



A new proxy for trophic and ecosystem-level responses to mass extinction events? The palaeoecology of conodonts.

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Conodonts, are an early and extinct group of jawless vertebrates; their teeth (elements) provide one of the most complete fossil records of any organism, with an evolutionary history spanning over 300 million years of the Palaeozoic and Triassic. However, despite the quality of their fossil record, their widespread occurrence, and the different forms of data encoded in their morphology and hard-tissues, conodonts have been underutilised as a palaeoecological resource. They survived the Late Ordovician, Devonian and Permian-Triassic mass extinction events, diversifying subsequently: robust palaeoecological analysis of conodonts thus has the potential to shed new light on biotic responses to these mass extinction events. Historically, analyses of spatial distributions have provided only limited constraints on conodont ecology. Nevertheless, it is widely accepted that variation in the size, morphology and differentiation of elements within the conodont dentition is indicative of differences in ecology between taxa. Bilaterally occluding P_1 elements, which functioned to process food, show clear morphological convergence both across coeval independent lineages and along lineages through time. Similarities in the morphology of the functional surfaces of P_1 elements are hypothesised to correlate with diet and represent trophic guilds. Using morphological, mesowear and biomechanical analyses of conodont P_1 elements, we aim to reconstruct the trophic ecologies of conodonts. We will investigate the differential likelihoods of extinction and diversification of trophic guilds through time, allowing us to evaluate the potential of conodonts as novel proxies for trophic and ecosystem-level responses to mass extinction events.