

## **Belemnite Rostra Geochemistry and Their Utility as Tools for Investigating Isotope Stratigraphy and Palaeoclimate**

Findlay, Duncan J.<sup>1</sup> (1) Imperial Oil Resources, Calgary, AB, Canada.

The low Mg calcite rostra of extinct Belemnoida are commonly used in Mesozoic palaeoenvironmental reconstructions as they often exhibit excellent preservation. However, published studies show that there can be substantial variability (on the order of 3 ‰) in both oxygen and carbon isotope values in the belemnite geochemical record. To investigate this, 44 belemnite rostra containing two genera, *Cylindroteuthis* and *Pachyteuthis*, were collected from the Middle Jurassic (Oxfordian) Green Beds at Carbondale River, southern Alberta, Canada. These were sampled at high resolution for trace element and stable isotope values and geochemically screened for diagenetic alteration. The range in internal geochemical values may account for some of the variability observed in the geochemical record. In addition, rostra collected from the same horizon show similar values, implying that coeval belemnites record the same signals.

$\delta^{18}\text{O}$  values do not display seasonal cyclicity suggesting the occurrence of seasonal migration in the behaviour of these organisms. Mg abundance and  $\delta^{18}\text{O}$  values tend to co-vary along the growth profile, which may indicate that the rate of Mg incorporation is temperature-dependant. The general trends observed in Mg and  $\delta^{18}\text{O}$  may imply that these belemnites migrated from shallow to deep water with maturity.

A general trend of increasing  $\delta^{13}\text{C}$  values with ontogeny is observed in both genera, which is interpreted as metabolic slowdown with age superimposed on an environmental DIC signal. There is a difference in  $\delta^{13}\text{C}$  profiles between the two identified genera, suggesting differing metabolic rates in each. The internal range of  $\delta^{13}\text{C}$  values per rostra is relatively constant, and was used to investigate changes in DIC  $\delta^{13}\text{C}$  over geologic time. A positive  $\delta^{13}\text{C}$  excursion is observed stratigraphically, which may be a useful geochemical age marker for the region.