

Microfossil response to the late Silurian Lau Event in the Bebirva-111 drill core, Lithuania

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The Silurian period was characterised by several environmental perturbations and biotic crises. The mid-Ludfordian time is known by one of the most significant carbon isotope excursions in the Phanerozoic (MLCIE), associated with changes in ocean circulation and chemistry. These environmental changes caused extinctions in many groups of marine organisms, although different fossil groups reacted somewhat differently, and thus the bioevent is known as the *kozłowskii* Event in graptolite successions and Lau Event when considering primarily conodonts and shelly faunas (below, we use the latter name to refer to this geo-bio event collectively). The Lau Event was initially defined based on the turnover in conodont faunas in Gotland, Sweden. In the East Baltic outcrop area of Ludfordian rocks on Saaremaa Island, western Estonia, the Lau Event

interval is missing due to a gap in the succession but is well represented in the subsurface sections of Latvia and Lithuania. It is currently being studied for a better understanding of the spatial distribution of the carbon isotope event and associated geochemical signatures, as well as biotic responses.

Here, we report the preliminary results of an integrated paleontological study based on 32 samples collected from the Bebirva-111 drill core, Lithuania. The study interval (ca 1024 to 1135 m) corresponds to the Dubysa, Pagėgiai and Minija regional stages of Lithuania, and is represented by variable carbonate lithologies (marlstones, coarse-grained skeletal grainstones, nodular carbonate mudstones). The peak $\delta^{13}\text{C}$ values reach up to 7.5‰ in this interval.

The studied microfossils include conodonts, chitinozoans, scolecodonts, prasinophycean algae, melanoscleritoids, foraminiferans, graptolites, eurypterid fragments and vertebrate scales. A distinct decrease in abundance and diversity (including the disappearance of *Polygnathoides siluricus*) in the conodont succession (almost) coinciding with the base of the growing limb of MLCIE marks the beginning of the Lau Event in the section (at ca 1121m). The event is characterised by low-diversity conodont faunas strongly dominated (up to 95%) by *Panderodus equicostatus*. At its end (ca 1062 m), the conodont fauna starts to recover gradually, and new taxa appear. Graptolites found in the section are represented by fragments and occur below the Lau Event only. Melanoscleritoids show higher abundance in the upper part of the event, just above the maximum $\delta^{13}\text{C}$ values. The chitinozoan assemblage contains seven genera, including *Eisenackitina*, *Angochitina*, *Ramochitina* and *Alhajrichitina*. The last taxon is reported for the first time in the Baltic region. Due to the generally poor preservation of chitinozoans, their species-level identification needs further SEM studies. It is nevertheless apparent that the distribution of chitinozoans shows clear changes across the studied interval, suggesting a direct response to the Lau Event. The scolecodonts are well preserved and are represented by at least 30 species from 18 genera and nine families. Their distribution is somewhat uneven and possibly influenced by the Lau Event, but many species range through the event interval and show no signs of major extinction.

Collectively, these data provide new insights into the biotic effects of the Lau Event on several groups of organisms that were hitherto poorly documented in the Baltic region but also worldwide. It confirms the resilience of jawed polychaetes to environmental change that severely affected other elements of late Silurian marine ecosystems.

Keywords: Conodonts, chitinozoans, scolecodonts, biostratigraphy, Baltica, Ludfordian.