

THE BASAL MIDDLE ORDOVICIAN FAUNAL REVOLUTION IN
LAURENTIA: PHYLOGENY AND PALEOENVIRONMENT

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The Middle Ordovician (Whiterockian) was a time of fundamental change in the invertebrate faunas of the Laurentian paleocontinent, as superfamilies, orders, and even classes which came to dominate the rest of the Paleozoic made their first prominent appearance. Only in the deep water (Olenid) biofacies was there essentially no change. We analyze the composition of basal Middle Ordovician faunas in terms of the phylogenetic relationships of their trilobites and the paleoenvironments which they inhabited. We identify four different cases: (1) trilobites belonging to clades easily identified among endemic pre-Whiterockian assemblages in Laurentia (e.g., Bathyruridae, Dimeropygidae, Cybelopsinae); these are dominant in nearshore (Bathyrurid) biofacies; (2) trilobites belonging to Laurentian clades previously restricted to the Cambrian because of assumptions about the Cambrian-Ordovician boundary as an extinction horizon (Isocolidae, Raymondinidae, Dokimokephalidae); (3) a minority of trilobites whose sister group has not been identified (Proetidae, Phacopina); and most importantly (4) trilobite clades making their first appearance, but whose sister groups can be identified in earlier strata on a different paleocontinent (Baltica and Gondwana) (Illaenidae, Lichidae, Alsataspidae, Calymenidae, Odontopleuridae) - these exemplify a major and irreversible geographic shift, and are typical of the illaenid-cheirurid biofacies. A dominant component of subsequent (Upper Ordovician to Upper Devonian) Paleozoic Fauna diversity can be traced to a first appearance in the basal Whiterockian of shelf-margin Laurentia. In that the top of the Ibexian is an important sequence boundary and emergent in many sections, it seems possible to associate the change with subsequent re-establishment of shelf and outer shelf habitats.