

Abstract Submitted  
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**Evolutionary learning of adaptation to varying environments through a transgenerational feedback**<sup>1</sup> BINGKAN XUE, Inst for Advanced Study, STANISLAS LEIBLER, Inst for Advanced Study; Rockefeller University — Organisms can adapt to a randomly varying environment by creating phenotypic diversity in their population, a phenomenon often referred to as evolutionary bet-hedging. The favorable level of phenotypic diversity depends on the statistics of local environmental variations. Often, the timescale of environmental variations can be much longer than the lifespan of individual organisms. How could organisms collect such long-term environmental information to adjust their phenotypic diversity? We propose here a general mechanism of evolutionary learning based on a transgenerational feedback: the frequency of the parent phenotype is progressively reinforced in the distribution of phenotypes among the offspring. This mechanism can in principle be realized through known molecular processes of epigenetic inheritance, observed in some model organisms. Thus, our theory may provide a perspective for understanding the evolutionary significance of such processes.

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