'Where did they come from?' Baseline stable isotope mapping of the Adelaide Plains.

Abstract: The research has created strontium and oxygen isotope baseline maps to better understand the diet, climate, landscape use, mobility, and hunting mobility of hunter-gatherer groups located in Adelaide, South Australia. These maps will allow, for the first time, accurate provenancing of artefacts, faunal and skeletal remains from archaeological sites located in the Adelaide region.

This research applies laser ablation multi-collector inductively coupled plasma mass spectrometry (LA-MC-ICPMS), thermal ionization mass spectrometry (TIMS), and isotope ratio mass spectrometry (IRMS) to 9 teeth and 9 bone samples. The faunal samples come from mammals with a limited mobility ranges (such as koalas and rats) from locations representing the major geological and physiographic regions in the Adelaide area. Bioavailable strontium isotope values obtained from the Adelaide Geosyncline have the range of 0.71222045±0.00020–0.72022698±0.0020, and samples from the Adelaide Plains have values in the range of 0.709800±0.0002–0.712071±0.000096. While samples from the alluvial fan sediments near the Eden-Burnside Fault at the boundary between these regions have the values of 0.71305±0.00011–0.71365±0.00018. Oxygen isotope results ($\delta^{18}O_C$ (PDB)) show variation over the range of -9.55– -4.51 that is independent of elevation or rainfall and is probably strongly seasonally controlled.

The results demonstrated that the stable strontium isotopes were potentially an important tool that can enable discrimination between provenance within the

Adelaide area, and that oxygen isotope are probably a more appropriate tool for discriminating seasonality rather than location in this region. This research suggests that koalas are better suited for mapping isoscapes than rats, presumably because of their limited mobility and that, while (non-systematic) offsets appear to exist between LA-MC-ICPMS and TIMS data these values are not sufficient to prevent geological providences within the region from being distinguished. The results for this research make up the baseline dataset.