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This study used stable carbon $\delta^{13}\text{C}$ and oxygen $\delta^{18}\text{O}$ isotope compositions data to assess the extent to which diet breadths of northwestern Guyana changed during the Holocene. We analyzed human bone and enamel remains from seven shell mound sites dating between 7500 and 2600 BP. Our analyses demonstrate some degree of constancy in the availability of C_3 plants during the past several thousand years—though we note an increasing reliance on such plants beginning in the Early Holocene. We also document warming intervals during the Early Holocene (Early Archaic), which appear to correlate with dry periods known elsewhere in the central Amazon during this period.

Esta investigación usó datos de isótopos estables compuestos de carbono $\delta^{13}\text{C}$ y oxígeno $\delta^{18}\text{O}$ para evaluar hasta que punto la gama de especies animales y vegetales del noroeste de Guyana cambiaron durante el Holoceno. Analizamos los restos de huesos humanos y esmalte de siete lugares de montículos de conchas fechados entre 7500 y 2600 BP. Nuestros análisis demostraron cierto grado de constancia en la disponibilidad de plantas C_3 durante varios de los últimos miles de años, aunque observamos una creciente dependencia en tales plantas empezando en los principios del Holoceno. También documentamos periodos de calentamiento durante el Holoceno Temprano (el Arcaico Temprano) que parecen relacionarse con los periodos secos conocidos en otras partes del Amazonas central durante este periodo.

Little is known of the prehistoric environment of northwestern Guyana as it relates to the unique shell mound culture of the area. Although we presume a degree of constancy in Holocene contexts, few area studies address environmental change (Van der Hammen and Wijmstra 1964; Van der Hammen 1982). Williams (2003) argues that environmental conditions of the Late Pleistocene/Early Holocene resulted in instability marking in diet breadth shifts. To date, no studies have attempted to assess diet breadth shifts of hunter-gatherers utilizing the shellfish resources of the Guyana littoral. This study used the results of isotopic analyses of human and other faunal remains from shell mounds to assess environmental changes in northwestern Guyana during the Archaic period. Owing to highly degraded samples that failed to produce sufficient levels of collagen for nitrogen analysis, we used stable carbon $\delta^{13}\text{C}$ and oxygen $\delta^{18}\text{O}$ isotope compositions data to assess the degree of dietary constancy during the past several thousand years as a proxy for determining the likelihood of there being any significant changes in the Archaic/Holocene environment that would have influenced the use of shellfish resources in the northwest.

Archaic Shell Middens

The coastal plain of northwestern Guyana is characterized by Early to Middle Holocene-age shell mounds (Figure 1). The mounds, which are accumulations of shell refuse, served as living areas and as places for burials. The landscape is covered by primary, secondary and marsh forest. Archaeological discoveries of mounds within this area have reported assemblages of chipped and groundstone artifacts that form the basis of Evans and Meggers' (1960) description of the so-called Alaka phase, which they originally dated between 1950 and 1450 BP Radiocarbon dates, however, indicate pre-ceramic occupations of a number of shell midden deposits as early as ca. 7500 BP (Plew and Dagers 2016). Some mounds including Barabina (Williams 1981) and Kabakaburi (Plew, Pereria and Simon 2007) contain early ceramic remains—the former being the focus of a debate regarding the earliest presence of pottery in northwestern Guyana (Williams 1996, Roosevelt 1997). Although shell mounds are not found in adjacent Suriname and French Guiana they are common in the south Caribbean where, beginning around 6,000 BP the Banwari Trace and El Conchero shell midden occupations represent a regional Archaic pattern similar to that of Alaka phase sites though different in assemblage variation (Boomert 2000:54-56). In general, Banwari Trace assemblages contain many more specialized tools. To the east, at Taperinha and Pedra Pintada, Mina phase pottery dates between 7090 BP and 7580 BP respectively. Early and Middle Holocene Age non-ceramic-bearing shell mounds have recently been identified in lowland Bolivia (Lombardo et al. 2013).

The Holocene shell deposits examined in this study are located on the coastal plain within the Northwestern district of Guyana. The area is believed to have been occupied by the prehistoric Warrau population, which exploited marine resources and left behind an extensive shell midden complex with ages ranging between 7500 BP and 260 BP. The coastal littoral is characterized by vast rivers, creeks and tributaries, swamps and marsh forest. Based on coastal pollen data, the vegetation of the period consists predominantly of mangroves, palms and open grass vegetation (Van der Hammen 1982). Williams (2003) argues that fluctuating environmental conditions of the Late Pleistocene-Early Holocene resulted in periods of instability and shifting resource emphases in which different species associated with marine and brackish waters were taken at differing water levels associated with sea-level rise between 7200 and 6000 BP and the emergence of mangrove swamps between 6000 and 4000 BP. Although Early Holocene sea levels would have varied owing to differences in precipitation and temperature, Van der Hammen (1963) suggests that Late Alleröd interstadial sea levels rose as much as thirty-six meters above the modern land surface in the Demerara River Valley. Rull et al. (1999) however suggest that post-glacial/Holocene sea levels vary greatly from one location to another. It appears that sea level oscillations during the past 6000 years may have varied little more than 3 meters in many locations (Fairbridge 1976). In this regard Early Holocene sea levels along the Guyana coast were most probably varied by features of local terrain—the ebb and flow of which would have influenced settlement and resource availability. Acknowledging these fluctuations and their influence upon local patterns, Plew (2010:35) argues that periods of environmental change should not be seen as reflecting instability but rather as events resulting in an ever-increasing range of potential adaptive responses. In this regard, the density of the *Rhizophora* species indicates a rising relative sea level. The variation of pollen distribution provides a relative marker for fluctuating shorelines (Van Der Hammen and Wijmstra 1964). The surrounding mangrove provided a productive aquatic habitat whereas the marine ecosystem supported estuarine resources including fish and shellfish.

The stratigraphy of shell mounds documents alternating layers of shell refuse from different species of mollusks that include the small striped snail, clams, oysters, crabs and fish remains intermixed with clayey lateritic soil. The remains of peccary, agouti, turtle, large birds and cayman have also been reported (Williams 2003, Plew 2016, Plew and Dagers 2016). Subsistence appears to have relied heavily upon the exploitation of mollusks associated with relatively brackish environs (Williams 1981:16, 30-32; Jansma 1981). Williams's (1981, 2003) excavations have produced evidence of features including hearths, postmolds and several storage pits measuring 30-40 centimeters in diameter and extending to 40-50 centimeters in depth. Similar features have been noted at Kabakaburi (Plew, Willson and Simon 2007) and Siriki (Plew, Willson and Dagers 2012, Plew and Dagers 2016).

Radiocarbon dates have been obtained for nine shell mounds. The dates establish a general temporal range of between 7500 BP and 2600 BP—the more recent dates from the upper levels of Hosororo Creek (2660±45 BP, SI 6636, Williams 2003) and the earliest from Piraka, (7545 BP, Beta 449110) together with the earliest ones occurring at Barabina where a radiocarbon date of 6885±85 BP has been reported. An additionally early date was obtained from carbon collected from the Wyva Creek shell mound near the Barima River. Wyva Creek returned a conventional radiocarbon age of 6340±50 BP (Beta 264970, Plew and Willson 2009). A recently obtained date for Little Kaniballi dates its occupation to 6340±30 BP (Cal 7320-7245 BP (Beta 449111, Dagers and Plew 2017). Other Middle

Holocene dates in the range from 5965 \pm 50 BP (Barabina) to 5710 \pm 80 BP (Koriabo) are not common, suggesting that there may be a more limited shell mound occupation in this time frame—though the sample size is too small to provide a level of confidence. In contrast, a number of mounds were occupied between c. 4000 and c. 2600 BP. The most recent dates are from Hobodiah at 139 \pm 60 (Beta 109244) and Siriki at 270 \pm 30 BP.

Isotope Analyses as a Source of Assessing Dietary and Environmental Change

Bone and tooth enamel are composed of hydroxyapatite ($\text{Ca}_5(\text{PO}_4)_3\text{OH}$) with a carbonate (CO_3) substitution in either the PO_4 and OH sites (Elliot 2002). In this study, we analyzed the (CO_3) component in human bone and tooth enamel samples for $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values. The carbon isotopic compositions $\delta^{13}\text{C}$ of mammalian bones and teeth record dietary $\delta^{13}\text{C}$ values, with a fixed fractionation factor of $\sim 13\%$ in primates (Cerling et al. 2004; Sandberg et al. 2012). In enamel, there is limited fractionation in $\delta^{13}\text{C}$ composition with increasing trophic level (i.e., through carnivores and omnivores higher in the food chain, see Lee-Thorp and Sponheimer (2006), therefore, the $\delta^{13}\text{C}$ of animal tissue preserves the $\delta^{13}\text{C}$ value of the vegetation at the base of the food chain (Janssen et al. 2016). The majority of global vegetation (>90%) utilizes the C_3 photosynthetic pathway, whereas the remainder is split between the C_4 and CAM (Crassulacean Acid Metabolism) pathways – both adaptations to hot, arid environments through increased water use efficiency and reduced photorespiration (Ehleringer et al. 1992; Ehleringer and Monson 1993; Kohn 2010). C_3 plants have a mean $\delta^{13}\text{C}$ value of -27% (range -22% to -35% ; Kohn 2010), whereas C_4 plants have a mean $\delta^{13}\text{C}$ value of -13% (range -9% to -19%). CAM plants have a range of value but typically fall closer to the C_4 range; however, CAM plants (e.g., succulents, orchids) rarely contribute to human diets and therefore are not considered as a food source in this study. The $\delta^{13}\text{C}$ values of C_3 plants can be further influenced by environmental factors -- water stress results in higher $\delta^{13}\text{C}$ values and a closed canopy environment shifts $\delta^{13}\text{C}$ to very low values (Van der Merwe and Medina 1991; Kohn 2010; Janssen et al. 2016). More positive $\delta^{13}\text{C}$ values in vegetation and animal tissues may indicate a habitat with more open vegetation. Thus, differences in the $\delta^{13}\text{C}$ value recorded in animal bone and tooth enamel allow detection of changing vegetation patterns (C_3 vs C_4 plants; closed vs open canopy structure) which can be interpreted as paleodietary and paleoenvironmental proxies in archeological specimens. Further paleoclimate inferences can be made by applying a mean annual precipitation model to $\delta^{13}\text{C}$ values (Kohn 2010); however, these calculations have mainly been done on herbivore tooth specimens—omnivory and any component of artificial irrigation incorporated into the dietary $\delta^{13}\text{C}$ would potentially undermine model output. It remains important to note that fossil fuel combustion since the late 19th century has decreased the $\delta^{13}\text{C}$ value of atmospheric CO_2 by $\sim 1.5\%$ (Indermühle et al. 1999).

The oxygen isotope composition of mammalian tooth enamel and bone hydroxyapatite carbonate is directly linked to the $\delta^{18}\text{O}$ values of body water, reflecting food and drinking water, which are in turn a complex function of habitat, climate, and diet (Kohn et al. 1996; Janssen et al. 2016; Lüdecke et al. 2016). The $\delta^{18}\text{O}$ value of rainwater decreases with increasing distance from moisture source, increasing altitude, decreasing temperature, and intensity of precipitation (Dansgaard 1964). In arid environments, surface waters and leaf water $\delta^{18}\text{O}$ values increase with evaporation (Gonfiantini et al. 1965), and, under similar conditions, C_4 plants have higher $\delta^{18}\text{O}$ values than C_3 vegetation (Sternberg 1989; Helliker and Ehleringer 2000). Fossil tooth enamel and bone $\delta^{18}\text{O}$ values represent the interplay of environmental parameters and diet composition influence on body water composition. For mammals, there is a constant offset ($\sim 26\%$) between the $\delta^{18}\text{O}$ of body water and the CO_3 component of bioapatite (Bryant et al. 1996; Kohn and Cerling 2002; Lüdecke et al. 2016).

Methods

Geographical and dietary baseline data for this project utilized both animal proxies and contemporary plant materials. Oxygen and carbon stable isotope compositions were collected from tooth enamel and bone samples from seven sites. Baseline data were collected for Barabina, Kabakaburi, Piraka, and Waramuri mounds excavated by Denis Williams during the 1980s and from more recent samples from excavations of Little Kaniballi (Daggers 2017), Siriki (Plew, Wilson, and Daggers 2012) and Wyva Creek (Plew and Wilson 2009) stored in the archives of the Walter Roth Museum of Anthropology.

Surficial material was removed manually from specimens with a carbide burr followed by an ethanol rinse prior to sampling. Bioapatite samples were then hand-milled using a Dremel[®] rotary tool equipped with a 0.5 mm carbide dental drill bit. Approximately 8 mg of enamel or bone powder were pretreated using the approach of Koch et al.

(1997). Residual organics were oxidized overnight using 30% hydrogen peroxide. Twelve hours later, the hydrogen peroxide was decanted and powders were rinsed twice with deionized water. Powders were then treated with a 1.0 M Ca-acetate/acetic acid buffer overnight to remove labile carbonates. Following this pretreatment procedure, samples were rinsed three times with deionized water and dried in a vacuum oven at 40 °C.

The CO₃ component of powdered enamel and bone samples were analyzed by digestion in phosphoric acid using a Thermo Delta V Plus continuous flow isotope ratio mass spectrometer coupled with a Thermo GasBench II. All carbonate isotopic compositions were standardized to Pee Dee Belemnite (PDB), using NBS-18 and NBS-19 calcite standards; oxygen isotopic compositions were then normalized to Vienna Standard Mean Ocean Water (VSMOW). Analytical reproducibility for the dataset was $\pm 0.20\text{‰}$ and $\pm 0.25\text{‰}$ for $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ respectively, based on NBS 18 and 19 (n=14). All isotope data are reported in standard delta (δ) notation. Statistical analyses were completed using R - v. 3.3.2. One-way ANOVA was used to compare pooled bone and tooth data between localities. Post hoc Students' T-tests corrected for multiple comparisons isolated significant differences at the $p < 0.05$ level.

Sample Selection

Differences in the quantity and condition of bone from the mound sites served to define sample size. During the selection process, bones displaying evidence of pathologies were avoided (Olsen et al. 2014). A total of 81 samples of human bone and teeth were analyzed in this study, although four lacked exact stratigraphic proveniences (Table 1). Owing to considerable differences in past recovery processes, many collections are incomplete. Given this, we used whatever remains were present from early excavations. In the case of Barabina we used a number of rib fragments that had been retained in the collection. In other assemblages, long bone fragments were sampled. A significant percent of the collections analyzed was degraded and resulted in poor collagen preservation. As a result we were not able to conduct nitrogen analysis. Only a few samples were taken from stratigraphic units that had been radiocarbon dated. In this regard we were cognizant of the problem of sampling elements from the same individuals. Although we cannot say with certainty that all samples come from separate individuals we believe that most are. To afford control of this problem, we relied upon detailed descriptions of stratigraphic positioning of skeletal remains (Williams 1981) and distinct locations of burials within mounds (Plew, Willson and Dagers 2012). The samples document an age range of infants to thirty years of age (Figure 2).

In addition to bone and teeth samples from the midden sites, a number of contemporary samples (C₃, C₄ and cam, n=27) were collected for the purpose of $\delta^{13}\text{C}$ analysis. Carbon isotope compositions were used as a primary proxy of diet and of the Archaic shell mound populations, whereas oxygen isotope compositions provided a basis for assessing environmental changes.

Results

We analyzed as noted, 81 samples from seven sites that included Barabina, Little Kaniballi, Kabakaburi, Piraka, Siriki, Waramuri and Wyva Creek (Table 1). Although some studies have shown offsets between bone and tooth enamel isotopic compositions within individuals (Warinner and Tuross 2009; Webb et al. 2014), our analysis showed no difference between bone and tooth enamel datasets. Oxygen isotope values range from 25.7‰ to 26.7‰ and show no significant differences between localities (ANOVA, $p = 0.2274$). Carbon isotope values range from -14.7‰ to -11.1‰ and show significant differences between localities (ANOVA, $p = 0.001$). Pairwise comparisons (t-test, Bonferroni correction) are reported in Table 2.

The $\delta^{13}\text{C}$ values from all samples fall within the range indicative of C₃ plant resource utilization in an open canopy environment (Kohn 2010). This conclusion is supported by carbon isotopic analyses of modern examples of local plants, which are dominantly C₃ photosynthesizing (Table 3, Figure 3). Plant $\delta^{13}\text{C}$ values measured here are consistent with the findings of Guehl et al. (1998) for regional vegetation in Guyana. A diet correction incorporating the fractionation from diet to bioapatite and an offset to account for modern decreases in atmospheric $\delta^{13}\text{C}$ ($13\text{‰} + 1.5\text{‰}$) were applied to the plant $\delta^{13}\text{C}$ compositions (Table 3). Diet-corrected $\delta^{13}\text{C}$ values based on the local plant isotopic compositions are consistent with the bone and tooth enamel sample compositions shown, supporting the conclusion that the diet of the populations sampled was dominated by C₃ vegetation (Guehl et al. 1998; Table 4).

Locations with ^{14}C dates are shown by age in Figure 4. The uniformity over time/between locations in bone and tooth enamel $\delta^{18}\text{O}$ compositions suggests that isotopically similar drinking water sources were accessed at all sites, and that other variables known to influence oxygen isotopic compositions in surface water (precipitation sources, temperature, evaporative enrichment) were similar across all sites through time. The time span represented by the majority of the dated material from these locations falls within a period referred to as the Holocene Climatic Optimum (HCO), climatic warming which spanned 8000-5000 years BP. Temperature increases of up to 4°C at the poles and decreasing to 1°C at the equator have been inferred from ice-core datasets and global climate models (Dahl-Jensen et al. 1998; Gagan et al. 1998; Koshkarova and Koshkarov 2004; Mayle et al. 2004). This warm period may have influenced the carbon isotopic values recorded in bone and tooth enamel.

Mayle et al. (2004) extend the period of warming in Amazonia from 8000-3600 years BP, spanning the full chronology potentially represented by the present study. Areas of the northern Amazon may have had reduced precipitation during this time period, leading to shifts toward more drought-tolerant dry forest taxa and savannahs in ecotonal areas (Mayle et al. 2004). The Barabina site is the recent dated location falling at the end of the HCO. It had significantly higher $\delta^{13}\text{C}$ compositions in comparison with the older Little Kaniballi, Siriki, and Piraka sites. The 1-2‰ increase in $\delta^{13}\text{C}$ values at Barabina does not seem significant to represent a shift toward C_4 diet inputs, it may be the result of a drier environment under water stress after prolonged warming.

In this regard, $\delta^{18}\text{O}$ fails to identify climate change unless all factors are known. It is however useful in reflecting the state of climate and surface temperature. Pooled bone and teeth data shown in Figure 5 show no statistical differences (ANOVA, $p = 0.2274$). Fricke, O'Neil and Lynnerup (1995) posit that the $\delta^{18}\text{O}$ composition of the body water is a reflection of the water consumed, as a result of which climate and surface water temperature can be deduced. The $\delta^{18}\text{O}$ samples from Barabina suggest variations in temperatures that may suggest intense rainfall and warming during this period. A warmer trend is evident in samples for the early Holocene, including Little Kaniballi, Wyva, Piraka and Siriki (Figure 5).

Diet Breadth

The apatite-collagen model suggests that populations in the Northwest became increasingly reliant on C_3 -based resources and fauna that are C_3 -fed. In this regard, Williams (2003) has argued that the later Holocene sees increasing use of multiple resources, including those of niche resources, specifically starchy plants (Plew, Wilson and Dagers 2012). This is further supported by the appearance of mangrove fringes/ forest along the coast during the Holocene, which provided favorable habitat for both marine resources and terrestrial fauna (van der Hammen and Wijmstra 1964). The $\delta^{13}\text{C}$ values are consistent with an open landscape such as palm forest in the Amazon region. The population who are believed to be small highly mobile groups would have adapted a coastal hunter-gatherer strategy, in which residential base camps were established with the seasonal use of shell midden sites— which to an extent supports William's (2003) arguments regarding shifting resource use.

The $\delta^{13}\text{C}$ values of the sediments transported and accumulated on four sites—Wyva, Siriki, Piraka and Barabina— show varying levels of depletion and enrichment by depth and age. These values, which range between -24.3 and 27.3 ‰ (Figure 6), suggest that sediments moved to these locations were taken from an environment dominated by C_3 plants. This indicates the depletion of $\delta^{13}\text{C}$ approaching the Mid-Holocene; within our data set this is evident at Siriki 5490 +/- 30 BP and at the Barabina site 4470 +/- 30 BP. This is further supported by Hammond, Steege and van der Borg's (2006) study of soil charcoal in the wet tropical forest of Guyana where data suggest a series of forest fires during the Holocene with $\delta^{13}\text{C}$ values ranging between -29.4 and -25.4 ‰, thus suggesting that charcoal was formed from C_3 plants typifying modern tropical forest habitat.

The $\delta^{13}\text{C}$ range of the human samples, while suggesting the consumption of C_3 plants, also suggests that these populations were utilizing resources from an open canopy environment. This is supported by van der Hammen (1982), who reports a series of dry periods in the Central Amazon Basin and South America during the early and Mid-Holocene. In this regard, Ledru (1993) suggests vegetation changes and forest retreat associated with dry climatic conditions between 11,000 and 4500 BP, resulting in forest fires (Pessenda et al. 1996), and possibly anthropogenic fires to some degree, which would have influenced the vegetation cover as suggested by Tardy (1998) in French Guiana. The influence of prehistoric populations in fires is arguable but possible since human ignition of already combustible dry forest may have been one means of controlling forest resources during the Holocene (Mayle and

Power 2008; Hammond, Steege and van der Borg 2006; Tardy 1998. However, in the absence of charcoal samples from the study area, conclusions regarding anthropogenic fires are not possible. Notably, however, Iriarte et al. (2012) suggest fire-free land use in pre-1492 Amazonian savannas. Regardless, the fluctuating climatic conditions of the Amazon and Guyana are further supported by the $\delta^{18}\text{O}$ data. The data suggest a period of greater warming in the early Holocene reflected in the $\delta^{18}\text{O}$ values from Piraka range of 28-26 ‰, the Wyva sample range between 26 -27 ‰, and the Siriki sample range 26-28 ‰, though $\delta^{18}\text{O}$ is observed at Little Kanaballi and a steady depletion in $\delta^{18}\text{O}$ as seen at Barabina in the Mid- Holocene. This may indicate climate fluctuation and possible stabilization resulting in much favorable temperatures.

This study has used the results of isotopic analyses of human and other faunal remains to assess environmental changes in northwestern Guyana during the Early to Late Archaic period. Using $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ data, we have demonstrated some degree of constancy in the availability of C_3 plants during the past several thousand years—though we note an increasing reliance on such plants beginning in the Early Holocene. We also document warming intervals during the Early Holocene (Early Archaic) which appear to correlate with dry periods known elsewhere in the central Amazon during this period. While our data support long-term perpetuation of what may be thought of as relatively modern forest conditions, we conclude that in at least the Early Holocene there may have been more open canopy—a condition that may well have seen prehistoric peoples moving to a range of seasonally available resources. In sum, we believe that over time what we know as the modern environment may have remained relatively unchanged with the minor exception of drying conditions of the Early Holocene, which may have seen increased residential mobility.

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Figure 1. Map showing general location shell mound sites mentioned in text: 1, Barabina, 2, Hosororo Creek, 3, Piraka, 4, Kabakaburi, 5, Sirki, 6, Wyva Creek, 7, Little Kaniaballi.

Figure 2. $\delta^{13}\text{C}$ values (range) for each locality showing age variations from youngest to oldest.

Figure 3. Values of $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ for each locality. Larger circles represent site mean values with two error bars. Vertical dashed lines indicate cutoff for closed canopy forests resources (Kohn, 2010) and mixed C3-C4 resources.

Figure 4. Values of $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ in tooth enamel and bone from 4 localities in coastal Guyana.

Figure 5. $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ variations across sample populations.

Figure 6. $\delta^{13}\text{C}$ values compared against radiocarbon dates (C-14) of different levels of sediment by depth from 4 localities.

Table 1. Frequency Distribution of Sample by Site and Human Remains, Associated Stratigraphic Levels, Radiocarbon Dates and $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ Results.

Table 2. Descriptive Statistics for Enamel and Bone Stable Isotope Compositions.

Table 3. Statistical Comparisons of $\delta^{13}\text{C}$ Values. Bold *p*-Values Indicate Significant Differences. For Localities Where $n = 1$, Minus Signs (-) Indicate the Data Fell Beyond 2σ of the Mean.

Table 5. Isotopic Analyses of Modern Plant Taxa with a Diet Correction to Illustrate Potential Values in Associated Bone and Tooth Enamel.