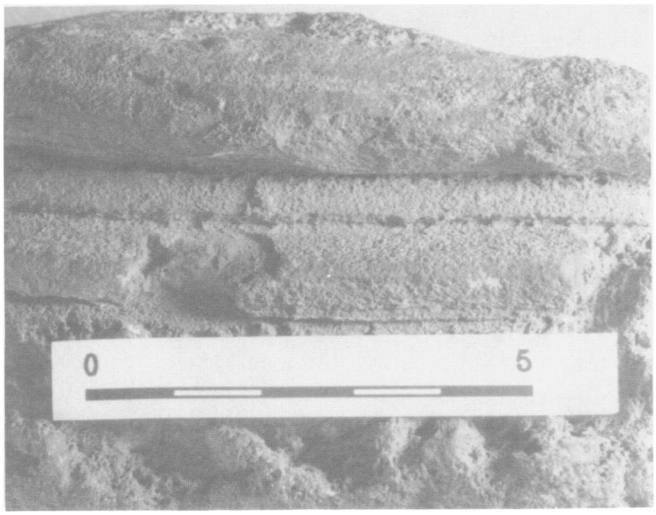

FIG. 2. *Detail of the same scoria pebble, showing natural groove.*

process described above, pointing to the grooves delineating the head and arms as hominid modifications. However, in light of the geological evidence for the creation of various grooves during scoria production, it should be seriously considered that the grooves distinguishing the head and arms are the result of natural processes as well.

The provenance of the object and the other artifacts excavated at Berekhat Ram is described by Goren-Inbar (1986) as under, among, and on top of basalt and scoria gravels and pebbles, and therefore (*contra* Schepartz 1993:117) it is not the only piece of scoria found at the site. No other scoria objects were examined, however, to confirm that the grooves found on the figurine were human modifications. Without an examination of the grooves found on the unworked scoria, Goren-Inbar's differentiation between worked and unworked seems to be based solely upon natural form.

Other natural phenomena have fooled archaeologists into producing complicated explanations. For example, the suggestion of the cave bear cult was based upon the discovery of cave bear skulls in Drachenloch Cave (Chase 1987). Further examination of other caves and study of the natural behavioral patterns of modern bears indicated that the cave bear skulls were in fact natural cave accumulations, not evidence of prehistoric ritual (Jequier 1975). As in the case of the cave bear cult, further analysis in the context of naturally occurring processes leads to reevaluation of initial interpretations of the scoria pebble. When one considers that the figurine was excavated from a scoria bed, that there is a tendency for lapilli to form a skin with natural grooves, and that lapilli can take strange natural forms, it is not only conceivable but probable that the figurine is entirely of geologic origin. Microscopic examination of the grooves, particularly those that delineate the head and arms, compared with grooves on unworked pieces of scoria excavated from the bed would demonstrate whether there had been hominid modification of the scoria pebble in question. Until such a comparison is made, the symbolic nature of the scoria pebble from Berekhat Ram should not be cited as indisputable evidence either for or against the existence of symbolic art prior to the Upper Paleolithic.

References Cited

BEDNARIK, R. G. 1989. The Galgenberg figurine from Krems, Austria. *Rock Art Research* 6:118–25.

———. 1992. Paleoart and archaeological myths. *Cambridge Archaeological Journal* 2:27–41.

CHASE, P. G. 1987. The cult of the cave bear: Prehistoric rite or scientific myth? *Expedition* 29:4–9.

CHASE, P. G., AND H. L. DIBBLE. 1987. Middle Paleolithic symbolism: A review of current evidence and interpretations. *Journal of Anthropological Archaeology* 6:263–96.

———. 1992. Scientific archaeology and the origins of symbolism: A reply to Bednarik. *Cambridge Archaeological Review* 2:43–51.

DAVIDSON, I. 1990. Bilzingsleben and early marking. *Rock Art Research* 7:52–56.

DAVIDSON, I., AND W. NOBLE. 1989. The archaeology of perception: Traces of depiction and language. CURRENT ANTHROPOLOGY 30:125–55.

GOREN-INBAR, N. 1986. A figurine from the Acheulian site of Berekhat Ram. *Mi'tekufat Ha'even* 19:7–12.

JEQUIER, J. P. 1975. *Le Moustérien alpin: Revision critique, Eburodunum II.* Yverdon: Institut d'Archéologie Yverdonnois.

MACDONALD, G. A. 1967 "Forms and structures of extrusive basaltic rocks," in *Basalt: The Poldervaart treatise on rocks of basaltic composition.* Edited by H. H. Hess, pp 1–62. New York: Interscience.

SCHEPARTZ, L. A. 1993. Language and modern human origins. *Yearbook of Physical Anthropology* 36:91–126.

Cahuachi: New Evidence for an Early Nasca Ceremonial Role[1]

LIDIO M. VALDEZ
Department of Archaeology, University of Calgary, 2500 University Dr. N.W., Calgary, Alberta, Canada T2N 1N4. 7 VI 94

Having conducted archaeological excavations at the early Nasca site of Cahuachi in 1952–53, Strong (1957: table 1, fig. 3) concluded that the site was composed of temples, cemeteries, and house mounds. Subsequent scholars stressed the apparent presence of house structures (for discussion, see Silverman 1988*a*:422), and this

 I think G. Orefici and the members of the Centro Italiano Studi e Richerche Archaeologiche Precolombiane for having given me the opportunity to participate in the excavations at Cahuachi. In addition, I thank N. Machaca, A. Pariahuaman, and Y. Cavero for their help during the excavation of experiment 8. I am grateful to an anonymous referee for his/her comments and suggestions on an earlier version of this paper. Finally, I thank my wife, Katrina Bettcher, for her help during the preparation of this paper.

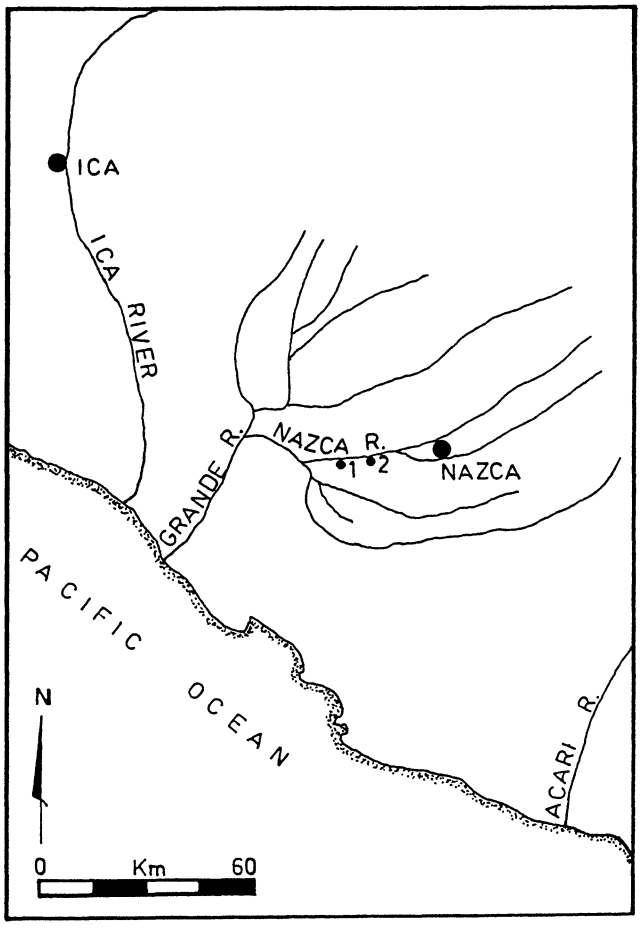

FIG. 1. *The Nazca Valley, showing the archaeological sites of Cahuachi (1) and Pacheco (2).*

and its size led to an interpretation of the site as an urban center (see, e.g., Rowe 1963:11–12; Lanning 1967:116–117; Lumbreras 1974:123–24). This interpretation remained dominant in Peruvian archaeology until very recently.

The 1980s constituted a new era in the archaeological investigation of the Nasca[2] culture (circa 100 B.C.–A.D. 550), which until then had been understood almost exclusively from the study of polychrome Nasca pottery. Little was known about Nasca society, and therefore new archaeological studies were needed. Archaeological excavations were carried out at various Nasca sites and in particular at Cahuachi. In the early 1980s Silverman carried out archaeological excavations in unit 16 of Cahuachi, and shortly thereafter G. Orefici conducted intensive and extensive archaeological excavations in several areas of this site, most of them in unit 10, located east of what Strong identified as burial area 2 (1957:fig. 4). This new archaeological research was oriented in general terms toward clarifying the character of the site and of Nasca society (see Silverman 1988*a*:409). Because Cahuachi is completely different from any other Nasca site, the possibility was considered that it was built for purposes other than habitation.

Cahuachi is unique in the south coastal region. It lies in the lower portion of the Nazca Valley (fig. 1) and was initially occupied during the late Paracas phase (Strong 1957:13–14). During the Nasca 1 phase it continued as a small farming village of little significance in the context of Nasca society. However, during the Nasca 2 phase it experienced radical change, becoming a ceremonial center with probably only local (Nazca Valley) impact. During the Nasca 3 phase Cahuachi was apparently the main ceremonial center not only of the Nazca Valley but also of the whole south coastal region (Silverman 1986:400; 1987:7). As is apparent from the abundance of Nasca pottery belonging to this phase, this was the period when most of the building construction at this site was undertaken. The site was abandoned at the end of Nasca 3 or the beginning of the following phase (Menzel 1971:64; Silverman 1988*a*:440). Given these new data, it is arguable that by the close of Nasca 3 the number of ceremonial activities carried out at Cahuachi had declined drastically.

One of the first to argue against the urban-center interpretation of Cahuachi was Silverman (1986, 1988*a*). During her excavations at Cahuachi, she found no evidence of a large population or remains of domestic and residential structures suggesting that it was an urban settlement. Thus, she argued that it was an empty ceremonial center to which people went periodically for religious activities (Silverman 1986, 1988*a*, 1990). For instance, she noted an "enormous amount of decorated pottery at Cahuachi" (1986:228) and speculated that this was probably because "fancy pottery [was] brought to the site and used there (and in the course of such use broken accidentally and deliberately) and possibly . . . redistributed" (p. 389). In fact, about 70% of the pottery pieces found at Cahuachi are polychrome (Silverman 1988*a*:421). In addition, Silverman (1986:419–20) suggested that "pottery was made especially to be taken to the ceremonial center; it was used there and some broken, some also deliberately broken as part of the activities occurring at this site." Finally, Silverman indicated that "the vegetal and faunal remains suggest that food [was] brought to the site to be immediately consumed there" (p. 390).

Most of this, however, was speculation (see Silverman 1988*a*:425). Until recently the only facts were the abundance of fancy pottery and the absence of domestic features; there was no evidence of pottery's being broken during ceremonial activities or of the consumption of food.

NEW DATA

In 1986 archaeological excavations were carried out near Strong's cut 9 (1957: fig. 4). Designated experiment 8,

2. "Nasca" refers to the ancient Andean culture; "Nazca" is the spelling used for the river, the valley, the contemporary city, and the geographical region of the Peruvian south coast.

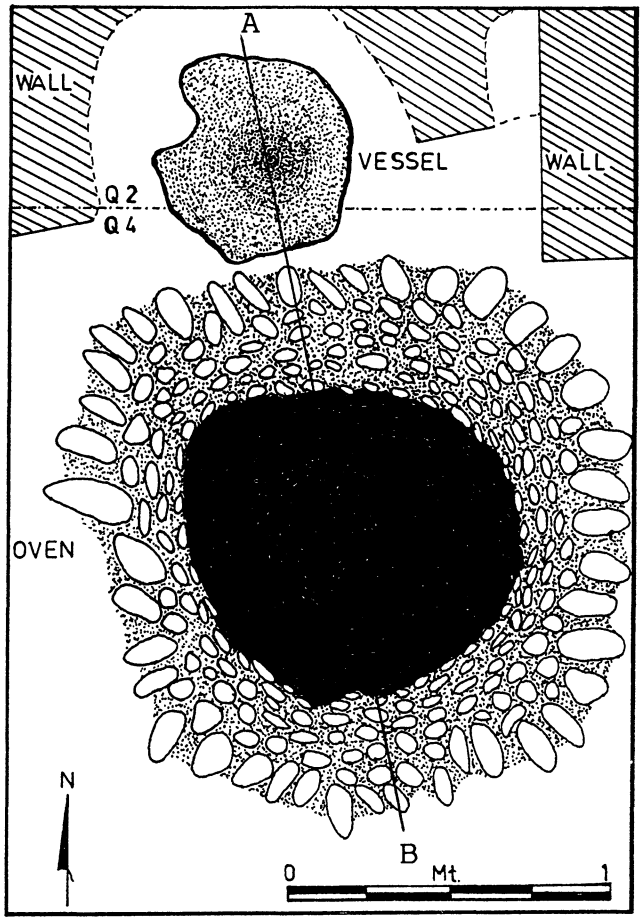

FIG. 2. *Feature of experiment 8: association of oven with vessel.*

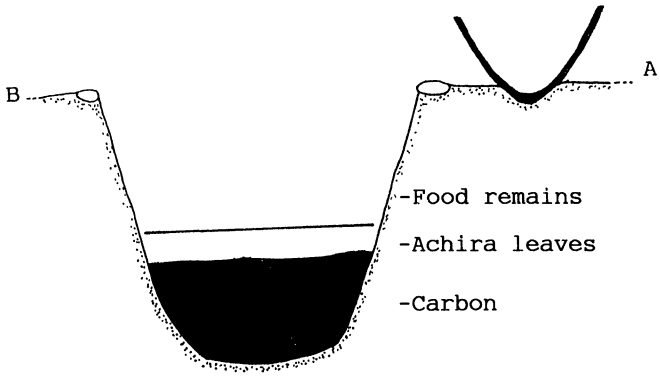

FIG. 3. *Vertical sections of experiment 8 feature.*

these excavations were composed of two 5 × 5-m excavation units (Q1 and Q2) and a third 2 × 2.5-m unit (Q4). Between units Q1 and Q2 the excavations uncovered an adobe wall with a north-south orientation. On the east side of the wall (Q1) there was a clean floor and a few archaeological remains; on the west side of the wall (Q2) were abundant food remains, vegetal and faunal, a large concentration of fancy early Nasca pottery, and the remains of algarrobo (*Prosopis chilensis*) seeds and San Pedro cactus (*Trichocerius pachanoi*). The plant remains included some complete plants.

Unit Q4, however, proved even more significant for understanding the nature of this early Nasca site. Excavations in it uncovered a circular structure built of stone and mud and next to it a large vessel (fig. 2). Because Cahuachi was built almost entirely of adobes, the circular structure is unique. Inside it were found food remains including corn (*Zea mays*), beans (*Phaseolus lunatus, P. vulgaris,* and *Canavalia plagiosperma*), sweet potatoes (*Ipomoea batatas*), manioc (*Manihot esculenta*), achira (*Canna edulis*), jicama (*Pachyrrhizus tuberosus*), chile (*Capsicum* sp.), and Andean camelid bones. In addition, there was an obsidian projectile point. Below this level there was an accumulation of intact achira leaves. Those on top showed evidence of food and fat, while those on the bottom appeared burned. Finally, below the accumulation of achira leaves there was a concentration of carbon and some wood remains (fig. 3). The latter were recognized as belonging to the huarango tree (*Acacia macracantha*). Around the vessel and the circular structure itself there were more food remains and, most interesting, fragments and whole pieces of painted Nasca pottery. Taken together, these new data strongly support most of Silverman's earlier claims. The feature just described represents an oven built and used to prepare the food for ceremonial activities, and the large ceramic vessel indicates the consumption of chicha (a fermented beverage) during the rituals.

The presence of complete plant remains in association with the Q4 feature is critical for a better understanding of the nature of Cahuachi as a ceremonial center. Currently, in the Nazca Valley there are two agricultural seasons, summer (November–March) and winter (June–October). If this information can be applied to the past, we can argue that the ceremonial activities carried out at Cahuachi took place at the end of each agricultural season and therefore at least twice a year. At the same time, it suggests that the rituals were closely related to agricultural fertility, considering that Nasca subsistence was mainly based on agriculture (Valdez 1988).

The presence of the bones of Andean camelids in association with the oven and the vessel suggests that these animals were perhaps sacrificed. All anatomical parts are represented, indicating that the animals were brought alive to Cahuachi and slaughtered there. The projectile point, rare in a Nasca site, that was found inside the oven may have been used to sacrifice the camelids. Most of the bones are those of adults, suggesting that these were domestic camelids; with wild species the representation of adults and young would be more equal. Of all the camelid bones from the other units of Cahuachi 3,382 belonged to adults and only 822 to young ones (Valdez 1988), suggesting that during this period there was already control over domestic camelids and the preferential sacrifice of adults, leaving the young to maintain the herd.

The presence of the vessel near the oven suggests that the ritual activities that took place included the consumption of chicha and apparently hallucinogenic beverages. Excavations in Q2 uncovered remains of algarrobo seeds that were probably used in preparing chicha. In the same context in all the excavated areas of Cahuachi there are corn remains, and because in the Andes corn is frequently used to prepare chicha (see Hastorf and Johannessen 1993) it is likely that at Cahuachi corn was used for this purpose. Likewise, excavations in Q2 uncovered remains of crushed San Pedro cactus, a hallucinogenic plant not typical of the Nazca Valley. This suggests that San Pedro cactus was brought to Cahuachi to be used as hallucinogen during the ceremonial activities. The presence of San Pedro cactus in Nasca iconography (P. Carmichael, personal communication, 1994) indicates that this plant was well known to the Nasca people.

The fragments of fancy Nasca pottery found to the west of the oven, most of them belonging to whole pots, indicate that polychrome pottery, probably made and brought especially for the ritual occasion, was accidentally and/or deliberately broken near the oven. It is interesting that most of the pottery found near the oven belongs to Nasca 3, although there is also Nasca 2 pottery and some from Nasca 4. The prominence of Nasca 3 pottery near the oven, perhaps representing an intensification of ceremonial activities at Cahuachi at this time, accords with the evidence that the site reached the peak of its prestige during this phase (Silverman 1987:7). The pottery found near the oven also includes fragments of panpipes, perhaps indicating that music was part of the rituals carried out at this Nasca center (see Silverman 1988*a*:425).

Finally, the oven itself, at a site that had no resident population, is evidence for the preparation of ceremonial food. A wide variety of plant foods were brought to Cahuachi and then cooked and eaten. Meat from sacrificed camelids was probably also consumed. According to Silverman (1988*a*:421), guinea pigs (*Cavia porcellus*) seem to have been sacrificed at the site as well. All these activities probably occurred as part of periodic rituals performed at the site at the end of each agricultural cycle.

Summarizing, data from the excavations of experiment 8 at Cahuachi strongly support the initial claims of Silverman (1986). Indeed, there is concrete evidence of food and chicha consumption, probably as part of the ceremonial activities carried out at the site. Likewise, it is likely that polychrome pottery was brought to the site for ritual use and breakage. Finally, the ceremonial activities apparently also included the consumption of hallucinogenic beverages.

DISCUSSION

Although the data from Cahuachi are unique in Andean archaeology, there is ethnographic and archaeological information that closely resembles them. First, the inhabitants of Andamarka barrio in Huamanga (Ayacucho) carry plant offerings in pilgrimage during the celebration of the Holy Cross on May 3, coincidentally the end of the main agricultural season in the highland central Andes. The plant offerings are placed in a chapel where there is a portrait of Jesus Christ on the cross. Second, the Front Face Deity of Wari appears in association with a variety of plants, most of them from the highlands (Lumbreras 1980:44). At the Wari site of Pacheco, a few kilometers east of Cahuachi in the Nazca Valley, offering vessels were found on which the Front Face Deity is associated with plants and Andean camelids (Menzel 1964:26–27). From this observation it seems possible that what the inhabitants of Andamarka practice is an old Andean tradition and that the presence of the portrait of Jesus Christ and the celebration of the Holy Cross are late introductions, probably a product of the evangelization of the Andean peoples and the replacement of the Andean gods (see Millones 1992). Wari iconography strongly supports this argument. In addition, in the Mantaro Valley (Huancayo), also in the central highlands, the inhabitants prepare food (*pachamanka* [*pacha* 'earth', *manka* 'pot']) in ovens like that found at Cahuachi.

Two of the main questions that need to be answered here are why Cahuachi was converted into a ceremonial center during Nasca 2 and why it became more important during the following phase. If the Nasca 2 sherds found next to the oven and the vessel indicate when the oven was built, this is perfectly in accordance with the evidence that Cahuachi was converted into a ceremonial center during this phase. However, the abundance of pottery belonging to the following phase clearly shows that this was when this Nasca center gained regional prestige. It seems to indicate an intensification of ceremonial activities at Cahuachi in Nasca 3 times. Assuming that the rituals carried out at Cahuachi were related to fertility and thus to agricultural activities, the intensification of ceremonial activities may reflect environmental deterioration. Chronologically, Nasca 3 can be placed between A.D. 400 and 500 (see Silverman 1988*b*: fig. 10), a period for which Thompson et al. (1985; Shimada et al. 1991) suggest a severe drought in the central Andes. Because agricultural activities in the coastal valleys are dependent on the rivers that flow from the highlands, the effects of that drought were probably devastating for most coastal populations, including the Nasca. Cahuachi was abandoned at the end of Nasca 3, and coincidentally several settlements were also unoccupied during this time in the adjacent Acari Valley (Rowe 1963). For the case of the Nazca Valley it is argued that just after the abandonment of Cahuachi there was a major concern about water leading to the construction of the so-called *pukios* (Schreiber and Lancho 1988, Clarkson and Dorn 1991). At the same time, the population was concentrated in certain portions of the valley where water was available (see Schreiber 1989). If this is so, it seems likely that Cahuachi was also abandoned because of the drought.

Cahuachi may have become important during a period

of environmental deterioration and then collapsed because of that environmental deterioration. The ceremonial activities carried out at Cahuachi were probably related to water, fertility, and agriculture. It is possible that during Nasca 3 the drought was severe and therefore rituals were intensified at Cahuachi. After its abandonment, this Nasca center apparently maintained its prestige, and the late establishment of the Wari site of Pacheco near Cahuachi was probably an effort to capture its prestige while replacing it and its Nasca gods with Pacheco and the Wari gods.

References Cited

CLARKSON, PERSIS B., AND RONALD I. DORN. 1981. Nuevos datos relativos a la antigüedad de los geoglífos y pukios de Nazca, Perú. *Boletín de Lima* 78:33–47.

HASTORF, CHRISTINE A., AND SISSEL JOHANNESSEN. 1993. Pre-Hispanic political change and the role of maize in the Central Andes of Peru. *American Anthropologist* 95:115–38.

LANNING, EDWARD P. 1967. *Peru before the Incas.* Englewood Cliffs: Prentice-Hall.

LUMBRERAS, LUIS G. 1974. *Peoples and cultures of ancient Peru.* Washington, D.C.: Smithsonian Institution Press.

———. 1980. "El imperio wari," in *Historia del Perú,* vol. 2, pp. 10–91. Lima: Editorial J. Mejía Baca.

MENZEL, DOROTHY. 1964. Style and time in the Middle Horizon. *Ñawpa Pacha* 2:1–106.

———. 1971. Estudios arqueológicos en los valles de Ica, Pisco, Chincha y Cañete. *Arqueología y Socieded* 6:1–106.

MILLONES, LUIS. 1992. The time of the Inca: The colonial Indian's quest. *Antiquity* 66:204–16.

ROWE, JOHN H. 1963. Urban settlements of ancient Peru. *Ñawpa Pacha* 1:1–27.

SCHREIBER, KATHARINA J. 1989. On revisiting Huaca del Loro: A cautionary note. *Andean Past* 2:69–79.

SCHREIBER, KATHARINA J., AND JOSUÉ LANCHO. 1988. Los puquios de Nazca: Un sistema de galerías filtrantes. *Boletín de Lima* 59:51–62.

SHIMADA, IZUMI, CRYSTAL B. SCHAAF, LONNIE G. THOMPSON, AND ELLEN MOSLEY-THOMPSON. 1991. Cultural impacts of severe droughts in the prehistoric Andes: Application of a 1,000-year ice core precipitation record. *World Archaeology* 22:247–70.

SILVERMAN, HELAINE. 1986. *Cahuachi: An Andean ceremonial center.* Ann Arbor: University Microfilms.

———. 1987. A Nasca 8 occupation at an Early Nasca site: The room of the pots at Cahuachi. *Andean Past* 1:5–55.

———. 1988*a*. Cahuachi: Non-urban cultural complexity on the south coast of Peru. *Journal of Field Archaeology* 15:403–30.

———. 1988*b*. "Nasca 8: A reassessment of its chronological placement and cultural significance," in *Multidisciplinary studies in Andean anthropology.* Edited by V. J. Vitzthum, pp. 23–32. Ann Arbor: Michigan Discussions in Anthropology.

———. 1990. "The Early Nasca pilgrimage center of Cahuachi and the Nasca lines: Anthropological and archaeological perspectives," in *The lines of Nazca.* Edited by A. F. Aveni, pp. 207–44. Philadelphia: American Philosophical Society.

STRONG, WILLIAM D. 1957. *Paracas, Nazca, and Tiahuanacoid cultural relationships in south coastal Peru.* Memoirs of the Society for American Archaeology 13(22), pt. 2.

THOMPSON, L. G, E. MOSLEY-THOMPSON, J. F. BOLZAN, AND B. R. KOCI. 1985. A 1500-year record of tropical precipitation in ice cores from the Quelccaya ice cap, Peru. *Science* 229:971–73.

VALDEZ, LIDIO M. 1988. Patrones de subsistencia nasca: Una perspectiva desde Kawachi y Tambo Viejo. Licenciatura thesis, Facultad de Ciencias Sociales, Universidad de Huamanga, Ayacucho, Peru.

The Origins of Weapon Systems[1]

MALCOLM F. FARMER
6146 Southwind Dr. Whittier, Calif. 90601, U.S.A.

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As Stiner (1993:70) has recently pointed out, "Upper Palaeolithic and Late Stone Age assemblages of Eurasia and Africa . . . seem to be full of projectile weapons, along with shaft straighteners, wrenches, or throwing boards." Mousterian weapons included thrusting and throwing spears, the bola, throwing clubs, and perhaps others, but the Upper Palaeolithic produced the dart thrower, using flaked stone and bone points, and eventually the bow-arrow complex. In the Mesolithic the bow and arrow ultimately dominated in Eurasia and Africa, remaining part of a mixed pattern elsewhere. Australia was a dart-thrower area, and the weapon may not have come into use there until about 5,000 years ago. The development of the dart thrower and the bow-arrow complex involved more complex mechanical systems than earlier weapons (although the bola was twirled about the upper body to confer maximum velocity on the missile), and parallels in their mechanical principles suggest a possible relationship between them.

Few anthropologists have ventured consideration of the origin of the bow-arrow complex, and a comment by Birket-Smith (1965:132) is typical: "The way the bow was invented is as puzzling as its age, for it is easy to see that furnishing a wooden stick with a cord in order to utilize the elasticity of the wood is not at all an obvious thing to do." Archaeological evidence is not present until after the Magdalenian. In the Mesolithic it is found in western Eurasia (Clark 1963, Pericot García 1942, Kehoe 1988, Rust 1943), northwestern Africa (Clark 1970, Wendorf 1968), and the Middle East (Belfer-Cohen 1991). This distribution hints at an early hearth in the Mediterranean Basin and diffusion as part of the Mesolithic, ultimately into northeastern Eurasia (Aikens and Niguchi 1981:177) and Southeast Asia. The bow appears to have been a late entry into North America, although the distribution in South America suggests that an earlier entry must be considered. The bow-arrow complex became dominant in the Neolithic (Rausing 1967), and in interior Eurasia there was innovation of the self-bow, the sinew-backed bow, and later the true composite bow (Hamilton 1970). A further innovation was the addition of the "ears" to the ends of the bow limbs, creating the fully recurved composite bow (McEwen, Miller, and Bergman 1991).

The "puzzle" of the origins of the bow remained, and no adequate hypothesis was presented in spite of new

 Useful comments on the subject of this paper have been made by Thomas F. Kehoe and Eugene Robinson. I owe a debt to the work of Michael A. Hoffman on Predynastic Egypt.