Stable Isotope Analysis of Samples from the East Okeechobee Area: A Preliminary Sketch of Paleodiet on the Southeast Florida Coast from 500 B.C.-A.D. 1513

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Introduction

The analysis of light stable isotopes from archaeological human bone can be useful to address important questions in prehistoric research. Stable carbon and nitrogen isotope ratios, in particular, can provide evidence for the consumption of certain classes of plants and proteins as well as marine and marine food resources. In this study, new isotopic data are evaluated for three prehistoric sites situated along the coast of Southeast Florida in the East Okeechobee Archaeological Area. Our goal is troffield. First, we aim to explore diachronic changes in prehistoric diet in this understudied region. Second, we correlate our new findings with ethnographic sources, which suggest differential access to food resources due to status-related differences between individuals.

This project analyzed sixteen human bone samples from three sites in the East Okeechobee Area, Patrician (1PP999) Graes G500 B.C.-A.D. 500), Boca Weir Midden (1B959Graes II and III-A.D. 500-1513), and Highland Beach Mount (1B959Graes II and III-A.D. 500-1513). Figure 1). The latter two sites are situated within the Spanish River Complex, a large pre- contact aboriginal village (Figures 2-4). This new isotopic data are compared to previously isotopic results from the Belle Glade Mount (1PP41Graes I and IIIB-A.D. 1000-1200), an inland Lake Okeechobee Archaeological Area site reported on by Ferdinando and Hilpert (2008).

Subsistence on the East Coast

The prehistoric people who lived in the East Okeechobee Area exploited food resources along the coasts of modern-day Palm Beach and Martin counties. Most settlements were located adjacent to the mouths of rivers, or along the banks of Lake Worth to capitalize on a diverse range of rivers, marine, and, to a lesser extent, terrestrial-based fauna (e.g. Ritchie et al. 1981; Carl 1991; Whelan et al. 2002b). Isotopic analysis has been utilized in this area, however, in an early study Leshan and colleagues (1989) used trace elements from human bone to infer freshwater dietary patterns, including the consumption of animal protein.

The ethnological record of the PGA contains a wealth of information concerning the subsistence of Contact Era inhabitants in the region. For instance, Jonathan Dickinson’s late seventeenth-century journal, includes references to the consumption of wild fruits including palm berries, seafood, and sea soup, and grape, along with copious quantities of fish (Andrews and Andrews 1985). Importantly, status-based differences in diet are also recognized. For example, Hare (2005) notes that certain foods may have been restricted to chiefs and high ranking individuals among the southern Florida tribes (e.g. turtle among the Tequesta and seals among the Indians of the Keys), and that there was “regular consumption of cauca,. among the elite of the east coast” (2005:72).

Stable Isotope Methods

Bone collagen was digested and purified following the modified longin protocol outlined in Anderson (1996). Purified bone collagen was frozen, freeze-dried (lyophilized), and stored in a desiccator at 2°C before samples to analysis. Atomic and stable isotope ratios were analyzed on an isotope ratio mass spectrometer (IRMS) in UF Biological Sciences, using the Delta V Advantage elemental analyzer and a Finnigan-MAT 252 with a ConFlo II interface. Bone apatite was prepared following protocols outlined in Koch et al. (1997). Freeze-dried samples were loaded into stainless steel boats and reacted in a common acid bath at 90°C. On-line water was cryogenically removed in a methane bath and the mass of the evolved CO2 gas was measured on a Micromass PQ2350 mass spectrometer. Isotope values were calibrated against the PDB and VPDB and 813C and 815N values measured relative to AIR.

Results

• EOAs peoples consumed a coastal-style diet enriched by marine protein, a significant contrast (P < 0.01, student t-test) to the C3 dominant isotopic signatures of the inland Belle Glade population.

• Three EOAs samples have isotopic signatures similar to the inland diet of the Belle Glade population. This strong evidence for the interior and the coast during the pre-contact era.

• EOAs Highland Beach samples present as a tight cluster, a contrast to the contemporary Boca Weir which are divided between inland and coastal isotopic signatures. The differential isotopic signatures provide compelling evidence of either differential, status-based, access to food, or endogenous group selection.

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Osteological Materials

Only adult bone was sampled in this study. Sex determination for the relatively complete bone taxa was guided from Patrician (Nest) follow methods outlined in Bukkove and Ubelaker (1994), specifically using the skull and/or pelvis. Rib bone samples were collected from 54 individuals. The Spectra line was used to identify both primary and secondary burials, making sex determination of some individuals more difficult. Long bone fragments of iliacus (Nest) were sampled from Boca Weir, with sex assessment (3 males, 2 females) based on associated tibiae following methods described in Bass (1995). Long bone tibial fragments (Nest) were sampled from Highland Beach (3 males, 2 females), again using Bass (1995) to determine sex.

References


Eck, Jennifer. 1997. Bone collagen was frozen and freeze-dried (lyophilized), and stored in a desiccator at 2°C before samples to analysis. Atomic and stable isotope ratios were analyzed on an isotope ratio mass spectrometer (IRMS) in UF Biological Sciences, using the Delta V Advantage elemental analyzer and a Finnigan MAT 252 with a ConFlo II interface. Bone apatite was prepared following protocols outlined in Koch et al. (1997). Freeze-dried samples were loaded into stainless steel boats and reacted in a common acid bath at 90°C. On-line water was cryogenically removed in a methane bath and the mass of the evolved CO2 gas was measured on a Micromass PQ2350 mass spectrometer. Isotope values were calibrated against the PDB and VPDB and 813C and 815N values measured relative to AIR.

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