Tiering in Ediacaran fronds from Mistaken Point, Newfoundland

Marc Laflamme and Guy M. Narbonne
Department of Geological Sciences and Geological Engineering, Queen's University, Kingston, ON, K7L 3N6
<Laflamme@geoladm.geol.queensu.ca>

The Ediacara Biota is a distinct group of soft-bodied organisms that flourished in the late Precambrian oceans some 575 to 543 million years ago. Recent work has revealed that the diversity of organisms that constitutes the core of the Ediacara Biota represent stem/crown group animals, in addition to unique "failed experiments" that have no known modern counterparts. Within the diverse assemblage of Ediacaran organisms, the leaf-shaped fronds are among the most widely recognizable forms due to their complex, multi-structural morphologies. Ediacaran fronds are characterized by an elevated soft-bodied leaf attached to a stem which was anchored to the seafloor by a circular basal holdfast. Fronds gathered nutrients from the water column through direct nutrient absorption resulting in the onset of Phanerozoic-style ecological competition complete with denizens occupying distinct tiers in the water column.

In contrast with the younger and mainly fragmentary material known elsewhere, Mistaken Point, Newfoundland is unique in preserving hundreds of complete fronds that represent the oldest specimens of Ediacara Biota known anywhere (575–560

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Ma). The diversity of frond types at Mistaken Point highlight the ever-present competition for nutrients in this deep water (below the photic zone) Precambrian ecosystem. Within the shared frond bauplan, several distinct feeding strategies are present, and each unique feeding style represents a different evolutionary life history. *Arborea*-type branching is characterized by a bifoliate sheet composed of pea-pod like primary branches which house several secondary branches within the protective sheath. Rangeomorph fractal branches are self similar over three branching orders and includes two separate categories of fronds: *Rangea*-type branching consists of multifoliate fronds composed of several overlapping primary fractal branches attached to a straight central stalk whereas *Charnia*-type branching results in a zigzagging central axis due to alternating of sigmoidal overlapping primary branches. Each branching style has representatives from several trophic levels, and therefore suggests that the branching arrangement is not governed by ecological pressure and rightfully represents a shared derived ancestry. Communities dominated by direct nutrient absorbers are restricted to the terminal Neoproterozoic, never to be seen after the onset of the "Cambrian Explosion" of filter-feeding ecosystems.