
Microbially induced sedimentary structures in the Carboniferous Horton Bluff Formation near Hantsport, Nova Scotia

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The Blue Beach Member of the Horton Bluff Formation comprises cyclic tidal deposits of early Mississippian age. Near Hantsport, microbially induced sedimentary structures, formed by the growth of cyanobacterial mats, are unusually well preserved on the bedding surfaces of tidal-flat

sandstones. The structures match those documented from modern sediments at Mellum Island, North Sea, and Archean strata at Barberton, South Africa. The sandstones display wrinkle structures, leveled surfaces and multidirectional ripple marks, in association with wave ripples, planed-off ripples, and desiccation cracks that imply shallow-water and periodically exposed conditions. A single, well exposed surface was mapped in one-metre segments with estimates of the areal percentage of microbial features, descriptions of the main types present, and photographs. The outcrop is ~70 m long and 1 m wide, selected for its high quality and quantity of microbial features. Microbial structures cover ~10% of the surface, with a maximum value per meter of 70% coverage and a minimum of zero. Within small patches < 25 cm² in area, wrinkles are sub-parallel or lack preferred orientation, and have 1 mm height and 1–2 mm spacing – much smaller than associated ripple marks. The wrinkled patches occur mostly on ripple crests, especially on flattened, planed-off areas, and are commonly associated with coarse, probably windblown, sand. Some wrinkled patches cover sediment that fills ripple troughs, where mat growth has contributed to levelling of the sediment surface. Examples of multi-directional ripples are present, formed where mats stabilized part of a rippled surface against reworking, allowing a different ripple orientation to be overprinted on unstabilized areas. A bed of domal stromatolites 1 km down the coast has a 15 × 10 cm microbial patch in the same bedset. Similar microbial features are present on many other bedding surfaces, and microbial effects were pervasive during deposition.