

## COMMENT

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John Rowe's recent review<sup>1</sup> uses as a stepping stone the final six pages of my article on the Inca calendar (Zuidema 1977); and although this portion was headed: "The ceque system and astronomical observation: a preliminary discussion," Rowe goes far beyond the tentative ideas expressed therein. However, since he discusses certain matters that I have dealt with after that paper was submitted for publication (1975), I would like to comment on Rowe's opinions in terms of this ongoing research (Zuidema and Urton 1976).

The Incas had a synodic lunar calendar; that is, a calendar counted by the phases of the Moon. Any observation of the Sun was relegated to the lunar calendar for its celebration, relating it to the observation of a nearby Full or New Moon. Rowe says "this calendar was controlled by observation of the solstices"; let us see if this is so. The one precise statement in the chronicles that explains how the Incas viewed the luni-solar correlation (a year of 365 days is 11 days longer than the period of 12 synodical months of 29½ days each) is found in an anonymous source (dated by Rowe from about 1570).<sup>2</sup> The writer says: ". . . and entering the Sun in between the two central pillars, it was the point [on the Western horizon] and the time . . . to sow in Cuzco, and this was always in the month of August. And so, in order to measure the Sun in between the two pillars, they had another pillar in the middle of the plaza . . . , called *Osno* and from there they measured the Sun . . ." (p. 151).

At the moment, the exact location of the two pillars on the horizon and the pillar on the plaza is immaterial, as well as why the Incas observed the Sun on an exact date in August. From the text alone we understand that the Incas made an important observation of the Sun in the Spanish month of August. Our chronicler said (pp. 150–51) that by way of this observation the Incas measured (or "controlled") the length of the solar year, whereas months of the Spanish-type calendar always retain the same fixed relationship to the solar year. Our chronicler says about the Incaic months (Anonymous, p. 158): "They called the moon of the month of August *Tarpuyquilla* [the "moon of the planting"]. During this month they would only plant. . . . And during this month of August the Sun would enter in between the two towers . . . as has been

discussed before." The August lunisolar correlation was extremely important and data from other chroniclers confirm August as the first month of the Inca agricultural year. We cannot say that the Incas did not make lunisolar readjustments at other times, including the December solstice, but we can say that observation of the solstices was only part of a more general system of solar observations. Solstices were not the most important observations because they did not mark the first correlation of lunar and solar cycles.

Rowe goes on to say:

Part of Zuidema's argument involves assuming that the ceques were straight lines. All appear in Cobo's list to radiate from the Temple of the Sun [Coricancha], and if they were straight lines, one could imagine exploring the possibility that at least some were astronomically aligned with the Temple of the Sun as the center of observation. Some of the ceques may indeed have been straight lines, but some certainly were not. For example, the set of verano markers is listed as a shrine on the sixth ceque of Chinchaysuyu. Some of the previous shrines on this ceque can be located on or near a line running up the Quebrada de Saphi. A prolongation of the Saphi line falls well outside the segment of the horizon in which the sun can set at any time between the solstices. As described, this ceque must have had at least one substantial bend in it. . . . (P. 232)

First, to refer to the huacas as "shrines" on the ceques gives a completely erroneous impression of their nature. They were both natural and man-made landmarks, chosen in relation to a ceque (direction), and they could be worshiped by way of shrines (as landmarks many can still be found, if one wants to do the fieldwork; or their location can be reconstructed from the descriptions).

Second, the data indicate that the tenth huaca on this ceque "was a well called Guargua Illapuquio close to this mountain [Quiancalla, the ninth huaca] . . ." Huarhuaylla is a hamlet (still existing) in the same direction as the Qubrada de Saphi, but further away from Cuzco.<sup>3</sup> With this information, we can also identify with more confidence the ninth huaca, Quiancalla ". . . that was on the road to Yucay, where there were two markers or pillars that they had as a signal. When the Sun reached those, it was the beginning of summer" (that is, winter in the Southern Hemisphere). The old road near Huarhuaylla to Yucay passes out of sight from the valley of Cuzco because it goes beyond the horizon as seen from the valley and because it turns more to the North around the mountain range of Huayna Corcor. A nearby peak is Senqa, and the chronicler Guaman Poma de Ayala confirms, in one of his drawings, the directional relationship of Quiancalla—together with Senqa as part of Huayna Corcor—to the river Saphi. Then there is the eleventh and last huaca:<sup>4</sup> "Illacamarca, it was a fortress that was built on a rock, on the road to Yucay." Thus, there is no bending necessary to reconstruct this ceque as a straight line.

Returning to the astronomical argument, we find Quiancalla too

far North for a sunset to be observed there from Coricancha. Then from where could the observation of the June solstice have been made? Calculating the direction, and observing back from Quiancalla with the transit, our sightline passes over an area that contained another Inca Sun temple, called Chuquimarca. Cobo's data on the ceque system, together with colonial documents, locate it northeast of Cuzco. We know from the descriptions of Molina and Cobo of the calendrical rituals that the Inca king went there to celebrate the June solstice (although they do not tell us how the lunisolar correlation was calculated); thus, there is evidence to favor Chuquimarca as a temple of the Sun, with the Sun seen setting behind Quiancalla during the June solstice. Cobo probably referred to this event when he mentioned the two pillars indicating the beginning of summer.<sup>5</sup> The tentative conclusions of my 1977 article suggested that there was not just one center for astronomical observation, and that the directions of ceques by themselves did not need to be astronomical even if the huacas, as observed on the horizon from the Cuzco valley, were used for astronomical observation. The research has been rewarding in that it led to Chuquimarca, a location of great archaeological interest and of great ritual importance for the Incas.

The fact that different centers were used for observing different astronomical events is not unique (see, e.g., McCluskey 1977, p. 177–78, in his discussion of the Hopi calendar and astronomy in Walpi; a similar situation existed in Zuni). We have already discussed the notation by the Anonymous chronicler that the "Osno" in the plaza of Cuzco was used for at least one solar alignment;<sup>6</sup> and the chronicler Garcilaso, says that he saw the towers (mentioned earlier) "standing in 1560 and if they have not been taken down later, one could verify by them the place from where the Incas observed the solstices and see if it was a tower that stood in the temple of the Sun or in another place that I do not mention as I am not sure of it." Rowe does not seem to accept that there could be more than one center of observation, whereas my investigations (1977, and Zuidema and Urton 1976) indicate that (1) the ceque system was a system of astronomical observation having various centers of observation; (2) the ceque system was a computing device for astronomical cycles having one center of computation; and (3) the ceque system was a device for integrating astronomy, cosmology, and sociopolitical structure that included its first two uses. Now that he is in possession of our more recent works perhaps Rowe's future criticism can be updated.

#### NOTES

1. John Howland Rowe, "Archaeoastronomy in Mesoamerica and Peru," *LARR* 14, no. 2 (1979):227–33.
2. For a line-by-line analysis of this information, see John Earls (1976).
3. On the map of Pukiura, hoja 27 r II S.E., scale of 1:25,000, Huarhuaylla is indicated as

Arajay, with a latitude of 13° 16'30" S and a longitude of 72° 01'30" W. Having visited both hamlets, I can confirm that this identification is wrong. Arajay is somewhat further to the North on the same road to Chinchero. The hamlet Huarhuaylla belongs to the former hacienda of the same name, indicated as such on the map.

4. In the edition of Cobo that I used, he says that there are eleven huacas in this ceque, but only ten are enumerated. I reported this omission, which had not yet been observed by anyone else. As Cobo later says that he had forgotten to mention four other huacas, I suggested that one of these might be the missing one (Zuidema 1977, p. 242). One might cite as an example of scientific cooperation the fact that Rowe discovered the real missing huaca in an earlier edition of Cobo, thus solving a small problem. Instead, Rowe mentions my "gratuitous emendation," but does not mention the missing huaca either (see his note 10).
5. Since antiquity, the astronomical beginning dates of the seasons were the solstices and equinoxes; this is opposed to the popular use of taking these dates as mid-season. Certainly, the well-educated Jesuit Cobo would know the scientific use of the term "verano."
6. For an elaboration of the problem of the Osno, see Zuidema (ms). An earlier version of this paper was given in Cuzco at a congress attended by Rowe.