

Supplemental Text 2. Strontium and Oxygen Isotope Methodology

New Perspectives on Migration into the Tlajinga District of Teotihuacan: A Dual-Isotope Approach

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Trace Element and Isotopic Analysis

Surface enamel was abraded using a disposable carbide rotary wheel attachment with a Dremel[®] tool to remove 30 μm of the outer surface. Teeth were then rinsed in Nanopure (MQ) water and sonicated for 30 min. Using a diamond-drill bit, 80 mg of the enamel sample was collected, avoiding surface defects, abnormalities, and underlying dentine. Enamel was crushed into a fine powder using a sterilized mortar and pestle. Forty mg of enamel was processed for $^{87}\text{Sr}/^{86}\text{Sr}$ analysis at the Laboratory for Isotopes and Metals in the Environment (LIME) at the Pennsylvania State University. The other 40 mg was sent to the Laboratory for Stable Isotope Science (LSIS) at the University of Western Ontario for $\delta^{18}\text{O}_p$.

At LIME, enamel powder (human and faunal) was placed in a 2% sodium hypochlorite solution for eight hours and then rinsed in MQ three times. Powders were then leached in a 0.1 M acetic acid solution for four hours and rinsed in MQ. The samples were digested in Savillex[®] PFA vials using 8 N Optima Grade HNO_3 heated at 120° C for 24 h. Following digestion, the sample solution was evaporated to dryness. Sample solutions were then diluted to 2% HNO_3 , and elemental analyses were performed using an X Series II-SBM Inductively Coupled Plasma – Mass Spectrometer (ICP-MS) with the addition of internal standards Sc, In, and Tl. SRM1640a was measured to monitor Sr mass concentration. The average Sr ppb value for SRM1640a obtained was 125.64 ± 0.87 (2σ , $n = 6$).

Sr was extracted using Sr-spec™ resin following a protocol adapted from De Muynck et al. (2009). Prior to analysis, Sr solutions were evaporated at 90° C, and the dry residues were re-dissolved in 0.05 N HNO₃. Sr isotope analyses were conducted in wet plasma using a ThermoScientific Neptune Plus MC-ICP-MS at LIME. Samples were analyzed in alternation with SRM 987. All samples and standards were prepared to obtain ~200 ppb and were corrected for mass fractionation and mass interferences of ⁸⁷Rb and ⁸⁶Kr and ⁸⁴Kr. The ⁸⁷Sr/⁸⁶Sr ratio was corrected for mass bias using exponential law and ⁸⁸Sr/⁸⁶Sr = 0.1194. Values obtained for the SRM 987 average 0.71024 ± 0.00001 (2σ, n = 40).

Water samples were first collected in 50 mL acid-cleaned disposable vials sealed with paraffin and refrigerated. Water samples were analyzed at the University of Missouri Research Reactor (MURR). First, 15 mL of water were processed through disposable, high-purity polypropylene syringe tip filters. The water samples were evaporated to dryness in Savillex® PFA vials at 100° C overnight. Dry residues were then dissolved in 7 N Optima Grade HNO₃ heated at 120° C for 24 h and then evaporated to dryness.

The samples were dissolved again in 2 ml 7 N HNO₃, and Sr extractions were realized using Sr-spec™ resin following a protocol adapted from De Muynck et al. (2009). The solutions were evaporated at 90° C, and the dry residues were re-dissolved in 0.05 N HNO₃ before analyses. Strontium isotope analyses were conducted in wet plasma using a Nu Plasma II (Nu Instruments) MC-ICP-MS in operation at MURR. Samples were run in alternation with solutions of SRM 987. Sample and standard solutions were prepared to obtain ~150 ppb Sr and were corrected for mass fractionation and mass interferences of ⁸⁷Rb and ⁸⁶Kr and ⁸⁴Kr. Sample values were corrected by standard bracketing using the value published by Thirwall (1991) for the ⁸⁷Sr/⁸⁶Sr ratio of SRM 987 (0.710248). Values obtained for the SRM 987 average 0.71025 ±

0.00001 (2σ , $n = 30$). SRM 1400 (Bone Ash) solutions were used as replicates to control for the reproducibility of the measurements. The average $^{87}\text{Sr}/^{86}\text{Sr}$ ratio obtained for Bone Ash is 0.71311 ± 0.00001 (2σ , $n = 7$), similar to values published by De Muynck et al. (2009).

At LSIS, bioapatite phosphate was prepared from tooth enamel as silver phosphate (Ag_3PO_4) following procedures adapted from Firsching (1961) and Stuart-Williams and Schwarcz (1995). The $\delta^{18}\text{O}_p$ of the Ag_3PO_4 was determined using Thermo Scientific™ High Temperature Conversion Elemental Analyzer (TC/EA) coupled to a Thermo Scientific™ Delta V Plus™ Isotope-Ratio Mass-Spectrometer (IRMS). Samples of Ag_3PO_4 were weighed (0.18-0.22 mg) into silver capsules and pyrolyzed within the TC/EA glassy carbon reactor at 1350°C along with equivalent weights of several standards. The resulting CO gas was transmitted through a 1.5m GC column with a 0.5nm molecular sieve at 90°C to remove impurities, after which it was swept to the IRMS using He carrier gas.

A two-point calibration curve anchored by standards Aldrich Silver Phosphate, Batch 03610EH (accepted $\delta^{18}\text{O} = +11.2\text{‰}$; Webb et al. 2014) and IAEA-CH-6 (accepted $\delta^{18}\text{O} = +36.4\text{‰}$; Farquhar et al. 1997) was used to convert results to VSMOW. Reproducibility for Aldrich Silver Phosphate $\delta^{18}\text{O}$ during the analyses performed for this study was $\pm 0.3\text{‰}$ (1σ , $n = 11$) and $\pm 0.6\text{‰}$ (1σ , $n = 7$) for IAEA-CH-6. The reproducibility of ‘unknowns’ (samples) was $\pm 0.3\text{‰}$ (1σ , $n = 5$).

The procedures for oxygen-phosphate isotope analysis for enamel samples not measured in this study can be found in White et al. (2004).

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