

## ONSHORE-OFFSHORE PATTERNS IN LATE PRECAMBRIAN AND LOWER PALAEOZOIC TRACE FOSSILS

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There was a dramatic increase in abundance and diversity of trace fossils in Upper Precambrian and Lower Cambrian shallow water seas. The trace-producing animals rapidly filled all the available niches and in low energy, muddy, environments they evolved winding, meandering and patterned habits. Traces such as Taprhelminthopsis, Helminthoida, Nereites, Paleodictyon and Squamodictyon had all evolved in clastic shelf seas during the pre-trilobite Lower Cambrian.

Significant colonisation of the deep oceans seems to have mostly been delayed until the Ordovician. A recently described suite of trace fossils from a flysch sequence in Eire includes such deep water types as: Glockerichnus, Helminthopsis, Lorenzina, Paleodictyon and Taprhelminthopsis. This migration into the deep sea is accompanied by a virtual absence of such traces from shallow water sequences after the Cambrian.

Deep water trace fossils therefore seem to have evolved initially in shallow water clastic seas and then migrated in to the deep ocean, thereby providing an exciting example of an onshore-offshore pattern. This may be of particular significance in that it is presumably mimicked by body fossil migrations in these early seas.