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Critically Assessing the Geochemical Evidence for a Terrestrial Ediacaran Biota at Mistaken Point, Newfoundland

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The Mistaken Point Ecological Reserve, Newfoundland, contains some of the oldest known examples of the enigmatic Ediacaran macrobiota. The fossil assemblages, preserved on more than 100 bedding planes, provide some of the earliest evidence for both complex macroscopic eukaryotes, and metazoan-style locomotion.

Several depositional settings have been proposed for the strata of the Mistaken Point Formation in which many fossil taxa are found, including deep-marine and terrestrial environments. These interpretations have been used to argue against photosynthetic biological affinities, and in favour of a lichen-affinity for the biota, respectively.
In this study, detailed sedimentological analysis of the Mistaken Point Formation demonstrates that the Ediacaran organisms lived and died within subaqueous, most likely deep-marine, environments. Furthermore, the use of several geochemical proxies as indicators of palaeoenvironment is questioned. These findings categorically refute a terrestrial depositional environment for this unit, and enable constraint of the possible phylogenetic affinities for organisms within the Mistaken Point assemblages, specifically refuting the possibility that these organisms could have been lichens.