The Mistaken Point Assemblage: Ecology and Evolution of Earth's Earliest Ediacarans

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The Mistaken Point assemblage of eastern Newfoundland (575 - 560 Ma) contains the oldest large and architecturally complex organisms known anywhere on Earth. These Ediacaran fossils are preserved on more than 100 large bedding surfaces spanning nearly 4 km of section, each surface littered with tens to thousands of fossil specimens that died in place when they were smothered beneath beds of volcanic ash. The deep-water setting, in oceanic basin-plain and slope settings well below both storm wave base and the photic zone, rules out any possible affinities with plants or other obligate photoautotrophs. The ecological structure of Mistaken Point communities is strikingly similar to that of Phanerozoic and modern communities of suspension-feeding animals.

Trace fossils are conspicuously absent from the Mistaken Point assemblage, which consists entirely of cm- to m-scale, soft-bodied, sessile, benthic organisms/colonies. In contrast with the variety of segmented body plans that characterized younger Ediacaran taxa worldwide, most of the fossils of the Mistaken Point biota consist of highly fractal elements that were used as the "building blocks" of a wide array of different body plans including frond-, spindle-, bush-, and fan-shaped constructions. It is difficult to relate these to living groups of organisms.

Some Ediacaran genera such as Charnia masoni may have ranged over 20-30 million years but, despite the presence of younger deep-water Ediacaran assemblages in Britain and NW Canada, only a handful of the 30 distinct Mistaken Point taxa are known from younger Ediacaran assemblages. It is difficult or impossible to determine true stratigraphic ranges based on a single region, however fossiliferous, but most common Mistaken Point
taxa appear to have local biostratigraphic ranges corresponding to a single formation or part of a formation. For example, two new species of *Charniodiscus* are stratigraphically separated with only minor overlap, as are two undescribed species of spindles. Different rangid fronds characterize the lower Mistaken Point Formation, upper Mistaken Point Formation, and the Trepassey Formation with only *Charnia* in common between the three. There is little evidence of significant environmental change at these biostratigraphic boundaries. To a first order approximation, Ediacaran evolutionary rates appear to be more similar to those of the Phanerozoic than to those of the preceding Proterozoic.