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Backward evolution from gene network dynamics MERZU BELETE, University of Houston and Laufer Center for Physical and Quantitative Biology, Stony Brook University, Stony Brook, New York, United States of America, DANIEL CHARLEBOIS, GÁBOR BALÁZSI, Laufer Center for Physical and Quantitative Biology, Stony Brook University, Stony Brook, New York, United States of America — Gene expression is often controlled by regulator genes that form gene regulatory network cascades. How mutation in the genes comprising regulatory cascades influences cell populations dynamics has not been adequately investigated. In this study, we developed a model to study how a mutation in a regulator gene that reaches the effector gene with a time delay affects short-term and long-term population growth. We find a paradoxical outcome of evolution, where a mutation in a regulator gene leads to an interaction between gene regulatory network dynamics and population dynamics, causing in certain cases a permanent decrease in population fitness.

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