

“Persistent Social Memory in Spite of Volcanic Disasters in the Arenal Area”

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ABSTRACT:

Ancient Costa Ricans in the Arenal area exhibited extraordinary persistence in landscape use, and social memory, in spite of repeated catastrophes caused by explosive volcanic eruptions. The Cañales village on the south shore of Lake Arenal was struck by two large explosive eruptions during the Arenal phase (500 BC – AD 600). Following ecological recovery, the village was reoccupied after each of these eruptions. I argue that the people who reoccupied the village were direct descendants of pre-disaster villagers due to the fact that they reinstated use of the same path to the village cemetery. While project members in the 1980s emphasized ecological reasons for village reoccupation, I suggest that a dominating reason for reoccupation was to re-establish contact with the spirits of deceased ancestors in the cemetery. The living and the spirits of the deceased constituted the functioning community. The refugees re-established processional access to their cemetery as soon as possible, perhaps even before the village was reoccupied. Villagers created and perpetuated social memory by regular linear ritual processions along precisely the same path, in spite of challenging topography and occasional regional disasters obscuring the path. This recognition has implications for the arguments of sedentism versus residential mobility during the Arenal phase.

Introduction

The exploration of ancient landscapes and memory has challenged and excited archaeologists in recent years. Layton and Ucko (1999) summarize the range of conceptualization of landscape from the phenomenological emphasis on natural setting to the ideational emphasis on perception, meaning, and belief. Likewise, Ashmore and Knapp (1999) explore the conceptualized and constructed aspects of ancient landscapes. I view the range of landscape conceptualization as encompassing scientific (physical and social science) through humanistic approaches, although archaeological emphasis has shifted recently from the former more toward the latter (Ashmore and Knapp 1999). It is this upsurge of humanistic approaches in archaeology that emphasized the affective, perceptual, and experiential dimensions of landscape. Yet I agree with Layton and Ucko (1999) that employing the full range from science to humanism can be very useful. Thus we can see the landscape as environment, and paying attention to topography, rainforest resources, soils, water, and sources for stone tools, while seeing the landscape as social space, paying attention to repeated activities that become deeply embedded in social memory.

Connerton (1989) explored how traditional societies incorporate practices over many generations. Ritual performances such as the linear processions to access ancestral spirits provide a good example. In ancient Costa Rica the separation of village from cemetery began about 2,500 years ago, marking a dramatic change from the previous tradition of interments adjacent to individual households. That separation represented a new

formulation of social memory, which persisted for over a millennium, as recorded in the entrenched ritual pathways. In exploring the potential reasons for this change in mortuary practices, we can consider the environment as symbolically charged. Ethnographic accounts of funerary practices and beliefs among traditional Native Americans in lower Central America provide possible clues to ancient behavior and perceptions.

In this article I explore how ancient Costa Rican cemeteries were first established as special places at considerable distances from villages, breaking dramatically from the past tradition of burial adjacent to each individual household. The cultural prescription of single-file procession along precisely the same path began entrenching the path literally into the landscape as well as into social memory. As people walked the same path, that path surface compacted into a linear hollow, which began eroding and entrenching where it traversed sloping surfaces. I use the ancient Cañales village as an example of what was happening regionally.

I begin by reviewing the work of the Arenal Research Project that I have directed since the 1980s in northwestern Costa Rica. Results indicate approximately 15 centuries of secondary burial practices within households occurred before a switch to primary burials in distant village cemeteries, which lasted for approximately the same duration. The Cañales village was occupied during both of those periods. Detailed study of the Cañales site has provided new insights into human behavior and social memory in the area. I originally interpreted the repeated reoccupation of the Cañales village after natural disasters caused by explosive eruptions of Arenal volcano as contingent upon ecological recovery during the earlier stages of our research (Sheets 1994). While those are still important factors and should not be subordinated or ignored, I believe that a primary motivation for reoccupation of the village was to reinstate path use to the cemetery to reconnect with the spirits of deceased ancestors.

THE ARENAL RESEARCH PROJECT

The Lake Arenal area (Figure 1) was occupied in Paleoindian times, as evidenced by the Clovis-style projectile point found during survey of the southern shore (Sheets 1994). It was also occupied during the Archaic, as indicated by radiocarbon-dated campsites and associated artifacts. Not surprisingly, we find no evidence of sedentary or semi-sedentary habitations in either of these early time periods. It is likely that “membership” in a mobile band was flexible, and presumably people had some sense of place regarding loci useful in collecting, hunting, and gathering, of nondomesticated sources of food, as well as a short-term sense of place in the campsite with its temporary hearth and activity areas. As Ashmore and Knapp (1999:10) state, “mobile human groups create their landscapes by projecting ideas and emotions onto the world as they find it – on trails, views, campsites or other special places. Sedentary people, on the other hand, structure their landscapes more obtrusively, physically constructing gardens, houses and villages on the land....” Although we have no direct evidence, a few cultigens probably were part

of the diet at least toward the end of the Archaic. We have definitive evidence of cultigens for all later phases, but it appears they remained a small fraction of the diet during Precolumbian times. Burial practices related to settlements form key elements to this article. Project researchers have excavated fairly extensively in three Arenal phase cemeteries and one Silencio phase cemetery.

The Tronadora Phase

Figure 1 - Arenal Map

During the Tronadora phase (2000 —500 B.C., but perhaps beginning before 3000 B.C.), village sites were established in the area. We found a total of 24 village sites around the Lake Arenal shore and along drainages emptying into the lake (Mueller 1994: 55). Pole and presumably thatch-roofed houses were large and circular, averaging about five meters in diameter. The lithic technology was expedient, apparently with each household obtaining their own raw materials and making their own percussion flake cutting tools. Ceramics were sophisticated, with painted and plastic decoration, and their abundance indicates a greater degree of sedentism than before, although not as developed as what emerges in the following phase. Secondary burials were interred within villages by digging narrow trenches adjacent to each house, and usually including tall, decorated cylinder vessels. No stone was found in grave construction. It is important to note that burial was per household, with no evidence of village level participation. Thus, village life was at least semi-sedentary, with individual households maintaining a high degree of economic autonomy. We have no evidence of communal facilities or social cohesion on the village level during this early phase. That autonomy may have extended into social, political, and religious matters as well.

Consideration of the sense of place is appropriate here. Although we found only a few sites dating to the earlier Fortuna phase, the Archaic hunter-gatherers probably were developing senses of places such as sacred loci, perhaps similar to those reported in the Ucko and Layton (1999) volume. I do think a different sense of place must have been developing during this phase, especially because deceased ancestors were buried adjacent to the house. People may have been differentiating their households from the outside world. At any rate, at this time the sense of place probably was more strongly focused on toward the individual household than the village. The sense of place likely was more longitudinal, linking deceased ancestors below the outside of the house, and presumably their spirits, up to the live residents, and perhaps farther upward into the heavens into the spirit world. The picture we get is a high degree of individual household independence within the settlement. It is likely that some social accommodations needed to be made, given the greater proximity of people living in households in the village during the period that it was occupied. I suggest it is worth considering these early villages as more representing seasonally compressed late Archaic lifestyles rather than a sudden burst of formative sedentary settlements that qualitatively revolutionized society and habitation. Settlement may well have been semi-sedentary. Now let us focus on a particular village occupied during this early Tronadora phase, and then witness the dramatic changes during the Arenal phase that followed it.

The Cañales Village Site (G-156)

This village was first established by 2000 BC on the south shore of Lake Arenal at an elevation of 540 m. Dating is by associating ceramics and stratigraphy within the Cañales village with the abundant C14 dates and stratigraphy of the nearby Tronadora Vieja site (Bradley 1994). Given the two calibrated C14 dates older than 3000 BC at Tronadora Vieja, these early villages with their sophisticated ceramics may have been founded over a millennium earlier than 2000 BC.

Cañales and other early Tronadora phase villages were quite dispersed, as individual households maintained large open spaces between them. We documented the maximum extent of the site at 440 m east-west. We do not know the north-south dimension, as the northern end is under water, beneath the expanded lake after it was augmented by water impounded behind the Sangregado dam built in the early 1980s. The southern boundary is still buried by volcanic ash, and thus fortunately preserved for future research. By Mesoamerican standards the habitation residues we found within that swath were sparse, but they were moderately abundant by Costa Rican standards. Hence I would hazard a guess of village population at most times as between a few dozen to perhaps a hundred people. Mean annual precipitation here is about 3000 mm with negligible seasonality. Thus natural vegetation would have been a high biomass and very high biodiversity tropical rainforest providing abundant wild natural foods.

Village occupation appears to have been rather stable during the Tronadora phase, with two notable exceptions. Two large explosive eruptions of Arenal volcano, one early and one late in the phase, resulted in substantial volcanic ashfalls at the site. Each ashfall (tephra deposit) is identified as a Unit, and numbered sequentially with the larger numbers at the bottom (Melson 1994). The two eruptions deposited Units 61 and 55 over the village (see Figure 2). Each would have been about a meter or more in thickness and had major ecological effects that must have caused the village to be abandoned for at least a few years, and perhaps decades. Most people could have survived the tephra, especially if they had something like clothing to cover their faces to assist in breathing. Yet presumably they would have had to emigrate to many kilometers away, and do that promptly. The ecological effects would have included fine particulate contamination of water that would have clogged the gills of fish, thus eliminating a rich source of protein. The sulfur dioxide in the eruptive clouds combines with moisture to form hydrosulfuric and sulfuric acids, further contaminating water as well as the moist lining of the lungs of air breathing animals. For people who had successfully adapted to the rich biodiversity and high biomass of the tropical rainforest, with some horticulture, the impact of these great explosive eruptions is hard to exaggerate. Their tropical rainforest environmental abundance was changed overnight into a sterile lifeless desert, and the people who survived the eruption would quickly perceive the benefits of being elsewhere. One can only guess about the death rate/survival rate of people with more than a meter of fine-grained tephra falling in the air. The death rate of vegetation would have been virtually total, with only a few scattered large trees surviving.

Population densities in the Arenal area during all the Precolumbian phases were low, just a few people per square kilometer, and thus well below carrying capacities. The

contrast with many areas in Lower Central America is striking, and even more dramatic with the dozens to hundreds of people per square kilometer in Mesoamerica. Perhaps an unanticipated benefit of low population densities, and the absence of hostilities, is that emergency emigrants could more readily find suitable refuge in the Arenal area. Also, the high proportion of the diet from nondomesticated vegetative resources would facilitate a sudden relocation. Each eruption was followed by quiescence of approximately 11 and 6 centuries respectively, sufficient to develop a very thick rich “A” horizon soil.

My theoretical framework for ancient human decision-making regarding resettlement in the 1980s was ecological, thinking that people would return when soils had recovered sufficiently to support a recolonizing rainforest, and some horticulture (Sheets 1992). Yet understanding whether the reoccupants the descendants of the pre-disaster villagers was difficult. Because of the generalized regional similarities in artifacts, architecture, and village layout, we were unable to answer that question. Only recently, when we began “thinking outside the site” and using different theoretical/interpretive perspectives did we perceive an answer, presented in the next section.

A crucial element in looking for that answer was good chronological control of human activities, and particularly a detailed stratigraphic record. We repeatedly made the same mistake, of looking closely at the stratigraphy within each site to try to understand relationships. Finally we learned that the worst stratigraphic records were consistently those within sites. The strata recorded in Figure 3 provide an example. The stratigraphic profile is a meter and a half thick, covering the last four millennia, but the identifiable strata are few indeed. Only two tephra units can be identified with confidence, and both occurred during the last 600 years, well after our time of interest. Four other tephra units could be identified only on a “probable” basis, and none had an abrupt contact at top or bottom. The reasons are the combination of bioturbation, human disturbance, and possibly anthrosol formation all end up “homogenizing” strata. By recording stratigraphy within dozens of sites, and more importantly at dozens of localities well outside of sites, we have learned that the latter consistently give us a more complete record. Thus in this article I will use the superior stratigraphic record in a three-kilometer radius outside the site to clarify the blended stratigraphy within the site. The contrast with the stratigraphy preserved outside the site, recorded in trenches across the path, is striking. Outside of the site one can clearly identify seven tephra units, and the contacts are consistently abrupt and thus can be drawn with a line (Fig. 4). The stratigraphic interpretations of this profile are presented below.

Fig. 2 Volcanic stratigraphy at G 150 H

The Arenal Phase (500 BC – AD 600) and the Cañales Village

The Arenal phase witnessed increased size and sedentism of villages, shared activities, a markedly greater sense of place, and the situating of oneself in the landscape via long-distance ritual pathways. Remarkably the sense of place had broad landscape

implications, as people established ritual pathways between villages and distant cemeteries. I suspect the villager's changing sense of place recognized the entity of the village as an interacting series of households that was greater than the sum of the parts. The village had become a significant entity in itself well beyond the grouping of independent households of the former phase. The cooperative activities that took place in cemeteries further promoted solidarity linked to sacred space. Those activities included feasting, rituals, and perhaps construction projects that were performed in the Arenal phase, and became particularly elaborate in the later Silencio phase. Ethnographic analogies aid in inferring the meanings of people creating distant cemeteries, and walking precise single-file processional paths to and from them, are presented in the "Ethnographic Considerations" section below. People were sinking deeper social roots and simultaneously establishing processional routes, thus materializing a communal identity. The most dramatic change that ever occurred in Precolumbian Costa Rican burial customs happened about 500 BC, with the creation of communal cemeteries and the separation of them from villages. The details of why and how this occurred are unknown, but it must have been some kind of regional-scale compelling religious conversion, or new belief in the greatly enhanced power of the spirit of deceased ancestors. In most areas of Costa Rica people began to use large amounts of subrounded river rock to build up mounds over primary interments, and engaged in rituals and feasting. These activities continued throughout the Arenal phase. It would be tempting to interpret these visually impressive mounds of rock with their multiple interments as indicative of centralized authority, and in fact many top-down theorists do just that. However, I suggest the mounds at least in our research area were accretional over many centuries, resulting from households burying their dead within the same graveyard, and expanding the cemetery incrementally upward and/or outward with each interment (Butler 2003). Such a dramatic religious change could have been the result of the arrival of a new ethnic/cultural group, or it could have been a conversion within the same group. I favor the latter, given a considerable degree of continuity in architecture and artifacts.

Figure 3. Stratigraphy inside the Cañales site.

Fig. 4. Stratigraphy just outside Cañales village, along path to cemetery.

The distances separating cemetery from village in our research area range from a few hundred meters to a dozen kilometers. As best we can tell, the Cañales residents began burying their dead 11 km (straight line map distance) west southwest of their village. In map view the overall path route is surprisingly straight, and most path segments are exceptionally straight. Yet map-view straight-line conceptualizing is misleading, as the path rises from the village at 540 m in elevation up over the continental divide at 970 m and descends on the Pacific side into the complex of cemeteries at an average elevation of 500 m. As it traverses these marked elevation changes the path heads directly down and up very steep slopes up to 40°, and crosses numerous ravines and streams. In a few notable cases, path segments followed gentle, uniform curves that had nothing to do with topography; the reason(s) for the deviation from straight segments must have been important, but is unknown. In many cases the path divides into two or three parallel segments. When a segment of a path eroded down

through all the Arenal tephra layers to the “Aguacate formation” (Melson 1994), people would have had trouble walking up or down the steep slopes. That is because the Aguacate formation is heavily clay-laden and extremely slippery when wet. Relocating a path segment a few meters to one side or the other was the solution.

A methodological note is appropriate here. We use remote sensing to detect linear anomalies, of which some are determined to be ancient paths. In particular, color infrared aerial photography provided by low flying NASA research aircraft has been the most useful imagery, followed by commercial black-and-white aerial photography, then NASA true color airphotos, and finally various digital sensors such as the Thermal Infrared Multispectral Scanner, Radar, and LiDAR (McKee and Sever 1994). More recently, the sub-meter resolution of satellites such as IKONOS has proven very useful. We have developed rigorous standards for field verification, by excavating trenches and dating erosion and deposition from cultural and natural processes (McKee et al. 1994). The dozens of trenches we have excavated to confirm (or deny) a remote sensing anomaly as an ancient path consistently indicate the actual path surface was less than a meter wide, and usually about ½ meter wide (Figure 4), providing evidence for consistent single-file processions. As villagers followed the same path for years, the initial compaction and depression caused erosion in areas with slopes greater than about 5°, with greatly accelerated erosion where the path was inclined more than 15° or 20°. The angle of repose of sediments perpendicular to the path, on each side of the eroding trail, is only about 30° from horizontal because the sediments are so unconsolidated, resulting in a path that was entrenching itself and the adjoining sediments in a very broad “V” shape (Figure 4). A few centuries of use resulted in path entrenchment a few meters below the surrounding ground surface in steeper areas, and I believe a treasured cultural standard of the favored way to enter a special place by a deep path developed as an unanticipated result of these repeated practices. Those processions literally entrenched the processionways into the landscape, and embedded into social memory the proper and ideal way to traverse the landscape, via the deep path with its long extent where vision of the landscape on either side is obscured, thus focusing attention on what lies ahead. Then, when one enters a ceremonial special place, it dramatically opens up to one’s full vision. Thus the repeated walks to the cemetery and back literally and spiritually deepened the embeddedness and significance of the processions. After a major volcanic disaster, when people reoccupied the area and resumed processional path use, they mentally re-established their remembered landscape and access to the spirits of their deceased.

Fig. 5. Map of hill between Rio Piedra village and cemetery.

One case particularly underscores the importance of inscribed processionways. Past the west end of Lake Arenal we discovered a village separated from their cemetery by about a kilometer (Fig. 5). The easiest and most direct access to the cemetery would have been along a straight line following the gentle gradient of the Rio Piedra. But the villagers diverged from the straight line to go up a prominent hill, over the top, and down the other side, thus entrenching their single-file processionway on both sides (Fig. 6). And they built stone platforms atop the hill, on either side of the path. The platforms look more like special features on which people stood, on either side of the procession,

rather than shrines. Clearly the importance of having entrenched processionway superseded a straight line and topographically easy access route between village and cemetery.

Figure 6. Airphoto of Rio Piedra village, cemetery, and path over hill.

Routes and Roots: Processional Paths, Social Memory, and Volcanic Disasters

The principal focus of this paper is human practice, belief, and their repercussions during the Arenal phase (500 BC – AD 600). By the dawn of the phase, the Unit 54 thick volcanic ash layer had been subjected to enough weathering and soil formation that vegetative and faunal recovery was presumably complete, and the Cañales village might have been reoccupied for perhaps a few generations before the dramatic change in burial location occurred. Because the religious transformation did not correlate with one of the big explosive eruptions, a natural event should not be considered as a contributing factor to that transformation. Further, the changes in mortuary practices occurred over such a widespread area of the Intermediate Area that Arenal volcanism certainly was not involved.

As best we can tell, the Cañales village thrived on the south shore of Lake Arenal for approximately three centuries before the next eruption occurred, obtaining their subsistence, lithic, and construction materials from nearby sources, and involving themselves in a rich social and ideological milieu of life. Generations of villagers walked the precise path more than 11 km to the cemetery to bury their dead, and to frequently revisit the graves. Of course, these visits involved respect for the deceased, and they must have involved getting in contact with the spirits of their ancestors. Although separated by considerable time and distance, ethnographic accounts of traditional Bribri Indians in Costa Rica and Cuna in Panama describe the importance of separating village from cemetery, and the need to contact the spirits (see ethnographic section below). The spirits of the dead appreciate being at a distance from the village so barking dogs and crying babies do not disturb them. Moreover, the villagers are not troubled by the proximity of spirits to their everyday lives. Certainly cemeteries needed sustained spiritual sustenance, and I suspect so did villages.

I think we can roughly estimate the depth of entrenchment that would have occurred in three centuries, so long as we remember these quantitative figures are only approximations and should not achieve a misplaced concreteness. Based upon our overall estimate of Cañales-cemetery travel, of about 1100 years, then three centuries would represent 27% of use. That would indicate that the path at Trench 26 had entrenched only about 35 cm (27% of 130 cm). The slope is slight there; the total entrenchment in a steeper location a bit farther west is estimated at over 7 meters, so at this time it would have entrenched an estimated 1.89 m, well over the heads of the people in procession. Thus in the first centuries of repeated processional path use resulted in unintended landscape modification, steeper sections eroded sufficiently to create a new sensation of the surrounding terrain disappearing and the objective ahead coming into more clear mental focus. The trek to connect with the ancestors presumably attained a greater sense of history, as people saw and experienced the tangible result of their doing

what their ancestors did, and maybe thinking this was the way it was always done. But then disaster struck again.

Arenal Volcano's next large explosive eruption was at about 200 BC, and deposited a blanket of sterile volcanic ash (Unit 53A, Figure 2) over the rainforest, small agricultural plots, rivers, and the lake. Melson (1994: 47) measured the thickness of what he identified as tephra from the same eruption at El Tajo, closer to the source, at 1.2m. He estimates a diminution to 25% near Cañales, for an estimated depth of about 30 cm. Actually, these measurements are of tephra thicknesses in sections preserved today; original tephra depths prior to erosion and compaction would have been much greater, and therefore impacts proportionally more severe. That would be devastating for freshwater for drinking, for fish, and for smaller plants such as cultigens. Large trees could survive such an impact. Hence the impact was less than the earlier Unit 55 emplacement, but people would presumably have had to leave the area for sufficient time for the environment to recover. If the people who reoccupied the village were not related to the pre-eruption inhabitants, I am confident that they would not reinstate use of the path to the village-associated cemetery in the Mandela area of the Pacific drainage. It makes no sense for unrelated people to re-establish a path to someone else's cemetery and their spirits. The path would have been difficult to discern after the eruption because it would have largely filled in with the fresh tephra draping the entire countryside. More specifically, the path leading westward from the village is on a gentle slope and would have been only slightly entrenched, and thus difficult to detect unless someone already knew where it ran. It only would have been quite visible in steeper sections after the ashfall. The evidence is clear, however, that the villagers resumed single file use of the same path right out of the village to the same cemetery, and I take that as compelling evidence that they were the direct descendents of the pre-eruption villagers.

I would guess that resumption was within a decade or two, but we have no sufficiently detailed stratigraphic, artifactual, or chronometric data to support this. When we conducted the original research in the 1980s the core of my resettlement thinking was ecological, that resettlement was principally based on environmental recovery. However, in examining the path carefully, and thinking regionally as well as spiritually, I am thinking that a (and perhaps **the**) dominating motivation was to re-establish contacts with the spirits of their ancestors. Moreover I think that it is possible that the refugees, settled into a distant temporary refuge locality, would have needed access to their ancestors' spirits, and occasionally would revisit the village to tread the path to the cemetery, and back, before the village could be occupied. And I believe it is probable that the visiting refugees would check the abandoned village's condition in terms of water supply, soil recovery, and revegetation, to sense when they could return to re-establish the village. The application of new interpretive/theoretical models need not be antithetical toward former ones, and I believe in this case enriches our understanding of the importance of religion to Precolumbian peoples.

Once Cañales was resettled, generations of villagers resumed single file processions to and from their cemetery, and erosion continued to deepen the path, proportional to slope. However, not very many generations of villagers continued to use the path, as the soil developed on Unit 53a, called Unit 53, is thin and juvenile. I would estimate perhaps a century of use, that ended abruptly by the next big explosive eruption from Arenal volcano.

Unit 52 is our designation of that next big eruption, dated to about 2000 years ago. Melson (1994: 47) describes it as having dacitic and andesitic components, and correlating with his Unit 5 at El Tajo, where it was about 330 cm thick. Thus it would have diminished with distance to a predicted approximately 83 cm if preserved in section at Cañales, and quite a bit thicker when originally emplaced. Thus it would have wreaked a much greater disaster for the villagers and their environment than did Unit 53, perhaps resulting in an abandonment lasting for quite a few decades. Due to bioturbation and anthroturbation within the village, the stratigraphy is mute regarding the details, but the path stratigraphy in Trench 26 informs us that people resumed path use, and that eroded away the recently emplaced Unit 52 from the path itself and the slope within about two meters of the path. The Unit 52 tephra is well preserved farther from the path, as can be seen in Figures 2 and 4. Finally, sustained path use caused greater entrenchment downward through deeper strata all the way to touching the Aguacate Formation (Figure 4).

The big Unit 52 eruption was followed by a long period of quiescence, or at least no eruptions big enough to leave a detectable record in the stratigraphy in the Cañales area. That quiescence, lasting for some seven centuries, allowed pedogenic processes to generate ideal edaphic conditions (rich soils), designated Unit 50 in our stratigraphic sequence. Path use evidently continued during much of that time, or at least the first half of that time. The end of the Arenal phase, at about A.D. 600, may have marked the end of path use. Or it might have ended earlier, at about A.D. 300, the recently suggested adjustment to chronology as the date marking the end of the Arenal phase (Guerrero et al. 2003:102). I favor the Guerrero et al. re-dating, based on their recent research, and the amount of Unit 50 soil (a relatively mature "A" horizon with high organic content) that formed on the sides of the path, and draping over it, prior to the Unit 41 (Figure 4) eruption at approximately A.D. 800.

So the path from the Cañales village to the cemetery was in use over a period of some 800 years, or possibly as long as 1100 years, interrupted twice by natural disasters from Arenal volcano. That the villagers re-established settlement in the same location and re-established linear processions and rituals at their cemetery is evidence of the persistence of social memory and the importance of the spirits of their ancestors. Here I use the term "social memory" in the sense used by Van Dyke and Alcock (2003:2) as "the construction of a collective notion (not an individual belief) about the way things were in the past." Their concept that "the construction of social memory can involve direct connections to ancestors in a remembered past..." (Van Dyke and Alcock 2003:3) is pertinent here. Our story here ends with the cessation of path use from Cañales to the Mandela cemetery, but the village continued to be occupied for many more centuries until the end of the Precolumbian era. Where people were buried, and why funerary belief and practice changed yet again, are unknown. Certainly the practice of traveling long distances in single file processions continued in the region, at least until about AD 1300, as evidenced by the trail network focusing on the Silencio cemetery. Yet we do not know if the Cañales villagers were participating in a similar practice. The construction of social memory was active and ongoing in the Silencio phase (AD 600 – 1300). It was embedded in single file processional movement through the paths and inscribed in path entrenchments as well as in cemetery formation and rituals.

Ethnographic Considerations

What possible reasons might have led ancient Costa Ricans to separate their villages from their cemeteries? A potential answer is provided by ethnographic accounts in lower Central America. First we consider the present day Cuna in Panama (Dillon 1984), the most traditional Native Americans in lower Central America. The Cuna bury their most prominent village members such as civic leaders, heads of prominent households, diviners (“shamans”), or curers in cemeteries at or near ridge tops visible from the village, but many kilometers away. When asked why the cemetery is so far away, the Cuna respond that the spirits of the dead are less bothered by the noise, smoke, and crying children of the busy village, and the living are happier with the powerful spirits of the formerly live powerful people buried at a distance. The body of a powerful person may have stopped functioning, but their spirit has not and it must be dealt with appropriately. As the Cuna travel from village to cemetery and visit the graves of deceased ancestors for extended times, they consume food and drink, burn incense, and make offerings to the deceased.

The most traditional Native Americans in Costa Rica are the Bribri, described by Skinner (1920) and Bozzoli de Wille (1975). The Bribri believe that people leave a part of themselves in everything they touch, or in every place to which they have traveled (Bozzoli de Wille 1975). Both ethnographers mention the Bribri concern for evil spirits at the time of death. After death, the soul-spirit of the deceased will revisit all those places, and to find those places the assistance of the living is essential (Bozzoli de Willie 1975).

Skinner (1920: 95-102) describes Bribri activities and beliefs regarding death in considerable detail. When an individual is near death, they are removed from their house and taken to a temporary hut away from the village. If a Bribri dies in their house it must be burned to destroy the influences of evil spirits. Only a trained “oko” can handle the body. The “oko” wraps the body and takes it to a platform in the forest. The “Apagando el Fuego” (“Quenching the Fire”) ceremony takes place nine days after death. The ceremony lasts one night, and includes feasting and consumption of chicha (fermented maize beer) and cacao. The leader of the ceremony makes a new fire with a hand fire-drill, blesses articles of the deceased that still remain, sings secret songs, and then extinguishes the fire to reassure the surviving relatives of the deceased.

The body remains on the platform in the forest for five years, during which it become defleshed (Skinner 1920:97-102). After those five years a “Baile de los Huesos” (“Bone Dance”) is held. The ceremony lasts from 15 to 22 days, and involves prodigious quantities of chicha, cacao, and food. The same “oko” who presided over the fire ceremony also leads these ceremonies. The “oko” and assistants wrap the bones in a bark blanket and take them to the cemetery. Bozzoli de Wille (1975:95) describes an example of a cemetery on a hilltop two kilometers from the village and the processions carrying the bones (presumably from the platform) to the cemetery. The spirit, following the bone and the procession, needs guidance. The women tie string along the path to help guide the spirit, thus causing a path segment to follow a straight line. A special funeral fire is burned for nine days, and then extinguished with cacao (Skinner 1920). After the fire is extinguished, the bones finally were interred in the grave.

Why might ancient Costa Ricans have traveled such a precisely prescribed route linking village with cemetery? Snead (2002) provided important insights that could help answer this question in his study of ancestral Pueblo trails of northern New Mexico. He found that meaning as well as practical and economic factors were intrinsic to ancient paths in the Bandelier area. In a paradigm-changing insight into how differently Westerners and Native Americans can view a trail, Snead (2002:756) provides a quote from Waterman about the Yurok of California: “Trails are sentient, and must be traveled with urbanity. If you step out of a trail and in again, and fail to preserve decorum, the trail becomes resentful.” This special animated sense of a trail, that channeled transit within a learned social memory, and imbued with sacred power, is what may have developed in ancient Costa Rica. Generations of processions of Arenal people along their paths constructed meaning. And the experience of walking the entrenched paths and entering sacred places acted back on people’s dispositions.

I believe there must have been two key initial elements, at about 500 BC, which eventually led to the development of the entrenched entryway physical and ideational complex. One is the separation of village from cemetery, and for that we have direct archaeological evidence. The other must have been the cultural prescription of traveling the same precise route between them. For this we do not have direct evidence of the concept at its inception, but we do find the result of it after generations of prescribed use. I suggest that the early generations of prescribed use resulted in some entrenching, but it was not until the entrenching became prominent, deeper than a meter, that the significance of deep, tunnel-like approaches to special places began to form. Based on our evidence of entrenchment formation, that would have been a century or two before Christ.

It is clear that people began traveling along exactly the same path between village and cemetery, generation after generation, during the Arenal phase. What is less clear is why. The separation of village and cemetery occurs during the same phase as do the incised paths connecting them, so the answer probably lies in the culturally regularized transit between these special places. It is possible that the belief in the supernatural power of the spirits of the deceased was increasing, and therefore separation of village and cemetery was necessary, as well as prescribed passage between them. Single-file processions clearly were prescribed, and a sense of powerful spirit place, as well as the tradition of going to the cemetery precisely as ones’ parents and grandparents did. When people trod the same path on slopes over 10°, the channel formed by many footsteps began to erode. Generation after generation of path use resulted in entrenchment of the paths one, two, three, or more meters below the surrounding ground surface.

There is, of course, a voluminous literature on procession routes, roads, paths, causeways, and other formalizations of human movement across the landscape (e.g. Trombold 1991, Snead 2002). I add only one more here. Although they are half a world away, the paths followed by traditional Tamu-mai of Nepal (Evans 1999) are somewhat similar in that they form cognitive maps as well as function as narrative trails as they are traversed. The Tamu-mai walk paths that link settlements with sacred sites, forts and other features, and “such walking of the route itself serves as an act of cultural/historical reclamation.” (Evans 1999:441). This is reminiscent of the geographic distance between village and cemetery corresponding to a supernatural distance, to borrow a

concept from Helms (1999). Not only are the endpoints sacred, so is the trajectory traversed.

The Sedentism Issue

Archaeologists working in Costa Rica have not agreed about the degree to which ancient peoples were sedentary, living in villages year-round. Some scholars, with extensive fieldwork experience, argue that many ancient Costa Rican villages were only semi-sedentary (summarized by Murillo 2003) based on subsistence focusing on hunting and gathering, with some horticulture. According to Murillo's survey of the literature, most archaeologists believe the mixed subsistence strategy for the Tempisque period (500 BC – AD 300) is evidence for a still mobile society, headed toward sedentism, but still maintaining significant residential mobility. I have not agreed (Sheets 2003), and have interpreted our Arenal area data as indicating sedentary societies beginning in the Tronadora phase, about 2000 BC or earlier, and continuing to the Spanish Conquest. In reconsidering the data I am now thinking that our evidence for sedentism in that early phase is not convincing, and settlement could well have been semisedentary. However, the argument I wish to make here is that by the Arenal phase, the focus of this paper, people were sedentary with subsistence based on an impressively broad spectrum of largely wild and some domesticated food resources. Moreover, and most pertinent here, I believe they were determinedly sedentary because of the towering importance of continuing use of paths to cemeteries in order to access their deceased's spirits. If I am correct, it strikes me as ironic that the best evidence for village sedentism came not from within the village, but from outside the site in the forms of stratigraphy, ritual path use, and spirituality within the landscape.

Conclusions: As the Tail wags the Dog, Might the Trail to the Ancestor's Spirits Resettle the Village?

Arenal volcano's explosive eruptions, averaging every four centuries, forced people to abandon their villages and seek refuge in areas beyond the deep tephra blankets. The villages were reoccupied after soils, flora, and fauna recovered from the disasters. Were the people reoccupying the villages the descendents of those that lived there before the eruption? Or were they residents of the area deciding to occupy a favorable location that happened to have been occupied before? Close examination of the architecture, artifacts, and features was unable to identify individual village traditions. These questions remained unanswered until recently. New interpretive/theoretical frameworks combined with close examination of extra-village stratigraphy and path use now indicate that the people reoccupying one village, Cañales, were the descendents of the original occupants. That they discerned the faint traces of the path to the same village cemetery, and followed it precisely, to contact the spirits of their deceased, is evidence of the continuity of social memory. I suggest here that the need to access the spirits may have been a prime motivator for the refugees to re-establish their village as soon as possible, and some processional access to the cemetery may have occurred prior to re-establishment of the village. The living and the spirits of the dead constituted a fully functioning ancient Arenal society, and the re-established paths are a material manifestation of the return to wholeness.

References Cited

Ashmore, Wendy, and A. Bernard Knapp, Editors.

1999 *Archaeologies of Landscape: Contemporary Perspectives*. Blackwell ,Oxford.

Bozzoli de Wille, Maria

1975 *Birth and Death in the Belief System of the Bribri Indians of Costa Rica*.

Unpublished Ph.D. dissertation, Department of Anthropology, University of Georgia, Athens.

Bradley, John

1994 Tronadora Vieja: An Archaic and Early Formative Village in the Arenal Basin. In *Archaeology, Volcanism, and Remote Sensing in the Arenal Region, Costa Rica*, Edited. by Payson Sheets and Brian McKee, Pp. 73-86.. University of Texas Press, Austin.

Butler, Michelle

2003 El Sitio Poma, G-725PM, Proyecto Prehistorico Arenal 2002-03. *VINCULOS* 28: 61-76. Museo Nacional, San Jose, Costa Rica

Connerton, Paul

1989 *How Societies Remember* Cambridge University Press, Cambridge.

Dillon, Brian

1984 Island Building and Villages of the Dead: Living Archaeology in the Comarca de San Blas, Panama. *Journal of New World Archaeology* 6:2:49-65.

Evans, Christopher

1999 Cognitive maps and narrative trails: fieldwork with the Tamu-mai (Gurung) of Nepal. In *The Archaeology and Anthropology of Landscape*, Edited. by Peter Ucko and Robert Layton, Pp. 439-57. Routledge, London.

Guerrero, Juan Vicente, Monica Aguilar, y Jeffrey Peytrequin

2003 La Ceramica de dos contextos funerarios de las Fases Arenal y Silencio, Region Arenal-Tilaran. *VINCULOS* 28: 87-105. Museo Nacional, San Jose, Costa Rica.

Helms, Mary

1999 *Access to Origins: Affines, Ancestors, and Aristocrats*. University of Texas Press, Austin.

Layton, Robert, and Peter Ucko

1999 Introduction: gazing on the landscape and encountering the environment. In *The Archaeology and Anthropology of Landscape*, Edited by Peter Ucko and Robert Layton, Pp. 1-20. Routledge, London.

McKee, Brian, and Tom Sever

1994 Remote Sensing in the Arenal Region. In *Archaeology, Volcanism, and Remote Sensing in the Arenal Region, Costa Rica*, Edited by Payson Sheets and Brian McKee, Pp. 135-141. University of Texas Press, Austin.

McKee, Brian, Tom Sever, and Payson Sheets
1994 Prehistoric Footpaths in Costa Rica: Remote Sensing and Field Verification. In *Archaeology, Volcanism, and Remote Sensing in the Arenal Region, Costa Rica*, Edited by Payson Sheets and Brian McKee, Pp. 142-157. University of Texas Press, Austin.

Melson, William
1994 The Eruption of 1968 and Tephra Stratigraphy of Arenal volcano. In *Archaeology, Volcanism, and Remote Sensing in the Arenal Region, Costa Rica*, Edited by Payson Sheets and Brian McKee, Pp. 24-47. University of Texas Press, Austin.

Mueller, Marilyn
1994 Archaeological Survey in the Arenal Basin. In *Archaeology, Volcanism, and Remote Sensing in the Arenal Region, Costa Rica*, Edited by Payson Sheets and Brian McKee, Pp. 48-72. University of Texas Press, Austin.

Murillo Herrera, Mauricio
2003 Una Reseña y Caracterización del Periodo Tempisque (500 AC – 300 DC) *VINCULOS* 28: 135-147. Museo Nacional, San Jose, Costa Rica.

Skinner, Alanson
1920 Notes on the Bribri of Costa Rica. *Indian Notes and Monographs*, V. VI, # 3. Pp. 40-106. Museum of the American Indian, Heye Foundation, New York.

Sheets, Payson
1994 Summary and Conclusions. . In *Archaeology, Volcanism, and Remote Sensing in the Arenal Region, Costa Rica*, Edited by Payson Sheets and Brian McKee, Pp. 312-326. University of Texas Press, Austin.

Sheets, Payson
2003 Summary and Conclusions: Proyecto Prehistorico Arenal. *VINCULOS* 28:175-188. Museo Nacional, San Jose, Costa Rica.

Snead, James
2002 Ancestral Pueblo Trails and the Cultural Landscape of the Pajarito Plateau, New Mexico. *Antiquity* 76: 756-765.

Trombold, Charles, Editor
1991 *Ancient Road Networks and Settlement Hierarchies in the New World*. Cambridge University Press, Cambridge.

Ucko, Peter, and Robert Layton, Editors.
1999 *The Archaeology and Anthropology of Landscape*. Routledge, London.

Van Dyke, Ruth, and Susan Alcock

2003 *Archaeologies of Memory: An Introduction*. In *Archaeologies of Memory*, Ed. by Ruth Van Dyke and Susan Alcock, Pp. 1-14. Blackwell, Oxford, UK.

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Figure Captions:

Figure 1. Arenal Research area, Northwestern Costa Rica. The Cañales village is on the southern lakeshore at upper right, and its cemetery at "Mandela" lower left, a dozen kilometers away. They are connected by the ancient processional pathway.

Figure 2. Stratigraphy on hilltop near the Silencio cemetery, away from archaeological sites. Tephra units identified along right margin. Unit 52 is preserved only on the left, at the 948 m level. Note abrupt contacts of volcanic ash and soil units.

Figure 3. Stratigraphy within the Cañales village. Note that during the time the village was occupied, from Units 60 up to 30, not a single abrupt contact survived anthropurbation and bioturbation. Stratigraphic units are almost unrecognizable. Compare with Figures 2 and 4.

Figure 4. Stratigraphy just outside Cañales village, at Trench 26, along the path to their cemetery. Note that not a single one of these abrupt stratigraphic contacts could be identified within the village, as shown in Figure 3 above. Outside the village we can see very clear stratigraphic relationships that reveal the timing and nature of ritual path processions to the cemetery in the Mandela area across the Continental Divide.

Figure 5. Map of hill between the village (immediately south of hill) and the cemetery (to the north), along the left bank of the Rio Piedra. Villagers went out of their way to walk up and over the hill, presumably so they could have an embedded processionway.

Figure 6. Airphoto of Rio Piedra area, west of Lake Arenal. Lake Arenal at right. The village is immediately below the "V," and the entrenched path up and over the hill is immediately northwest of the village. The cemetery is at "C." The airphoto is approximately 2 km horizontal distance, east-to-west.