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A Massive Terraced Village Complex in Chihuahua, Mexico, 3000 Years Before Present

Robert J. Hard and John R. Roney

Cerro Juanaqueña is a residential complex with 8 kilometers of terrace walls in northwestern Mexico that was occupied at ~3000 calendar years before present based on radiocarbon dates on maize (*Zea mays* L.). Most other similar sized terrace complex sites that have been found date to ~1000 years before present. Cerro Juanaqueña was contemporaneous with 10 other sites in the southwestern United States that have yielded 18 of the earliest maize or squash radiocarbon dates yet, and it is by far the largest and most complex site. The archaeological evidence from this site, combined with other recent data, implies that highly variable combinations of population aggregation, agricultural dependence, and degrees of sedentism were present during the time maize was being introduced into the American Southwest.

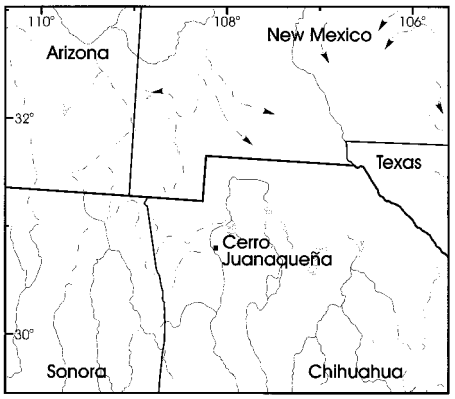

Fig. 1. Cerro Juanaqueña is on the Rio Casas Grandes that drains the Sierra Madre Occidental.

Cerros de trincheras are among the most impressive prehistoric features in the southwestern United States and northwestern Mexico. These archaeological sites consist of terrace complexes ~0.1 to 10 ha in size built on the summits and upper slopes of isolated hills and small mountains. They are best documented in northern Sonora and southern Arizona. Dates as early as 1200 calendar years before present (B.P.) have been suggested for a few of these sites but most are thought to have been built late in the prehistoric sequence (900 to 600 calendar years B.P.). Several interpretations of cerros de trincheras have been offered (*1*). Large populations of farmers may have used terraces as agricultural plots. Excavations on cerros de trincheras have revealed evidence of residential occupation, leading some to suggest that the sites were defensive villages or places of refuge that were occupied during periods of raiding or organized warfare. The largest late-period cerro de trincheras site, with 870 terraces and covering 50 ha, has been interpreted as a population, political, and religious center (*2*).

Here we describe Cerro Juanaqueña, a large cerro de trincheras similar to the late prehistoric ones, yet it was in use by 3000 calendar years B.P. Located in northwestern Chihuahua, Mexico, it was constructed on the summit and slopes of a steep, 140-m-high basalt hill that juts above the Rio Casas Grandes floodplain (Fig. 1). Covering an area of more than 10 ha, the constructed features on the site include more than 8 km of terrace walls and 100 rock rings. Cerro Juanaqueña lacks the formal vertical masonry that is commonly present on cerros de trincheras in Sonora and Arizona, but it conforms closely in other respects, including overall scale, scale of individual features, morphology, and presence of ancillary features such as rock rings. Cerro Juanaqueña also resembles many late prehistoric cerros de trincheras in that it bears evidence of extensive residential occupation.

Dating. In 1997 we made test excavations in four terraces and three rock rings. Three widely separated terraces yielded pieces of carbonized maize (*Zea mays* L.) or other annual plant remains suitable for direct dating by the small-sample accelerator mass spectrometer (AMS) radiocarbon method (Fig. 2), and we obtained four dates from this material (Table 1). All samples were recovered either from the interior of the terrace rock walls or berms or from within the terrace fill behind the berms. The average of the three maize dates is 3070 calendar years B.P. (*3–5*).

This date is contemporaneous with virtually all of the earliest maize sites in the American Southwest. Cerro Juanaqueña and 10 other early maize sites have 21 AMS radiocarbon dates of maize and squash that are statistically contemporaneous and average 2980 calendar years B.P. (*3, 4, 6–8*). There is no south-to-north age gradient among the early maize sites. Maize evidently spread rapidly from northern Mexico throughout the Southwest as far as northern Arizona and northern New Mexico. However, a few outlier dates hint that future work may demonstrate earlier maize ages (*3, 4, 9, 10*).

The artifacts documented at Cerro Juanaqueña are consistent with a Late Archaic period (3500 to 1700 calendar years B.P.) occupation (*11*). A total of 254 projectile points have been recovered from a variety of contexts on the site. Of these, 235 are dart points characteristic of the Archaic period. Only 5 are arrow points, which suggests that there was limited use after 1500 calendar years B.P., and 14 are

Table 1. Four AMS ^{14}C dates from Cerro Juanaqueña. TF, terrace fill; BW, berm wall.

Provenience*	Context	Material	INSTARR no.‡	Age in radiocarbon years B.P.§	Measured $\delta^{13}C$ (per mil)	Dendrocalibrated 2σ age ranges‖
167-42-3-56	TF	*Z. mays* L. cob	3983	2980 ± 50	−12.2	3330 (3200, 3150) 2970
537-74-4-55	BW	*Z. mays* L. cob	3986	2890 ± 50	−9.9	3200 (2980) 2860
222-100-2-105	BW	*Z. mays* L. 17 cupules	3995	2930 ± 50	−9.3	3220 (3070) 2890
222-94-3-95	TF	*Cucurbita*†	3985	3310 ± 60	−25.3	3690 (3550, 3520, 3480) 3380

*The numbers indicate terrace-bag-unit-depth below surface in centimeters. †The interior tissue of a seed of a wild species of *Cucurbita*, such as *Cucurbita digitata* or *C. foetidissima* type (*23*). ‡The University of Colorado at Boulder INSTARR Laboratory for AMS Radiocarbon Research. §Uncalibrated conventional ^{14}C age in years B.P. (±1σ). ‖ The 2σ dendrocalibrated minimums (intercepts) and maximums are based on a bidecadel correction in calendar years B.P., rounded to the nearest decade (*4*).

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intermediate in size between dart points and arrow points. Most of the dart points are side-notched or corner-notched forms with expanding stems and straight or convex bases (Fig. 3), which could be classified variously as San Pedro, Hatch, Hueco, or En Medio. These types all occur from 3500 to 1000 calendar years B.P. but are most common during the earlier times (*12*, *13*). The collection also includes 19 points with deep basal notches and prominent barbs that resemble the Shumla type from the Lower Pecos region in Texas and the Diagonal Notched type from the Mogollon Highlands and Colorado Plateau of New Mexico and Arizona. Both date from 3500 to 1000 calendar years B.P. but were most common during the earlier times (*14*, *15*). Two specimens can be classified as Cortaro points, a southern Arizona type that may span the transition between the Middle Archaic (5500 to 3500 calendar years B.P.) and Late Archaic (3500 to 1700 calendar years B.P.) periods (*12*). The Middle Archaic is poorly documented in northwestern Mexico. However, most of the forms that might be expected in this period have contracting stems or concave bases or both (*13*, *15*, *16*). These characteristics are rare or absent in the collection from Cerro Juanaqueña.

Other artifacts provide further corroboration of a Late Archaic age for the Cerro Juanaqueña assemblage. These include slab and basin metates (stone with a concave surface, used for grinding grain), small oval to round manos (handstones for grinding grain), tubular stone pipes, shallow stone bowls or trays, small mushroom-shaped pestles, and cruciforms shaped by both flaking and grinding (*17*). Evidence of post-Archaic activities is limited. In addition to the five small arrow points mentioned above, we have found pottery at two loci. One of these contains a few shards of a single pot dating between 1250 and 750 calendar years B.P., and the other contains a 10-m-diameter cluster containing about 30 shards from three plainware vessels and a Historic period (500 calendar years B.P. to present) shallow metal bowl-like object. At least 30 petroglyphs, representing the Medio period (750 to 500 calendar years B.P.), the Historic period, and perhaps other periods, are present on the upper slopes and top of Cerro Juanaqueña (*18*).

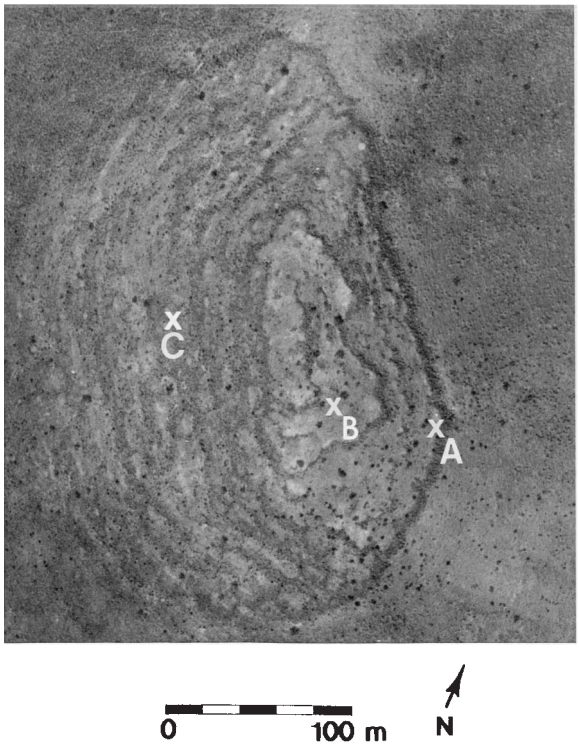

Fig. 2. Aerial photograph of the terrace complex at Cerro Juanaqueña showing locations of radiocarbon samples: (A) NSRL-3983, (B) NSRL-3986, and (C) NSRL-3985 and NSRL-3995. The largest macrofeature runs north-south through location A. (Photo courtesy of Baker Aerial Photography, Tijeras, New Mexico.)

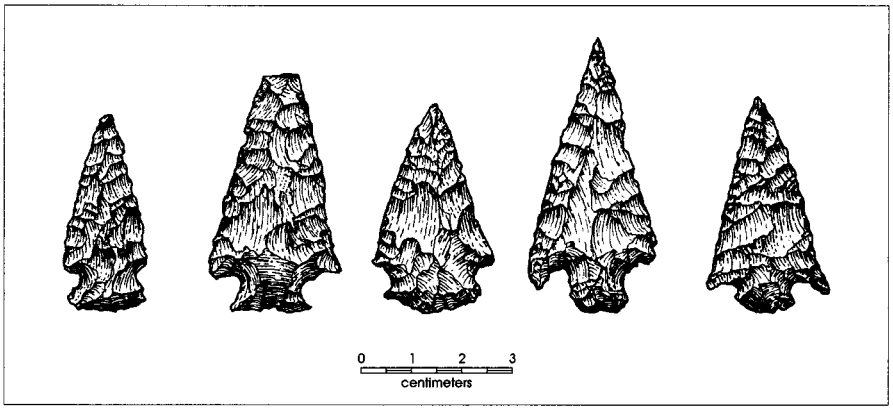

Fig. 3. Typical Late Archaic projectile points from Cerro Juanaqueña.

Features. The most prominent cultural features on Cerro Juanaqueña are 468 terraces, also known as trincheras (Fig. 2). They are concentrated in a 6-ha area over the summit and upper slopes of the hill and a 4-ha area on the western lower slope. Most of the terraces are arc-shaped and have a mean length of 17.8 m (SD = 9.98 m, n = 468) and a width of 7 m (SD = 2.12 m, n = 30). The prehistoric inhabitants constructed them by piling basalt cobbles to form berms 3 to 6 m wide at the base and up to 1.2 m or more in height with a semiparabolic cross-section (Fig. 4). Typically, cobbles were simply mounded with little organization, but some were stacked to hold a steeper grade. The pockets between the terrace berm walls and the hill slopes contain small stones and soil. Many of the individual terrace features articulate with one another end-to-end to constitute coalescent macrofeatures. The largest of these is formed by a continuum of 25 terraces forming an alignment 400 m long that defines the northern, eastern, and southern perimeters of the site (Fig. 2). Such features would seem to require a substantial population and a significant degree of site planning. As many as 100 rock rings were built on the terrace surfaces. These range from well-defined features that appear to have been multiple courses of dry-laid rock, to subtle cobble arrangements. The mean diameter is 2.8 m (SD = 0.62, n = 20). We tested three of these features in 1997 but did not find internal features or any other indication of their construction and use.

The broad range of activities represented by artifacts associated with the terraces at Cerro Juanaqueña indicates that one of their major functions was to provide level surfaces for residential occupation. On one terrace we exposed an unprepared floor

with postholes, as well as burned clay daub possibly indicating a clay-plastered structure. Terrace surfaces and berm slopes contained large basin metates, smaller slab metates, manos, and chipped stone debris. Excavated terrace deposits contained ashy soil, charred and uncharred animal bone, grinding stone fragments, and large quantities of chipped stone debris, all representing domestic refuse.

Subsistence. An estimated 585 whole basin and slab metates are present on the upper slopes and top of the site. Deep ovoid concavities in the basin metates (*19*) indicate that most of these tools were used for decades of intensive food grinding (*20*). The extraordinarily high density of ground stone and its extensive wear confirms that food grinding was a major activity on this residential site. The small grinding surface of the manos (mean = 126.5 cm^2) suggests that indigenous seeds, to a much greater extent than maize, were being processed (*21, 22*).

Two charred maize (*Z. mays* L.) cob fragments were found during excavation, and maize was also found in 2 of 41 sediment flotation samples. The maize is a 12-rowed variety, consistent with maize found in other locations in northwestern Mexico and the American Southwest, including Late Archaic sites. The location of Cerro Juanaqueña adjacent to the Rio Casas Grandes suggests the inhabitants practiced floodplain agriculture. Other charred seeds found include chenopodium or amaranth (cheno-am), wild gourds (*Cucurbita digitata* or *C. foetidissima* type), chia (*Salvia* sp. type), plains lovegrass (*Eragrostis intermedia* type), unidentified grasses (Gramineae), milk-vetch (*Astragalus nuttalliana* type), bulrush (*Scirpus* sp. type), and globe-mallow (*Sphaeralcea* sp. type) (*23*). All of these are potentially economic seed plants and their ubiquity, along with the nature of the ground stone assemblage, implies that indigenous seeds may have been important staples.

Analysis of 1067 identifiable faunal elements from one terrace indicate that jackrabbit (*Lepus* sp.), cottontail rabbit (*Sylvilagus* sp.), mule deer (*Odocoileus heminous*), and pronghorn antelope (*Antilocapra americana*) were important game species. A turtle carapace and a few fish bones have also been identified, but despite the site's location next to the Rio Casas Grandes, waterfowl and other riverine species are surprisingly absent (*24*). The subsistence evidence signifies that the occupants of Cerro Juanaqueña exploited similar species as other contemporaneous groups in the southern portion of the American Southwest and northwestern Mexico.

Implications. Although the material culture at Cerro Juanaqueña is consistent with that found in the larger region, the construction at this site reflects a far greater level of population aggregation, labor investment, and an extraordinary level of land modification relative to other contemporaneous northwestern Mexico or American Southwest locations including substantial villages in southern Arizona and rockshelters and small clusters of pithouses found elsewhere in the region (*6–10, 25, 26*). Replication of a typical 15-m-long terrace on a hill slope near Cerro Juanaqueña suggests that construction of the entire site involved movement of 11,000 m^3 or 20,000 metric tons of rock and soil. On the basis of this experiment we estimate that construction of the terraces on Cerro Juanaqueña required about 16 person-years of labor. This level of effort is comparable to construction of a site with about 64 large pithouses with substantial superstructures or a surface pueblo with about 141 living rooms (*27, 28*).

Traditionally archaeologists have thought that the adoption of agriculture and the formation of sedentary villages in the southwestern United States and northwestern Mexico was a gradual process. Archaic period societies were characterized as small, band-level groups with dispersed and highly mobile residence patterns. During the Late Archaic period casual cultivation of maize and other cultigens was incorporated into this foraging way of life, but it was thought to have had little immediate impact for a millennium or more before the development of fully agricultural societies (*26, 29*). Aggregation, sedentary villages, more complex social structures, and subsistence systems that were dependent on agricultural production were believed to have developed only after 1500 calendar years B.P. in some areas and much later in other areas (*22*).

A series of recent advances has cast doubt on this scenario, or at least on its applicability to the region as a whole. In southern Arizona at ~3000 calendar years B.P. residential sites include abundant evidence of maize (*7*). By 2500 calendar years B.P. large villages had formed. These contained numerous pithouses, storage pits, midden deposits, burials, and communal structures (*17, 30, 31*). Clearly dependence on maize and floodplain agriculture was increasing, along with village aggregation and sedentism. Some reports suggest that comparable processes were taking place in northern Sonora as well (*32*). Combined with the evidence from Cerro Juanaqueña, these data show that the formation of substantial settlements in the Sonoran desert scrub and Chihuahuan semidesert grasslands occurred simultaneously with the initial sweep of Mesoamerican cultigens across northwestern Mexico and the American Southwest.

However, these developments took place at a different pace in other parts of the Southwest. In the northern parts of the region substantial use of maize is not documented until ~2000 calendar years B.P., when it is found in the context of camps consisting of a few pithouses or rock shelters in locales such as Black Mesa in northern Arizona and Cedar Mesa in southern Utah. In many other areas maize remained a minor portion of the hunter-gatherer diet as suggested by the traditional model until after 1500 calendar years B.P. In other locales, such as south-central New Mexico and far western Texas, sites with numerous pithouses and features were present, but maize remained a minor part of the diet until after 900 calendar years B.P. (*22, 33*).

These observations indicate that the transition from mobile hunting and gathering bands to sedentary agricultural villages did not proceed in a simple, unilinear fashion in the southwestern United States and northwestern Mexico. Instead this process included highly variable combinations of

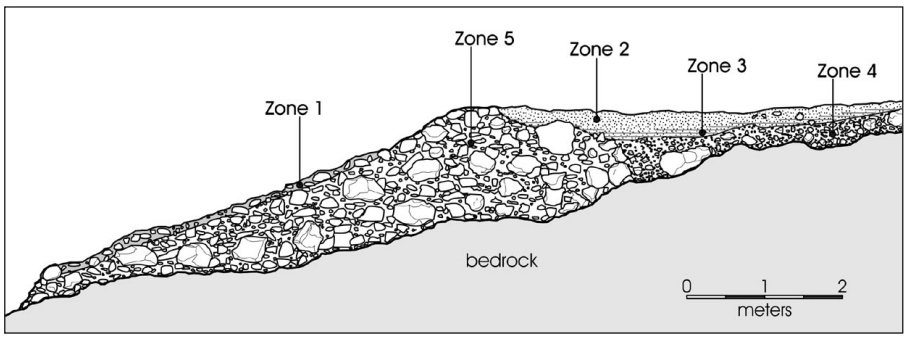

Fig. 4. Cross section of terrace 167. Zone 1 colluvium, dark grayish brown sandy clay loam; zone 2 upper fill, brown fine sandy loam; zone 3 intermediate fill, brown sandy clay loam; zone 4 lower fill or colluvium, dark gray to very dark gray sandy clay loam, 65% basalt granules to cobbles; and zone 5 berm, dark grayish brown to black sandy clay loam, 65% basalt pebbles to cobbles (*34*).

population aggregation, agriculture dependence, and degree of sedentism. The evidence from Cerro Juanaqueña, combined with recent data from other Late Archaic sites, indicates that the traditional Late Archaic model of mobile hunters and gatherers residing in small band-level camps must be expanded to incorporate these various patterns.

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5. There is a 95% probability that the three maize dates were drawn from the same population ($T′ = 1.54$, $\chi^2 = 5.99$) (*3*). The pooled mean of the three maize dates is 2930 ± 30 radiocarbon years B.P. Sample NSRL 3985 is a statistical outlier.
6. All AMS-cultigen dates >2700 radiocarbon years were included in this analysis. Dates that have been discounted by their author as contaminated were excluded. The 21 radiocarbon ages from 11 sites were statistically the same at a 95% confidence level ($T = 23.33$, $\chi^2 = 31.4$) with a mean of 2890 ± 15 radiocarbon years. The sites and radiocarbon ages (years B.P. ± 1σ) are for Cerro Juanaqueña, see Table 1; in southern Arizona—West End (2735 ± 75) and Fairbank (2815 ± 80, 2800 ± 140) [B. B. Huckell, thesis, University of Arizona (1990)], Cortaro Fan (2790 ± 60) [B. Roth, thesis, University of Arizona (1989)], and Milagro (2930 ± 45, 2915 ± 45, 2910 ± 45, 2780 ± 90, 2775 ± 60) (*7*); in northeastern Arizona—Three Fir Shelter (2880 ± 140) (*8*); in southern New Mexico—Fresnal Shelter (2945 ± 55, 2880 ± 60) [M. D. Tagg, *Am. Antiq.* **61**, 311 (1991)] and Tornillo Cave (3175 ± 240) [S. Upham *et al.*, *Am. Anthropol.* **89**, 410 (1987)]; in central New Mexico—Bat Cave (3010 ± 150, 2780 ± 90, 2980 ± 120) [W. H. Wills, *Early Prehistoric Agriculture in the American Southwest* (School American Research, Santa Fe, NM, 1988)]; and in northwestern New Mexico—Sheep Camp Shelter (2900 ± 230) and LA 18091 (2720 ± 265) [A. H. Simmons, *Am. Antiq.* **51**, 73 (1986)].
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31. The Tumamoc Hill cerro de trincheras site in Tucson, AZ, long considered to have been constructed after ~1200 calendar years B.P., yielded Late Archaic AMS maize dates, the earliest of which was 2470 ± 270 radiocarbon years B.P. Although, these dates were not clearly associated with trincheras wall construction, they suggest Late Archaic period cerro de trincheras sites may be more widespread [P. R. Fish, S. K. Fish, A. Long, C. Miksicek, *Am. Antiq.* **51**, 564 (1986)].
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33. R. G. Matson, *The Origins of Southwestern Agriculture* (Univ. of Arizona Press, Tucson, AZ 1991), pp. 90–124; R. J. Hard, *Proceedings of the Ninth Jornada-Mogollon Conference*, University of Texas at El Paso and Centro de Investigaciones Aqueologicas, El Paso, TX, 10 to 11 November 1995, R. P. Mauldin, J. D. Leach, S. Ruth, Eds. (*Publ. 12*, Centro de Investigaciones Arqueologicas, El Paso, TX, 1997); M. E. Whalen, *Am. Antiq.* **59**, 622 (1994).
34. L. Nordt, personal communication.

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