The Use of Building Technology in Cultural Forensics: A Pre-Columbian Case Study

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INTRODUCTION

This paper poses the possibility that as early as 750 AD, technology transfer may have taken place between Pre-Columbian Peru and the Anasazi culture in Utah/Colorado. The possibility of such a cultural link became apparent to this researcher in 1976 while executing graduate field work in Central America; however, further study has awaited adequate funding. If such transfer existed, the probable route would seem to have been from Peru north along the Pacific coast, then up the Colorado River to the San Juan area of Utah/Colorado.

PURPOSE

The first objective of this study has been to determine if this tentative hypothesis is sufficiently plausible to warrant further testing. It is a status report of preliminary research work that is currently in progress. The second objective of this study was to explore the possible usefulness of architectural technology as an overt and objective measure in evaluating such plausibility. This study specifically focused on an attempt to track the evolution of a reasonably unique roof structure in both the upper Mantaro river area near Ayacucho, Peru and in the San Juan drainage area in Utah/Colorado.

Because of the great distances involved, even if similarities in building technology can be adequately identified, additional architectural similarities will need to be sought in subsequent studies before a final hypothesis can be defined that will warrant testing. Further, if such a cultural link existed, there should be corroborating evidence among other indicators traditionally used by archaeologists such as pottery, linguistics, and other primitive artifacts.

BACKGROUND

For decades, archaeologists and anthropologists have had and interest in establishing links between Pre-Columbian Mesoamerica (Mexico and Central America), and the cultures of the American Southwest. The "kiva" in the "Four-Corners" area of the American Southwest is perhaps the most unique building form of the Anasazi culture, but it does not seem to exist in Mesoamerica. In the world of architecture, this argues significantly against significant Mesoamerican/Anasazi "diffusion" theories.

The prevailing theory for the "in-situ" evolution of the kiva building type was proposed by John Otis Brew in 1946. Brew dismissed outside cultural diffusion as necessary to kiva development based on his field studies at Alkali Ridge, Utah. Briefly his theory traces the shift from the Basket III pit house (used as a domestic residence), to the ceremonial kiva configuration common to Pueblo II period of the Anasazi culture. His study of this subject is thorough, and continues to largely accepted by archaeologists. However, this well-developed theory did not specifically address the unique "corbeled-dome" or "cribbed" roof structure used at many Mesa Verde/Hovenweep Anasazi sites. From an architect's viewpoint it is arguably one of the greatest innovations in building technology offered by the native American experience.

ASSUMPTIONS

In pursuing this draft hypothesis, it was necessary to accept the following assumptions:

1. That by their education and practice architects have a significant role to play in cultural forensics involving the interpretation of ancient architectural technology. Webster defines "forensics" as public debate in support of subsequent judicial proceedings, or the use of professional skill to produce evidence in a judicial proceeding establishing legal responsibility. In this current project this legal analogy gives rise to the potential use of other judicial concepts such as motive, opportunity, and levels of proof that can be reasonably required.
2. That cultural judgments being pursued through public debate necessarily involve "surmise." Surmise is defined by A. J. Jaffe as judgment made in a realm of uncertainty, and holds that it is justified in theories involving migration of ancient cultures.

3. That the circular or D-shaped kiva of the Mesa Verde/ Hovenweep Anasazi has sufficient similarities in form and construction to represent an identifiable architectural "type."
4. That the circular kiva form should be recognizable in aerial photos.
5. That the corbeled-dome kiva roof is sufficiently unique to be considered a cultural "signature" item for the Anasazi.

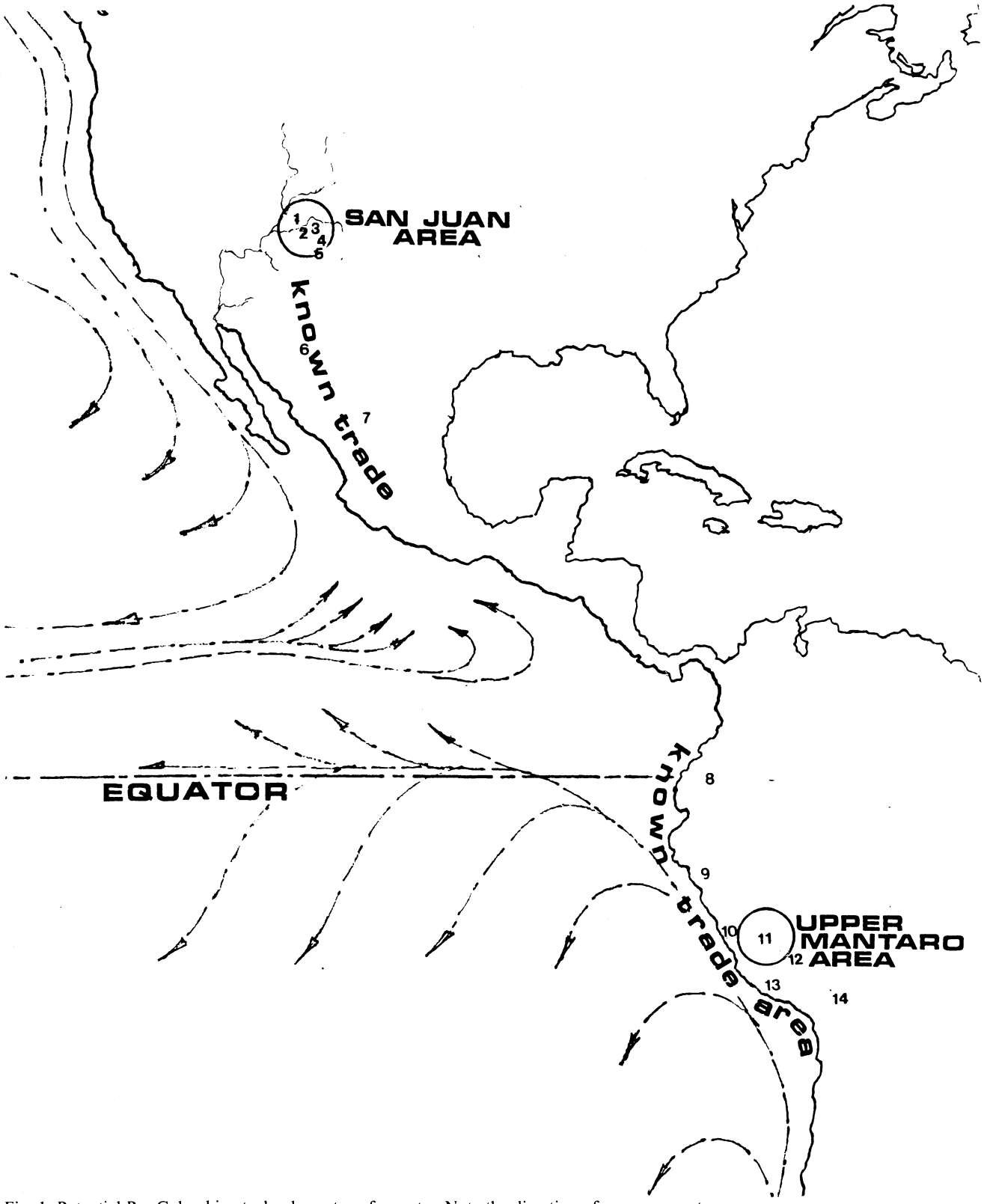

Fig. 1. Potential Pre-Columbian technology transfer route. Note the direction of ocean currents.

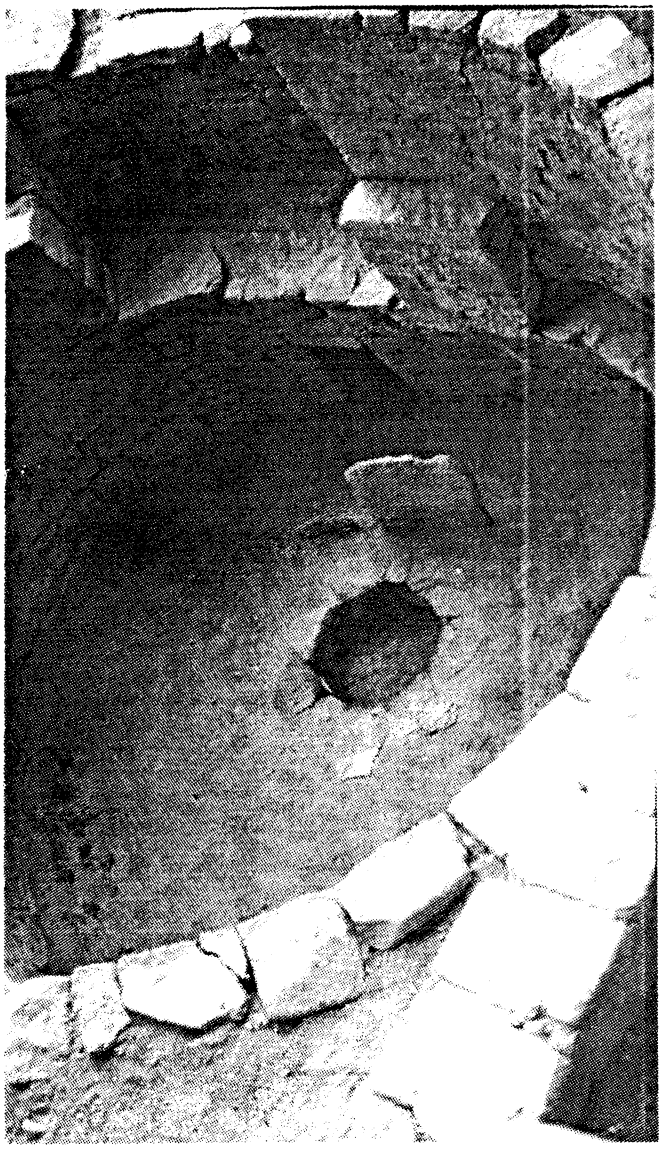

Fig. 2. A typical Mesa Verde/Hovenweep Anasazi kiva. Note the perimeter bench and pilasters.

SCOPE

This paper is based on site examinations in the American Southwest conducted well before 1976, site reconnaissance and analysis completed during graduate work in several countries of Mesoamerica (1976), sabbatical study conducted in residence at selected Anasazi sites (between 1987 and 1995), and reconnaissance completed at selected Pre-Columbian sites in Peru (1995).

The sites of greatest interest in the United States are Hovenweep, Mesa Verde, Aztec, and Chaco Canyon. Pisac, Machu Picchu, Sacsayhuaman, Wari, Tunasniyoq, Huaca Pucllana, and the National Museum of Anthropology and Archaeology in Lima, were studied in Peru.

Up to this time the study has only involved one researcher. Sites in the United States Southwest, Mexico, Central, and South America have been studied. The time period of greatest interest is from 500 AD through 1300 AD. Where justified, limited study has been given to issues outside this time frame.

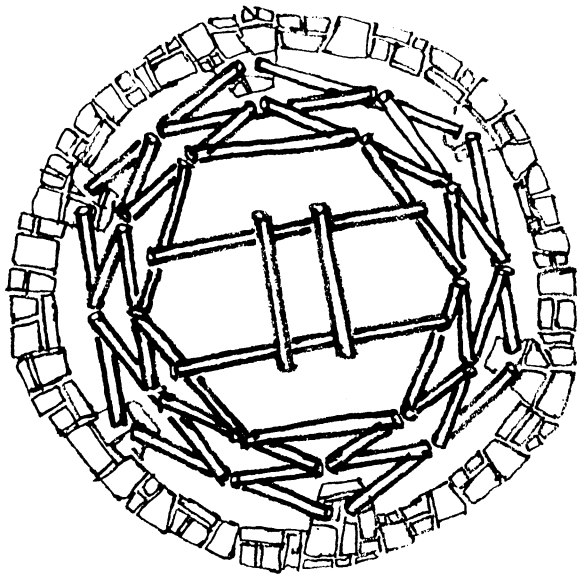

Fig. 3. Plan view of an Anasazi "cribbed or corbeled dome" kiva roof structure.

PROBLEMS AND LIMITATIONS

Surmise: Jaffe states that appropriate rigor in using surmise requires first that the researcher has adequate knowledge of the subject matter, and second that all available data must be reviewed. With respect to the first requirement some adequacy in knowledge of architecture can be claimed however, in the issues of linguistics, pottery, and other areas of archaeology, no such claim of adequacy can be made. Since at this point only a plausible hypothesis is sought, not final proof, the second requirement has only been partially met.

Barriers to diffusion: Thomas Mails in his book "Pueblo Children of Mother Earth" argues against diffusion between cultures that are very distant from each other since an external idea must undergo a selective process before being integrated into a new, and potentially very different culture.

Kiva Types: Watson Smith in his book "When is a kiva" emphasizes the difficulty in defining a "typical" kiva given the considerable diversity of kiva design and construction.

Overcoming/Complementing Accepted Kiva Theory: Brew's theory of in-situ development for the kiva is so convincing that any new hypothesis addressing the evolution of the kiva must either have the potential to bring overwhelming evidence to deny this well-accepted interpretation, or it must be compatible with it.

A single architectural feature or construction method may not be sufficient by itself to assure sufficient plausibility for further testing of a new hypothesis. For this reason, corroboration in other architectural aspects and by other accepted archaeological methods such as pottery was sought.

METHOD

Phase One - Literary Research began in 1976 and has continued through 1996 on an intermittent basis. Available aerial photographs were also studied. Evidence found in these aerial photographs first suggested the hypothesis, and guided the planning of the 1995 site reconnaissance effort in Peru

Phase Two - Formal Site Data Collection was conducted at selected sites in the San Juan drainage area in Utah/ Colorado, and at selected sites in Peru. Data collected during earlier research at other sites in the Southwest, Mexico, and Central America was also utilized. Some disaster site reconnaissance methods were employed.

Phase Three - Data Analysis began prior to leaving each site, but was primarily completed in residence within the United States. It is primarily a comparative study and makes use of checklist, matrices, and overlays following a methods developed by this researcher while completing graduate work at the University of Colorado, and utilized in thesis work for Kansas State University during field data collection in Central America in 1976.

SUMMARY OF DATA

Selected Anasazi Sites showed considerable similarity of building footprint, wall construction, and the use of attached pilasters to support a corbeled-dome roof structure. The Anasazi kiva of Pueblo II period and later consistently had a religious/ceremonial use. At most sites this innovative roof structure appeared fairly suddenly without evidence of local evolution. With the exception of the Alkali Ridge excavation it has had the appearance either a technical import, or as a leap of separate intuitive insight. Brew's interpretation does not address the structural need or revolutionary long span potential of this roof structure. From an architectural standpoint, this structural innovation is not needed at Alkali ridge due the very short spans involved. The largest was about nine meters and could easily be spanned by other systems that were already in use at the site.

Selected Inca sites showed some similarity in building footprint, contradictory functional building use in some cases, and no similarity in roof construction. For example, an elaborate water supply system is an important part of the function of the Muyuc Marca at Sacsahuaman. At Pisac and Machu Picchu the Intiwatanta had no roof, no pilasters, and was completely filled with a large single stone used in sun worship.

Selected Proto-Incan Sites: Only the Vegachayoq Moqo complex at Wari (or Huari) near the modern town of Ayacucho showed significant similarity in building footprint, apparent functional use, and wall construction to an Anasazi kiva. A four foot wide bench occupies about one third of the perimeter of this D-shaped ceremonial space. Pilasters interrupt the bench areas at a regular interval (about 10 feet). Most importantly these pilasters may have supported a cribbed roof covering a portion of the perimeter of this ceremonial space. Unfortunately little excavation has taken place at this site other than the 1953 expedition by Bennett and the 1982 excavation by Bragayrac.

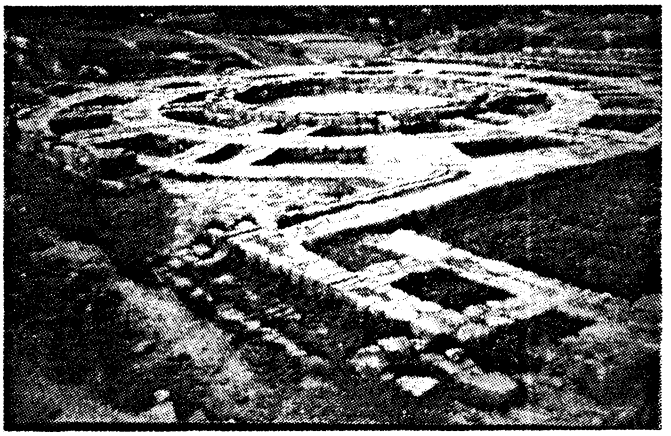

Fig. 4. The Muyuc Marca at Sacsahuaman near Cuzco, Peru.

ANALYSIS

Architectural Similarities

The apparent function of the kivas of the Mesa Verde/ Hovenweep Anasazi and the selected building at Wari were both ceremonial. Attached pilasters in association with a bench surrounding a ceremonial space is found in Anasazi sites, and the same condition exists for a portion of the perimeter at Wari. This is a critical feature in both Anasazi and Peruvian archaeology since stone evidence is better preserved than the wooden roof system. Unfortunately, the actual pattern of roof structures have occasionally been ignored during excavation, or were found to be burned. A proto-cribbed or corbeled structure seems reasonable given the geometry of the supports and climate at Wari. Such a roof might represent a transitional step to the full cribbed or corbeled-dome structure that is the focus of this paper. The geographic distance from Peru to Utah argues strongly against its involvement as a precedent for the American southwest, but architecturally the substantial span at Huari (70 feet across the ceremonial space) verses the much shorter span (27 feet maximum) at Alkali Ridge, Utah at least makes the need for such a long span structure a more plausible at Wari.

The climate and farming methods are strikingly similar between the Huarpa/ Huari/ Chanka cultures of Peru, and the Mesa Verde/Hovenweep Anasazi in Colorado/Utah. North-South orientation of the ceremonial rooms in both the Upper Mantaro and the San Juan drainage are quite common. The placement of round kivas and their large size is similar between the early North Coast cultures in Peru and that found at Aztec National Monument in New Mexico. The topography is quite similar in the Upper Mantaro and the San Juan drainage area. These ceremonial spaces were often located on the mesa tops in both areas.

The masonry wall construction, to include rough stone

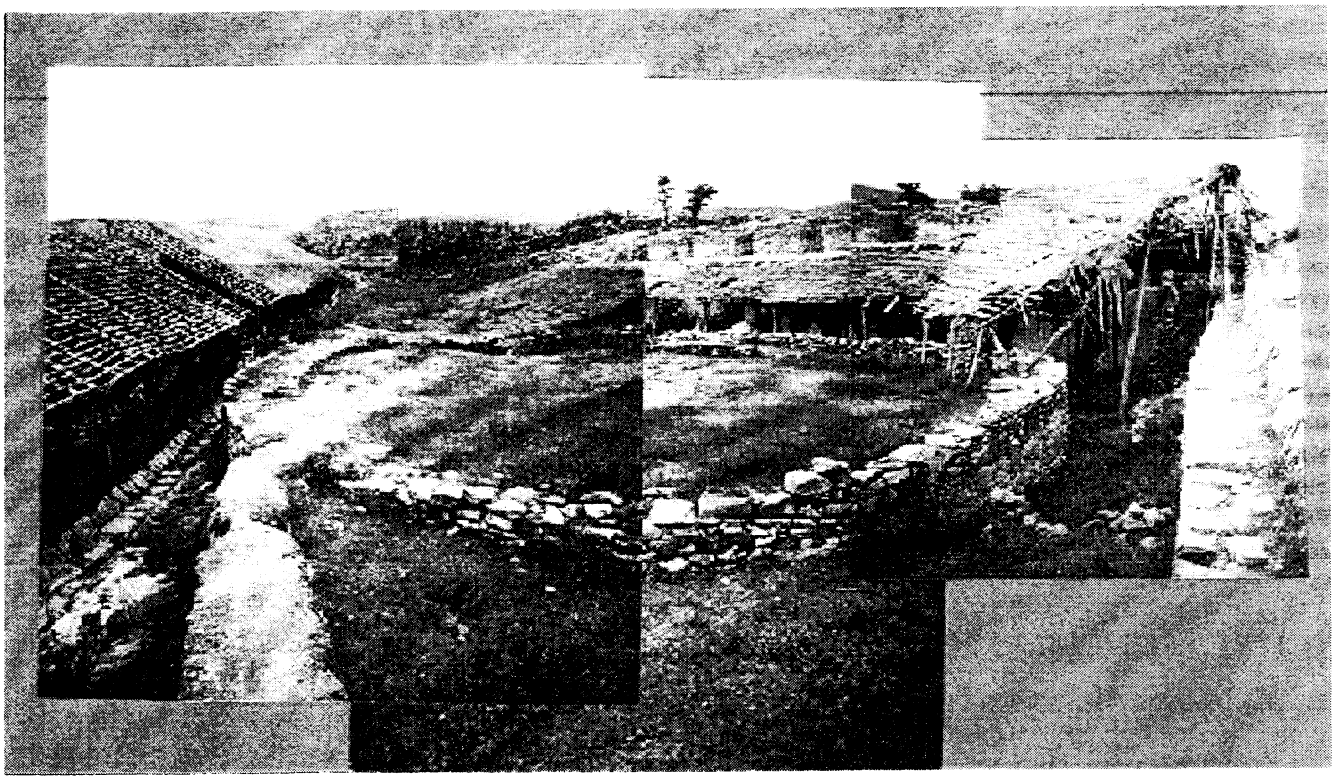

Fig. 5. Vegachayoq Moqo at Wari, Peru. Note the D-Shaped footprint.

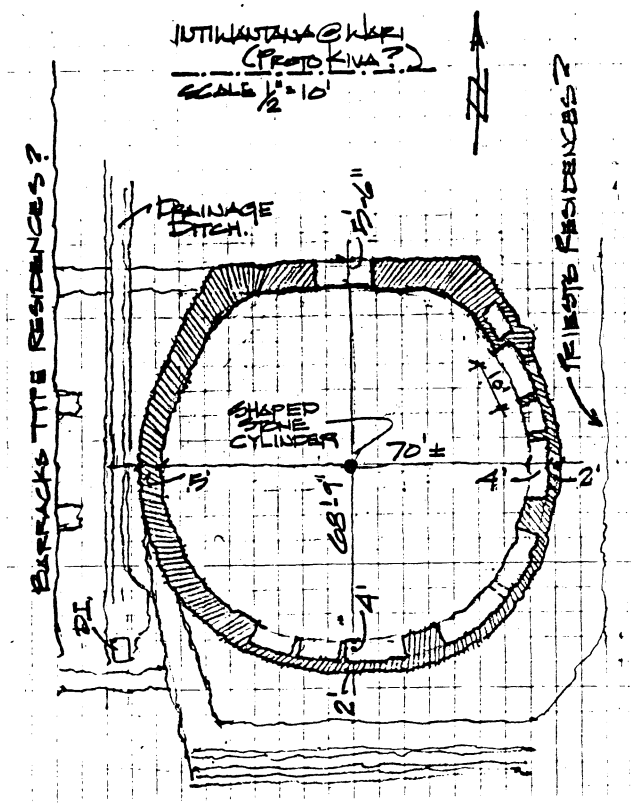

Fig. 6. Plan of the potential "proto-kiva" at Wari, extracted from field notes by Wahl in 1995.

shaping and adobe plastering, is common to both the Upper Mantaro and the San Juan cultures. Thicker walls occasionally receive rough fill between coursed masonry in both cultural areas. Lintels that are almost identical in construction can be found at both Huari in Peru, and Hovenweep in Utah/Colorado.

Other Apparent Similarities

Hopi legends of their migration tell of coming by ocean from Asia. This is possible given existing currents. It further describes some groups proceeding south, and some going north along the Pacific coast. To go north would have been easier by water if the traveler stays close to the coast. This route would lead up the Sea of Cortez to the mouth of the Colorado river. In its day, the Colorado river and its tributaries were the superhighways offering food, shelter, and water in an arid land. Successive waves of travelers have evidently used this same route. The Hopis call those that migrated through the Aleutians the "back-door people."

The Zuni language is considered a linguistic isolate. Links to other languages has proven problematic and controversial. No complete Zuni dictionary is apparently available; however, enticing similarities seem to exist. According to the local Quechuan speakers at Pisac and Machu Picchu the central urban feature of these important cities is the"anchor or center for the sun." In the Quechuan language of Peru the "intiwatana." According to Alvin M. Josephy Jr, the Zuni word for their town is "itiwana" meaning "the center (of their world)." Great diversity of language roots exists in

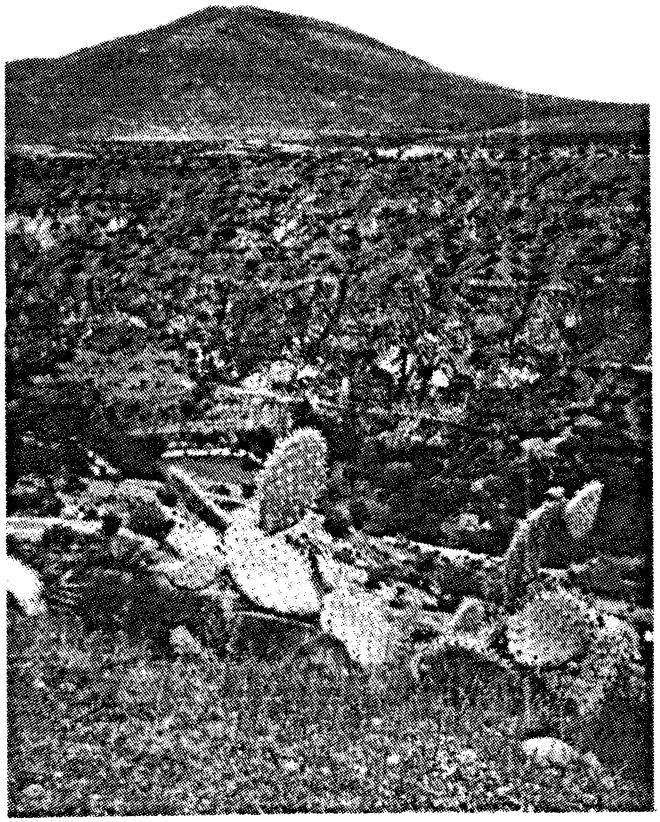

Fig. 7. View of the context for Wari, Peru. Note the similarity to the American Southwest.

the native Americans of the southwest. This is particularly true of the pueblo Indians at Hopi, Zuni, Acoma, and the Rio Grande Pueblos of New Mexico. In San Juan county Brian Stubbs has demonstrated linguistic ties to Hopi, Aztec, Serrano, Luisno, O'odham, North and South Tepehuan, Yaki, Mayo, Tarahumara, Ute, and Numic among others. The importance of this set of linguistic groups is that they geographically line the route for technology transfer suggested in this paper.

Both the Anasazi and the cultures of Peru had a "vertical economy." It has been demonstrated that with wide variation in altitude, climate varies substantially. This was very important to both agricultural and hunter/gatherer societies since each zone inherently had a different food producing potential. Trade and seasonal migration across these elevation changes seems to have been an important feature in both Peru and the American Southwest.

Parrots are present in the pueblos of the American Southwest as early as 1100 AD. Hopi legends hold that they are a clan that migrated from far to the south, parrot petroglyphs appear at Hovenweep in Utah, and parrots play a significant role in current Hopi ritual. Parrots of the type that has been found by archaeologist in the Southwest are from at least as far south as southern Mexico. Trade is therefore believed to have come through Casa Grande in Chihuahua, Mexico.

Straight lines that are apparent in Aerial Photographs at Chaco Canyon appear to be similar to the forty-one ceques at Cuzco, Inca roads which may have been built by the Huari, and to some of the Nazca lines on the south coast of Peru. Ball courts of the Mesoamerican type are found at Snaketown in the American Southwest. This is unusual since this is a characteristic of the east coast of Mexico and the Maya in Central America.

To the untutored eye of this researcher, there are some similarities in the form and decoration of pottery of the Ayacucho area in Peru, and Pueblo II pottery found at Anasazi sites such as Alkali Ridge and Mesa Verde. Boats sufficient for extended maritime travel existed in Peru as early as 600 AD. A unique tule (reed) boat is still used by traditional individual fisherman along the north coast of Peru. This same type of reed boat is also constructed by Paiute Indians of the American Southwest. This boat is an excellent design for the ocean, but is not as useful on desrt lakes as other primitive reed boats built elsewhere in the ancient world.

CONCLUSIONS

Motive: Potential motives for use of the Pacific coast route

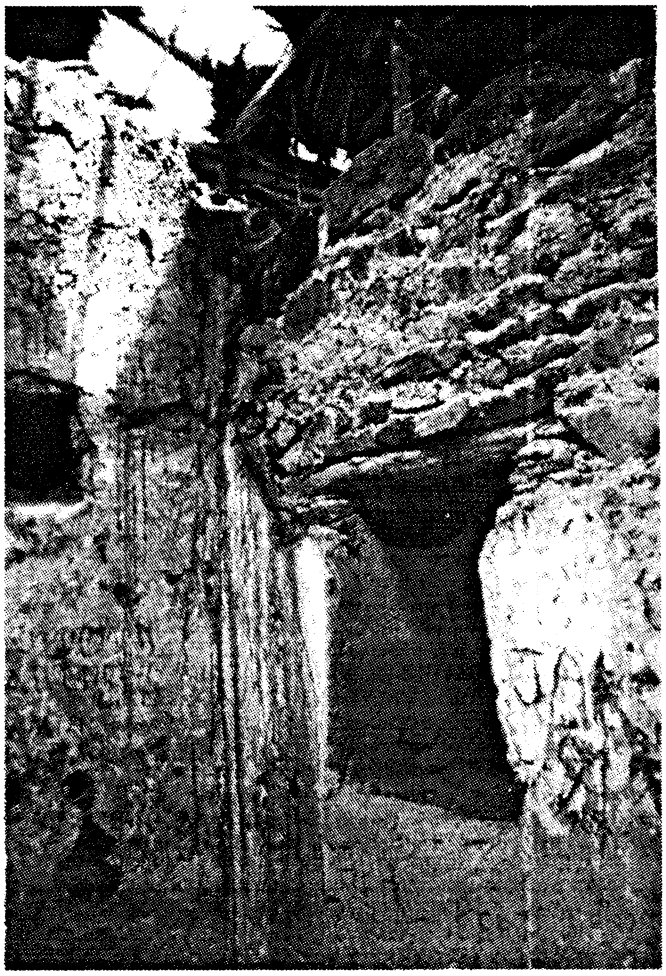

Fig. 8. Typical wall and lintel construction at Wari.

of transfer would have varied widely. Trade, immigration due to a lack of success at their current site (such as the parrot clan of Hopi legend), escape from progressive integration and consolidation of power in Peru, and escape from the numerous wars and economic conflicts that characterize the period from 500 to 1500 AD would be the most likely. For those escaping wars or religious oppression in Peru, they could not head south since one of the most arid deserts in the world is there. The Andes mountains and the powerful opposition of Tiahuanaco and the Cuzco Inca were to the west. Nazca on the coast and Huari were connected by trade and excellent roads. This route was about a 10 day walk.

Opportunity: The time of expansion and consolidation in the Peruvian highlands coincides with the development of the roof system in question in the American Southwest. The shortest estimate of the time required to migrate from Alaska to Tierra del Fuego is about 1000 to 2000 years. Once the route was known and populated it should have been faster going the other direction for trade or continued migration as outlined in Hopi and Zuni legend. That leaves about 12000 years for such contact to develop prior to the roof structure in question. In law this might be considered "opportunity" in a temporal sense.

Means: Existing currents and adequate boats existed to exploit the potential water route up the Pacific coast. There is a growing body of evidence that at least portions of this route were heavily used for trade.

Resolution with existing theories: Brew's in-situ evolution interpretation remains convincing. That outside ideas may have accompanied relatively small groups of migrating people across the San Juan area remains possible, and can coexist with Brew's interpretation. Ideas from such individuals or groups would face selective acceptance before being integrated into local society. People from a similar climate, topography, and agricultural tradition might possess such ideas. It is widely recognized that maize spread from one end of the New World to the other. Therefore, at least agricultural technology has been proven convincingly to have existed along the Pacific coast as asserted in the proposed hypothesis. The existence of the Paiutes tule boats in almost identical form to that in use on the north coast of Peru suggests strongly that maritime technology may also have made the trip.

Building Technology as Evidence: It was fortunate that the roof being investigated was relatively unique. Comparisons of specific building construction methods proved to be significantly more objective than other judgments of "kiva" similarities in this study. Supporting archaeological reports were very important in establishing the probable internal functions for the buildings studied. However, surmise of significant proportion was required in interpreting the internal functions of those buildings for which adequate archaeological reports were not available. For this reason, greater confidence in judgments relating to specific building technology is justified.

Unfortunately the actual roof configuration at Huari still remains in question. This, and the fragmentary nature of the evidence at this time leads me to conclude that insufficient architectural weight is brought to the argument for the plausibility of the working hypothesis at this time. More architectural research and analysis is both needed and scheduled for the spring of 1997 in Peru before the hypothesis can be finalized for testing.

ACKNOWLEDGEMENTS

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