

## **Closing Romer's Gap in New Brunswick: a diverse ichnoassemblage from the Lower Carboniferous of southern New Brunswick, Canada**

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The landscape of the Late Carboniferous (325–300 Ma) is thought to have been covered in lush, tropical rainforests that were biologically diverse; the iconic image of the “coal-age.” Many of the crown groups of tetrapods and invertebrates were well established within such terrestrial ecosystems. The fossil record is known from both abundant skeletal remains as well as abundant trace fossil assemblages (i.e., Joggins, Nova Scotia and Union Chapel Mine, Alabama). Indeed, the Canadian Atlantic provinces are considered a gold standard for late Paleozoic ichnology. The Early Carboniferous (350– 325 Ma), however, was until recently thought to be generally barren, with little evidence of terrestrial life, a hiatus known as Romer's Gap. New discoveries from famous fossil sites (Horton Bluff, Nova Scotia; numerous sites in Scotland; and trackways in the Mauch Chunk Formation, Pennsylvania) have shed new light on this mysterious void in the fossil record. Yet, despite the abundance of Early Carboniferous rocks in New Brunswick and their interest to the oil and gas industry for more than 100 years, only plant fossils and fish fossils were previously known with ichnofossils being rare from the Lower Carboniferous of New Brunswick. It was only recently that fossils of terrestrial life were recognized from Early Carboniferous rocks near Norton and Bloomfield, New Brunswick. Although body fossils remain absent, fossil footprints of tetrapods, and invertebrate traces, are now providing new evidence of a diverse terrestrial and marginal lacustrine ecosystem in the middle of Romer's Gap, spanning the entire Tournaisian and Serpukhovian stages. The Kennebecasis, Albert, Bloomfield, Stilesville, Lepreau, and Maringouin formations preserve approximately 40 ichnospecies. This ichnological record in New Brunswick is closely associated with fossil microbial mats and biofilms that seem critical to the taphonomic conditions that allowed trace fossil preservation. This further demonstrates the important role that microbial mats play in both the taphonomy of ichnofossils and in paleoecology. Only one other locality worldwide (Horton Bluff) provides such insight into the continental ichnological diversity during Romer's Gap. Strata in New Brunswick offer the opportunity to compare ichnofaunal assemblages, paleogeographically and chronologically. This has allowed for the study of new ecological niches previously unrecognized as inhabited during the Early Carboniferous (upland alluvial fans).