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ABSTRACT | Philip Gerrish

Title

The rhythm of microbial adaptation

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Abstract

The evolutionary biologist "studies the steps by which the miraculous adaptations so characteristic of every aspect of the organic world have evolved"¹. But the general nature of such adaptive steps is still unclear. Evolution is often thought to be random and dependent on unpredictable events². In this light, one might expect the steps taken by adaptation to be completely random, both biologically and temporally. Here I present a mathematical derivation to show that, on the contrary, adaptive steps can have fairly strong rhythm. I find that the strength of the adaptive rhythm, that is its relative temporal regularity, is equal to a constant that is the same for all microbial populations. As a consequence, numbers of accumulated adaptations are predicted to have a universal variance/mean ratio. The theory derived here is potentially applicable to the study of molecular evolution.

