

## **NEOPROTEROZOIC ENVIRONMENTAL PERTURBATIONS DROVE THE CAMBRIAN EXPLOSION**

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Stacking up the succession of environmental and biotic events seen in late Neoproterozoic and Cambrian rock and fossil records suggests the following scenario: (1) Pelleting of organic matter by planktic, microscopic, metazoan omnivores gave seafloor sulfate-reducing bacteria an unexpected bonus. (2) Greatly enhanced rates of sulfate reduction drew down sea water sulfate to unprecedented levels. (3) As a result, organic matter could not be efficiently recycled and was sequestered in sediments. (4) This led to a rapid and significant increase in the oxygen content of the atmosphere - an effect exacerbated by the increased solubility of oxygen in the oceans of successive "Snowball Earths". (5) As a result, metazoans became large, muscular, and mineralized. (6) They eventually touched down on the sea floor – first as cnidarian-grade suspension feeders and then as mobile bilaterians – during the final 10-20 million years of the Neoproterozoic. (7) This boom and bust world persisted until the Late Cambrian as evidenced by the declining amplitude of positive carbon isotope excursions. The Late Cambrian SPICE excursion illustrates a number of features of the boom and bust cycles.