

THE DEVELOPMENT OF EARLY PALEOZOIC SHELL CONCENTRATIONS: EVIDENCE FROM THE CAMBRIAN AND ORDOVICIAN OF THE GREAT BASIN

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Shell concentrations have constituted an important and conspicuous part of the stratigraphic record since the Early Cambrian. The paleontological and stratigraphic significance of shell beds is well understood, primarily from Mesozoic and Cenozoic examples. Lower Paleozoic fossil concentrations, however, have not received much attention. The Cambrian and Ordovician evolutionary radiations were two of the most significant events in the history of life and established the Cambrian and Paleozoic faunas respectively. In order to determine the effect of these radiations on the development of fossil accumulations, a systematic study of early Paleozoic shell beds was conducted in the Great Basin areas of California, Nevada, and Utah.

In order to minimize taphonomic variations in original chemical and physical conditions, shell beds were compared from strata deposited in similar depositional environments from similar tectonic settings. Preliminary analysis of the shell beds from relatively pure carbonate facies and mixed carbonate and siliciclastic facies shows: 1) that shell concentrations became a significant stratigraphic feature in the later Early Cambrian; 2) the thickness and lateral extent of the shell beds increase from Early Cambrian to Middle Ordovician; 3) the abundance and internal complexity of the shell beds increase from Early Cambrian to Middle Ordovician; and 4) the Cambrian and Early Ordovician shell beds are primarily, if not exclusively, dominated by trilobites whereas the Middle Ordovician shell beds are dominated by brachiopods and ostracodes.

These data show a temporal trend in the development of the early Paleozoic shell beds. The nature of the Cambrian and Ordovician shell beds differs qualitatively and quantitatively. There is an increase in physical scale, abundance, and internal complexity through time. The thickness and abundance of the trilobite beds increase through the Cambrian. Interestingly, although trilobites were still diverse and abundant, they did not commonly generate thick trilobite beds after the Late Cambrian. The early Middle Ordovician is a critical time in the development of early Paleozoic shell beds. A variety of monotaxic and polytaxic shell beds, including 6m thick composite beds, first appeared at this time. While the brachiopods and ostracodes generate laterally extensive, commonly monotaxic, shell beds, the gastropods and bryozoans only formed lenticular concentrations.