FLORIDA'S DEEP PAST: THE BIOARCHAEOLOGY OF LITTLE SALT SPRING (8SO18) AND ITS PLACE AMONG MORTUARY PONDS OF THE ARCHAIC

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Little Salt Spring is a large sinkhole located near the western coast of Florida that has produced human remains dating to the Middle Archaic. Excavations spanning several decades have reinforced its place in Florida's prehistory, yet this is the first comprehensive analysis of skeletal remains produced from the site. The well-preserved remains consist primarily of femurs. Stature and femur dimensions are similar to another Archaic Florida population, Windover (8BR246). Little Salt Spring is one of several mortuary ponds bound temporally and geographically to the Archaic period in Florida. The similarities in use and interment style hint at the possibility of cultural continuity among the inhabitants of Florida's Archaic.

Background

Florida is synonymous with water. It is rimmed by the longest and most ecologically diverse coastline within the contiguous forty-eight states and continues to be shaped by wind and water. Today, more than half of Florida's 14 million residents live in coastal zones (Davis 1997). This attraction to water has existed since humans first wandered onto the peninsula. The living sites of our earliest coastal residents have been swallowed by the inundation of advancing seas. Following the Late Glacial Maximum, the planet warmed. By the beginning of the Holocene epoch, glaciers were reduced in size, elevating sea levels and submerging the scant evidence of early Floridians as the coastline migrated inland.

But the early inhabitants of Florida were also drawn to the numerous inland freshwater sources that dot the landscape. Lakes, rivers and springs provided water necessary for drinking, fishing, and utilitarian purposes. In some cases, ponds and springs also provided a place for the interment of the dead. Little Salt Spring (8SO18) is just such a place. Located in Sarasota County in southwest Florida, the spring is one of several bodies of water within the state that served as a cemetery for the people of the Archaic period.

Waller (1983) reported that avocational SCUBA divers exploring southern Sarasota County for new dive sites noted extensive scatters of human bones in the basin of Little Salt Spring by the early 1950s. But it was in the late 1950s that the exploration of both Warm Mineral Springs (8SO19) and Little Salt Spring by William Royal (Steen and Stephens 1961) made the scientific community aware of the archaeological potential of these sites. Royal, a local diver and avocational archaeologist, and marine biologist Eugenie Clark of the Cape Haze Marine Laboratory made numerous SCUBA dives into Little Salt Spring and Warm Mineral Springs beginning in 1958 (as described in the autobiographical accounts of Clark 1969 and Royal 1978). They recovered hundreds of disarticulated human bones in both springs, and a human skull with brain tissue in the latter (Royal and Clark 1960). John Goggin (1960), a pioneer of academic underwater archaeology in Florida, briefly describes the discovery of human bones in Little Salt Spring.

Between 1971 and 1980 Carl J. Clausen was employed by the owner of Little Salt Spring, the General Development Corporation to direct archaeological research in the spring. The investigation would also include, to a limited extent, the nearby slough (an erosional drainageway that empties into the spring from the northeast), as well as its adjacent midden deposit. The midden caps a limestone ridge immediately west of the slough (Figure 1).

The slough and midden constitute a Middle Archaic cemetery and settlement, respectively (8SO79). Clausen et al. (1979) estimated, in a report on the archaeological work at Little Salt Spring during the 1970s, that between 100 and 1,000 Archaic burials rest in the slough's peaty sediments, as well as an unknown number of burials in the Little Salt Spring basin. In addition to numerous disarticulated skeletal material that other divers observed underwater between the surface of the spring basin and the ''drop-off'' at 13 m, Clausen and his associates discovered two partially articulated burials, one on the west side in only 2 m of water, and another in the northeast quadrant at a depth of 8–9 m (Clausen et al. 1979). Whether this latter burial was *in situ* or disarticulated is unknown.

Human bones believed to be disarticulated Middle Archaic burials are still present in the spring basin, usually under 5–10 cm of organic detritus and freshwater biogenic carbonate shell hash (small and microgastropod shells and silt-sized calcite from the decomposition of algal mats that ring the upper basin). They are partially mineralized and appear to be derived from burials that were interred around the circumference of the spring basin, between 1 and 2 m below the

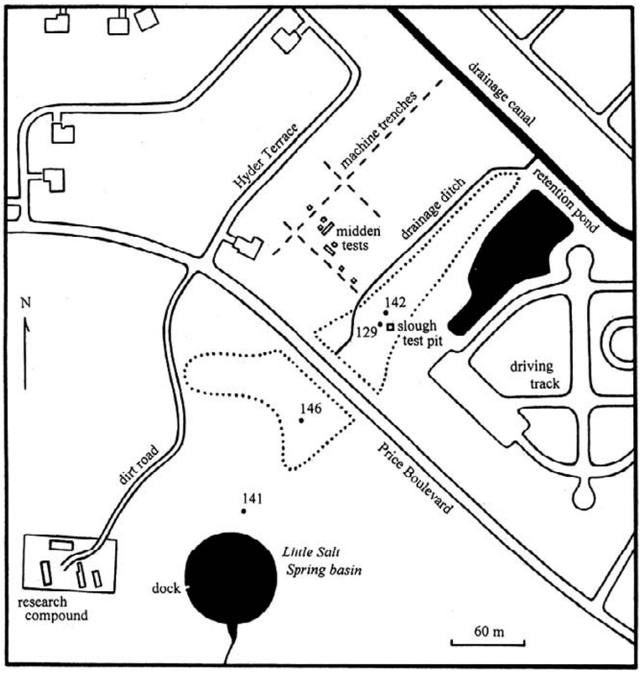

Figure 1. Site plan of Little Salt Spring (Luer 2002:Figure 9). The slough in indicated by a dotted line. Midden tests and trenches date from an unpublished Phase I survey by C. Clausen in 1986 to determine the extent of the habitation component of 8SO79. Cores 129, 141, and 142 were taken in the late 1970s for pollen analyses (Brown and Cohen 1985).

present surface, in a freshwater peat deposit. A second *in situ* burial from the west side of the spring basin was examined in 1986, a young female from which brain tissue was removed yielding mitochondrial DNA and a radiocarbon date of 6860 ± 110 rcybp (Beta-17207) (Paabo et al. 1988). Applying the intcal04 correction (Calib Rev. 5.0; Reimer, Baillie, and Bard 2004) to this date gives a single 1-sigma age range of 7592–7794 calendar years B.P.

The burials represent interments in a ''wet cemetery'' of the type also known from Republic Groves (8HR4) (Wharton et al. 1981), Windover (8BR246) (Doran 2002) and Bay West (8CR200) (Beriault et al. 1981) (Figure 2). At Little Salt Spring the extent of the wet cemetery is unknown but there may be burials around the circumference of the spring, extending to the peat-filled slough adjacent to the upland settlement site (8SO79).

Little Salt Spring and a 110-acre buffer zone surrounding it were donated to the University of Miami in 1982. Since 1992, underwater excavations at Little Salt Spring have focused on three 2-x-2-m test pits in the spring basin designed to sample the complete stratigraphic section and determine the general depositional sequence in the basin (Gifford 2003, 2005). To date none of these excavations has reached the late Pleistocene Fort Thompson formation, the geological deposit underlying all younger sediments containing cultural material. There has been no substantial discovery of human remains in any of these test pits, but numerous artifacts of deer bone and antler, as well as oak, have been recovered from strata dating to ca. 9,500 rcybp (Gifford 2003, 2005).

Bioarchaeology

Bioarchaeological assessment of the collection, which is now housed in its entirety at the University of Miami, is severely hampered by lack of provenience, documentation and association of remains. The collection is the result of numerous excavations spanning several decades. The elements are identified by varying accession numbers; many elements lack accession numbers altogether. The remains have now been separated and stored by element. Therefore, the ability to assess ''individuals'' within the collection has been lost. William Royal recovered the majority of the skeletal remains from Little Salt Spring beginning in the late 1950s but field notes and records have been lost.

The remains are well preserved but the collection consists primarily of femurs, which may reflect the preferential survival of such robust elements or sampling preferences of Royal, who collected remains exposed on the base of the spring as opposed to using systematic excavation. There is only one individual whose remains are still in association. A subadult, approximately eighth years of age based on dental eruption, was excavated in the mid-1970s from the western margin of the sink. Approximately 30 percent of the child was recovered, yet information concerning provenience, burial position, orientation, and associated grave goods has been lost (Merbs and Clausen 1981). The individual displays numerous indications of biological ''stress,'' including cribra orbitalia, periostitis, and linear enamel hyoplasias. Cribra orbitalia, porous lesions found in the roof of orbits caused by expansion of diploic bone, has been linked to scurvy as well as anemia secondary to nutritional deficiency or parasite infestation (Ortner et al. 1999; Mittler and Van Gerven 1994) and is especially extensive in the left orbit (Figure 3). The subadult exhibits periosteal inflammation to the left femur, an inflammatory response of the outer layer of bone due to bacterial infection or trauma. Linear enamel hypoplasias, horizontal grooves caused by disruption in the enamel matrix, are present on the anterior dentition. The limited number of elements available for analysis makes differential diagnoses difficult. The periosteal and orbital lesions were healed at the time of death.

Although skeletal preservation is good, many of the elements, including the large number of femurs (68) are fragmented. Four crania are represented: a single

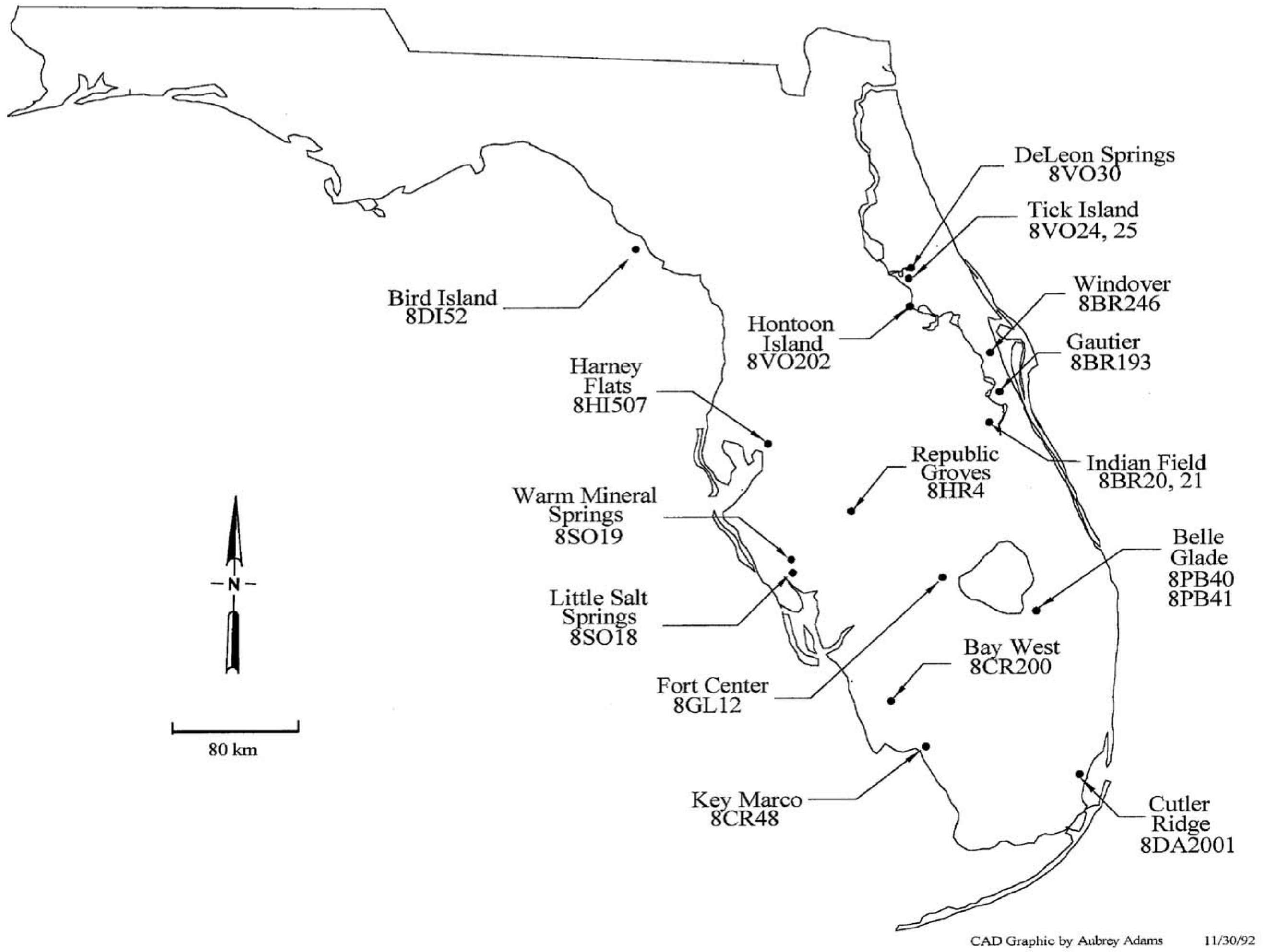

Figure 2. Archaeological sites in Florida producing human skeletal remains (Doran 2002:Map 1.1).

Figure 3. Orbits of subadult exhibiting healed cribra orbitalia lesions. (Photo courtesy J. Gifford.)

complete skull (the subadult) and three facial portions lacking vaults. Metric analyses were restricted to postcranial elements. The minimum number of individuals (MNI) is 44, based on femur count. Sexing of 22 innominates was determined based on pelvic morphology (Buikstra and Ubelaker 1994), with 18 females and four males identified. Regression formulae (Steele and Bramblett 1988) were used to calculate maximum length of fragmented femurs. Stature was calculated based on Scuilii et al. (1990). Sex was indeterminate for the femurs. Therefore, stature calculations were performed based on male and female parameters (Figure 4) for each complete femur in the collection. Metrics obtained from the femurs included maximum length, midshaft dimensions, and subtrochanteric dimensions. The same measurements were taken from the Windover collection (8BR246), an Archaic population from Florida's east coast and were found to be comparable to those from Little Salt Spring (Figure 5 and 6), with the single outlier from Little Salt Spring representing a subadult. Data

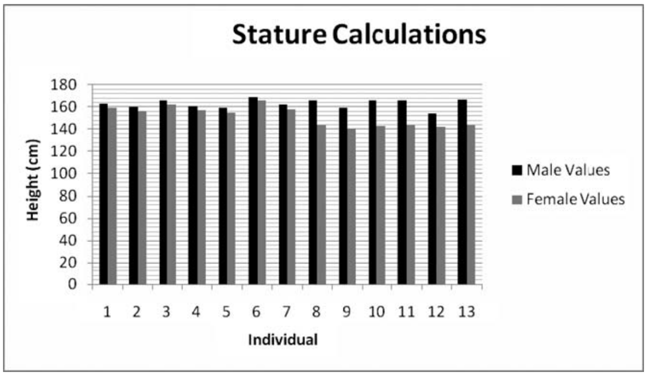

Figure 4. Stature calculations based on maximum femur length.

provided per side is based on larger number of elements present for comparison.

Maximum femur lengths (left side) averaged 452 cm and 439 cm from Little Salt Spring and Windover, respectively (only six Little Salt Spring femurs available for measurement versus 48 at Windover). Femoral midshaft dimensions (left side) ranged from 25 to 30 cm (medial/lateral) and 20 to 34 cm (anterior/posterior) from Little Salt Spring. These same dimensions from Windover ranged from 22 to 30 cm and 20 to 33 cm, respectively. Stature distributions also fall within the range of the distributions from the Windover population. Stature calculations at Little Salt Spring range from 140 to 166 cm using the formula for females and 154 to 169 cm if projecting for males. Windover stature ranges from 141 to 162 cm for females and 154 to 170 cm for males. Subtrochanteric dimensions from Little Salt Spring ranged from 27 to 38 cm (medial/lateral) and 18 to 28 cm (anterior/posterior). These same measurements from Windover ranged from 26 to 35 cm (m/l) and 20 to 26 cm (a/p), respectively. Measurements taken from the head of the talus and humeral midshafts, although limited in number (a single talus and three humeri from Little Salt), are consistent with those from Windover as well. Metric comparisons are provided in Table 1.

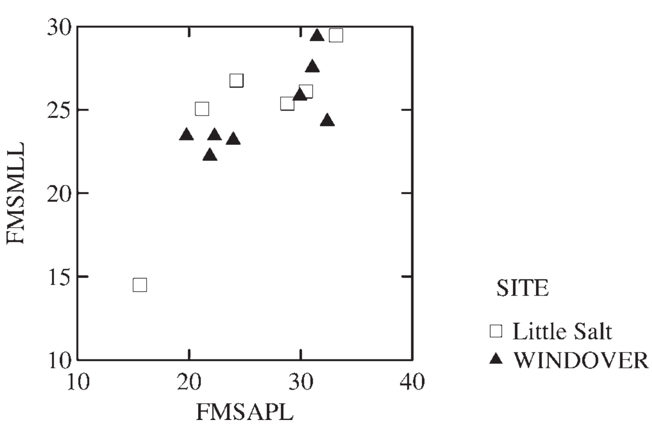

Figure 5. Comparison of femur midshaft dimensions from Little Salt Spring and Windover.

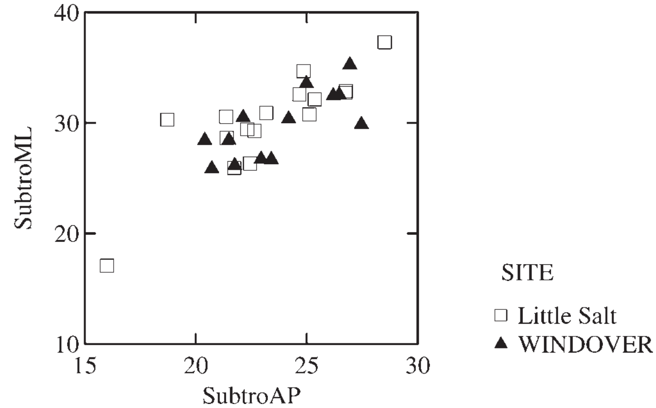

Figure 6. Comparison of femur subtrochanteric dimensions from Little Salt Spring and Windover.

Of the dentition, a total of 369 sockets were examined (Figure 7). There are only six complete mandibles with many of the examined sockets coming from mandibular/maxillary fragments. Many of the teeth (229) have been lost postmortem. Of the remaining teeth, most display heavy attrition caused from high amounts of abrasives in the diet, the use of teeth in extramasticatory functions, or a combination of both (Molnar and Molnar 1985; Isler et al. 1985). A total of 45 teeth were lost premortem, which can be indicative of poor oral health (Roberts and Manchester 1995). A total of 13 carious lesions were recorded, as well as six periapical abscesses. When compared to the dentition from Windover (Wentz 2006), the remains from Little Salt Spring exhibit twice the percentages of teeth lost premortem (12 percent vs. 6 percent at Windover) and affected by carious lesions (10 percent vs. 5 percent at Windover). There is evidence of enamel hypoplasias, yet many of the teeth utilized for scoring hypoplastic defects (incisors and canines) were lost postmortem.

Pathologies noted among the remains from Little Salt Spring included cribra orbitalia, periosteal inflammation, and degenerative joint disease. Of the 18 orbits examined at Little Salt Spring, 27 percent exhibited cribra orbitalia (compared to 31 percent at Windover) (Wentz 2004). Of the few vertebrae represented in the collection, a majority of them exhibit osteophytic lipping of the anterior bodies indicative of degenerative joint disease. The only other example of degenerative joint disease is a small erosive lesion on the proximal head of an ulna. Another ulna displays unusual pathology at its distal end. The distal end of the bone tapers off, secondary to what appears to have been a possible traumatic amputation (Figure 8). The injury resulted in the loss of the distal articular surface, yet the bone exhibits extensive remodeling, indicating the individual survived the injury.

There are no fractures among the remains from Little Salt Spring. Femurs make up the majority of the collection and are the largest and hardest bone within

Table 1. Stature and Femoral Dimensions from Little Salt Spring and Windover.

	Stature	Femur Length M.S. M/L	Femur M.S. A/P	Femur M/L	Femur Sub. Tro. A/P	Femur Sub. Tro.
Little Salt Females	140–166 cm	*	*	*	*	*
Little Salt Males	154–169 cm	*	*	*	*	*
Windover Females	141–162 cm	*	*	*	*	*
Windover Males	154–170 cm	*	*	*	*	*
Little Salt Tot. Pop.	*	452 cm	25–30 cm	20–34 cm	27–38 cm	18–28 cm
Windover Tot. Pop.	*	439 cm	22–30 cm	20–33 cm	26–35 cm	20–26 cm

Note: Femur M.S. M/L = femoral midshaft dimensions, medial/lateral; Femur M.S. A/P = femoral midshaft dimensions, anterior/posterior; Femur Sub. Tro. M/L = femoral subtrochanteric dimensions medial/lateral; Femur Sub. Tro. A/P = femoral subtrochanteric dimensions anterior/posterior; * = measurement not taken.

the human body, requiring significant force to fracture. The lack of fractures could be related to element representation within the collection. Among the Windover population, which consists of over 168 individuals, a total of 90 fractures are documented, yet only two are femur fractures (Smith 2003).

Mortuary Ponds

Interment style is one of the most visible activities through which human societies map out and express their relationships to ancestors, land and the living (Pearson 2002). Archaeologists utilize mortuary ritual to reconstruct social structure and sacred practices of past peoples by examining the place, position, and arrangement of the dead, the distribution and types of grave goods accompanying the dead, and the methods used for their interment.

Little Salt Spring, like several Archaic cemeteries in Florida, is characterized as a ''mortuary pond.'' Mortuary ponds are small bodies of water used as sites of interment for the dead. But mortuary ponds like Little Salt Spring are bound temporally and geographically to Florida's Archaic. Nowhere else do we find the early inhabitants of North America disposing of their dead beneath the surface of natural bodies of water. It is this exclusivity that adds to the intrigue of Florida's Archaic pond burials.

By investigating burial customs, one can trace the formation and development of an archaeological culture and the succession of archaeological cultures (Alekshin 1983). What we see when we examine the mortuary ponds of Florida's Archaic are similarities in technique–similarities that may hint at cultural continuity among the people of this period and region.

Although the lack of provenience at Little Salt Spring diminishes our ability to interpret the site archaeologically, the similarities between this site and other Archaic mortuary ponds is compelling. Bay West (8CR200), Republic Groves (8HR4), Windover (8BR246) and Little Salt Spring are all Archaic period pond cemeteries where individuals, accompanied by grave goods made of bone, wood, antler and stone were interred (Figures 9 and 10). Merbs and Clausen (1981) excavated the remains of an adult male and female located within the slough at Little Salt Spring, which was wet at the time of interment. Foot bones believed to be those of the male had been carefully wrapped in grass and placed next to the body. The female was buried with a chert knife and wooden digging stick. Next to her were post molds thought to be from effigy poles or from a shelter erected over the body. Similar poles have been found at Bay West and Windover. Due to the lack of excavation records, it is unclear if these individuals are included in the present skeletal analysis.

At Bay West, wooden poles of uniform diameter (averaging 4.5 cm) are possibly the remnants of scaffolds or platforms (Purdy 1991). Some of the wood

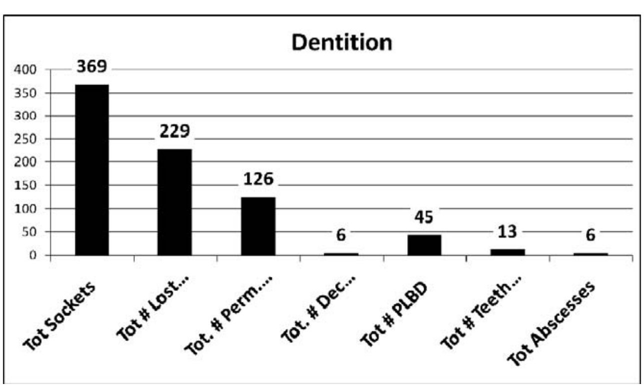

Figure 7. Analysis of dentition from Little Salt Spring.

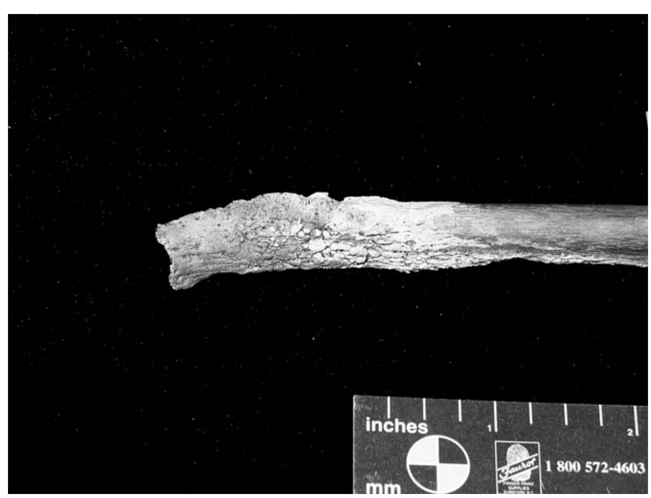

Figure 8. Distal ulna exhibiting possible traumatic amputation. (Photo courtesy J. Gifford.)

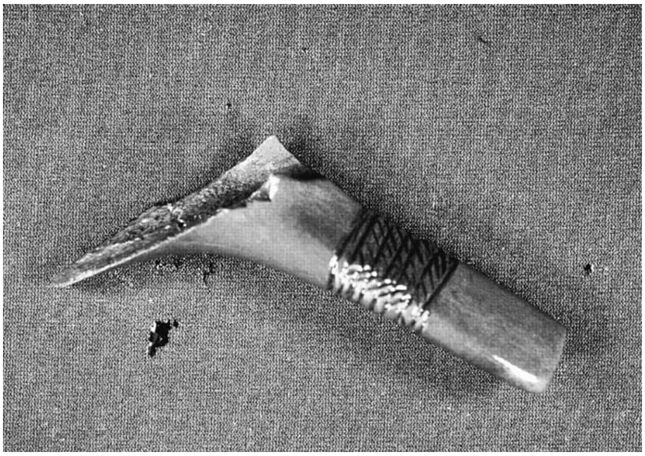

Figure 9. Bone artifact from Little Salt Spring showing detailed engraving. (Photo courtesy J. Gifford.)

Figure 10. Stone tool recovered from Little Salt Spring indicative of the Archaic period. (Photo courtesy J. Gifford.)

exhibits charring, possibly the result of intentional burning or from natural fires occurring during dry conditions. At Windover, wooden stakes believed to be effigy poles were recovered in association with many burials (Dickel 2002). Thirty-three tapered wooden stakes, made of pine and oak, were recovered from the Republic Groves site. They appeared to have been hammered into position, since the tops of the stakes showed signs of battering (Purdy 1991).

The female located in the slough at Little Salt Spring had been covered by layered grape vine upon interment (Merbs and Clausen 1981). Each layer was oriented in a particular direction. A plant fiber shroud encased the body, with the fibers placed at right angles to each other instead of being woven together. She was extended, with hands at her sides and her body oriented to the west. Many of the individuals at Windover received similar treatment upon interment. Grave goods of wood, lithics, and antler were recovered in association with many burials at Windover and many individuals were wrapped in woven textiles (Doran 2002). The majority of individuals at Windover were buried in flexed position, oriented to the west (Dickel 2002). Sticks of pine erected over the bodies covered some individuals. Although excavations of burials within the sink at Little Salt Spring were not performed with proper control, the similarity of interment methods within the slough to those of Windover is intriguing. Unfortunately, the majority of the mortuary ponds have had little to no control during excavation, much of the recovered material resulting from salvage excavations. The human remains from Bay West were recovered under such conditions. Many of the details as to position, orientation, and association of grave goods from these cemeteries have been lost. Windover stands out as an example of the wealth of information available from these sites when proper excavation techniques are utilized.

The significance of water to the people of this period and region is unknown. Whether ritual or utilitarian, the continuous use of the ponds for burial purposes attests to their importance. The people of Windover utilized the pond for over 500 years (Doran 2002). Some of the human remains recovered from Warm Mineral Springs (8SO19) are over 10,000 years old (Purdy 1991), indicating the use of mortuary ponds may predate the Archaic period. But the association of water with death is not limited to Florida or the Americas. We see similar reverence for water in cultures around the world. In Papua New Guinea, the headwaters of the Sepik River ''consist of deep sinkholes within limestone ridges which the Bimin-Kuskusmin consider to be passages to the underworld out of which ancestral spirits return to haunt and to bless the living'' (Pearson 2002). The Berawan of Long Jegan in Malaysia believe the dead are led to the afterworld via a river. If the river is bypassed, ''the dead will be consigned to wander indefinitely'' (Metcalf and Huntington 1999). The ritual of burial at sea in our own culture is testament to the symbolic nature of water among sailors, although the utilitarian nature of burials at sea cannot be ignored. Utility may also have played a part in some of Florida's Archaic pond burials, yet the care that accompanied the placement of the bodies and the inclusion of grave goods attest to the ritual significance of these mortuary ponds.

These ponds, spread across the Florida peninsula, with histories extending back thousands of years, may indicate cultural continuity among these early inhabitants. Since much of the archaeology has been lost, perhaps the answers lie in the bones themselves. A reconstruction of the molecular history of Florida's Archaic may tell us how closely these individuals were related and whether or not we are witnessing the faint traces of a people linked through time and space.

Notes

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