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Supporting Online Material for

Rapid Temporal Reversal in Predator-Driven Natural Selection

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Published 17 November 2006, *Science* **314**, 1111 (2006)
DOI: 10.1126/science.1133584

This PDF file includes:

Supplementary Information

Methods

L. carinatus were introduced to islands near Great Abaco, Bahamas, in early June, 2003 (details in (*S1*)). Prior to this introduction, we captured *A. sagrei* (> 33 mm snout-vent length) on all 12 islands. For individual identification, each lizard received an island-unique pattern of colored marks by injecting elastomer (Northwest Marine Technologies) subdermally into two limb segments. In November 2003 and May 2004, we censused nearly exhaustively on each island to determine surviving individuals.

Standardized selection gradients were calculated on relative hindlimb length for each island for 0-6 and 6-12 months. Relative hindlimb length was calculated (using only males) as the residual of ln-transformed hindlimb length versus ln snout-vent length (SVL) using the regression for all individuals from all islands (between-island heterogeneity in slope is not significant in ANCOVA). SVL was also included in the regression equation used to calculate selection gradients. Selection gradients could only be calculated on islands for which some, but not all, lizards died. Because survival of marked lizards was either 0 or 100% on some islands in some of the time periods, our sample size was reduced to nine islands in the first time period and five in the second time period; those five islands were used in the repeated measures analysis. On these islands, an average of 20.6 males was measured at the start of the experiment; survival rates were 33% and 58% in the 0-6 and 6-12 month periods.

Habitat-use data were recorded immediately prior to and after the introduction as in (*S1*). Data on marked individuals were collected on all 12 islands in November 2003 and May 2004, whereas in May 2003 habitat data on marked individuals were only collected on two introduction and two control islands. Habitat data were log-transformed.

The time*treatment interaction from a repeated-measures ANCOVA was used to test differences in selection gradients after the first versus second six-month periods; the model included log-transformed island vegetated area as a covariate, and the repeated factors time and time*area were also significant (*P* = 0.0l3, 0.014). We report the unweighted (by sample size), rather than, as in reference (*S1*), the weighted analysis because sample size changed from the first to the second time period; using the mean sample size as weights gave only a slightly higher *P* value for the interaction of interest (*P* = 0.021 vs. 0.017).

An alternative explanation for these results is that selection favored the same limb length in both treatments in the second time period, but that because of differences in trait distribution between the treatments, selection gradients differed between them. However, analysis of selection gradients calculated from quadratic regression reveals no consistent evidence across islands for stabilizing selection in either treatment; moreover, examination of survival vs. non-survival over the range of limb lengths found in both treatments reveals a clear difference in patterns of selection (Figure S1).

A second repeated-measures analysis tested the significance of the time*treatment interaction for perch diameter using data from the beginning and end of the second six-month period (Nov. 2003 and May 2004); no covariate was used here.

On September 3, 2004, the experiment was terminated by the storm surge associated with Hurricane Frances.

References:

S1. J. B. Losos, T. W. Schoener, D. A. Spiller. *Nature* **432**, 505 (2004).

<u>Figure S1 caption</u>

Selection gradients calculated with data pooled across islands within treatments were highly similar to estimated treatment means using island-specific gradients (n = 4, r = 0.98, P = 0.017). Therefore, we used the pooled dataset with its higher sample size to visualize the fitness functions. Fitness functions were generated using the nonparametric cubic-spline regression technique. The solid line represents mean survival probability and the dashed lines indicate ± 1 SE of predicted values from 1000 bootstrap replicates of the fitness function. To control for possible effects of differences in the phenotypic range among treatments, fitness functions were generated excluding individuals with limb lengths not present in the alternative treatment (i.e., three lizards in the experimental treatment had relatively longer limbs than any lizard in the control treatment and two lizards in the control treatment had shorter limbs than any lizard in the experimental treatment).

Supplementary Figure 1

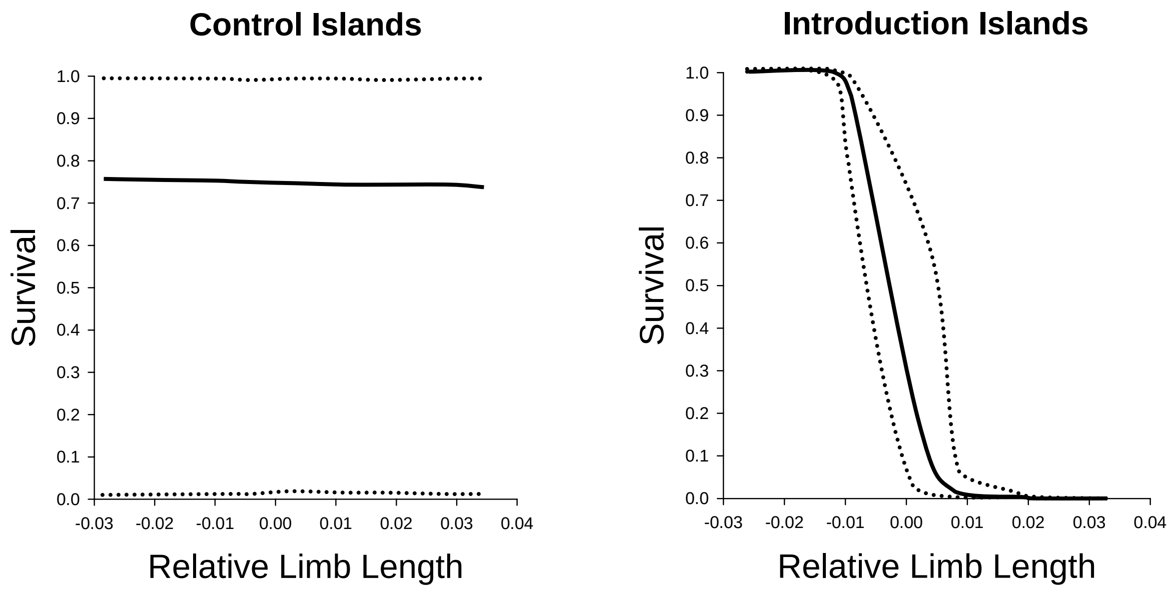

Table S1. Selection gradients ± 1 SE for relative hindlimb length (adjusted for vegetated island area using ANCOVA; see Methods), and mean limb lengths (residual values × 100 ± 1 s.e.) for lizards that either died or survived. Subscripts indicate the time period examined (1: first six months, 2: second six months, 1+2: all 12 months). Note that the survivors for the second period are the same as the survivors for the 12 month period. NA indicates that the standard error is not available because it could not be calculated due to a lack of degrees of freedom.

	Selection Gradient			Mean Relative Hindlimb Length				
Island	β_1	β_2	β_{1+2}	$Died_1$	$Lived_1$	$Died_2$	$Lived_{2,\ 1+2}$	$Died_{1+2}$
Control Islands	**-0.07 ± 0.25**	**-0.17 ± 0.29**	**-0.11 ± 0.59**	**0.01 ± 0.28**	**0.12 ± 0.27**	**0.52 ± 0.32**	**-0.01 ± 0.45**	**0.09 ± 0.32**
1	-0.15 ± 0.12 (25)	0.07 ± 0.14 (19)	-0.18 ± 0.15 (25)	1.48 ± 0.57	0.17 ± 0.34	-0.05 ± 0.23	0.23 ± 0.42	0.87 ± 0.74
6	-0.28 ± 0.48 (25)	-0.59 ± 0.39 (4)	-0.67 ± 0.54 (25)	-0.58 ± 0.42	-2.08 ± 0.53	-0.10 ± 0.00	-2.73 ± 1.40	-0.56 ± 0.44
Buddy	0.21 ± 0.46 (12)	0.01 ± NA (3)	0.52 ± 0.70 (12)	0.42 ± 0.41	2.70 ± 0.28	3.40 ± 0.00	2.35 ± 0.61	0.72 ± 0.52
Introduction Islands	**0.70 ± 0.32**	**-1.68 ± 0.36**	**-0.59 ± 0.74**	**0.82 ± 0.42**	**1.48 ± 0.34**	**2.44 ± 0.33**	**-0.06 ± 0.66**	**1.23 ± 0.42**
5	1.03 ± 0.32 (23)	-1.39 ± 0.42 (8)	0.17 ± 0.51 (23)	1.26 ± 0.52	1.93 ± 0.44	2.50 ± 0.61	0.58 ± 0.78	1.52 ± 0.55
x3	0.37 ± 0.41 (14)	-1.97 ± 0.28 (5)	-1.35 ± 1.12 (14)	0.09 ± 0.69	1.38 ± 0.17	2.38 ± 0.28	-2.60 ± 0.00	0.79 ± 0.67