Trackways of Gregarious Tetrapods in a Fossil Walchian Forest from the Permo-Carboniferous of Nova Scotia[1]

J. H. Calder, A. P. Hunt[2] and H. E. K. Van Allen[3]

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 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 inferred continental setting within a network of intermontane depocentres. Preserved within a coarsening up sequence of silty to fine-grained sandstone is the only known example in the world of an *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 *Walchia* Sternburg *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 *Carbonita scalpellus* Jones and Kirkby, the branchiopod *Leaia sp.* Jones and arthropod traces. The paleoenvironment is interpreted as a shallow, abandoned dryland channel, ephemerally flooded by the tropical Permian monsoon.

The following provisional ichnotaxonomy is a conservative assessment of the footprint record of Brule: Class Amphibia: *Batrachichnus species novum*; Class Reptiliomorpha: *Amphisauropus latus* Haubold, 1970, *Amphisauropus imminutus* Haubold, 1970; Class Reptilia: *Dimetropus nicolasi* Gand and Haubold, 1986; *Dromopus agilis* Marsh, 1894; *Varanopus sp.* Moodie, 1929; *Hyloidichnus bifurcatus* Gilmore, 1927; *Gilmoreichnus brachydactylus* Pabst, 1900. *Amphisauropus* and *Batrachichnus* predominate. Evidence of group behaviour, the earliest in the geological record of terrestrial vertebrates, is exhibited by the trackmakers of *A. latus* and *G. brachydactyl*us, and possibly by those of *Batrachi*chnus and *A. imminutus*. Parallel, equally spaced trackways of *A. latus* and similarly curving trackways of *G. brachydactylus* are particularly evocative of herding.

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

References

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[2] 13 Dahlia Street, Dartmouth, Nova Scotia, Canada B3A 2R8

[3] Mesalands Dinosaur Museum, Mesa Technical College, 911 South Tenth Street, Tucumcari, New Mexico, USA 88401