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Something new under the sun? Microbial mats and “streamers” in subaerial and terrestrial deposits of the late Ediacaran Signal Hill Group, Newfoundland, Canada.

Sean McMahon (1,2) and Jack Matthews (3,4)

(1) Department of Geology and Geophysics, Yale University, (2) School of Physics and Astronomy, University of Edinburgh, (3) Department of Earth Sciences, Memorial University of St. Johns, (4) Oxford University Museum of Natural History

Little is known about the nature and productivity of microbial life on land in the Precambrian despite its importance as a mediator of continental weathering and global nutrient cycling. Here, we report sedimentary structures in the late Ediacaran siliciclastic Signal Hill Group, Newfoundland, Canada, which we infer to record the presence of microbial and/or algal communities in subaerial and terrestrial settings. Within the dominantly shallow marine Gibbet Hill Formation, we find evidence for transient exposure in the form of fossilized microbial mats displaying exceptionally preserved roll-ups surrounding clear desiccation cracks. Further up-section, floodplain deposits within the Ferryland Head Formation contain several microbial mat textures, Arumberia, and desiccation cracks, including cracked microbial mats. These deposits also contain unique, previously unreported dm-scale branching ribbon-like structures preserved on the upper surfaces of fine sandstone beds as thin clay veneers and, more rarely, thick phosphatic replacements. These structures are broadly aligned parallel to the prevailing palaeo-current indicated by ripples on adjacent beds, and show a range of pinching, widening, splitting, flaring and criss-crossing morphologies, as well as a finely lineated internal texture. On the basis of textural, mineralogical, geochemical and taphonomic arguments, we interpret these structures as fossilized microbial/algal "streamers" similar to those commonly found in eutrophic streams and hot springs today. These findings may have implications for the development of the clay mineral factory, the evolution of fluvial channel architecture, and the nature of life on land in the late Proterozoic.