The Graf Phosphatic Fauna: Is It Dwarfed?

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Abstract

Some of the earliest fossils of multi-valvate animals are the "normal cladoshells" from Lower Cambrian (~510-million-years-old) sediments, making the "Cambrian Explosion". Small shell faunas are common features of extant small, Ordovician-sized fos- sil faunas. These shelly sediments are often poorly studied or ignored entirely if they are smaller fossils in the same and others. The Elgin Member of the Elgin Formation, for example, is dominated by larger fossils in Ordovician (~450-million-years-old) sediments, and many other sediments that fossilize such small fossils are often poorly studied or ignored entirely if they are larger fossils in the same and others. The Elgin Member is the lower part of the Maquoketa Shale in Graf, Iowa, a larger member (~450-million-years-old) of a smaller, shelly Member in the lower part of the Maquoketa Shale unit, and the predominant fossil in the Elgin Member is the "normal" cladoshell fauna. While small shelly faunas are found in sediments ranging up to recent times, the Maquoketa Shale/Elgin Member phosphorite has been attributed to upwelling of such small animals. As a result, the alternative hypothesis is closely linked with a modern debate of the oceanic anoxia hypothesis. The organic burial hypothesis can be tested by identifying size-selective preservation, or if there were evidence of the presence of normal marine fauna in these deposits, that would argue against the alternative hypothesis over long periods of time rather than by rapid precipitation from phosphorus-saturated water. If phosphatic preservation is size-selective and if there were evidence of the presence of normal marine fauna in these deposits, that would argue against the alternative hypothesis. For this reason, the Maquoketa Shale/Elgin Member phosphorite has been attributed to upwelling of such small animals. As a result, the alternative hypothesis is closely linked with a modern debate of the oceanic anoxia hypothesis. The organic burial hypothesis can be tested by identifying size-selective preservation, or if there were evidence of the presence of normal marine fauna in these deposits, that would argue against the alternative hypothesis. For this reason, the Maquoketa Shale/Elgin Member phosphorite has been attributed to upwelling of such small animals. As a result, the alternative hypothesis is closely linked with a modern debate of the oceanic anoxia hypothesis. The organic burial hypothesis can be tested by identifying size-selective preservation, or if there were evidence of the presence of normal marine fauna in these deposits, that would argue against the alternative hypothesis.