



Which rules evolutionary change: life or climate?

The fossil record over the last half a billion years shows biodiversity as a zigzagging pattern of species births and extinctions. For decades scientist have attempted to answer the question: Which rules supreme – life or the environment? To explain this macroevolution, scientists have used two opposing theories: the *Red Queen* versus the *Court Jester* theory, inspired by the story *Alice in Wonderland*. New research by McGill University and Vilnius University puts these two theories to the test.

“According to the *Red Queen* hypothesis, interactions between species, like competition, are the most important drivers of evolutionary change, whereas the *Court Jester* hypothesis advances that environmental perturbances, like climate change, are the most important,” says McGill Professor [Shaun Lovejoy](#) of the Department of Physics.

Analyzing fluctuations in marine animal biodiversity and climate conditions over last half billion years, the researchers found that at shorter time scales, diversity acts like the *Court Jester* system (environment is the driver), with fluctuations increasing with passing time, reaching their maximum at 40 million years. Beyond this time scale they followed the equilibrating *Red Queen* rules (competition and evolutionary innovation are the drivers).

“After 40 million years the diversity of marine animals becomes more and more autonomous from the climate. Therefore, life acquires autonomy at the largest time scales without the need of stabilization of the physical environment,” says Andrej Spiridonov of Vilnius University.

“[Life rather than climate influences diversity at scales greater than 40 million years](#)” was published in *Nature*.

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Image

The queen wins over the court jester. Credit: Tadas Razmas

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