The first evidence of terrestrial vertebrates from the Lower Mississippian Albert Formation of New Brunswick: implications for the invasion of continental lacustrine ecosystems and biodiversity during Romer's Gap in Atlantic Canada

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The evolution of the tetrapod crown groups, including the transition from aquatic environments to fully terrestrial environments, has remained enigmatic given the dearth of evidence during the Mississippian Period. Thus, it was hypothesized that these crown groups evolved during the so-called "Romer's Gap". Romer's Gap marks the start of a critical divergent point in the history of life, as organisms transitioned from solely aquatic to terrestrial ecosystems. This expansion into dry environments sets the stage for the radiation of all terrestrial animal life on Earth, yet it is one of the least understood intervals of Earth's history. The exact timing for the radiation of tetrapods and other terrestrial biota into inland continental environments is not known due to a near lack of continental body fossils or ichnofossils from terrestrial deposits. New discoveries of body and trace fossils from sites in Scotland and Nova Scotia (Horton Bluff), represent rare exceptions that offer a glimpse into terrestrial ecologies during Romer's Gap; however, both sites display evidence for an open-water connection, suggesting a coastal paleogeographical position.

The half-graben, pull-apart Moncton Subbasin in southern New Brunswick accommodated up to 5 km of sediment during the Early Mississippian. The sediments deposited are interpreted to represent freshwater and intra-continental conditions (lacustrine, wetland, fluvial, alluvial settings). Within the Moncton Subbasin, a single stratigraphic horizon in the Hiram Brook Member of the Albert Formation exposed along Highway 1 south of Norton has yielded abundant tetrapod footprints. Preliminary assessment of these trackways suggests at least 4 ichnogenera are preserved in this formation (*Characichnos, Matthewichnus, Paleosauropus, Batrachichnus*). Footprints range in size from 1 cm to 3 cm, suggesting that tetrapods were smaller than those documented from time-equivalent sites in Nova Scotia, but are comparable in size to skeletal remains described from Scotland, including small microsaurs, temnospondyl amphibians, and stem amniotes that are candidates as trace makers. Additional putative disarticulated tetrapod bones (a limb and a mandibular jaw) have been found and warrant further study.

These footprints are interpreted to be preserved on the margins of small channels associated with dense fossil forests of *Lepidodendropsis* trees preserved in their ecological context. The large sample size of tetrapod footprints and association with previously studied invertebrate traces suggests that a community of tetrapods was present and part of a diverse ecosystem adapted to terrestrial and semi-aquatic continental environments in the Early Mississippian (Tourniasian) of New Brunswick.

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