Supplement 3. Stable and Radiogenic Isotope Sample Preparation Procedures.

Sample preparation for carbon and nitrogen isotope analysis of dental collagen, including chemical cleaning, demineralization and freeze-drying, was performed in the ACL according to established methodologies (Ambrose 1990, 1991; Longin 1971), utilizing approximately 0.1 g of dentin. Carbon and nitrogen (*δ*13C and *δ*15N) analysis of archaeological hydroxyapatite collagen was performed using the Thermo-Finnigan MAT 253 stable isotope ratio mass spectrometer in METAL at ASU. Replicates of international standards result in a reproducibility of *δ*13C=+0.2‰ and *δ*15N=+0.2‰. Nitrogen and carbonate isotope ratios are reported relative to V-PDB (Vienna PeeDee belemnite) and AIR standards. They are expressed in parts per thousand (‰) using the following standard formula: *δ*18O = (((18O/16Osample)/(18O/16Ostandard)) – 1)\* 1,000 (Coplen 1994; Craig 1961).

Preparation of archaeological hydroxyapatite carbonate samples for carbon (*δ*13C) and oxygen (*δ*18O) isotope analysis was performed in the ACL according to established methodologies (Koch et al. 1997). For each enamel sample, approximately 15 mg of tooth enamel powder was treated with 0.60 mL of 2% sodium hypochlorite (NaOCl) and then 0.60 mL of 0.1M acetic acid (CH3COOH). These samples were then analyzed at the Colorado Plateau Stable Isotope Laboratory at Northern Arizona, equipped with a Gas Bench II. International standards NBS-18 and NBS-19 were used to create the calibration curve. External and internal laboratory standards (NBS-18, NBS-19, Joplin calcite (CC), and an internal laboratory calcium carbonate (CaCO3)) were reproducible within ±0.2‰.

Sample cleaning and preparation for radiogenic strontium (87Sr/86Sr) isotope analysis was conducted at the ACL. For each enamel sample, 4-6 mg of enamel powder was utilized. Radiogenic strontium isotopes were measured on a Neptune multi-collector inductively-coupled plasma mass spectrometer (MC-ICP-MS) in METAL. For radiogenic strontium, SRM-987 (international standard) exhibited 87Sr/86Sr=0.710277 + 0.000018 (2s, n=17) after normalization of 86Sr/88Sr to a value of 0.1194 to correct for instrumental mass fractionation.

**References Cited**

Ambrose, Stanley H.

1990 Preparation and Characterization of Bone and Tooth Collagen for Isotopic Analysis. *Journal of Archaeological Science* 17:430-451.

1991 Effects of Diet, Climate and Physiology on Nitrogen Isotope Abundances in Terrestrial Foodwebs. *Journal of Archaeological Science* 18(3):293-317.

Coplen, Tyler B.

1994 Reporting of Stable Hydrogen, Carbon, and Oxygen Isotopic Abundances. *Pure and Applied Chemistry* 66:273-276.

Craig, Harmon

1961 Standard for Reporting Concentrations of Deuterium and Oxygen-18 in Natural Waters. *Science* 133:1833-1834.

Koch, Paul L., Noreen Tuross, and Marilyn L. Fogel

1997 The Effects of Sample Treatment and Diagenesis on the Isotopic Integrity of Carbonate in Biogenic Hydroxyapatite. *Journal of Archaeological Science* 24:417-429.

Longin, R.

1971 New Method of Collagen Extraction for Radiocarbon Dating. *Nature* 230:241-242.