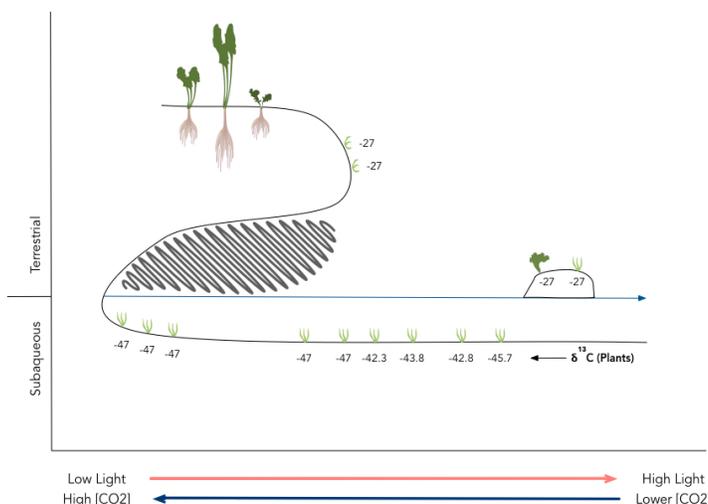


Once upon a cave:
Overtime Nitrogen Carbon Estudio,
Using Phosphate (and) Oxygen Nicely, And
Carbonates Are Very Exciting

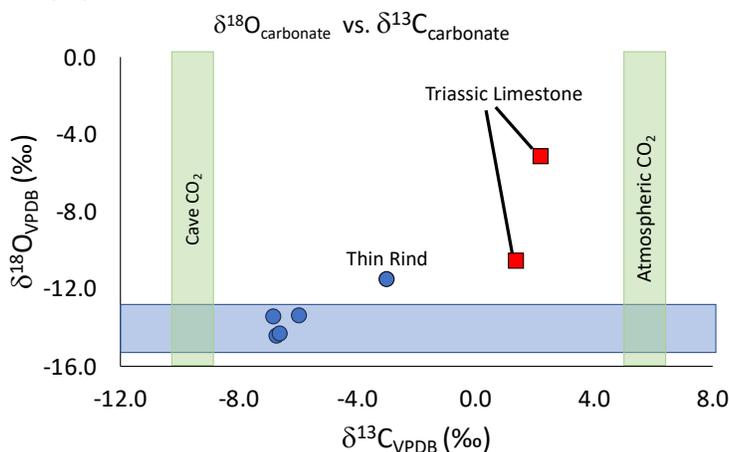
Rachel Havranek, Julia Monk, Daniela Yaffar, Bian Wang, Firas Aloqailli, Vlastimil Novak, Caro Shull



ONCE Hypotheses: (1) There will be a change in the carbon isotope value of mosses found underwater versus outside because of a changing carbon source. (2) Mosses found in humid conditions will not differ from mosses found on a dry rock because of a lack of stomates in the gametophyte.

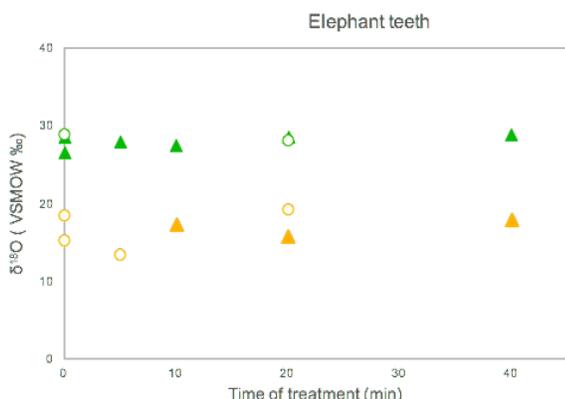
Conclusion: The mosses inside the cave are sourcing carbon from C3 respired CO₂ that is dissolved into the cave water. Mosses found on rocks outside the cave reflect atmospheric CO₂.

CAVE Hypothesis: The tufa carbonates present at the Weeping Rock cave will have an isotopic composition that represents mixing of the limestone composition and modern water/ atmospheric composition.
Conclusion: The well formed tufa in the Weeping Rock Cave were formed from waters similar to modern meteoric water. The carbon isotopic value is representative of disequilibrium formation using depleted carbon sourced from respiring plants.



UPON Hypothesis: The delta values of oxygen in carbonate and phosphate reflect the delta value of the water they were formed in. In the case of animals, this is the body water.

d13C and d18O values from dentin are affected by the addition of Acetic acid, contrasting with a more stable isotopic values of the enamel. The offset between the d18O values from carbonate and phosphate is ~9‰.



▲ Enamel
 ○ Dentin
 ▲ Enamel
 ○ Dentin

Carbonate
 Phosphate

Conclusion: We found that the d18O values of carbonate in enamel and dentin are similar for carbonate and phosphate. We calculated the delta values of the body water, which is around 0.5‰ for the phosphate and 1.6‰ of the carbonate, which match the d18O_{water} of Ethiopia (0.2 ± 1.8‰).