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Colorado's newest mass extinction: Weird facies and cool fossils from the end-Devonian Dyer Formation

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ABSTRACT: The Dyer Formation of west-central Colorado is spectacularly exposed in the Glenwood Canyon area and is of interest because it spans one of the most enigmatic mass extinctions in earth history -- the end-Devonian event. Whereas the Dyer is known among fossil collectors for its diverse invertebrate and vertebrate assemblages, its geochronology and facies are poorly constrained. Recent chemostratigraphic analyses of the Dyer reveals a regionally extensive six per mil positive excursion in the carbonate delta carbon thirteen values in the upper member of the unit. This excursion is interpreted to represent



the Hangenberg isotopic excursion, thought to be the predominant signature element of the end-Famnenian extinction. New biostratigraphic work in the Dyer Formation, based largely on conodonts preserved in fish fecal pellets, supports this interpretation, and moreover demonstrates that the upper part of the Dyer, as well as the conformably overlying Gilman Sandstone, were deposited during the Early Carboniferous. Concordant with these observations, the extinction interval in the Dyer is immediately underlain by a firmground-like facies which bears abundant rugose corals. Elsewhere in the globe, such fossils have been interpreted to represent Lazarus taxa that return after near decimation at the end-Frasnian extinction. Most of the lower Dyer in the Glenwood area exhibits sedimentologic, paleontologic, and diagenetic features consistent with deposition in a shallow wave-influenced stenohaline tropical platform whereas the upper portion of the unit exhibits features more consistent with deposition in a protected mud-dominated euryhaline setting. In contrast, the Dyer's extinction interval facies are characterized by microbialites and bedded cherts -- features consistent with a short-term perturbation in environmental conditions at or prior to the Hangenberg Event.

Speaker Biography: James Hagadorn is currently the Tim and Kathryn Ryan Curator of Geology at the Denver Museum of Nature & Science. Everything about "deep time" fascinates him, and he has spent the last twenty years studying modern and ancient environments all over the world. Much of his research has focused on Neoproterozoic and Cambrian strata, but since moving here he's become distracted by Colorado's youthful and marvelously exposed stratigraphy - with recent ventures taking him all the way to the Cretaceous. Through fieldwork, labwork, and collaboration with academic and citizen scientists, Hagadorn has studied ancient sedimentary environments, large volcanic deposits, weird minerals, extinct

creatures, and a variety of enigmatic 'whatsits'. Although this work contributes to improving our understanding of ancient earth systems, Hagadorn is cognizant of the need to leverage our understanding of ancient earth to better understand future earths, and our responsibility to convey science and scientific thinking to the public. To this end, he writes a monthly Colorado-focused science newspaper column, regularly co-hosts a Colorado mineral show, and is helping colleagues to bring Colorado stratigraphy more into the public eye.

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