

Evolutionary trends of the Carboniferous ostracod *Velatomorpha attilis*, Joggins Fossil Cliffs, UNESCO World Heritage Site

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The ostracod *Velatomorpha attilis* thrived in brackish coastal environments of the Carboniferous. Especially well preserved examples occur in strata exposed at the Joggins Fossil Cliffs World Heritage Site, providing an opportunity to investigate the link between evolutionary mode and temporal changes in depositional environment. The relationship between the evolutionary mode of *V. attilis* and its environment is especially important since few other studies have examined evolutionary mode of organism living in marginal environments.

V. attilis was analyzed for evolutionary mode by measuring the length, height, width, area, and perimeter of valves from 332 specimens from 5 stratigraphic levels in the Boss Point and overlying Joggins formations. After quantitative model-based analyses, an unbiased random walk was supported as the evolutionary mode when ostracods from all 5 stratigraphic levels were included. Stasis was the suggested evolutionary mode only when ostracods from each formation were considered separately. This is consistent with other work on the evolutionary mode of *V. attilis* in the Joggins Formation.

Stasis is expected in fluctuating, stressed environments, such as the brackish coastal paleoenvironments of the Boss Point and Joggins formations. This is because organisms that inhabit those environments are usually tolerant to changing conditions. It is possible that between the formations an environmental threshold was reached that triggered rapid change in shell size. This represents a classic example of punctuated equilibrium wherein long periods of stasis are punctuated by geologically short periods of drastic morphological change.