of Tiwanaku Aqueduct Structures at Lukurmata and Pajchiri, Bolivia. *Journal of Archaeological Science* 16: 513–535.

PONCE SANGINES, CARLOS

1972 *Tiwanaku: Espacio, tiempo y cultura; Ensayo de síntesis arqueológica.* Academia Nacional de Ciencias de Bolivia, publicación 30, La Paz.

1976 *La cerámica de la Época I de Tiwanaku,* 2nd ed. Instituto Nacional de Arqueología, publicación 18, La Paz.

1981a *Descripción sumaria del templete semisubterraneo de Tiwanaku,* 5th rev. ed. Libreria y Editorial "Juventud," La Paz.

1981b *Tiwanaku: Espacio, tiempo y cultura; Ensayo de síntesis arqueológica,* 4th ed. Editorial "Los Amigos del Libro," La Paz and Cochabamba.

POSNANSKY, ARTHUR

1945 *Tihuanacu, the Cradle of American Man,* 2 vols. J. J. Augustin, New York.

RAVINES, ROGGER

1965 Investigaciones arqueológicas en el Perú. *Revista del Museo Nacional* 34: 247–254. Lima.

RICE, DON, CHARLES STANISH, AND PHILIP SCARR (EDS.)

1989 *Ecology, Settlement and History in the Osmore Drainage, Peru.* BAR International Series 545 (i–ii). Oxford.

ROWE, JOHN, DONALD COLLIER, AND GORDON WILLEY

1950 Reconnaisance Notes on the Site of Huari near Ayacucho, Peru. *American Antiquity* 16: 120–137.

SALOMON, FRANK

1980 *Los señores étnicos de Quito en la época de los Incas.* Serie Pendorenos 10. Instituto Otavaleño de Antropología, Otavalo.

1985 The Dynamic Potential of the Complementarity Concept. In *Andean Ecology and Civilization* (Shozo Masuda, Izumi Shimada, and Craig Morris, eds.): 511–531. University of Tokyo Press, Tokyo.

SHIMADA, IZUMI

1985 Perception, Procurement, and Management of Resources: Archaeological Perspective. In *Andean Ecology and Civilization* (Shozo Masuda, Izumi Shimada, and Craig Morris, eds): 357–399. University of Tokyo Press, Tokyo.

SPICKARD, LYNDA

1983 The Development of Huari Administrative Architecture. In *Investigations of the Andean Past: Papers of the First Annual Northeast Conference on Andean Archaeology and Ethnology* (Daniel Sandweiss, ed.): 136–160. Latin American Studies Program. Cornell University, Ithaca, New York.

STANISH, CHARLES

1989 Tamaño y complejidad de los asentamientos nucleares de Tiwanaku. In *Arqueología de Lukurmata,* 2 (Alan L. Kolata, ed.): 41–58. Instituto Nacional de Arqueología y Ediciones Puma Punku, La Paz.

STÜBEL, ALFONS, AND MAX UHLE

1892 *Die Ruinenstaette von Tiahuanaco im Hochlande des alten Perú.* Eine Kulturgeschichtliche Studie auf Grund selbstandiger Aufnahmen. Verlag von Karl W. Hiersmann, Leipzig.

TOMOEDA, HIROYASU
1985 The Llama is My Chacra: Metaphor of Andean Pastoralists. In *Andean Ecology and Civilization* (Shozo Masuda, Izumi Shimada, and Craig Morris, eds.): 277–300. University of Tokyo Press, Tokyo.

UHLE, MAX
1902 Types of Culture in Peru. *American Anthropologist* 4: 753–759.
1903 *Pachacamac: Report of the William Pepper, M.D., LL.D. Peruvian Expedition of 1896*. Department of Archaeology, University of Pennsylvania, Philadelphia.
1913 Los indios atacameños. *Revista Chilena de Historia y Geografía* 9: 105–111. Santiago.
1915 Las tabletas y tubos de rape en Chile. *Revista Chilena de Historia y Geografía* 16: 114–136. Santiago.
1919 La arqueología de Arica y Tacna. *Boletín de la Sociedad Ecuatoriana de Estudios Historicos Americanos* 8: 1–48. Quito.

VALCARCEL, LUIS
1932a El personaje mítico de Pukara. *Revista del Museo Nacional* 1 (1): 18–30. Lima.
1932b El gato de agua, sus representaciones en Pukara y Naska. *Revista del Museo Nacional* 1 (2): 3–27. Lima.
1935 Litoesculturas y cerámica de Pukara. *Revista del Museo Nacional* 4 (1): 25–38. Lima.

WACHTEL, NATHAN
1986 Men of the Water: The Uru Problem (Sixteenth and Seventeenth Centuries). In *Anthropological History of Andean Polities* (John Murra, Nathan Wachtel, and Jacques Revel, eds.): 283–310. Cambridge University Press, Cambridge.

WALLACE, DWIGHT
n.d. *The Tiahuanaco Horizon Styles in the Peruvian and Bolivian Highlands*. Ph.D. dissertation, University of California, Berkeley, 1957.

WILLEY, GORDON
1945 Horizon Styles and Pottery Traditions in Peruvian Archaeology. *American Antiquity* 11: 49–56.
1948 Functional Analysis of "Horizon Styles" in Peruvian Archaeology. In *A Reappraisal of Peruvian Archaeology* (Wendell Bennett, ed.): 8–15. Memoirs of the Society for American Archaeology 4, Supplement to *American Antiquity* 13 (4), part 2.

YAMAMOTO, NORIO
1985 The Ecological Complementarity of Agro-Pastoralism: Some Comments. In *Andean Ecology and Civilization* (Shozo Masuda, Izumi Shimada, and Craig Morris, eds.): 85–100. University of Tokyo Press, Tokyo.