Evidence of fossil horseshoe crabs from Joggins, Nova Scotia: Paleoichnology and paleonvironmental implications

M. STIMSON AND R.A. MACRAE
Department of Geology, Saint Mary's University, Halifax, Nova Scotia B3H 3C3, Canada <mstimson29@hotmail.com>

The existence of horseshoe crab activity within the Upper Carboniferous section at Joggins, Nova Scotia is well known, however it remains a poorly studied part of this Coal Age ecosystem. We present an overview of the paleoichnology of limulids from Joggins and their implications for a possible brackish coastal paleoenvironment. Limulids at Joggins are primarily represented by the trackway *Koupichnium*, which is characterized by two rows of multiple foot impressions including a Y-shaped impression from the limulid "pusher" foot and a tail drag. By contrast, the arthropod ichnogenus *Diplichnites* currently includes traces of myriapods, such as the colossal two metre long *Arthropleura*. *Diplichnites* is defined as two parallel rows of footprints and it lacks tail drags or Y-shaped foot impressions. The large specimens of *Diplichnites* at Joggins are interpreted as terrestrial. At smaller sizes undertracks of *Koupichnium* bear a striking resemblance to small *Diplichnites*, leading to potential confusion between the two ichnotaxa. Furthermore, intergradations along the length of the trackway between *Diplichnites* and *Koupichnium* ichnofossils have also been observed. These discoveries explain the close proximity of both *Koupichnium* (aquatic limulid) and small *Diplichnites* (supposed terrestrial myriapod) trackways within the same paleoenvironment at Joggins, which is otherwise a seemingly unlikely association. The taxonomic problems and paleoenviromental interpretations of these two traces are reviewed and possible solutions proposed.

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