Review of: "Micro- and Macroevolution: A Continuum or Two Distinct Types of Change?"

Nadia Tahiri[1]

1 Université de Sherbrooke

Potential competing interests: No potential competing interests to declare.

This article thoroughly examines the relationship between microevolution and macroevolution, proposing a distinction between first-order evolution (microevolution) and second-order evolution (macroevolution) based on mathematical principles. The authors use a genotype-based approach to operationalize this distinction, aiming to replace the subjective phenotype-based analysis of evolution with a more objective method supported by DNA analysis technology.

Through a computer simulation involving digital amoebas, the authors illustrate how populations undergo both first-order and second-order evolution in response to changing selection pressures. They discuss the implications of this distinction for understanding evolutionary novelty, particularly in terms of defining and explaining the origins of new traits and behaviors.

Additionally, the article explores potential applications of this framework beyond biology, suggesting its relevance to understanding the adaptive dynamics of various systems, including physical, technical, and social systems. It concludes by highlighting directions for future research, such as further developing simulation models and investigating the role of genetic dimensions in evolutionary processes.

How do biogeographic factors, such as dispersal, vicariance, and geographic isolation, influence the tempo and mode of evolutionary change within and between populations? How do historical biogeographic events shape the distribution of biodiversity and the assembly of biotic communities over geological time scales?

One major point of contention revolves around the operationalization of the proposed distinction between first-order and second-order evolution. Critics argue that while the mathematical distinction is theoretically sound, its practical application to biological systems may be oversimplified. Evolutionary processes are highly complex, influenced by a multitude of factors beyond simple genotype changes, including environmental interactions, developmental constraints, and stochastic events. The reliance on a genotype-based approach may neglect crucial aspects of phenotypic plasticity and emergent properties that contribute to evolutionary dynamics.