Supporting Information

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SI Materials and Methods

Testing for the Direction of Changes in Body Size. To further understand the accelerated phenotypic evolution correlated with morph loss, we determined the direction of phenotypic evolution in dimorphic/monomorphic populations. We compared body size within each sex among populations using a two-sample *t*-test in the program Systat 10.2. Dimorphic and monomorphic populations were compared with closely related trimorphic populations (Table S1 and Table S2) as determined by our phylogeny (Fig. 3 in main text). We used phylogenetically independent sets of trimorphic populations for these pairwise comparisons (i.e., the evolutionary paths linking the pairs were not shared [see Maddison (1)]. The dimorphic population 11 (Pisgah Lava Flow) was compared with the geographically and phylogenetically closest trimorphic population (Power = population 10). The other dimorphic populations were closely related to two different trimorphic populations and were individually compared with each population (Table S1). The comparisons of each dimorphic population with two different trimorphic populations are not statistically independent (because the two trimorphic populations have a shared evolutionary history), but they show whether the results vary depending on the trimorphic population used in the comparison. We grouped data from all monomorphic populations sharing the same morph loss event and compared them with a set of trimorphic populations (Table S2). Data from population 31 was not used in the comparisons because its phylogenetic placement was uncertain when multiple population samples were analyzed [see supporting information in Corl et al. (2)].

SI Results

Three of the four dimorphic populations (Pisgah Lava Flow = population 11, Anacapa Island = 8, and Monserrat Island = 19) had significantly larger males than closely related trimorphic populations (Table S1). Anacapa Island also had significantly larger females ($P < 0.001$). Monserrat Island had significantly larger females when compared with population 22 ($P = 0.017$) but not when compared with population 21 ($P = 0.210$). In both cases in which there were increases in female size, male size increased by a greater degree. Therefore, the predominant changes in body size in these dimorphic populations are increases in male size. These three populations also had increases in sexual size dimorphism (SSD) as a result of the increases in male body size (Table S1). The final dimorphic population (Santa Catalina Island = 20) had no significant changes in either male or female size.

Both independent sets of monomorphic *ob* populations had significant reductions in male body size (Table S2). Monomorphic *ob* populations in California (populations 4 and 5) also had significant reductions in female size ($P < 0.001$), but monomorphic *Uta stansburiana uniformis* populations (populations 26–30) had no significant changes in female size ($P = 0.423$). Monomorphic orange populations in Utah (populations 33 and 34) had significantly larger females ($P = 0.004$) than a closely related trimorphic population (population 32) and no significant changes in male size ($P = 0.300$). Monomorphic orange *U. s. stansburiana* populations (populations 37–41) had no significant changes in body size, although males tended toward being smaller ($P = 0.068$) and females tended toward being larger ($P = 0.102$).

Testing for Body Size Differences Among Morphs. We performed an ANOVA to test whether the three male morphs differed in snout–vent length, which was our measure of body size. For this test, we used the same data from our focal study population at Los Baños that was used to calculate OBY (for orange, blue, and yellow) allele frequencies in Fig. 1 (main text) and Table S3. Average body size did not show significant differences among the morphs (orange = 57.9 mm, blue = 58.5 mm, yellow = 57.3 mm; $F_{2,\,34} = 0.69$; $P = 0.509$).

1. Maddison WP (2000) Testing character correlation using pairwise comparisons on a phylogeny. *J Theor Biol* 202:195–204.

2. Corl A, Davis AR, Kuchta SR, Comendant T, Sinervo B (2010) Alternative mating strategies and the evolution of sexual size dimorphism in the side-blotched lizard, *Uta stansburiana*: A population-level comparative analysis. *Evolution* 64:79–96.

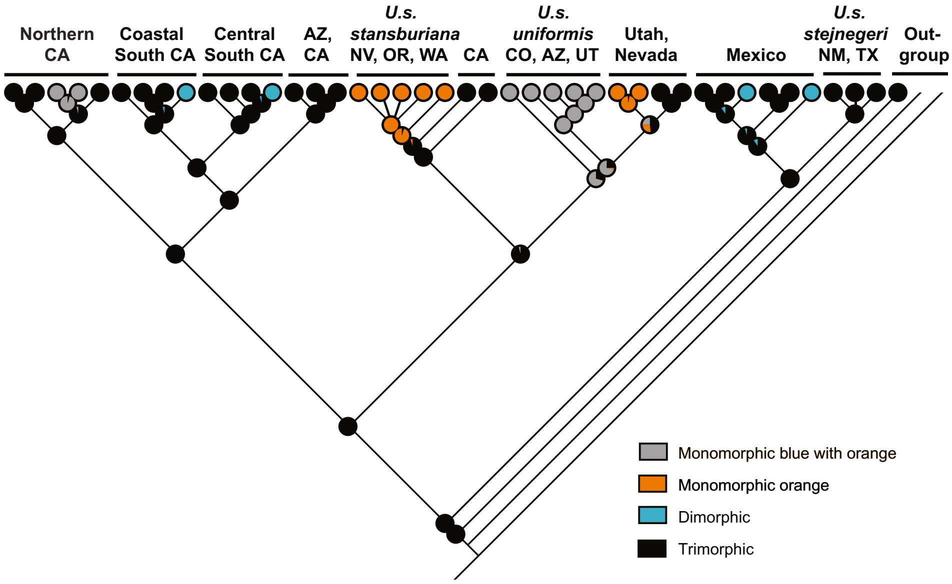

Fig. S1. Maximum likelihood reconstruction of the evolutionary history of the throat color polymorphism of *U. stansburiana*. Colored pie charts depict the maximum likelihood reconstruction of transitions in the throat color polymorphism. Geographic regions correspond to groups of pie charts in Fig. 1 in the main text. The most likely ancestral state for the interior branch connecting the *U. s. uniformis* clade with the Utah, Nevada clade becomes trimorphic if all *U. s. uniformis* populations are constrained to be monophyletic. The outgroup species are (from left to right) *Urosaurus ornatus, Sceloporus occidentalis*, and *Petrosaurus mearnsi.* Trimorphic reconstruction of basal branches is observed regardless of whether trimorphic *U. ornatus* is included in the ancestral state reconstruction of the throat color polymorphism.

Table S1. Body size comparisons between dimorphic and trimorphic populations

Population no.		Females (*n*)		F mean SVL					Males (*n*)		M Mean SVL					SSD	
Di	Tri	Di	Tri	Di	Tri	*t*	df	*P*	Di	Tri	Di	Tri	*t*	df	*P*	Di	Tri
11	10	30	43	45.67	45.16	1.14	71	0.259	28	46	48.68	46.33	4.84	72	<0.001*	1.066	1.026
8	7	59	28	51.36	47.21	6.61	85	<0.001*	55	34	58.47	51.26	12.07	87	<0.001*	1.139	1.086
8	6	59	12	51.36	47.75	4.35	69	<0.001*	55	21	58.47	49.95	14.35	74	<0.001*	1.139	1.046
19	21	22	7	46.82	45.57	1.28	27	0.210	7	7	53.00	50.43	3.17	12	0.008*	1.132	1.107
19	22	22	9	46.82	44.33	2.54	29	0.017*	7	8	53.00	48.50	2.94	13	0.012*	1.132	1.094
20	18	29	31	48.86	49.19	0.58	58	0.563	23	19	53.39	54.66	1.39	40	0.173	1.093	1.111
20	17	29	12	48.86	48.08	−0.98	39	0.334	23	9	53.39	54.39	0.82	30	0.419	1.093	1.131

The population no. corresponds to the populations in Fig. 1 (main text) and Table S3. F, females; SVL, snout–vent length (in millimeters), a measure of body size; M, males; SSD, sexual size dimorphism; Di, dimorphic population; Tri, trimorphic population.
*Significant differences in body sizes.

Table S2. Body size comparisons between monomorphic and trimorphic populations

	Population no.		Females (*n*)		F mean SVL					Males (*n*)		M mean SVL					SSD	
Type	Mono	Tri	Mono	Tri	Mono	Tri	*t*	df	*P*	Mono	Tri	Mono	Tri	*t*	df	*P*	Mono	Tri
ob	4, 5	1–3	26	79	47.19	52.72	−11.17	103	<0.001*	28	67	51.75	56.28	−7.75	93	<0.001*	1.097	1.068
ob	26–30	14–16	51	26	46.69	47.13	−0.81	75	0.423	77	60	47.38	51.10	−7.83	135	<0.001*	1.015	1.084
orange	33, 34	32	23	20	49.17	47.00	3.07	41	0.004*	33	15	48.65	49.27	−1.05	46	0.300	0.989	1.048
orange	37–41	35, 36	76	21	46.93	45.52	1.65	95	0.102	85	29	47.59	48.93	−1.84	112	0.068	1.014	1.075

The first two rows are monomorphic *ob* populations, and the last two rows are monomorphic orange populations. Population no. corresponds to the populations in Fig. 1 (main text) and Table S3. F, females; SVL, snout–vent length (in millimeters), a measure of body size; M, males; SSD, sexual size dimorphism; Di, dimorphic population; Tri, trimorphic population.
*Significant differences in body sizes.

Table S3. Populations, years sampled, sample sizes, and OBY allele frequencies

Population no.	Population name, state	Years data collected	Females (*n*)	Males (*n*)	Total (*n*)	Morphs (*n*)	M frequency			F frequency		
							O	B	Y	O	B	Y
1	Corral Hollow, CA	2004	35	15	50	3	0.033	0.5	0.467	0.314	0.171	0.514
2	Los Baños, CA	2003	35	37	72	3	0.122	0.486	0.392	0.371	0.271	0.357
3	Pinnacles National Monument, CA	2003	9	15	24	3	0.4	0.433	0.167	0.556	0.222	0.222
4	Big Creek University of California Reserve, CA	2002	5	7	12	1	0	1	0	0	1	0
5	Nacimiento Road, CA	2004, 2005	24	34	58	1	0	1	0	0	1	0
6	Sedgwick University of California Reserve Reserve, CA	April 2002, June 2002	13	26	39	3	0.154	0.673	0.173	0.423	0.308	0.269
7	Santa Cruz Island, Channel Islands National Park, CA	2003	28	34	62	3	0.412	0.456	0.132	0.375	0.339	0.286
8	Anacapa Island, Channel Islands National Park, CA	2003	59	55	114	2	0.018	0.982	0	0.008	0.992	0
9	Stunt Ranch U.C. Reserve and Cold Creek Preserve, CA	2002, 2007	24	20	44	3	0.288	0.413	0.3	0.25	0.313	0.438
10	Power (Off-Lava Site), CA	2003, 2004, 2005	52	55	107	3	0.355	0.536	0.109	0.519	0.202	0.279
11	Pisgah Lava Flow, CA	2003, 2004, 2005	44	47	91	2	0.277	0.723	0	0.455	0.545	0
12	Granite Mountains University of California Reserve, CA	2002, 2003	16	21	37	3	0.167	0.619	0.214	0.375	0.469	0.156
13	Corn Springs, CA	2003	6	6	12	3	0.25	0.583	0.167	0.5	0.333	0.167
14	Mountain Springs, CA	2006	8	21	29	3	0.429	0.548	0.024	0.438	0.5	0.063
15	Kofa National Wildlife Refuge, AZ	2002, 2004	12	30	42	3	0.167	0.683	0.15	0.417	0.333	0.25
16	McDowell Mountains, AZ	2006	11	21	32	3	0.286	0.619	0.095	0.455	0.364	0.182
17	Carmen Island, BCS, Mexico	2005	12	9	21	3	0.5	0.444	0.056	0.333	0.333	0.333
18	Danzante Island, BCS, Mexico	2005	31	19	50	3	0.368	0.5	0.132	0	0.21	0.79
19	Monserrat Island, BCS, Mexico	2005	22	7	29	2	0.429	0.571	0	0.682	0.318	0
20	Santa Catalina Island, BCS, Mexico	2005	29	23	52	2	0.196	0.804	0	0.948	0.052	0
21	San Jose Island, BCS, Mexico	2003	7	7	14	3	0.071	0.571	0.357	0.286	0.071	0.643
22	San Francisco Island, BCS, Mexico	2003	9	8	17	3	0.438	0.438	0.125	0.444	0	0.556
23	White Sands National Monument, NM	2002, 2004	21	27	48	3	0.278	0.537	0.185	0.5	0.167	0.333
24	Guadalupe Mountains National Park, TX	2002, 2004	12	19	31	3	0.316	0.553	0.132	0.5	0.125	0.375
25	Bitter Lake National Wildlife Refuge, NM	2002, 2004	15	20	35	3	0.3	0.425	0.275	0.2	0.133	0.667
26	Petrified Forest National Park, AZ	2002, 2004	10	15	25	1	0	1	0	0	1	0
27	Wupatki National Monument, AZ	2002, 2003	15	11	26	1	0	1	0	0	1	0
28	Zion National Park, UT	2003, 2004	14	22	36	1	0	1	0	0	1	0
29	Colorado National Monument, CO	2002, 2004	17	34	51	1	0	1	0	0	1	0
30	Dinosaur National Monument, UT	2002, 2004	19	24	43	1	0	1	0	0	1	0
31	Mercury, NV	2003	15	20	35	3	0.325	0.45	0.225	0.533	0.033	0.433
32	Lytle Ranch, UT	2003	20	15	35	3	0.3	0.567	0.133	0.625	0.025	0.35
33	Delta, UT	2004	7	8	15	1	1	0	0	1	0	0
34	Grantsville, UT	2004	16	25	41	1	1	0	0	1	0	0
35	Darwin Falls, Death Valley National Park, CA	2003, 2004	21	15	36	3	0.2	0.567	0.233	0.524	0.119	0.357
36	Daylight Pass, Death Valley National Park, NV	2003, 2004	13	21	34	3	0.167	0.619	0.214	0.654	0	0.346
37	Lovelock, NV	2003, 2004	11	9	20	1	1	0	0	1	0	0
38	Warner Mountains, CA	2006	13	17	30	1	1	0	0	1	0	0
39	Burns, OR	2006	31	19	50	1	1	0	0	1	0	0
40	Horseridge, OR	2003, 2006	18	26	44	1	1	0	0	1	0	0
41	Vantage, WA	2003, 2006	20	31	51	1	1	0	0	1	0	0

Global positioning system coordinates for each population can be found in Supplemental Table 1 of Corl et al. (2). Note that Los Baños has been continuously sampled since 1990, and Anacapa Island has been continuously sampled since 2000. A single representative year's data for each of these two populations is given to provide equal sample sizes. Sample sizes for the allele frequency data are twice the sample size of each sex, because each lizard has two OBY (for orange, blue, and yellow) alleles. Populations fixed for blue throats bordered by orange are depicted as being fixed for the blue allele, to distinguish them from populations in which both orange and blue alleles segregate. M, males; F, females.