

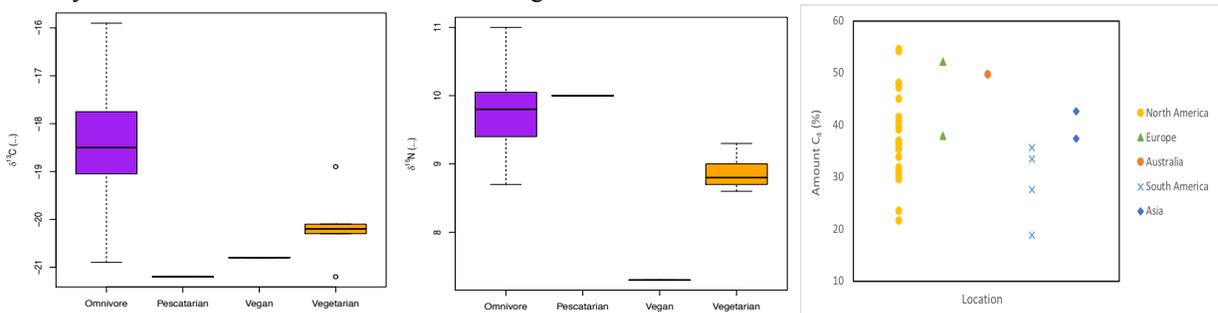
## D.I.E.T. & N.A.I.L.S.

### Did I Eat That & Nail Analysis of Isotopes Are Linked Spatially

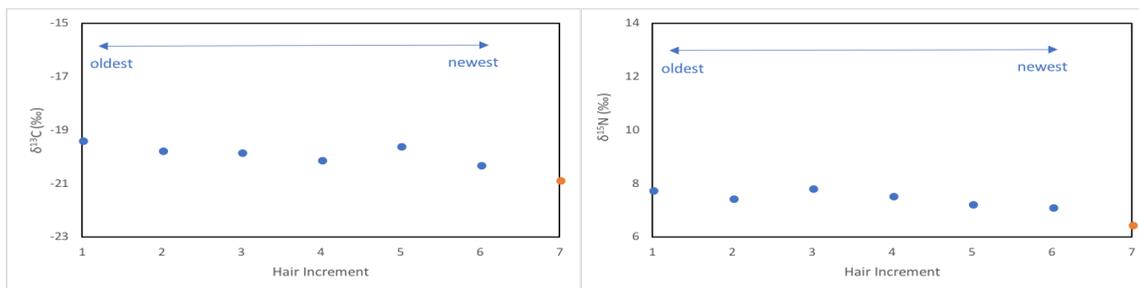
**Objectives:** The purposes of this study are to: (1) employ  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  analysis on human nails to examine dietary differences between omnivores and herbivores, (2) incrementally sample human hair to examine the impact of change to a vegan diet on  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values, (3) and examine  $\delta^{18}\text{O}$  and  $\delta^2\text{H}$  variability in human nails to examine geographic variation in local drinking water.

**Hypotheses:** (1) Humans with omnivorous diets will exhibit statistically significant different  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values than vegetarians, (2)  $\delta^{15}\text{N}$  values will decrease tip to root in the hair of a woman that transitioned from an omnivorous to a vegan diet, and (3)  $\delta^{18}\text{O}$  and  $\delta^2\text{H}$  will vary among Isotopeteers as they live in regions with different local drinking water signatures.

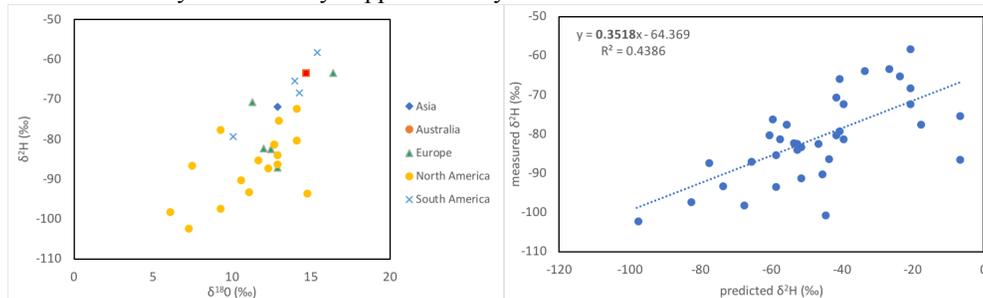
**Results:** (1) Omnivores and herbivores exhibit significantly different  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values ( $t=4.02$ ,  $df=6.94$ ,  $p=0.005$  for  $\delta^{13}\text{C}$ ;  $t=5.42$ ,  $df=10.24$ ,  $p=0.0003$   $\delta^{15}\text{N}$ ). The pescatarian  $\delta^{15}\text{N}$  values are similar to omnivores, but (s)he exhibits considerably lower  $\delta^{13}\text{C}$ . The vegan exhibited lower  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values. Amount of  $\text{C}_4$  plants in diet varies by location with North Americans consuming the most variable amounts.



(2) Both  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values exhibit little variation across increments ( $<1\text{‰}$ ) in no apparent pattern. The  $\delta^{15}\text{N}$  value of this person's fingernail (orange) is corrected as the fractionation in hair and nail keratin are slightly offset.



(3)  $\delta^{18}\text{O}$  and  $\delta^2\text{H}$  values vary considerably. Approximately 35% of water in nails comes from local drinking water.



**Interpretations:** (1) As expected, omnivores and the pescatarian exhibit the highest  $\delta^{15}\text{N}$  values because they are consuming higher trophic level organisms compared to vegetarians and the vegan. Based on  $\delta^{13}\text{C}$  values, it appears that omnivores consume a wide range of  $\text{C}_3$  and  $\text{C}_4$  inputs and vegetarians, vegans, and pescatarians likely consume primarily  $\text{C}_3$  plants. (2) We did not find decreasing  $\delta^{15}\text{N}$  values in hair increments over time as we expected. It appears that the time this woman was "omnivorous", she was consuming primarily  $\text{C}_3$  plant foods. (3)  $\delta^2\text{H}$  values reflecting local drinking water vary considerably based on climate, with warmer, more humid places are generally more enriched in  $\delta^2\text{H}$ . However, some variation in values may be due to people traveling and/or consuming water from different sources, such as bottled water or food.