**Appendix S1. Heritability rules.**

In a GEM, births and deaths occur through an iterative, stochastic process given an underlying model. In the event of a birth, a new individual is added to the population given some rule for heritability of that trait. In these simulations, we follow the heritability rules derived and presented in (1, 2) with the change that we are not using here the weighted mean for the parental trait.

If a birth event occurs in a GEM, an offspring trait is randomly drawn from a lognormal distribution with a mean of , where *b*max is the actual trait of the current parent, is the current population mean, and *h*2 is narrow-sense heritability. The standard deviation of this distribution is given as , where is the standard deviation in *b*max in the initial population and is the standard deviation in *b*max currently. This trait is then added as a new element of the trait distribution, increasing the size of the population by one and changing the mean and variance of the trait distribution.

This rule is derived from the equation of the regression line in a parent-offspring regression (2). To verify that the implementation of this rule in a GEM implementation generates a parent-offspring regression with an estimated *h*2 that matches what was set in the model, we track parent and offspring traits through GEMs initialized with different *h2* values (0.9, 0.7, 0.5, and 0.3). Using simple linear regression of offspring traits on parent traits, we verify that the estimated *h2* (the slope of the regression) remains close to the expected *h*2 (Fig. S1-S4).

Over any short interval of time in a GEM run, the realized parent-offspring relationship behaves as expected. After accumulating observations over longer runs, however, we see that the *h*2 appears to converge on one. This is also expected, as the mid-points of parent traits and offspring traits should be equal, parent-offspring regressions should be centered on a 1:1 line. Over time, mean traits evolve, moving the parent-offspring relationship along the 1:1 line and generating an apparent *h*2 near one.

1. J. P. DeLong, T. M. Luhring, Size-dependent predation and correlated life history traits alter eco-evolutionary dynamics and selection for faster individual growth. *Popul Ecol* **60**, 9–20 (2018).

2. J. P. DeLong, J. Belmaker, Ecological pleiotropy and indirect effects alter the potential for evolutionary rescue. *Evolutionary Applications* **12**, 636–654 (2019).



Fig. S1. Parent-offspring regressions through time when *h2* = 0.9.



Fig. S2. Parent-offspring regressions through time when *h2* = 0.7.



Fig. S3. Parent-offspring regressions through time when *h2* = 0.5.



Fig. S4. Parent-offspring regressions through time when *h2* = 0.3.