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Supporting Online Material for

Evidence for Ecological Speciation and Its Alternative

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Tables S1 to S3
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Table S1. Estimates of the magnitude of reproductive isolation resulting from divergent selection components compared with other components lacking identifiable causes. These are the raw data plotted in Fig. 2. The plant data are calculated from quantities provided in Table 1 in (S47), who give original data sources. The animal data are calculated from quantities extracted from Table 3 in (S48), who give original data sources. Calculation details are provided in Tables S2 and S3.

Study system	Divergent selection	Unknown causes	Data source
<i>Artemisia tridentata</i>	0.97		(S47)
<i>Chamaecrista desvauxii</i>	0.30	1.00	(S47)
<i>Costus</i>	0.95	0.88	(S47)
<i>Gelsemium</i>	0.96	0.80	(S47)
<i>Gilia capitata</i>	0.75	0.88	(S47)
<i>Helianthus exilis</i>	0.97	0.00	(S47)
<i>Helianthus</i>	0.35	1.00	(S47)
<i>Ipomopsis</i>	0.99	-0.09	(S47)
<i>Iris</i> (1)	0.94	-0.56	(S47)
<i>Iris</i> (2)	0.18	0.31	(S47)
<i>Iris</i> (3)	0.79	0.89	(S47)
<i>Iris</i> (4)	0.79	-2.66	(S47)
<i>Mimulus</i> (1)	1.00	0.95	(S47)
<i>Mimulus</i> (2)	0.75	0.80	(S47)
<i>Mimulus</i> (3)	0.95	0.96	(S47)
<i>Mimulus guttatus</i>	1.00	0.00	(S47)
<i>Penstemon</i>	0.53	0.87	(S47)
<i>Pedicularis</i>	0.97	0.46	(S47)
<i>Phlox</i>	0.52	0.98	(S47)
<i>Acyrtosiphon pisum</i>	1.00		(S48)
<i>Agelenopsis aperta</i>	0.63	-0.08	(S48)
<i>Bombina</i> spp.	0.81	0.19	(S48)
<i>Eurosta solidaginis</i>	1.00	0.37	(S48)
<i>Galerucella nymphaeae</i>	0.98	0.00	(S48)
<i>Galerucella</i> spp.	0.99	0.00	(S48)
<i>Gasterosteus aculeatus</i>	0.53	0.92	(S48)
<i>Heliconius erato</i>	0.74	0.00	(S48)
<i>Littorina saxatilis</i>	0.90	0.52	(S48)
<i>Mitoura</i> spp.	0.76	0.00	(S48)
<i>Neochlamisus bebbianae</i>	1.00	0.72	(S48)
<i>Rhagoletis</i> spp.	0.89		(S48)
<i>Timema cristinae</i>	0.51	0.22	(S48)

Table S2. Calculation details for the plant data given in Table S1. A) Reproductive isolation components calculated from Table 1 in (S47) by averaging the two directional values for each study system for simplicity. B) Absolute contributions of sequential components of reproductive isolation likely attributable to divergent selection. C) Absolute contributions of sequential components of reproductive isolation attributable to unknown causes. Absolute contributions of the sequential components of reproductive isolation were accumulated and totaled using the formulas in (S49). Briefly, the absolute contribution of the first component of reproductive isolation in a sequence is, $AC_1 = RI_1$, where RI_1 is the strength of the first component of reproductive isolation in the sequence. The absolute contribution of the second component in the sequence is $AC_2 = RI_2*(1-AC_1)$, where RI_2 is the strength of the second component of reproductive isolation. And in general, $AC_n = RI_n*(1-(AC_1+AC_2+...+AC_{n-1}))$. Total reproductive isolation for a set of components is the sum of all the AC_i . I assumed that the following components of reproductive isolation likely represented divergent selection by active selection or trait-based assortative mating: ecogeographic, immigrant inviability, phenology, pollinators, and extrinsic postzygotic isolation. Remaining components fell into the category of unknown causes.

A)	eco- geography	immigrant inviability	phenology	pollinator	mating system	pollen compe- tition	F1 seed forma- tion	F1 seed germi- nation	F1 via- bility	F1 male fertility	F1 seed set	extrinsic post- zygotic
<i>Artemisia tridentata</i>		0.85										0.7725
<i>Chamaecrista desvauxii</i>			0.301				1					
<i>Costus</i>	0.413		0.198	0.8845			0.8885	-0.068		0.0025		
<i>Gelsemium</i>			0.9635				0.8015					
<i>Gilia capitata</i>		0.749					0.875					
<i>Helianthus exilis</i>		0.971					0					
<i>Helianthus</i>			0.3505			0.983	-0.0215			0.949	0.991	
<i>Ipomopsis</i>		0.9615		0.7215		-0.0935						0.2775
<i>Iris (1)</i>		0.932	0.1425				-0.5635					
<i>Iris (2)</i>			0.1765				0.3145					
<i>Iris (3)</i>		0.072	0.4105	0.634		0.8055	0.598	0.035	-0.2275		-0.1435	-0.043
<i>Iris (4)</i>		-0.0855	0.858	-0.233		-0.305					-1.806	-0.0915
<i>Mimulus (1)</i>	0.587	0.934		0.975		0.6195	0.447	0.125	-0.668	0.645	0.573	
<i>Mimulus (2)</i>			0.4995		0.4995	0.446		0.1285	0.074	0.436	0.196	
<i>Mimulus (3)</i>				0.947			0.958					
<i>Mimulus guttatus</i>		0.9365	1						0.002			-0.7835
<i>Penstemon</i>				0.5295			0.7435		-0.0155	0.514		
<i>Pedicularis</i>			0.616	0.934			0.462					
<i>Phlox</i>		0.19		0.413		0.204	0.209			0.786	0.847	

B)

Study system	eco- geography	immigrant inviability	phenology	pollinator	mating system	extrinsic post- zygotic	Total
<i>Artemisia tridentata</i>		0.85				0.115875	0.965875
<i>Chamaecrista desvauxii</i>		0	0.301				0.301
<i>Costus</i>	0.413		0.116226	0.4163996			0.945626
<i>Gelsemium</i>			0.9635				0.9635
<i>Gilia capitata</i>		0.749					0.749
<i>Helianthus exilis</i>		0.971					0.971
<i>Helianthus</i>			0.3505				0.3505
<i>Ipomopsis</i>		0.9615		0.0277778		0.002975	0.992253
<i>Iris (1)</i>		0.932	0.00969				0.94169
<i>Iris (2)</i>			0.1765				0.1765
<i>Iris (3)</i>		0.072	0.380944	0.3468335		-0.00861	0.791168
<i>Iris (4)</i>		-0.0855	0.931359	-0.035915		-0.01739	0.792554
<i>Mimulus (1)</i>	0.587	0.385742		0.0265766			0.999319
<i>Mimulus (2)</i>			0.4995		0.25		0.7495
<i>Mimulus (3)</i>				0.947			0.947
<i>Mimulus guttatus</i>		0.9365	0.0635			0	1
<i>Penstemon</i>				0.5295			0.5295
<i>Pedicularis</i>			0.616	0.358656			0.974656
<i>Phlox</i>		0.19		0.33453			0.52453

C)

Study system	pollen competition	F1 seed formation	F1 seed germination	F1 viability	F1 male fertility	F1 seed set	Total
<i>Artemisia tridentata</i>							
<i>Chamaecrista desvauxii</i>		1	0				1
<i>Costus</i>		0.8885	-0.007582		0.000298		0.881216
<i>Gelsemium</i>		0.8015					0.8015
<i>Gilia capitata</i>		0.875					0.875
<i>Helianthus exilis</i>		0					0
<i>Helianthus</i>	0.983	-0.0003655			0.01648	0.000878	0.999992
<i>Ipomopsis</i>	-0.0935	0					-0.0935
<i>Iris (1)</i>		-0.5635					-0.5635
<i>Iris (2)</i>		0.3145					0.3145
<i>Iris (3)</i>	0.8055	0.116311	0.00273662	-0.017165		-0.01329	0.894092
<i>Iris (4)</i>	-0.305					-2.35683	-2.66183
<i>Mimulus (1)</i>	0.6195	0.1700835	0.02630206	-0.122988	0.198081	0.062469	0.953448
<i>Mimulus (2)</i>	0.446		0.071189	0.035728	0.194928	0.049422	0.797268
<i>Mimulus (3)</i>		0.958					0.958
<i>Mimulus guttatus</i>				0.002			0.002
<i>Penstemon</i>		0.7435		-0.003976	0.133885		0.873409
<i>Pedicularis</i>		0.462					0.462
<i>Phlox</i>	0.204	0.166364			0.494894	0.114127	0.979384

Table S3. Calculation details for the animal data given in Table S1. A) Numbers extracted from Table 3 in (S48). B) Absolute contributions of sequential components of reproductive isolation likely attributable to divergent selection. C) Absolute contributions of sequential components of reproductive isolation attributable to unknown causes. Absolute contributions of the sequential components of reproductive isolation were accumulated and totaled using the formulas in (S49), as described in the legend of Table S2. I assumed that the following components of reproductive isolation likely represented divergent selection by active selection or trait-based assortative mating: ecogeographic, immigrant inviability, phenology, pollinators, and extrinsic postzygotic isolation. Remaining components fell into the category of unknown causes.

A)							
Study system	Habitat isolation	Immigrant inviability	Sexual isolation	Pollen competition	Hybrid inviability (genetic)	Hybrid inviability (ecological)	Sexual selection on hybrids
<i>Acyrtosiphon pisum</i>	0.927	0.97			0	0.47	
<i>Agelenopsis aperta</i>		0.632	0.06		-0.15		
<i>Bombina spp.</i>	0.66	0.437			0.19		
<i>Eurosta solidaginis</i>	0.962	0.877	0.365		0	0.344	
<i>Galerucella nymphaeae</i>	0.855	0.772	0		0	0.322	
<i>Galerucella spp.</i>	0.904	0.938			0	-0.71	
<i>Gasterosteus aculeatus</i>		0.363	0.633		0	0.255	0.777
<i>Heliconius erato</i>	0	0.52	0		0	0.45	
<i>Littorina saxatilis</i>	0.742	0.691	0.518		0	-0.259	0
<i>Mitoura spp.</i>	0.696	0.208			0		
<i>Neochlamisus bebbianae</i>	0.947	0.99	0.72				
<i>Rhagoletis spp.</i>	0.555	0.368				0.606	
<i>Timema cristinae</i>	0.252	0.34	0.222				

B)

Study system	Habitat isolation	Immigrant inviability	Hybrid inviability (ecological)	Total
<i>Acyrtosiphon pisum</i>	0.927	0.07081	0.0010293	0.9988393
<i>Agelenopsis aperta</i>		0.632	0	0.632
<i>Bombina spp.</i>	0.66	0.14858	0	0.80858
<i>Eurosta solidaginis</i>	0.962	0.033326	0.001607856	0.99693386
<i>Galerucella nymphaeae</i>	0.855	0.11194	0.01064532	0.97758532
<i>Galerucella spp.</i>	0.904	0.090048	-0.00422592	0.98982208
<i>Gasterosteus aculeatus</i>		0.363	0.162435	0.525435
<i>Heliconius erato</i>	0	0.52	0.216	0.736
<i>Littorina saxatilis</i>	0.742	0.178278	-0.020648	0.89963
<i>Mitoura spp.</i>	0.696	0.063232	0	0.759232
<i>Neochlamisus bebbianae</i>	0.947	0.05247	0	0.99947
<i>Rhagoletis spp.</i>	0.555	0.16376	0.17043144	0.88919144
<i>Timema cristinae</i>	0.252	0.25432	0	0.50632

C)

Study system	Sexual isolation	Hybrid inviability (genetic)	Sexual selection on hybrids	Total
<i>Acyrtosiphon pisum</i>				
<i>Agelenopsis aperta</i>	0.06	-0.141	0	-0.081
<i>Bombina spp.</i>	0	0.19	0	0.19
<i>Eurosta solidaginis</i>	0.365	0	0	0.365
<i>Galerucella nymphaeae</i>	0	0	0	0
<i>Galerucella spp.</i>	0	0	0	0
<i>Gasterosteus aculeatus</i>	0.633	0	0.285159	0.918159
<i>Heliconius erato</i>	0	0	0	0
<i>Littorina saxatilis</i>	0.518	0	0	0.518
<i>Mitoura spp.</i>	0	0	0	0
<i>Neochlamisus bebbianae</i>	0.72	0	0	0.72
<i>Rhagoletis spp.</i>				
<i>Timema cristinae</i>	0.222	0	0	0.222

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