Constraining diet and migration in Early Medieval Ireland using an integrated multi-isotope ($^{87}Sr/^{86}Sr$, $\delta^{18}O$, $\delta^{2}H$, $\delta^{13}C$, $\delta^{15}N$) approach

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Multiple isotopes ($^{87}Sr/^{86}Sr$, $\delta^{18}O$, $\delta^{2}H$, $\delta^{13}C$, $\delta^{15}N$) have been employed to constrain diet and provenance of Early Medieval populations in Ireland. Existing $^{87}Sr/^{86}Sr$ data from geochemical mapping of contemporary soils, plants and streamwater, in combination with $\delta^{18}O$ values, have been used to assess potential archaeological human migration. $\delta^{18}O$ values of bone collagen are notably invariable for three local scale archaeological sites (10.0‰ ± 0.6 (n=36)).

Due to the formation of HCN during the measurement of certain organic compounds by High-Temperature Conversion (HTC) with a glassy carbon reactor, $\delta^{2}H$ values can be artificially skewed relative to those analysed using a Cr-packed reactor [1]. Here, we present the first comparative results using these two methods for human samples. Preliminary results show that 'glassy carbon' $\delta^{2}H$ values are offset by a mean of -12.2‰ ± 4.5 (n=36) compared to those obtained using a Cr-packed reactor.

High $\delta^{15}N$ values for both animal (9.8 ‰ ± 1.7) and adult human (12.0 ‰ ± 0.8) bone collagen suggests an ^{15}N enrichment in the biome, potentially reflecting the effects of manuring in this environment. A mean $\delta^{13}C$ of -21.0 ‰ ± 0.41 for adult humans suggests a largely terrestrial source of dietary protein relative to marine input.

[1] Reynard & Tuross (2016), *Rapid Commun. Mass Spectrom.* 30, 1857-1864