Effects of Changing Mutation Rate

1000 runs of 10,000 generations of the general construction model were run with Poisson mutation rates (mean number of mutant alleles per generation) of μ = 0.1, 0.5, 1 and 2. The models in the main paper had exactly one mutant per generation. Those results do not differ significantly if mutations are added using a Poisson-generated mutation rate of 1.
Faster mutation rates produce larger early transient polymorphisms but do not have a large effect on snapshot or equilibrium numbers of alleles (see Figures S1, S2, Table S1).

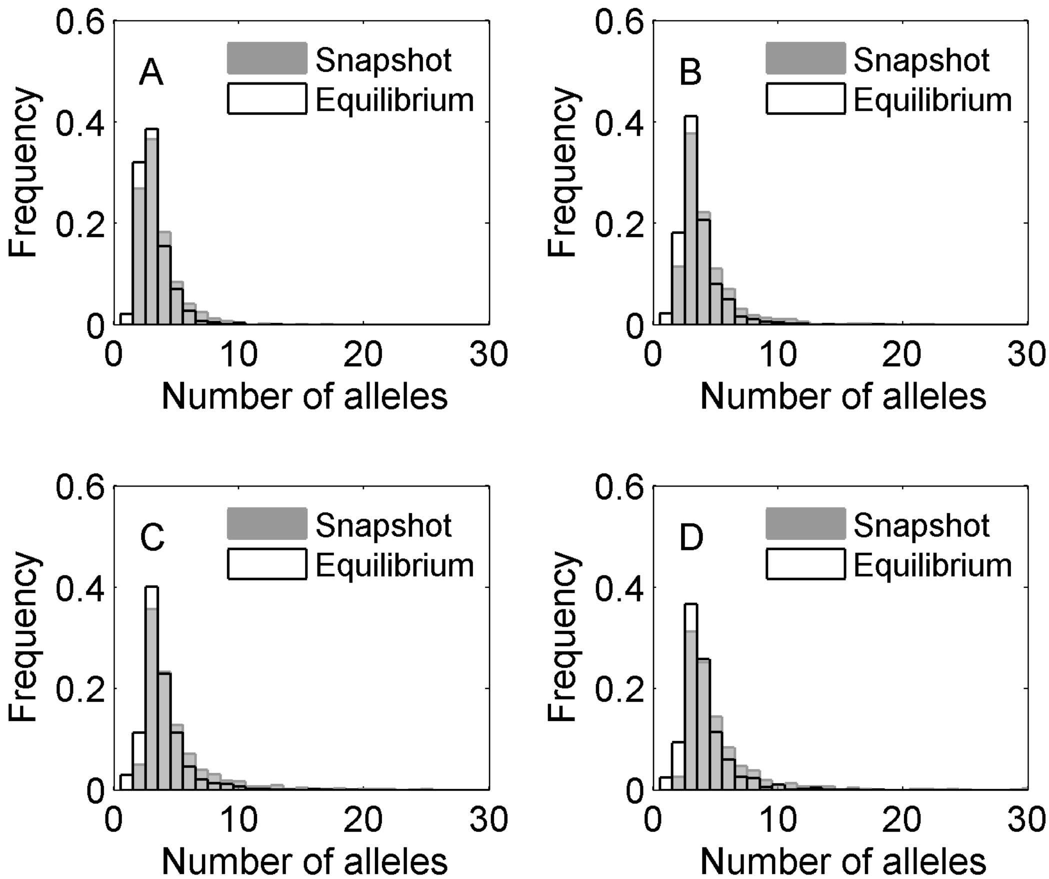

Figure S1 Snapshot and equilibrium alleles produced by Case 1 with different per-generation mutation rates. A. Mutation rate = 0.1 B. Mutation rate = 0.5. C. Mutation rate =1 (as in main text). D. Mutation rate =2

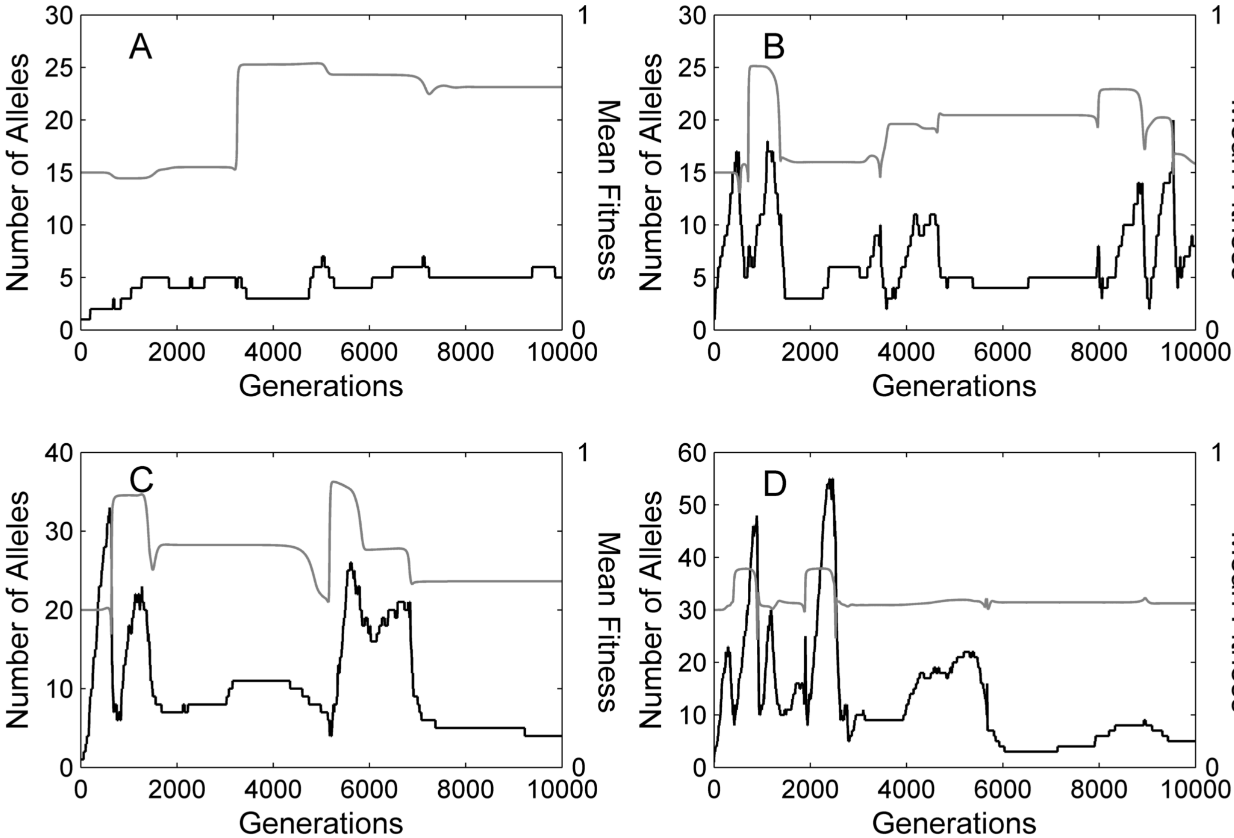

Figure S2 Dynamics of allele number (solid line) and mean fitness (grey line) in simulations of Case 1 with different mutation rates. A. Mutation rate = 0.1 B. Mutation rate = 0.5. C. Mutation rate =1 (as in main text). D. Mutation rate =2

Effects of changing the distribution of fitness effects

i) Changing the variance of the fitness distribution

In the main cases, the mean and variance of the effect of new mutations is very small, as is generally believed to be the case in nature. To explore the potential effects of highly variable fitness distributions, we repeated the simulations from Case 1 but with a tenfold increase in the variance of mutant fitness without changing the mean. Given the symmetry of our fitness distribution, increasing the variance necessarily increased the proportion and magnitude of beneficial mutations, and thus these simulations produced large numbers of transient alleles.

ii) The impact of homozygous lethality

In all cases in the main text, new mutants were given 0 fitness as homozygotes with probability 0.05, to mimic natural levels of recessive lethals. Simulations of Case 1 with homozygous lethality removed produced near-identical results (compare Table S1 with Table 2). The weak heterozygote advantage produced by homozygous lethals does not affect the dynamics or outcome of polymorphism construction.

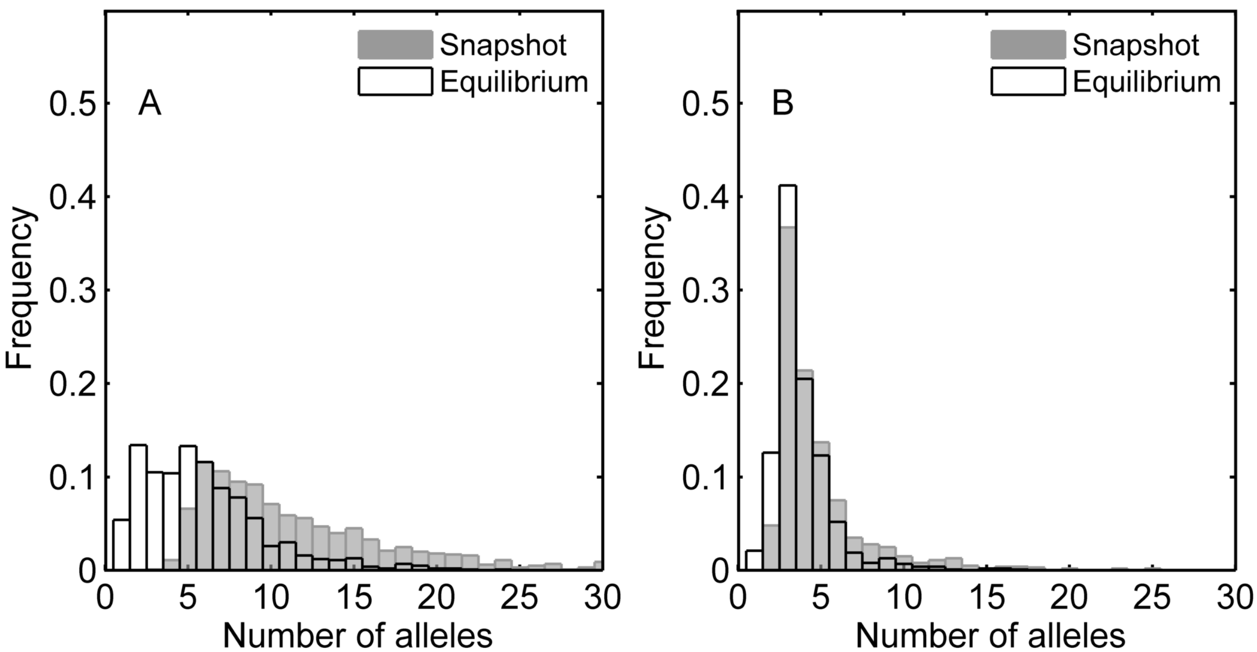

Figure S3 Snapshot and equilibrium alleles from supplementary simulations. A. High variance in fitness. B. Case 1 with no homozygous lethality

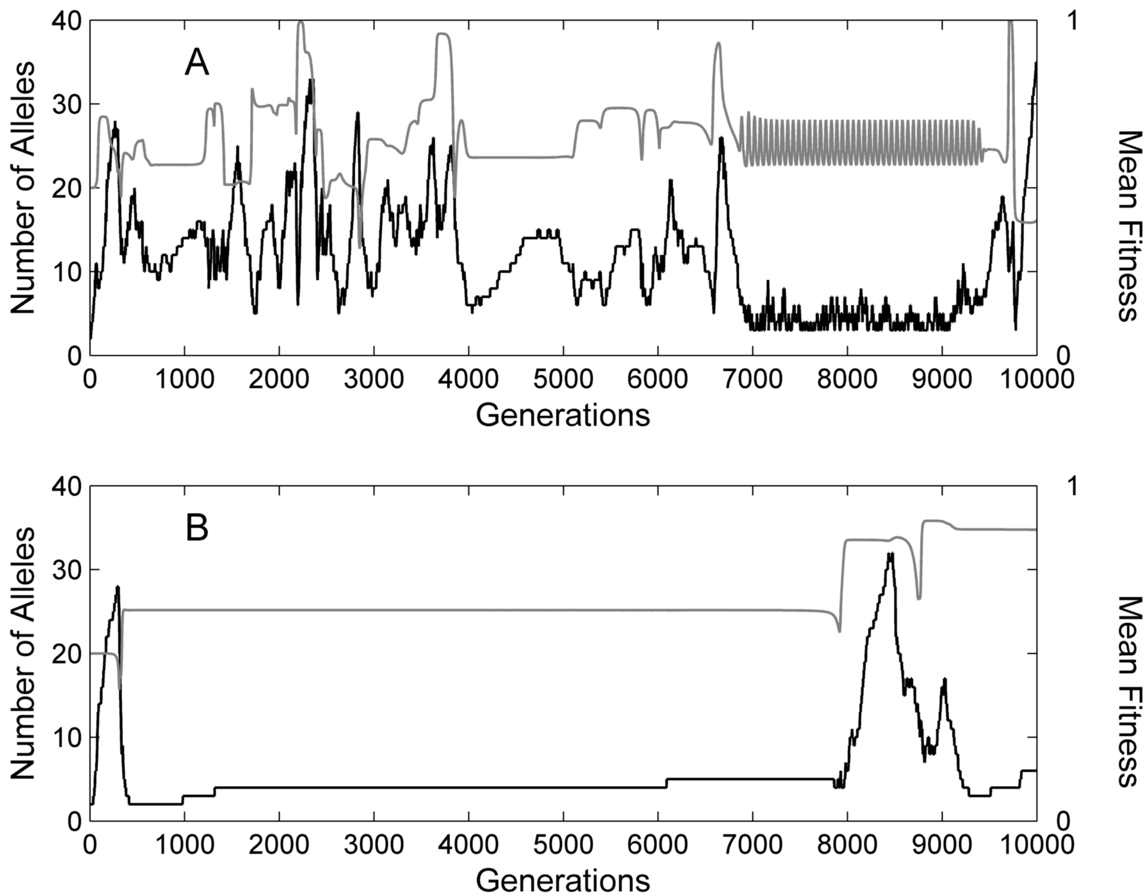

Figure S4 Dynamics of allele number (black line) and mean fitness (grey line) in simulations of Case 1 with different distributions of mutant fitness A. High variance in mutant fitness. B. No homozygous lethality

Table S1 Summary statistics for supplementary simulations

	Minimum		Mean		Maximum		Variance	
Case	snapshot	equilibrium	snapshot	equilibrium	snapshot	equilibrium	snapshot	equilibrium
$\mu = 0.1$	1	1	3.506	3.116	17	13	2.7527	1.6682
$\mu = 0.5$	2	1	4.222	3.552	22	18	5.3841	2.6539
$\mu = 2$	2	1	5.161	3.995	39	18	13.336	3.6466
High variance in fitness	3	1	11.264	5.892	35	24	30.861	13.898
No homozygous lethals	2	1	4.843	3.824	25	17	9.0694	3.5165