A Unique Neoproterozoic to Cambrian Trace Fossil Assemblage from the Goldenville Group, Southwestern Nova Scotia[1]

M. Gingras, J. W. F. Waldron, C. E. White and S. M. Barr

The High Head member is a ~860 m interval of fine-grained metasedimentary rocks, in the middle of the generally sandy Goldenville Group of southwestern Nova Scotia. The stratigraphy is punctuated by only rare coarser sandstone beds, and one interval of mafic intrusions, which appear to have been intruded while the sediments were still wet. Paleocurrents, deduced from flutes and grooves in the immediately underlying sandstone beds, and from rare washed-out ripple marks that are the 26 largest physical sedimentary structures in the mudrocks, show flow towards the south and west, in contrast with paleocurrents recorded from Atlantic coastal outcrops of the Goldenville Group, which are almost all toward the north or east. The High Head member contains spectacular trace fossils. In the lower part of the section, the trace-fossil assemblage comprises *Oldhamia radiata,* large, sparsely branching *Chondrites acutangulus, Curvolithus sp. Gordia sp., Planolites sp.* and *Taenidium sp*. Up-section, large *Glockerichnus sp.* are also rarely observed. Near the middle of the section *Trichophycus pedum* (formerly known as *Phycodes pedum*)is commonly observed. Also present are taphonomic variants of the *Trichophycus pedum* (i.e. *T. pedum* truncated and preserved at a different level); they appear as evenly spaced, reamed intrusions that some researchers have referred to as *Hormosiroidea*, *Saerichnites* or *Neonereites uniserialis.* The upper half of the section is bioturbated sporadically, and dominated by *Gordia marina, Helminthopsis sp., Taenidium sp.*, and rather persistent, if rare *Phycodes sp.* and *Trichophycus pedum*. Thick sand beds characterize the uppermost part of the High Head section and trace fossils become rare in that area. Of interest in the High-Head ichnology is: (1) the relatively high diversity of trace fossils observed; (2) the presence of *Trichophycus pedum*; and (3) the occurrence of *Gordia marina* with *Trichophycus*. The observed assemblage is very similar to those in late Precambrian to Early Cambrian sequences of southeastern Newfoundland (Chapel Island Formation), which yielded (in common with the Goldenville Group) *Curvolithus sp., Gordia sp., Neonereites uniserialis, Phycodes pedum, Planolites sp.*, and *Skolithos sp*. In Newfoundland, the diverse ichnofaunas were reported below the oldest trilobite-bearing strata. *Trichophycus* has been reported almost globally, with its first occurrence in strata with or immediately above Ediacaran fossils. *Trichophycus pedum* is taken to indicate the presence of the first well-developed, metazoan animals, and thereby indicative of the boundary between Precambrian and Phanerozoic strata. The occurrence of *Trichophycus pedum* and the similarities of the observed assemblage suggest that the High Head exposures may indeed straddle the Precambrian-Phanerozoic contact.

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