Reports

Archeological Excavations in Jalisco, Mexico

Abstract. *Recent archeological work in northeastern West Mexico has provided information about a previously unknown area and some evidence regarding its relationship with other parts of Mexico. An occupation as early as A.D. 100 is suggested.*

Excavations conducted in 1970 at an archeological site in northeastern Jalisco yielded material by means of which it is possible to link this previously unknown area to other parts of West Mexico and to some regions outside it. The site is El Cerro Encantado, located on the exhacienda Tequesquite near the town of Teocaltiche about 240 km northeast of Guadalajara—an area that until 1970 had not been investigated archeologically. Unfortunately, El Cerro Encantado has since been damaged so badly by looting that further work there may be impossible.

The site extends for approximately 1.5 km along the flank of a low hill overlooking the Río Grande, a tributary of the Río Verde. The excavated portions appeared to consist largely of burial areas, and there was some evidence that the habitation area may lie atop the hill. Excavations revealed a number of subterranean stone features resembling those described for Chupícuaro (*1*); a stone wall approximately 17 m long, which had once been decorated with painted stucco; and a subterranean secondary-burial chamber filled with ashes, charcoal, charred human bone, and a variety of artifacts. The architecture and the burial chamber are of types unknown before in West Mexico. In addition to the sherds from the strata pits, some of which were as deep as 220 cm, the artifact material included figurines and figurine fragments; whole and reconstructible pottery vessels with a good deal of negative or resist painting; slate mirror backs; ornaments of pottery, stone, bone, and shell; and small tools of bone and stone. Also, several reconstructible pottery vessels and fragments of a conch-shell trumpet were salvaged from the debris around a looter's pit.

Fig. 1. Pottery figurines from El Cerro Encantado, Jalisco, Mexico. The horned figurines are decorated with red paint on buff slip, with the addition of black resulting from resist painting. The male is 39 cm high, the female, 33 cm. [Photograph by William Winnie, Jr.]

A date of 1800 ± 80 years ago (*2*) was obtained from carbon-14 analysis of a burned antler found at the base of the wall, at a depth of 165 cm. At present this date seems acceptable on the basis of preliminary study of the excavated material, but full evaluation must await the results of additional radiocarbon tests on 15 charcoal samples from the strata pits and the burial chamber. Three obsidian hydration tests yielded dates somewhat later than expected. It is possible that all three samples were intrusive or that the site lies outside the area for which the West Mexican hydration rate has been determined (*3*), but these dates too can be evaluated only in the light of further study.

A pair of large, hollow pottery figurines—*los cornudos*, the horned figurines (Fig. 1)—were among the offerings found with one of the burials. There are many figurines of this type in private collections of pre-Columbian art, but all were obtained through looting. These from El Cerro Encantado are the first ever obtained through controlled excavation, and a specific source of the *cornudos* had been unknown until now. When they first appeared on the antiquities market they were said to come from "somewhere in Zacatecas," but it now seems clear that their source is northeastern Jalisco. In fact, if this region follows the general West Mexican pattern of narrow localization of styles, they may well be limited to a small area around Teocaltiche and nearby Belén del Refugio. The horned figurines lack the diversity of pose and activity that is so striking in the figurines from elsewhere in West Mexico. Females are invariably seated with hands on hips; males are seated with knees drawn up and arms folded across them. The male figurine shown is one of the rare variants that holds a drum between its knees. The horned figurines seem to occur in pairs that can be matched by designs in their body paint, and the richer burials may contain several pairs.

To the west, El Cerro Encantado is clearly related to the shaft-tomb complex that extends in an arc from southern Nayarit through most of west-central Jalisco and into Colima (*4*). There are no shaft tombs at El Cerro Encantado, but the contents of the more elaborate burials there virtually duplicate the offerings in the shaft-tomb chambers: large, hollow pottery figurines, polychrome pottery vessels, slate-backed pyrite mirrors, and conch-shell

trumpets. Unfortunately, such an assemblage has been seen intact only in collections looted from El Cerro Encantado, but the excavated material, albeit fragmentary, indicates that the assemblage is indeed present there. To the southeast, El Cerro Encantado can, at least tentatively, be linked to Chupícuaro by the character of its subterranean stone features, certain resemblances in pottery form and decoration, and perhaps some of its burial practices (*5*). And Chupícuaro, in turn, has been fitted into the well-established chronological sequences for Central Mexico (*6*). Some resemblances in ceramics suggest the possibility that El Cerro Encantado may also be related to the early phases of the Suchil branch of the Chalchihuites culture of northwestern Zacatecas (*7*).

The date of 1800 ± 80 years ago is well within the range of carbon-14 dates for the shaft-tomb complex (*8*), which is known to have been in existence at least during the late pre-Classic, and it presents no anomaly in linking El Cerro Encantado and Chupícuaro. It is slightly early for proposing a relationship to the Chalchihuites culture, but the margin of error allows for a small overlap with the starting date of the phases in Zacatecas and may indicate that certain influences moved from south to north (*9*).

Although the chronological sequences linking West Mexico to other areas are steadily being expanded and strengthened, we need much more information about the nature and extent of cultural relationships. Furthermore, many of the early pre-Columbian cultures of West Mexico are still known almost exclusively in terms of their burial offerings. Numerous shell trumpets of Caribbean conch (*Turbinella angulatus* Solander, *Strombus gigas* Linné) have been found in the shaft tombs, and Caribbean shells occur in archeological sites throughout the region (*10*); hence, West Mexico was undoubtedly part of a widespread network of trade during the late pre-Classic. We need to know much more about the West Mexican cultures that were involved in that trade and also about the cultural influences that moved into and out of West Mexico. El Cerro Encantado itself may be lost to future work, but the surrounding area is thickly dotted with sites that might provide some of the answers.

BETTY BELL

University Museum,
Southern Illinois University,
Carbondale 62901

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References and Notes

1. M. N. Porter, *Trans. Amer. Phil. Soc.* **46**, 526 (1956).
2. Radiocarbon date UCLA-1647, UCLA date lists in preparation.
3. C. W. Meighan, L. J. Foote, P. V. Aiello, *Science* **160**, 1069 (1968). This is the low, rather warm area near the Pacific Coast, and no samples from east of the Lake Chapala area had previously been tested. The hydration rate is sensitive to temperature, and the climate in northeastern Jalisco is much colder than in the coastal lowlands.
4. B. Bell, in *Handbook of Middle American Indians*, R. Wauchope, Ed. (Univ. of Texas Press, Austin, 1971), vol. 11; C. W. Meighan and H. B. Nicholson, in *Sculpture of Ancient West Mexico: Nayarit, Jalisco, Colima; The Proctor Stafford Collection* (Los Angeles County Museum of Art, Los Angeles, 1970), pp. 17–32; S. V. Long, *Razón Fábula No. 1* (1968), pp. 73–87. Long, in particular, describes these tombs and plots their distribution. In Mexico they occur only in a small area in the west. They occur in quantity in northern South America, however, which suggests waterborne contact at a period perhaps starting around 200 B.C.
5. M. P. Weaver [in *The Natalie Wood Collection of Pre-Columbian Ceramics at UCLA*, J. P. Frierman, Ed. (Museum and Laboratories of Ethnic Arts and Technology, Univ. of California, Los Angeles, 1969), pp. 1–15] discusses the revised Chupícuaro sequence to which the El Cerro Encantado material is being related.
6. H. W. McBride, *ibid.*, pp. 33–47.
7. Based on discussions with J. C. Kelley and inspection of the plates in his study of the Chalchihuites pottery [J. C. Kelley, *An Introduction to the Ceramics of the Chalchihuites Culture of Zacatecas and Durango, Mexico*; part 1, *The Decorated Wares* (Mesoamerican Studies 5, University Museum, Southern Illinois Univ., Carbondale, 1971)].
8. S. V. Long and R. E. Taylor, *Science* **154**, 1456 (1966); C. W. Meighan and H. B. Nicholson, in *Sculpture of Ancient West Mexico: Nayarit, Jalisco, Colima; The Proctor Stafford Collection* (Los Angeles County Museum of Art, Los Angeles, 1970), p. 32; R. E. Taylor R. Berger, C. W. Meighan, H. B. Nicholson, in *The Natalie Wood Collection of Pre-Columbian Ceramics at UCLA*, J. P. Frierman, Ed. (Museum and Laboratories of Ethnic Arts and Technology, Univ. of California, Los Angeles, 1969), pp. 18–30.
9. The possible role of northeastern Jalisco in the diffusion of traits of Mesoamerican culture to the southwestern United States is noted by J. C. Kelley [in *Handbook of Middle American Indians*, R. Wauchope, Ed. (Univ. of Texas Press, Austin, 1966), vol. 4, p. 102].
10. P. T. Furst, thesis, University of California (1966); L. H. Feldman, in *The Archaeology of West Mexico*, B. Bell, Ed. (Instituto Jalisciense de Antropología e Historia and the Sociedad de Estudios Avanzados del Occidente de México, in press).
11. I thank the American Philosophical Society for its grant 877 (Johnson Fund), which supported the fieldwork; the Instituto Nacional de Antropología e Historia, Mexico, for permission to excavate; R. Berger for the carbon-14 test; C. W. Meighan for the obsidian hydration tests; and J. C. Kelley for comments and suggestions.

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Electrical Generation of Natural Aerosols from Vegetation

Abstract. *It is suggested that an alternative, or additional, source of the blue haze above heavily forested areas may be the generation of submicrometer-sized wax particles by the action of strong electrical fields at the tips of pine needles and other wax-covered plant surfaces. Exposure of pine needles to high potential gradients results in the production of airborne wax particles with diameters less than 0.6 micrometer.*

One of the striking features of heavily forested mountain areas is the persistent atmospheric haze that seems to trail from the trees and ridges. Often associated with the blue haze is such a pleasant odor of terpenes and other organic gases that one is reluctant to regard this combination as an example of air pollution. Yet there have been suggestions which imply just that. Rasmussen and Went (*1*) observed the widespread occurrence of terpenes in forests and considered the concurrent blue haze in a cause-effect relation. They correctly interpreted the bluish cast of the haze to indicate the presence of predominantly submicrometer-sized solid or liquid particles and speculated that the particles were the product of the photochemical effects of sunlight acting on terpenes and other airborne hydrocarbons. Went also suggested that the resulting aerosols might prove to be toxic (*2*), in analogy with the more notorious photochemical oxidants associated with motor vehicle exhaust.

The presence of a wax coating on the surface of leaves is an almost universal phenomenon throughout the plant kingdom. According to Eglinton *et al.* (*3*), the major constituents of the wax are alkanes, alcohols and acids (usually in the form of esters), polymerized aldehydes, and ketones, with the specific composition depending on the plant (*4*). In at least some cases, wax is extruded

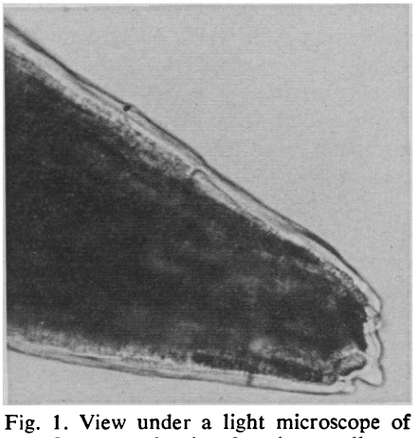

Fig. 1. View under a light microscope of wax fingers at the tip of a pine needle.