

## S27B - ISOTOPIC SIGNATURES FOR THE HABITAT AND GROWTH OF THE MIDDLE JURASSIC AMMONOID QUENSTEDTOCERAS

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Oxygen and carbon isotopic compositions are presented for extremely well preserved shells of the Callovian (Middle Jurassic) ammonoid *Quenstedtoceras* recovered from Lukow, western Poland. Averaged oxygen isotopic temperatures of two individuals analyzed (39 and 31 mm in maximum diameter, respectively) provide palaeotemperatures of 15 and 17 °C. Considering that the oxygen isotopic temperatures of *Gryphaea* (bivalve) and nektonic vertebrate remains recovered from the Callovian Oxford Clay of the UK show 11 and 24°C, respectively (Anderson et al, 1994; Price and Page, 2008), these two *Quenstedtoceras* individuals seem to have been nektonic swimmers within the Jurassic water column. While the oxygen isotopic compositions of these two individuals do not show a distinct systematic trend, carbon isotopic compositions ( $\delta^{13}\text{C}$ ) display a sigmoidal fluctuation in both individuals. Although the amplitude of  $\delta^{13}\text{C}$  variation is different, one period of isotopic fluctuation corresponds to three quarters to one whorl of growth in each individual. If we assume that the  $\delta^{13}\text{C}$  of the specimens analyzed reflects the  $\delta^{13}\text{C}$  of dissolved inorganic carbon (DIC) in the water column where these specimens lived, and that the fluctuation in  $\delta^{13}\text{C}$  of DIC is annual, we can estimate the growth rate of *Quenstedtoceras* as three quarters to one whorl a year.

## S7 - PLICATHYRIDINE BRACHIOPODS FROM THE FRASNIAN (UPPER DEVONIAN) OF THE MIDDLE EAST AND BELGIUM

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Plicathyridines (Athyridida), which disappeared during the Late Frasnian biological crisis, are well-known in the Frasnian of the Russian Platform and the Altai-Sayan Province, but these distinctive brachiopods also occur in Frasnian-aged rocks of the Middle East (Iran and Afghanistan) and Western Europe (e.g. Belgium). In Iran (Esfahan Province), specimens tentatively assigned to *Plicathyris* are present in a biostromal horizon apparently located just below the *Palmatolepis jamieae* conodont Zone whereas similar specimens occur in east-central Afghanistan (western part of the Dacht-e-Nawar). In this area, they are associated with an unidentified species of *Cariniferella* probably belonging to the *C. tioga* group. These orthides may indicate the *P. punctata* Zone in comparison with their occurrence in the Frasnian succession of the Boulonnais (northern France), but further research is needed. In southern Belgium (Dinant Synclinorium), plicathyridines are present only in the shaly La Prée (Nismes Formation) and Ermitage (Moulin Liénaux Formation) members (*P. falsiovalis* to *P. punctata* conodont zones) and belong to the genus *Anathyris* (*A. helmersenii* group); they are thus absent in the Upper Frasnian of the Namur-Dinant Basin. The plicathyridines constitute only a minor part of the Frasnian brachiopod assemblages recognized in the three studied areas.