Supporting Information

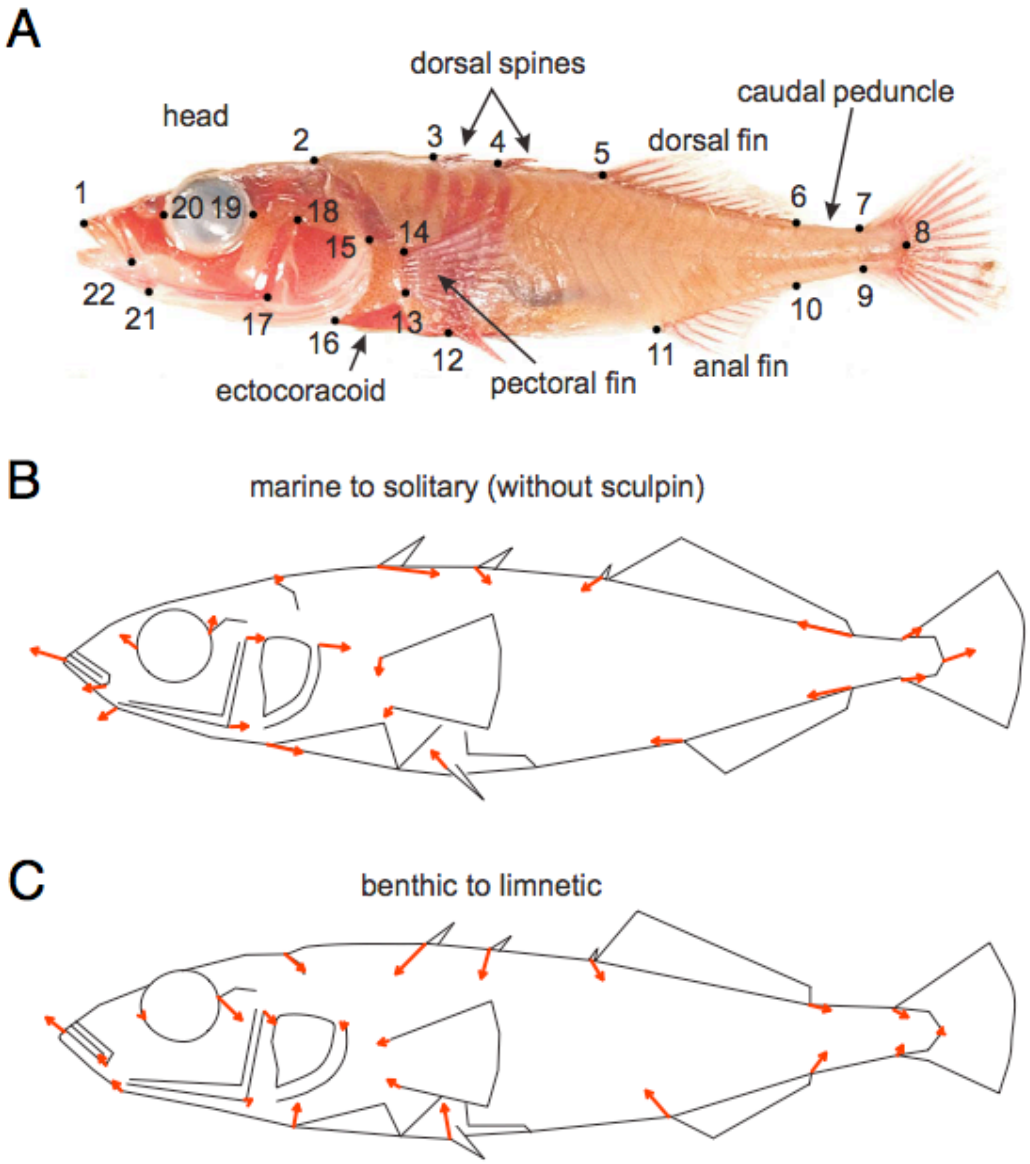

Figure A1. Landmark coordinates and shape shifts in threespine stickleback. (A) Landmark coordinates used for morphometric analysis. (B) Shifts associated with transition from the ancestral marine phenotype (base of arrow) to the phenotype of solitary populations in lakes without sculpin. (C) Difference between benthic (base of arrow) and limnetic species. Arrow lengths are multiplied by two for greater visibility.

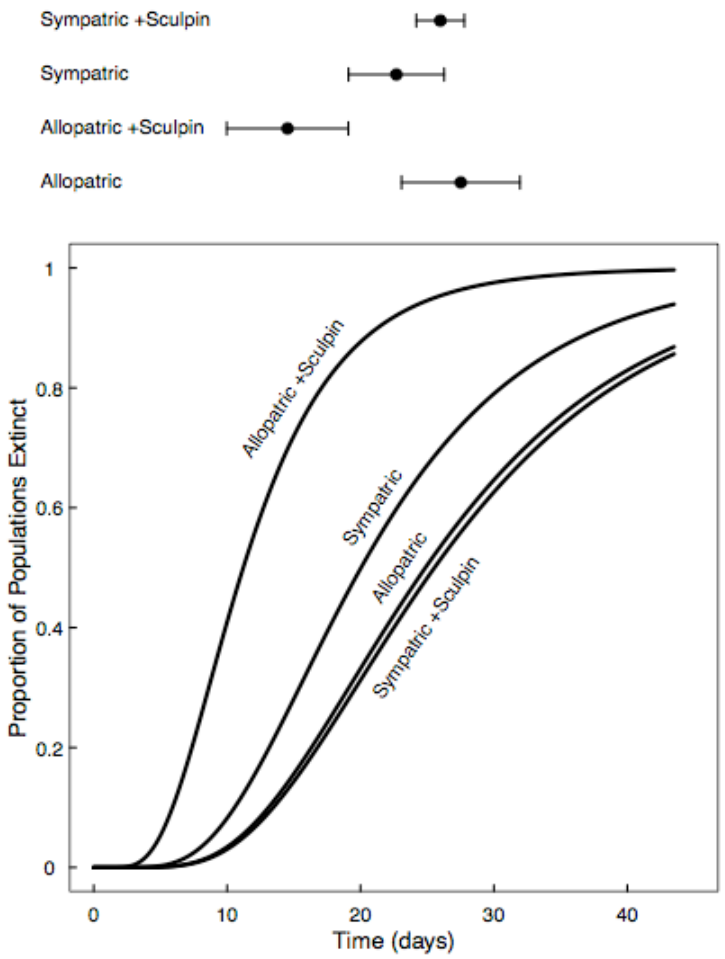

Figure A2. Parametric survival analysis of stickleback stocked at the beginning of the experiment. The average time until death (last observation) of stickleback was averaged within each mesocosm (means ± SD shown above the panel). These means were input into a survival analysis with log-normal error structure, and used to model the proportion of mesocosm populations in each treatment expected to become extinct over time. Neither sculpin addition (likelihood ratio test: d.f. = 1, G = 1.75, P = 0.19) nor stickleback population of origin (d.f. = 1, G = 2.12, P = 0.15) had individually significant effects, but there was a strong sculpin × population interaction (d.f. = 1, G = 7.65, P = 0.006; see also Fig. 3A).

Table A1. Lake morphology and sample sizes of stickleback populations sampled for geometric body shape analysis.

Lake	Population Type	Watershed	N	Elevation(m)	Surface Area (ha)	Depth (m)
	Solitary					
Priest* (Vancouver I.)	No sculpin	Priest Lake	25	15	2.3	4.8
Blackburn*	No sculpin	Cusheon Creek	53	106	3.7	3.2
Stowell*	No sculpin	Lake Stowell	40	77	5.6	4.6
Dougan*	No sculpin	Patrolas Creek	34	60	10.0	8.5
Hoggan*	No sculpin	Hoggan Lake	40	60	19.7	3.0
Bullocks	No sculpin	Bullocks Lake	10	61	9.4	4.0
Kirk	No sculpin	Van Anda Creek	40	121	8.3	8.3
Klein	No sculpin	Ruby Creek	40	135	13.5	12.0
Cranby	No sculpin	Cranby Creek	40	69	44.6	3.2
Trout	**No sculpin**	**Trout Lake**	**40**	**145**	**7.6**	**5.8**
Paq	**Sculpin**	**Paq Creek**	**40**	**21**	**12.1**	**2.2**
North	Sculpin	Ruby Creek	31	45	12.8	10.1
Brown	Sculpin	Brown Lake	40	32	18.8	3.5

Ambrose	Sculpin	Ruby Creek	40	56	29.8	13.3
Cedar	Sculpin	Amor de Cosmos Creek	20	204	31.0	3.0
	Species pairs					
Enos	Limnetic	Enos Creek	103	55	17.6	4.0
Enos	Benthic	Enos Creek	105	55	17.6	4.0
Paxton	Limnetic	Myrtle Creek	40	88	17.0	6.2
Paxton	Benthic	Myrtle Creek	30	88	17.0	6.2
Priest	Limnetic	Van Anda Creek	40	75	44.3	5.4
Priest	Benthic	Van Anda Creek	25	75	44.3	5.4
Little Campbell R.	Marine	-	**57**	0	-	-
Oyster Lagoon	Marine	-	40	0	-	-
Salmon R.	Marine	-	40	0	-	-

All lakes contain cutthroat trout, and lakes marked with an asterisk (*) also contain introduced rainbow trout (*Oncorhyncus mykiss*). Lakes used as sources of unexposed (Trout Lake) and exposed (Paq Lake) stickleback for the mesocosm experiment are in bold, and watersheds are labeled by lake if watershed names were unavailable. The Little Campbell River population included 35 wild-caught and 22 pond-reared fish.

Table A2. Description of landmarks and analyses of body shape. For each of the two LDAs (solitary populations only, and all populations), the percentage of variation explained and loadings of each landmark coordinate are given for the first two axes.

	Landmark		LD1 – Solitary (39.1%)	LD2 – Solitary (16.2%)	LD1 – All (35.2%)	LD2 – All (18.9%)
1	Anterior extent of maxilla	x	18.80	-56.60	-15.94	-83.08
		y	19.78	31.80	59.73	43.23
2	Posterior extent of supraoccipital	x	-25.81	33.84	9.59	54.80
		y	59.02	-146.75	-70.03	-116.95
3	Anterior insertion of first dorsal spine	x	39.05	-36.37	57.08	-33.02
		y	-100.68	43.06	-27.70	13.35
4	Anterior insertion of second dorsal spine	x	-28.96	9.17	-16.99	35.84
		y	41.10	1.43	5.13	-8.31
5	Anterior insertion of third dorsal spine	x	-36.56	25.74	-19.81	22.93
		y	-95.74	-1.53	-43.85	25.70
6	Posterior insertion of dorsal fin	x	5.93	39.21	-13.86	10.22
		y	56.01	-22.32	23.88	-56.29

7	Dorsal insertion of caudal fin	x	-47.50	-18.93	-30.98	31.51
		y	116.08	-132.08	92.88	-129.87
8	Posterior extent of caudal peduncle	x	-28.66	-46.61	37.69	-29.03
		y	-4.79	0.17	20.71	9.11
9	Ventral insertion of caudal fin	x	-0.91	-64.45	26.62	-19.26
		y	-91.53	129.39	-127.46	106.35
10	Posterior insertion of anal fin	x	-0.06	15.68	-38.46	-17.64
		y	-146.17	-28.49	-62.93	51.93
11	Anterior insertion of anal spine	x	67.64	1.10	30.97	-17.85
		y	90.74	4.56	68.46	-7.68
12	Anterior insertion of pelvic spine	x	-39.51	8.44	-14.79	18.62
		y	68.61	23.04	76.33	24.81
13	Ventral insertion of pectoral fin	x	44.02	-21.88	-54.36	-18.41
		y	0.88	11.54	2.59	-1.20
14	Dorsal insertion of pectoral fin	x	-103.93	32.87	-43.73	23.64
		y	-20.32	-25.47	-48.85	-32.03

15	Posterior extent of operculum	x	41.99	46.21	58.37	23.17
		y	37.23	-19.75	6.29	18.06
16	Anterior extent of ectocoracoid	x	29.52	13.50	19.34	-7.74
		y	-51.86	133.29	-31.76	85.21
17	Posterioventral extent of preopercular	x	5.16	-39.72	33.94	-23.98
		y	-5.88	71.60	47.44	2.32
18	Dorsal extent of preopercular	x	52.12	33.48	35.98	-16.07
		y	15.05	-27.01	-15.19	3.60
19	Posterior extent of orbit	x	-54.88	24.43	-17.72	163.52
		y	10.10	-50.78	50.31	-62.29
20	Anterior extent of orbit	x	-29.96	82.87	-53.42	11.69
		y	67.49	-19.77	37.03	-99.54
21	Anterioventral extent of preopercular	x	58.19	-78.29	18.76	3.49
		y	-27.06	-24.70	-68.94	-20.73
22	Posterior extent of premaxilla	x	-157.36	-35.01	-101.86	4.78
		y	-37.66	-29.02	-53.57	2.14

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Table A3. Effects of size, population and phenotypic plasticity to trait values of stickleback[a].

Trait	SL	Population	Rearing Environment	Population × Environment
First Dorsal Spine	178.9***	41.0***	0.52	21.2***
Second Dorsal Spine	117.7***	44.7***	3.37#	2.43
Pelvic Spine	207.7***	164.4***	0.03	6.78*
Lateral Plate Number	0.01	248.1***	12.0**	2.87#
Gill Raker Number	3.41#	0.51	12.5**	0.19
[b]Gill Raker Length	141.2***	105.1***	19.3***	1.07

[a]Test statistics (F-values) are given for each main effect and interaction; direction and magnitude of effects can be seen in Figure 6.

[b]log-transformed response variable

# $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$