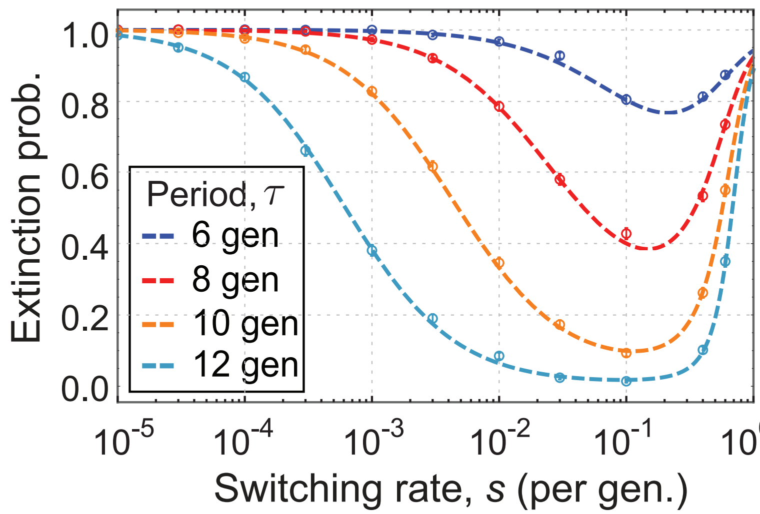
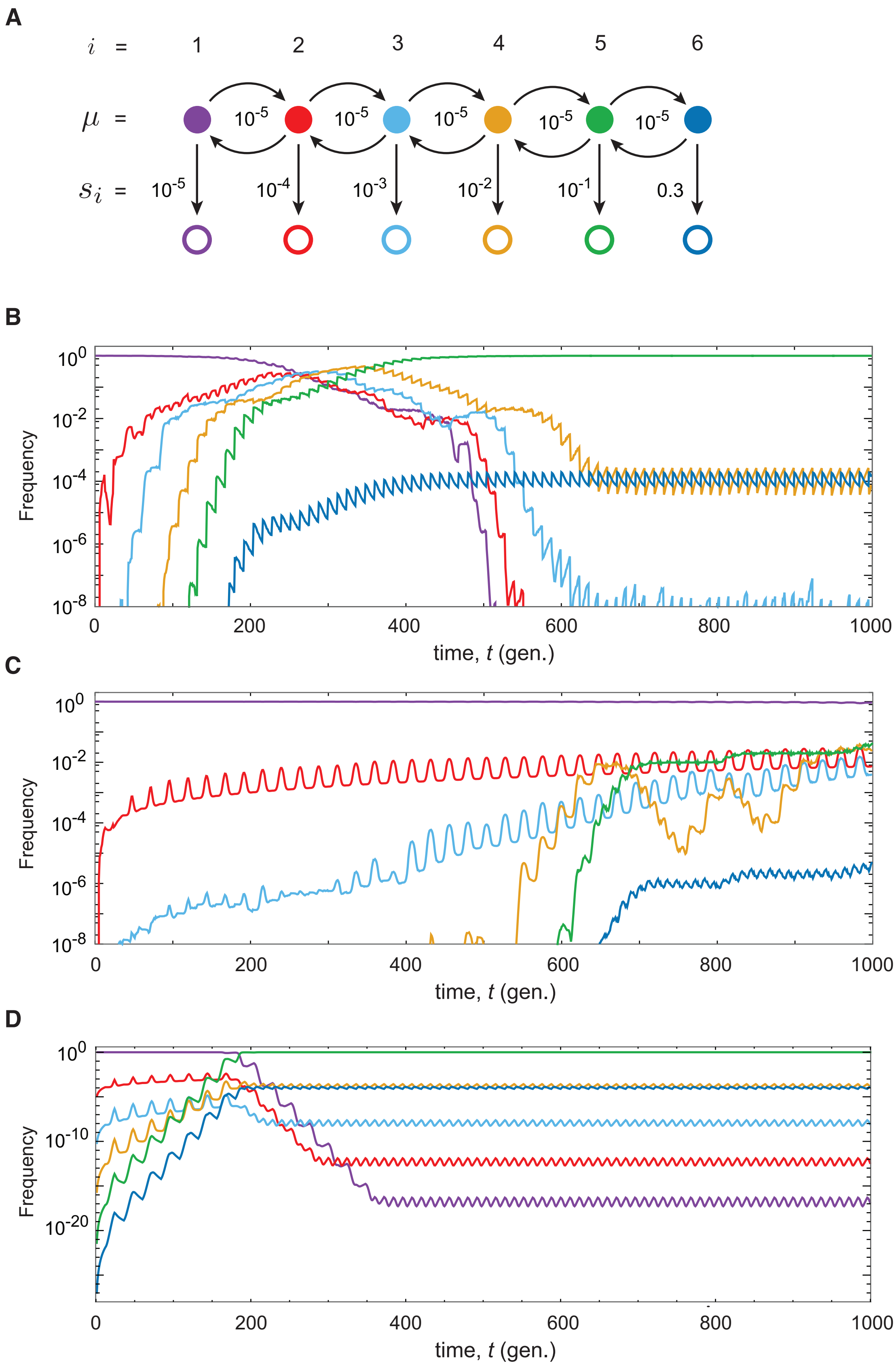


FIG. S1 Extinction probability computed in simulations (points) vs. theoretical prediction $P_{extinct}$ (curves) after a single round of growth and bottlenecking. Stochastic simulations were initialized from a single cell of phenotype A, and run for a time τ after which each cell of phenotype B survived with probability $r_b = 0.01$. Each data point is measured from 1000 simulations, with error bars indicating the standard error of the mean. See Appendix D for simulation details.

FIG S2. Simulated evolution of stochastic switching rates, for different strengths of bottleneck selection. **(A)** Genotype and phenotype network for evolutionary dynamics. Genotypes $i = 1 \ldots 6$ are indicated by six different colors. Phenotypes A and B are shown by filled and open circles, respectively. Vertical arrows indicate irreversible phenotypic switching from A to B. Horizontal arrows correspond to reversible mutations that alter the genotype i. Simulations using $\tau = 12$ generations were initialized from a single A cell of the purple genotype, whose switching rate $s = 10^{-5}$ per generation is identical to the mutation rate, in order to study how rapid switching rates could evolve from initially very low switching rates. Stochastic simulations were used to track each cell division and phenotype switching event (see Appendix D for details). The environment was switched every $\tau = 12$ time units, measured in generations ($f = 1$). The optimal switching rate for $\tau = 12$ is approximately 0.1, the rate of switching of the green strain. We included the dark blue strain with $s = 0.3$ in the network in order to test whether the population is able to stabilize at the optimum (green) rather than evolving to even higher rates (dark blue). **(B)** Stochastic dynamics of genotype frequencies averaged over 100 simulations, using $r_a = 0.001$ and $r_b = 1$. The optimal genotype $s = 0.1$ (green) is typically fixed within approximately 400 generations, and the population stabilizes this genotype vs. its nearest neighbors $s = 0.01$ (yellow) and $s = 0.3$ (dark blue), both of which remain at a frequency of approximately 10^{-4} by mutation-selection balance. **(C)** Stochastic dynamics of genotype frequencies averaged over 100 simulations, with no selective bottleneck ($r_a = r_b = 1.0$). The population is unable to evolve to the optimum in 1000 generations, and remains dominated by the initial low switching strain (purple). By the end of the simulation, the green genotype has typically reached appreciable frequency $> 10^{-2}$, and it will eventually establish and fix in the population over a longer timescale. **(D)** Evolutionary dynamics in an infinitely large population. The deterministic dynamics in the infinite population size limit are obtained by numerical solution of the differential equations corresponding to panel A in the periodically changing environment for $\tau = 12$ gen., and $r_a = r_b = 1.0$.



A
i = 1 2 3 4 5 6
μ = 10-5 10-5 10-5 10-5 10-5
si = 10-5 10-4 10-3 10-2 10-1 0.3
B
Frequency
100
10-2
10-4
10-6
10-8
0 200 400 600 800 1000
time, t (gen.)
C
Frequency
100
10-2
10-4
10-6
10-8
0 200 400 600 800 1000
time, t (gen.)
D
Frequency
100
10-10
10-20
0 200 400 600 800 1000
time, t (gen.)

FIG. S2