

War and early state formation in the northern Titicaca Basin, Peru

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Excavations at the site of Taraco in the northern Titicaca Basin of southern Peru indicate a 2,600-y sequence of human occupation beginning ca. 1100 B.C.E. Previous research has identified several political centers in the region in the latter part of the first millennium B.C.E. The two largest centers were Taraco, located near the northern lake edge, and Pukara, located 50 km to the northwest in the grassland pampas. Our data reveal that a high-status residential section of Taraco was burned in the first century A.D., after which economic activity in the area dramatically declined. Coincident with this massive fire at Taraco, Pukara adopted many of the characteristics of state societies and emerged as an expanding regional polity. We conclude that organized conflict, beginning approximately 500 B.C.E., is a significant factor in the evolution of the archaic state in the northern Titicaca Basin.

archaeology | evolution of cooperation | Pukara | Taraco

Over the last three decades, research methods for investigating the evolution of early states have focused on two general strategies. One involves intensive fieldwork in areas around the world where first-generation states emerged. First-generation states, sometimes referred to as “pristine” states (1–4), are those that developed in a political landscape without existing states (5). Data from such cases allow us to define the factors that explain the earliest development of complex state organizations in specific regions around the world.

Another strategy uses a comparative approach, evaluating analogous datasets from various regions to identify shared evolutionary patterns in the development of initial political complexity. From such methods we should be able to detect a common set of features that characterize the emergence of state societies in many parts of the world. That set of features can then be reformulated to create testable hypotheses for future research.

The emphasis on both intensive empirical data collection and systematic comparative analysis has been quite successful in identifying core aspects of the origin and evolution of first-generation states. We have learned, for instance, that state formation is not characterized by a single settlement that grew and expanded along a smooth trajectory; it is a saw-like or jagged process with many fits and starts. Furthermore, the empirical record does not indicate that a particular capital city of an archaic state was the product of progressive, in situ linear development. (Archaic states are premodern political formations that encompass both first-generation and later states.) Rather, complex state organizations emerge in a *regional* context over a large geographical area.

Current research points to the *interaction* of many nonstate polities across a regional landscape over many generations as the context in which first-generation states develop (6). Intensive and sustained interaction among many smaller polities seems to be critical to the emergence of increasingly complex political units. This recent work also identifies organized conflict and interregional trade as particularly important forms of interaction that, together, create the context for state emergence. Although counterintuitive to the western mind, the co-

existence of trade and war is firmly documented in the historical and archaeological record for premodern societies (7–16). Cross-culturally, there seem to be alternating periods of competition and cooperation among different political entities that are a precondition for the development of first-generation states. Marcus refers to this process as “cycling” or “evolutionary oscillations” (17). Archaic state emergence is therefore most likely when these oscillations occur in a landscape characterized by a number of competing nonstate, complex societies called chiefdoms.

The results of this research are also consistent with a body of theory that has emerged over the last 30 years. This theoretical work has reformulated the concept of “cultural evolution” into a more precise concept of the “evolution of cooperation” (18–22). Using various aspects of game theory and cultural transmission theory, we conceptualize the emergence of archaic states as a process in which people cooperate in increasingly larger (higher populations per bounded polity) and more complex (specialized and hierarchical) political and economic organizations. These processes of early state formation, as evidenced in the archaeological record, can therefore be seen as the “amalgamated behaviors of multiple agents” (23). As opposed to viewing humans as passive agents responding to larger factors beyond their grasp, this body of theory sees people as individuals engaged in strategic and adaptive decision making seeking not only to survive but to thrive in their physical and social environment. This shift from a “cultural evolution” perspective to one of “evolution of cooperation” rearranges our view of the role of exogenous factors (factors beyond human control, i.e., climate change, geography, etc.) vs. endogenous ones (those that are culturally created and controllable). Changes in the natural and cultural landscape are seen as both challenges and opportunities for strategic decision making by individual agents and, more importantly, groups of individual agents. Research also documents that emergent states actively alter their economic landscape as part of this strategic decision-making process (24). This change in thinking is subtle but profound. Exogenous factors are viewed less as a stress on the existing socio-political unit that *forces* people to adopt new and costly organizations and more as circumstances that *permit* the creation of cooperative organizations that were not possible in previous environmental and cultural contexts (25).

War as a Chiefly Strategy

The twin strategies of war and trade have emerged as two of the key factors in archaic state building (5, 8, 9, 15). From an evolution of cooperation perspective, war and trade have similar

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effects on chiefly societies. They effectively lead to high levels of in-group cooperation to achieve material and political ends. Trade and war bring outside resources into the group, which, in turn, fuel a cycle of internal faction-building, external political expansion, and then usually some kind of collapse. When this collapse cycle is broken, an archaic state can emerge as the most stable political entity in a region.

In earlier theories, the existence of war in nonstate (i.e., noncoercive) societies was problematic but was explained by positing that interethnic aggression was a social response to resource stress (7, 26, 27). Although specific cases in the ethnographic and historical record supported this perspective (16, 28), archaeological data, with a deeper time perspective, indicated that carrying capacities are rarely reached in areas where first-generation states occurred (29, 30). As such, the data make us question the extent to which population *pressure* is responsible for higher levels of socio-political integration.

From an evolution of cooperation perspective, we can model the existence of conflict in nonstate political landscapes in the absence of resource stress. In a context of sufficiently high regional population densities, conflict emerges as a viable strategy for highly cooperative groups to acquire more resources and protect themselves against potential adversaries. In effect, organized intergroup conflict is a type of *within-group* cooperation, albeit a form of behavior that is used in a decidedly non-cooperative manner *against other* groups. Groups that successfully organize themselves to raid others will acquire external resources and, in the long run, will be at a selective advantage against groups that are less well organized.

It is precisely such a cultural landscape that provides the fertile ground for the emergence of first-generation states. In this article we focus on a case of organized raiding and warfare between competing polities in the Titicaca Basin of southern Peru from *ca.* 500 B.C.E. to A.D. 400 as a major factor in first-generation state formation. The role of large-scale regional trade will be addressed in a separate article.

The Titicaca Basin

The Titicaca Basin is a high (*ca.* 3,800 m above sea level) and vast area stretching for more than 50,000 km² (Figs. 1 and 2). It is home to one of the first-generation states in the central Andes, Tiwanaku, as well as scores of smaller village societies that have flourished since the middle of the first millennium B.C.E. From a regional perspective, state formation began centuries before Tiwanaku with a number of complex polities, most notably

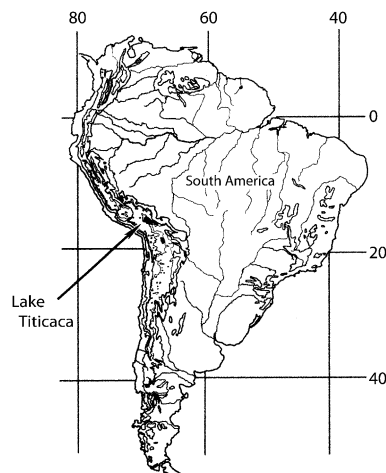


Fig. 1. Map of South America.

Pukara, Taraco, and Khonkho Wankané, that displayed many attributes of state-level societies.

The Titicaca landscape provides a rich variety of exploitable ecological niches. Vast grasslands support camelid herds that provide wool and meat, whereas the lake provides abundant fish, reeds, and aquatic birds. Arable plains and hillsides, dotted with natural and artificial *qochas* (sunken fields) and *bofedales* (marshes), permit intensive agriculture, including the cultivation of tubers and grains. Quaternary geological formations provide abundant mineral and rock resources, including copper and silver, limestone, sandstone, and fine-grain volcanics. Volcanic glass or obsidian, a high-valued commodity in the ancient economy, was generally imported from the Colca Valley, some 200 km away (31–33). In short, the Titicaca region is a rich and diverse environment providing a vast array of resources that would have facilitated the development of complex societies.

At approximately the middle of the first millennium B.C.E., after several millennia of mobile hunter-gatherer-forager lifestyles, a number of autonomous permanent villages formed. These first villages developed in areas where resources were rich, almost always within a short walk from rivers or the lake edge (34). Over the next millennium, from *ca.* 1400 and 500 B.C.E., some of these villages became regional political centers characterized by semisubterranean stone enclosures or sunken courts that first developed around the 15th century B.C.E. (35–38). As a regional center, the settlement hosted feasts, markets, and rituals that integrated people from smaller, allied villages. During this time sites were generally located in nondefensible locations, and there is little evidence for conflict or war on any organized scale (34, 39).

The political landscape changed at approximately 500 B.C.E. Iconography on carved stone stelae, textiles, and pottery depicts people who seem to be valued for their military prowess (40). Trophy head motifs, common throughout the central Andes at this time, suddenly appear in the northern Titicaca repertoire of motifs and favored images (41). Other data also suggest elevated levels of political unrest and warfare. Excavations at a sunken court site in the Pukara Valley yielded trophy heads in association with the Late Qaluyu phase occupation, which dates to *ca.* 800–200 B.C.E. (36). Archaeological surveys conducted in the northern Basin have also revealed sites of this era that were situated in defensible locales (42, 43).

Previous research likewise tells us that by approximately 2,000–2,500 y ago, several large regional centers with multiple sunken court complexes developed in the northern Titicaca Basin. These sites include Pukara, Balsas Pata, Qaluyu, Cancha Cancha, Arapa, Huancanewichinka, and Taraco (Fig. 2). By approximately A.D. 300, the site of Pukara emerged as a complex political center displaying many of the characteristics of a first-generation state. Pukara is at least 1.5 km² in size (34), with three large sunken courts and approximately a dozen smaller courts located on an imposing hill that rises over the settlement. A large and deep series of middens indicates that it was not just a ritual or political center but also home to a large resident population (44).

More recent research has provided additional information on lesser-known centers in the region. Qaluyu, identified more than 50 y ago, became the type-site for the pre-Pukara periods (36). It covers approximately 15 ha and has elaborate sunken courts. Balsas Pata, Huancanewachinka, and Cancha Cancha are similar in size and complexity to Qaluyu. Salvage work by the National Institute of Culture in 2009 at the town of Arapa discovered dozens of stone stelae and carved heads. The site of Taraco is substantially larger, approaching the size of Pukara during its apogee.

By 400 B.C.E., the northern Basin landscape was characterized by a multitiered settlement system with large political centers spaced ≈ 20 –25 km apart. Numerous smaller centers, with only



Fig. 2. The Lake Titicaca Basin.

one or two sunken courts, were also distributed over the landscape, along with subsidiary villages and hamlets. (The one exception is Qaluyu. Located a mere 4 km away from Pukara, it may have been part of the larger settlement complex in that area.) This time period matches the theoretical expectations of an “oscillating” political landscape with a number of autonomous, competing polities vying for power. At any particular site, one may track a cycle of rise and retraction, which may be followed by more oscillations. At a regional scale, however, this process provides a distinctive pattern marked by the slow emergence of fewer, yet substantially larger, sites over the ensuing centuries.

Site of Taraco

The site of Taraco, located along the Rámis River approximately 15 km north of the lake, is composed of a series of mounds connected by roads and possible causeways. Systematic survey indicates that the total aggregated site area is quite large, approaching 1 km². The site is famous for the large number of beautiful stone stelae found in and around the modern town of the same name (45). We have not directly identified the sunken courts; however, there is evidence of their presence in the form of large sandstone slabs that were likely used in the courts that housed the stelae. A modern town now sits over much of the site, and the present-day church and municipal building lie on a low rise that almost certainly contains the sunken courts—an architectural pattern similar to Pukara (46).

Excavations at Taraco

Three areas of Taraco were excavated (Fig. 3). Two were on peripheral mounds to the east and north of the main mound. The third, area A, was placed along the Rámis river edge in the highest part of the mound. Systematic surface collections in area A indicated high quantities of finely made pottery and obsidian. Such artifacts are usually indicators of either a high-status location or a workshop where such items were manufactured.

The excavations in area A revealed a stratified sequence of depositional layers including architectural fill episodes, midden accumulations under and on floors, and buildings that were remodeled, disassembled, or destroyed (Fig. 4 and Fig. S1). The most significant level in the excavations was a substantial burning episode associated with an early Pukara domestic compound (Figs. S2–S4). Evidence of this burn event was detected in all areas tested, including each of the excavations units, as well as in a profile cut along the margin of the river. Cleaning of this profile revealed a continuous stratum of ash and architectural debris measuring at least 35 m in length that corresponded to the same layer identified in excavation units. The burn was so intense that it melted the compound’s adobe superstructure in some areas. Three thatched roofs, composed of annual grasses and wooden beams, were burned so thoroughly that they carbonized through the clay floors. There is little doubt that this very high-status area of the site was leveled and burned in a single historical event.

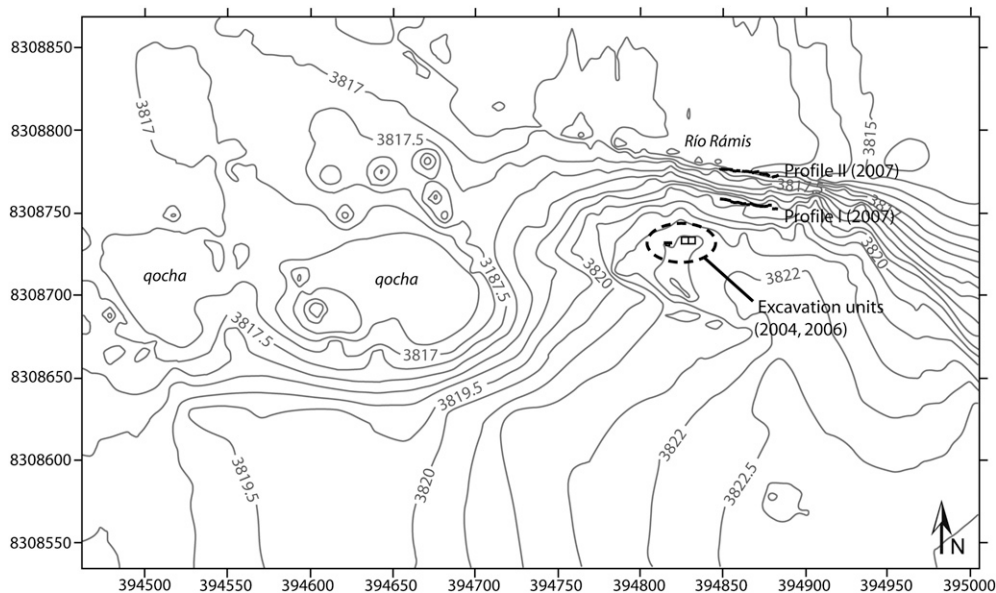


Fig. 3. The Taraco site area.

Analysis

Nine samples of charcoal from the burn event were selected for analysis. The six samples from the annual grasses or reeds—*Stipa ichu*, *Scirpus tatora*—used to thatch the roofs are consistent and place the intentional fire in the first century A.D. Not surprisingly, the dates from the large roof beams were much older, ranging from 765 to 90 B.C.E. (Fig. 5). These differences in age were almost certainly due to the practice of curating large and valuable wooden beams for use in each rebuilding of a structure. Such behaviors have been well documented in other arid and/or sparsely wooded areas around the world (47–49). Beams that are centuries old are still used in houses today in the Titicaca region.

This burn marks an important change in the nature of the occupation of area A. Comparisons of the artifacts in the preburn phase with those of the postburn phase indicate a significant loss in economic and political status for Taraco after this event. The following empirical patterns were noted.

There is a greater density of hoe/adze fragments in the postburn context. This indicates that agricultural activities were more common in the postburn phase. This finding does not preclude the notion that farming was an important component of daily practice before the burn event but rather indicates a relative decline in *other nonagricultural* activities after the burn event.

There is a substantial decrease in the abundance of finely made, decorated pottery after the burn event from 12% to 2%. This decline in the use of high-value pottery from pre- to postburn is highly significant ($\chi^2 = 32.70$, $P < 0.0001$) and suggests a corresponding drop in, or shift in the nature of, the ritual-political activities taking place at the site.

Two lines of evidence indicate a dramatic change in the obsidian industry after the burn event. First, there is more obsidian in the preburn contexts, and this is not simply a product of sample size. For flaked tools and debitage, there is a shift in the relative abundance of obsidian vs. nonobsidian (chert, quartz, etc.) artifacts from the preburn occupation to the postburn occupation. In the preburn context, obsidian artifacts make up 82% of the total sample of flaked tools/debitage. However, the postburn sample of similar artifacts was found to contain only 44% obsidian. This steep drop in the abundance of obsidian postburn is highly significant ($\chi^2 = 11.22$, $P = 0.0008$). Second, obsidian artifacts are, on average, significantly larger in the preburn context

($P = 0.01168$). In fact, the mean weight of preburn obsidian artifacts is nearly double (2.26 g) that of the postburn (1.318 g). Because the production of obsidian tools is a reductive process, the size of the artifacts—particularly of the debitage—may be considered as a proxy for primary access, because waste tends to increase when raw materials are plentiful (50). As a relative index of access patterns, this shift in mean artifact size indicates that the residents of area A had greater access to this exotic good before the burn. Alternatively, the reduction in mean artifact size could indicate the recycling of old materials by residents because their access to new raw materials had been curtailed.

Interpretations

The data strongly suggest that this site-wide burn event was an episode of deliberate destruction, one that represents evidence for intensive raiding. It is unlikely that residents would suddenly destroy their whole community and destroy their own very valuable and rare beams and posts, even if they were abandoning the settlement. Furthermore, the uninterrupted stratigraphy does not indicate any site abandonment. This site-wide burn is further distinguished from earlier instances of burning at the site because nothing was rebuilt immediately after the compound was destroyed, which would have been expected if the devastating burn was accidental or part of periodic household maintenance, renewal, or ritual practices, such as those documented at the site of Chiripa (37, 51). Those are not site-wide but restricted and controlled. This conflagration would have been immense and visible from a very long distance in the altiplano landscape.

After the burning episode, area A was leveled, with nearly a meter of fill indicating a large resident population that no longer built with fine stone or regularly engaged in long-distance trade. The data point to a substantial decrease in access to regional resources for the Taraco peoples after the burn event. The sudden decrease in the regional power of Taraco correlates chronologically with the rise of Pukara as a dominant political force in the first or second century A.D. Radiocarbon dates from a deposit of “pure Pukara style rubbish” (52) excavated by Kidder at the site of Pukara in the 1950s virtually overlap in time with these new data from Taraco. In other words, the Pukara settlement was at its height at the time that Taraco burned.

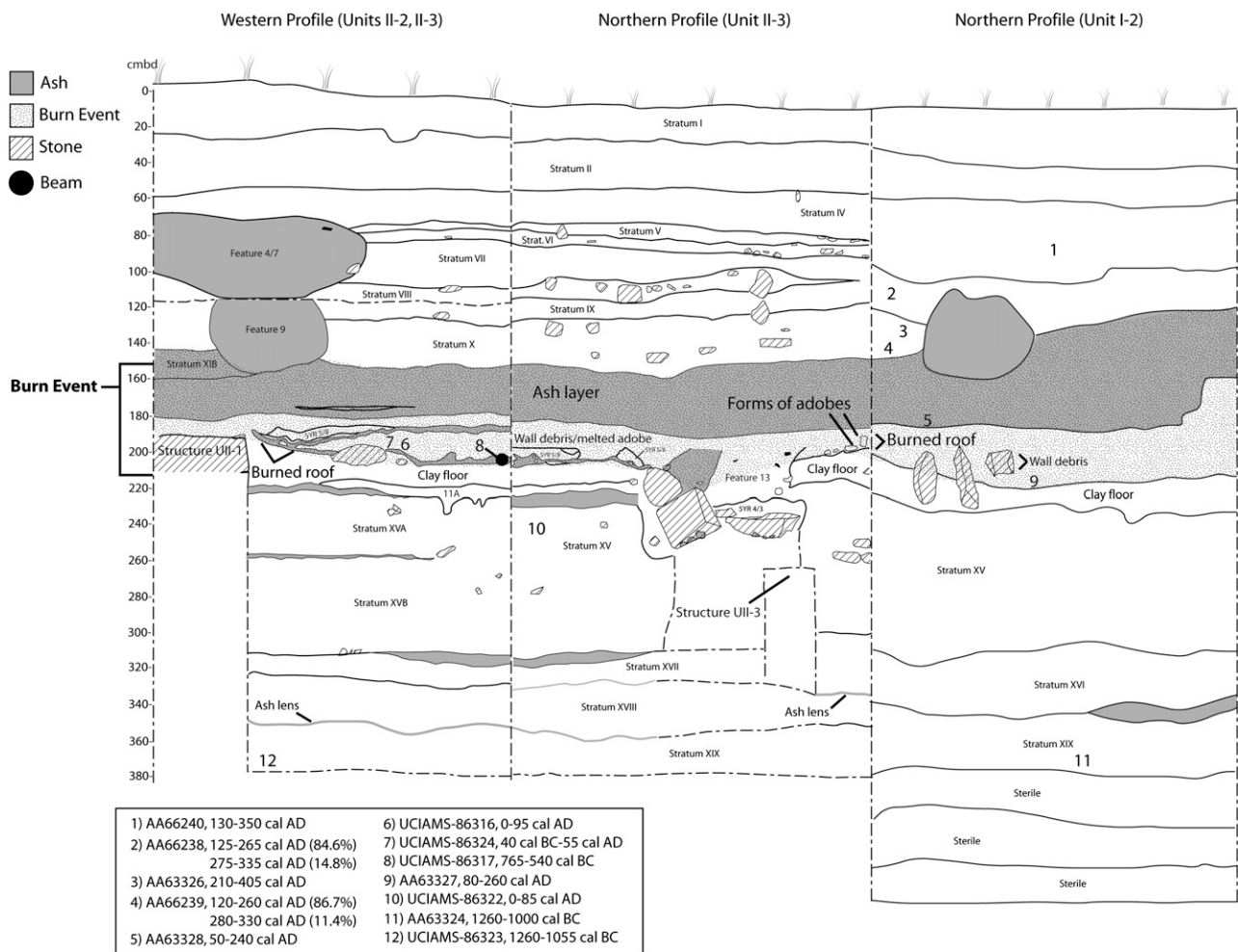


Fig. 4. Excavation profile with ¹⁴C dates.

In light of these developments, we can hypothesize a series of regional interactions that included both cooperation (alliances and trade) and conflict (war) between polities throughout their history. Over the centuries, a few sites grew larger by absorbing or eliminating competitors, and eventually only a handful of powerful centers remained. By the first century A.D. only two centers were regionally dominant in the northern Titicaca Basin—

Taraco and Pukara. By no later than the early second century A.D., Pukara had emerged as the largest regional polity, a period of ascendancy that lasted only until the late fourth or early fifth century.

A similar process was underway in the southern Titicaca Basin. This led to the consolidation of several polities by the fifth century A.D., and by the sixth century the great state of Tiwanaku emerged as the single dominant political power (53). By the eighth century, Tiwanaku had politically absorbed almost all resource-rich areas in the Titicaca Basin and beyond. In the southern Titicaca area, the process of state formation was a regional phenomenon that began *ca.* 700 B.C.E. and culminated in the development of the Tiwanaku state by *ca.* A.D. 500.

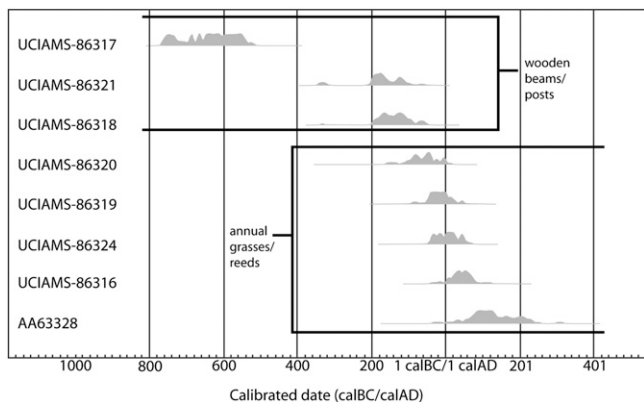


Fig. 5. Carbon-14 dates associated with the burn event showing 2- σ distributions.

Conclusions

The ubiquity of war in chiefly societies is well documented in the historical record in the Americas (54). The hypothesis linking organized intervillage raiding or war to the development of the archaic state has been confirmed in ancient Mesoamerica (5, 55) and the north coast of Peru (56). Data from Oaxaca indicate a process of intense competition resulting in the destruction of one political center—Tilcajete—by the nascent Monte Albán polity. In northern Mesopotamia, regional conflict, although apparently absent in most of the prestate periods, occurs at the end of the ‘Ubaid period “immediately before the transition to state organization” (57).

A similar process is documented for the northern Titicaca Basin. We have identified several political centers that competed in the altiplano landscape in the latter part of the first millennium B.C.E., including Pukara and Taraco. Both centers expanded in size to at least 100 ha by A.D. 50. Evidence of warfare is first documented around 500 B.C.E. A major, high-status section of Taraco was burned in the first century A.D., after which economic activity at the site dropped dramatically. Coincident with the conflagration, Pukara adopted many of the characteristics of state societies, including expansion at least 100 km to the south and

southeast, with many of the populations falling under its powerful influence. The people residing at Taraco at the very least lost the political freedom to form their own trade networks with high-status people in other regions for at least 2 centuries. In short, our work at Taraco demonstrates that in this area of early civilization, war was a critical factor in first-generation state development.

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