Trackways of Gregarious Tetrapods in a Fossil Walchian Forest from the Permo-Carboniferous of Nova Scotia\textsuperscript{1}

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An exceptional paleontological site discovered in 1994 at Brule, Nova Scotia, Canada contains a world class paleobotanical and vertebrate trackway record. The site occupies an area of \(<1000 \text{ m}^2\) entirely within the intertidal zone of the Northumberland Strait and is suffering rapid erosion. The fossiliferous redbeds occur within the late Stephanian-Autunian Cape John Formation of the Pictou Group, deposited in an inferriorly confined setting within a network of intermontane depocenters. Preserved within a coarsening up sequence of silty to fine-grained sandstone is the only known example in the world of an \textit{in situ} walchian conifer forest. Stump casts, ranging from 7 to 81 cm in diameter, branched prostrate trees preserved up to 12 m in length, and a monotypic forest litter of detached branchlets of the form genus \textit{Walchia} Sternburg \textit{sensu} Florin occur throughout the sequence. Trackways co-occur with the walchian impression flora throughout, but are best preserved in thinly bedded, mud-draped and pervasively mud-cracked silty sandstone. The invertebrate fauna includes the ostracod \textit{Carbonita scalpellus} Jones and Kirkby, the brachiopod \textit{Leadia} sp. Jones and arthropod traces. The paleoenvironment is interpreted as a shallow, abandoned dryland channel, ephemeral floods by the tropical Permian monsoon.

The following provisional ichnotaxonomy is a conservative assessment of the footprint record of Brule: Class Amphibia: \textit{Batrachichnus species novum}; Class Reptilomorpha: \textit{Amphisauropus laius} Haubold, 1970, \textit{Amphisauropus imminitus} Haubold, 1970; Class Reptilia: \textit{Dimetropus nicosai} Gand and Haubold, 1986; \textit{Dromopus agilis} Marsh, 1894; \textit{Varanopus sp.} Moodie, 1929; \textit{Hyloichnus bifurcatus} Gilmore, 1927; \textit{Gilmoreichnus brachydactylus} Pabst, 1900. \textit{Amphisauropus} and \textit{Batrachichnus} predominate.

Evidence of group behaviour, the earliest in the geological record of terrestrial vertebrates, is exhibited by the trackmakers of \textit{A. laius} and \textit{G. brachydactylus}, and possibly by those of \textit{Batrachichnus} and \textit{A. imminitus}. Parallel, equally spaced trackways of \textit{A. laius} and similarly curving trackways of \textit{G. brachydactylus} are particularly evocative of herding.

The ichnofauna bear resemblance to the \textit{Batrachichnus-Dimetropus} ichnofacies of the US Southwest of Wolfcampian-Artinskian age. Similarities include the abundance of \textit{Batrachichnus} and the presence of \textit{Dimetropus}, \textit{Hyloichnus} and \textit{Gilmoreichnus}. Marked differences in the Canadian ichnofauna include the presence and abundance of \textit{Amphisauropus} and the presence of \textit{Varanopus}. Apart from the presence of \textit{Amphisauropus}, the Brule ichnofaunas are closest to the \textit{Dimetropus-Batrachichnus} ichnofacies of the American Southwest. These differences may be biogeographical or, given the uniqueness of the walchian forest, paleocological in nature.

References


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