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جامعة القاضي عياض
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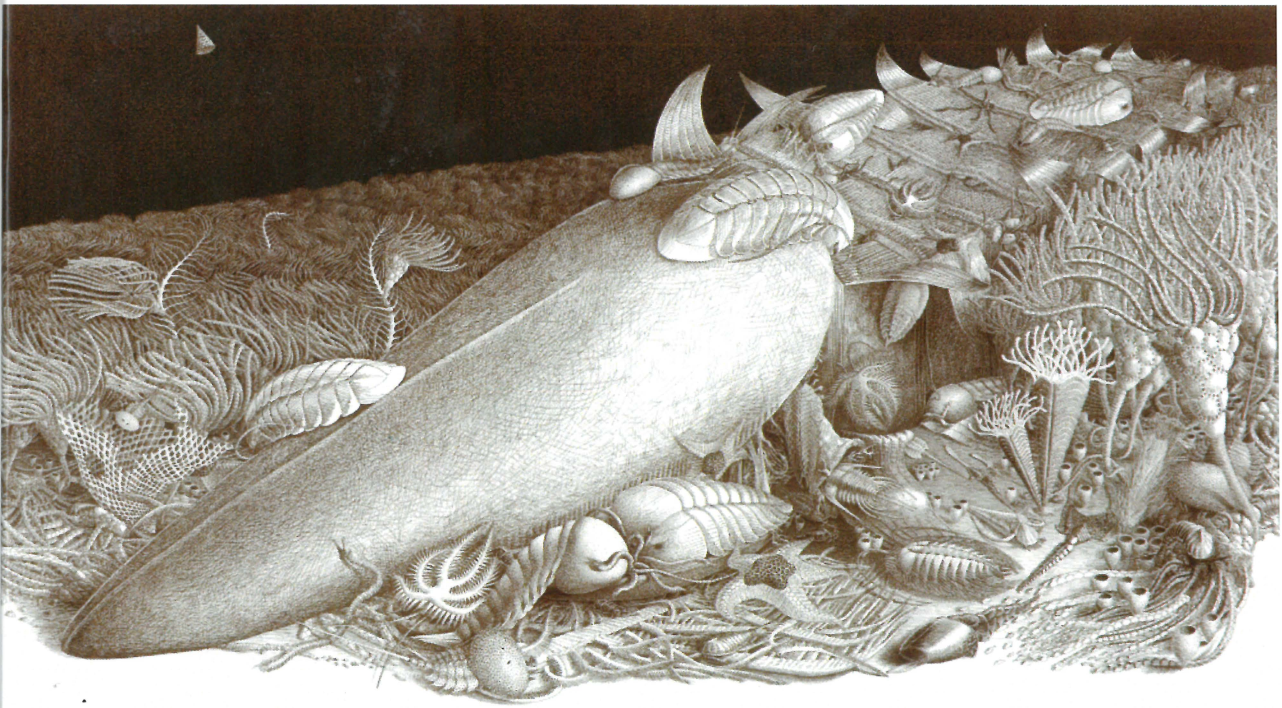
735 IUGS UNESCO IGCP
الصخور و بزوغ حياة الأوردوفيشي
Rocks and the Rise of Ordovician Life

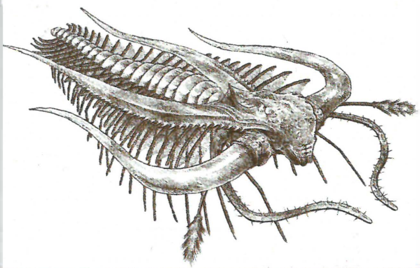
أكاديمية الحسن الثاني للعلوم والتقنيات
Hassan II Academy of Science and Technology

SECOND ANNUAL MEETING OF IGCP 735
October 19-20, 2022

ROCKS AND THE RISE OF ORDOVICIAN LIFE

Filling knowledge gaps in the Early Paleozoic Biodiversification and Promoting Geological Heritage





ABSTRACT BOOK

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Oxygen isotope composition of Ordovician conodonts: a SIMS approach from the East Baltic

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Oxygen isotopes from conodont apatite ($\delta^{18}O_{con}$) are considered to be one of the most reliable proxies for Ordovician temperature reconstructions. From Baltica, the first high-resolution $\delta^{18}O_{con}$ record was reported by Männik et al. (2021), suggesting a decrease in sea-surface temperatures of 9°C through the pre-Hirnantian Upper Ordovician, with a pronounced cooling episode in the Sandbian. A very similar $\delta^{18}O_{con}$ trend was published by Trelaet, al. (2022) from the Holy Cross Mountains, Poland. Both studies also showed smaller-scale $\delta^{18}O_{con}$ variations, interpreted as climate fluctuations. To verify these trends and understand the nature of sample-scale and stratigraphic $\delta^{18}O_{con}$ variations in conodont apatite, we analysed Darriwilian and Katian samples from the Mehikoorma section, Estonia, using bulk (GS-IRMS) and in-situ (SIMS) techniques. Altogether ca 100 individual conodont elements of four genera from four samples were analysed, each by up to 20 spot analyses; in total, ca 500 SIMS analyses were performed. Excluding apparent outlier values, the $\delta^{18}O_{con}$ ranged from 17.0 to 20.6‰ V-SMOW. The average SIMS results differed little between samples, not reflecting the trend and fluctuations documented by bulk GS-IRMS data. The range of variation within individual conodont elements as determined by SIMS was 1–2‰, with *Baltoniodus* generally showing the broadest distribution of $\delta^{18}O_{con}$ values. In addition, the data revealed a strong taxonomic effect, with *Drepanoistodus* being systematically 1.0–1.5‰ lighter than *Semiacontiodus*. The isotopic offset between *Drepanoistodus* and *Semiacontiodus* changed over time, probably reflecting the water depth variations of the Baltic palaeobasin during the early Sandbian and the somewhat different habitats of these two genera. In conclusion, our new data suggest that conodont apatite is important archive for taxon-specific temperature reconstructions and may provide new insights into paleoecology and palaeobasin development. We aim to extend this study to cover the entire Baltic Ordovician with parallel bulk and in-situ $\delta^{18}O_{con}$ records.

Keywords: Ordovician, Baltica, conodonts, oxygen isotopes, paleoclimate.