



Cold seep-related occurrence of the Early Jurassic rhynchonellid brachiopod *Anarhynchia* from the Canadian Cordillera

József Pálffy (1,2), Gregory D. Price (3), Attila Vörös (2), Zsófia Kovács (2,4), and Gary G. Johannson (5)

(1) Department of Geology, Eötvös Loránd University, Budapest, Hungary, (2) MTA-MTM-ELTE Research Group for Paleontology, Budapest, Hungary, (3) School of Geography, Earth & Environmental Sciences, Plymouth University, United Kingdom, (4) Institute of Earth Sciences, University of Graz, Austria, (5) Coastal Geological Consulting Ltd., Van Anda, B.C., Canada

Cold seeps, where seepage of methane and/or other hydrocarbon-rich fluids and hydrogen-sulfide occurs in the sea floor, are sites which harbor highly specialized ecosystems associated with distinctive carbonate sediments. Although their Mesozoic record is scarce and patchy, it commonly includes rhynchonellid brachiopods, often of large size. Each new occurrence is valuable in filling gaps and providing additional insight into these peculiar ecosystems. Here we report a monospecific assemblage of *Anarhynchia* from a boulder-sized limestone clast of Early Pliensbachian (Early Jurassic) age in the Inklin Formation of the Whitehorse Trough in Stikine terrane, recovered from a locality at Copper Island in Atlin Lake, northern British Columbia, Canada. Specimens are of unusually large size, up to 9 cm in length, and their external and internal morphology allows assignment to *Anarhynchia* but warrants introduction of a new species. Although $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values of the shells are close to equilibrium with ancient seawater, early precipitated carbonate cement phases of the enclosing limestone are characterised by highly depleted carbon isotopic composition, indicative of the influence of microbial oxidation of methane derived from a cold seep. Carbonate petrography of the isopachous, banded-fibrous cement supports its origin in a cold seep environment. Volcanogenic detrital grains in the micritic matrix of the limestone clast are indistinguishable from those in the sandstone layers in the siliciclastic sequence, suggesting that the seep carbonate is broadly coeval with the enclosing conglomerate. Previously, *Anarhynchia* has been known from the Lower Jurassic of California and Oregon, from both cold seep and hydrothermal vent deposits. Our new record extends the geographic range and species-level diversity of the genus, but supports its endemism to the East Pacific and membership in chemosynthesis-based ecosystems.