

## 2024\_64\_NHM\_RT: Marine ecosystem change in southwest UK during the Late Devonian mass extinction

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The Devonian-Carboniferous transition was a time of substantial climatic, environmental and biotic change, with the Late Devonian being recognised as one of the ‘Big 5’ mass extinction intervals of the Phanerozoic. Marine ecosystems of the time were affected by two major crises, known as the Kellwasser and Hangenberg events, which occurred within the Late Devonian and at the end of the Devonian period respectively. Although much is known about global changes in climate and environment and responses of individual marine groups, such as fish, cephalopods and trilobites [e.g. 1,2], there are few local or regional studies of whole-ecosystem response and resilience to these events, including ecological interactions between different components of the biota and the influence of environment and climate on those communities [3].

This project aims to study palaeoecological change in marine ecosystems through the Devonian-Carboniferous transition in southwest UK. The stratigraphic framework of the region is well known [4] but despite more than 200 years of study, fossil assemblages of that age are still relatively poorly understood. Largely this is due to a long-held misconception that fossils are absent or poorly preserved in those rocks. Recent discoveries of abundant, diverse and well-preserved marine fossils, including fish and invertebrates, from Devonian-Carboniferous rocks that were previously thought to be barren, demonstrate that rather than being absent, the fossils have simply been overlooked. Moreover, abundant conodonts present in these assemblages enable the successions to be accurately dated.

Through targeted fieldwork in southwest UK and analysis of museum specimens, the successful student will collect quantitative palaeoecological data from fossil marine assemblages, including species abundance, diversity, morphometric and functional trait data, along with sedimentological, geochemical and other palaeoenvironmental proxy data. Quantitative analyses of these assemblages will be further augmented by application of modern imaging techniques, including CT-scanning. Given the pioneering nature of the project, there are genuine opportunities to make new fossil discoveries. The data will be used to test hypotheses of marine ecosystem response to environmental change, and to test whether Late Devonian marine ecosystems of the southwest UK responded in similar ways to those of other regions and other mass extinction intervals.

References: [1] Kaiser et al. 2016. In, Geol. Soc. London, Spec. Publ. 423, 387–437; [2] Sallan & Coates, 2010. PNAS, 107, 10131-35; [3] Boyer et al. 2021. Palaeogeog., Palaeoclimatol., Palaeoecol. 566, 110226; [4] Leveridge & Shail, 2011. Proc. Geol. Assoc. 122, 540-567

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