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5 号館 8 階 813 号室

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Beyond errors: Phenotypic stochasticity as a fuel for adaptive evolution

For decades, it has been known that organisms of the same genotype in the same environment still look different from each other. Such variability has been attributed to technical errors in measurement or dismissed as uninformative noise. More recently, experiments have shown that the amount of within-genotype variability—phenotypic stochasticity—is genetically regulated. Despite this knowledge, most theoretical models of adaptation have not incorporated genetic variation in phenotypic stochasticity, and they still predict evolutionary outcomes solely based on the assumption of the deterministic genotype-phenotype map. As a consequence, a fundamental question remains: Does genetically regulated phenotypic stochasticity matter for adaptive evolution?

To answer this, we develop mathematical and computational models of population and quantitative genetics treating phenotypic stochasticity itself as a trait. We find that high phenotypic stochasticity is favored when a population sits far from the fitness optimum, and that genetic variation in stochasticity changes the trajectory of the adaptive walk across rugged fitness landscapes. To test these theoretical predictions empirically, we establish the first selection experiment of its kind with *Drosophila melanogaster* to compete low- and high-stochasticity alleles. We use *tim0*, a mutation in the circadian clock gene *timeless* causing arrhythmic eclosion, and the rhythmic wild-type as the high- and low-stochasticity alleles. By selecting flies eclosing in a pre-defined time window over generations, we compare the experimentally obtained frequency trajectory of *tim0* with the theoretical predictions. Our study, combining novel theoretical and experimental approaches, sheds light on the underappreciated role of biological randomness in adaptive evolution.

(Language: English)

石郷岡さんは、2017 年 3 月に本生物科学科（生物）を学部卒業後、2024 年にドイツ・マックスプランク進化生物研究所にて PhD を取得され、現在ポスドクをされています。一時帰国の機会にセミナーをしていただくことになりました。どうぞお気軽にご参加ください。

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