
**One more piece to the puzzle: new developments
in the trace fossil record from the Pennsylvanian
Joggins Formation**

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Since the mid 1800s, research conducted on the Joggins Formation has primarily focused on sedimentological, stratigraphic, and paleontological perplexities of the exposed cliffs. Despite this rich history of research, detailed studies of the less-preserved (generally soft-bodied) fauna that leave their mark as trace fossils is incomplete. Accordingly, this study incorporates a systematic ichnofossil record from the Joggins cliffs, as well as core from the River Hebert area, which adds another piece to the puzzle pertaining to faunal diversity, organism behaviours, and prevailing environmental conditions (water energy, food supply, and salinity).

Along the Joggins cliffs at Chignecto Bay, well-drained floodplain deposits reflecting a seasonally dry alluvial plain cut by channels are characterized by trackways (Diplichnites and Kouphichnium), locomotion trails (Cochlichnus), and unnamed burrow networks. This assemblage is typical of the Scoyenia Ichnofacies, which reflects fluctuations between periods of subaerial exposure and intermittent inundation by freshwater. During Joggins deposition, alluvial plains also reflected wetland conditions within poorly-drained floodplain units containing: trackways (Diplichnites and tetrapod trackways), locomotion trails (Cochlichnus), resting traces (Limulicubichnus), unnamed burrow networks, deposit-feeding structures (Planolites), and rare vertical dwellings (Skolithos). The presence of trackways again suggests an assemblage characteristic of the Scoyenia Ichnofacies; however one that is more diverse and abundant. Periodic flooding of these alluvial plain deposits is marked by limestones with faunal concentrates and associated open-water deposits characterized by locomotion or grazing traces (Cochlichnus, Gordia, and Haplotichnus), resting traces (Limulicubichnus), mobile deposit-feeding structures (Taenidium), horizontal dwellings (Paleophycus), unnamed burrow networks, and trackways (Kouphichnium). This diverse assemblage contains more abundant grazing structures and is best described by a transitional Scoyenia-Mermia Ichnofacies suggesting semi-permanent water bodies during deposition.

Surprisingly, a more fully marine ichnofossil signature was identified within core. Interbedded with fossiliferous shales that mark the onset of flooding, black silty shales contain a very low diversity suite of marine trace fossils (Phycosiphon and Chondrites) in low abundances. This suite of traces reflects a highly stressed Cruziana Ichnofacies, which supports

previous work suggesting periods of brackish water deposition. These early results indicate that traces will be pivotal to further understanding the complex shift in Joggins coastal marine and alluvial settings.