

## A STUDY OF THE RELIABILITY OF BIOAPATITE $\delta^{18}\text{O}$ AND $\delta^{13}\text{C}$ AS PROXIES FOR CHANGE IN PALEOVEGETATION AND PALEOENVIRONMENT

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### Introduction

Carbon isotopes in tooth enamel record the photosynthetic pathways exploited by the vegetation consumed by an organism. Enamel oxygen isotope signature is dependent on ingested water isotopic composition, animal behavior and physiology. As the isotopic signature of ingested water is dependent on that of meteoric water, enamel oxygen values are sensitive to climate changes. Interpretation of  $\delta^{13}\text{C}$  values in enamel is relatively straightforward when compared with the multitude of processes that affect the  $\delta^{18}\text{O}$  of tooth enamel; however, the assumption that either  $\delta^{13}\text{C}$  or  $\delta^{18}\text{O}$  values are robust proxies for site vegetation or climate deserves closer examination. This study explores the reliability of  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  values of tooth enamel as indicators of paleovegetation and paleoclimate change at Zhoukoudian, China, often referred to as the “Peking Man Site.”

### Experimental

Tooth enamel is analyzed using a Gas Bench II auto-carbonate device interfaced with a Finnigan MAT Delta Plus XP located within the Geochemistry Facility of the NHMFL.  $\text{CO}_2$  is produced through reaction with  $\text{H}_3\text{PO}_4$ .  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  are measured relative to standardized  $\text{CO}_2$  and corrected using the carbonate standards PDA, MERK, NBS-19, and ROY-CC.

### Results and Discussion

Figure 1 shows  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}_{\text{CO}_3}$  data as reported in Gaboardi et al. (2005), with the addition of newer data.

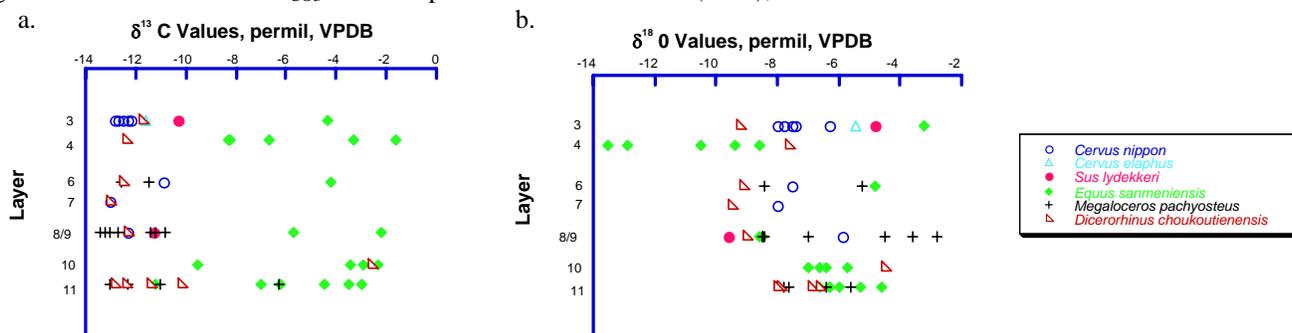


Figure 1.  $\delta^{13}\text{C}$  (a) and  $\delta^{18}\text{O}_{\text{CO}_3}$  (b) values of tooth enamel from Locality 1 at Zhoukoudian, China.

### Conclusions

$\text{C}_3$  and  $\text{C}_4$  vegetation was present throughout the time interval sampled. There is no evidence for any shift in vegetation. With such small sample sizes relative to possible  $\delta^{18}\text{O}$  variance, bulk data are difficult to interpret. Serial samples should provide a more reliable idea of seasonality at the site.

### Acknowledgements

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### References

- [1] Gaboardi, M. et al., Quaternary Research, **63**, 329-338 (2005).