Ecography

ECOG-01696
Algar, A. C. and López-Darias, M. 2015. Sex differences in how ecomorphological diversity responds to environmental variation in an island lizard. – Ecography doi: 10.1111/ecog.01696

Supplementary material

Supplementary Material: Appendix 1

Algar A.C. & López-Darias, M.

Table A1. Eigenvectors and eigenvalues of principal component analysis on climate and topographic variables on Tenerife at 500m resolution.

Variable	**PC1**	**PC2**	**PC3**	**PC4**	**PC5**	**PC6**	**PC7**	**PC8**	**PC9**
elevation	0.404	0.296	-0.024	0.002	-0.206	0.001	0.212	-0.233	-0.779
northness	0.181	-0.436	-0.006	-0.868	0.048	0.120	0.047	-0.022	-0.067
eastness	-0.088	0.173	-0.961	-0.075	0.085	0.139	0.061	0.039	0.033
mean annual temperature	-0.424	-0.220	0.012	0.060	0.185	0.063	-0.191	0.594	-0.583
minimum temperature	-0.427	-0.192	-0.083	-0.010	0.152	-0.302	-0.339	-0.706	-0.213
maximum temperature	-0.428	-0.164	0.100	0.096	0.050	0.374	0.762	-0.216	-0.028
annual precipitation	0.308	-0.444	-0.159	0.241	0.317	-0.610	0.376	0.104	-0.017
minimum monthly precipitation	0.090	-0.581	-0.182	0.292	-0.695	0.178	-0.140	-0.035	-0.011
maximum monthly precipitation	0.384	-0.214	0.011	0.292	0.551	0.572	-0.238	-0.180	-0.037
Eigenvalue	2.19	1.44	0.98	0.77	0.60	0.29	0.22	0.16	0.11
Proportion of variance	0.54	0.23	0.11	0.07	0.04	0.01	0.01	0.00	0.00
Cumulative prop. variance	0.54	0.77	0.88	0.94	0.98	0.99	1.00	1.00	1.00

Table A2. Number of males and females sampled per site. Coordinates are UTM zone 28N.

SITE ID	ENV	X	Y	Females	Males
1001	A	365762.6	3136550	14	14
1002	D	349800.5	3131521	14	12
1003	D	353773.9	3133595	1	2
1004	B	339979	3115007	13	13
1005	A	328311.5	3114815	12	12
1006	C	354846.7	3144547	13	12
1007	C	326289.6	3135064	12	11
1008	C	360714.3	3148344	14	13
1009	A	364928.5	3133472	12	12
1010	A	346810.2	3102087	5	5
1011	A	361127.3	3122320	3	3
1012	D	340252.2	3122924	5	9
1013	A	354388.3	3118119	5	5
1014	A	331874.9	3107425	8	5
1015	B	362735.9	3137748	5	1
1016	A	383013.2	3154269	7	6
1017	C	321847.3	3140502	12	12
1018	C	340335.4	3141458	6	8
1019	A	347733.1	3144500	11	12
1020	B	370697	3151004	7	6

Table A3. Eigenvectors and eigenvalues of principal component analysis on body-size corrected traits of *Gallotia galloti* from across Tenerife. To account for body size, each trait was regressed on snout-vent length and the residuals were then used in the PCA.

Variable (residuals)	**PC1**	**PC2**	**PC3**	**PC4**	**PC5**	**PC6**	**PC7**	**PC8**	**PC9**	**PC10**	**PC11**	**PC12**	**PC13**
femur	-0.258	-0.175	0.308	-0.039	-0.534	0.549	-0.450	0.100	0.043	-0.006	0.055	0.049	0.023
tibia	-0.306	-0.285	0.042	0.023	-0.024	-0.178	0.119	0.415	0.002	-0.431	-0.557	-0.329	0.013
hindtoe	-0.243	-0.468	-0.222	0.065	0.117	-0.291	-0.139	0.465	0.175	0.256	0.421	0.242	-0.048
humerus	-0.208	-0.184	0.559	-0.430	0.579	0.175	0.138	-0.108	0.148	0.017	0.054	0.056	-0.032
ulna	-0.269	-0.210	0.360	0.090	-0.249	-0.525	-0.002	-0.406	-0.467	0.134	0.077	-0.034	0.030
foretoe	-0.210	-0.410	-0.310	0.499	0.288	0.341	-0.013	-0.476	0.001	-0.113	-0.049	-0.033	0.028
head_length	-0.327	0.158	-0.195	-0.131	0.020	0.070	-0.035	-0.043	0.071	0.592	-0.093	-0.601	-0.281
pileus_width	-0.247	0.379	0.161	0.399	0.290	0.221	0.054	0.399	-0.542	0.063	0.112	0.057	0.048
head_height	-0.245	0.406	0.152	0.266	0.193	-0.320	-0.545	-0.124	0.438	-0.109	-0.129	0.085	0.045
head_width	-0.291	0.187	0.143	0.247	-0.283	0.016	0.595	-0.035	0.424	-0.167	0.381	-0.098	-0.019
snout_length	-0.289	0.162	-0.339	-0.404	0.053	-0.024	-0.198	-0.108	-0.237	-0.540	0.414	-0.144	-0.135
lower jaw I	-0.336	0.114	-0.249	-0.255	-0.046	0.029	0.119	-0.056	0.009	0.171	-0.134	0.161	0.809
lower jaw II	-0.336	0.126	-0.177	-0.126	-0.119	0.030	0.189	-0.084	-0.041	0.058	-0.354	0.630	-0.489
Eigenvalue	2.66	1.22	0.97	0.81	0.77	0.68	0.64	0.60	0.56	0.50	0.49	0.40	0.30
Prop. of var.	0.54	0.11	0.07	0.05	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01
Cum. prop. var.	0.54	0.66	0.73	0.78	0.82	0.86	0.89	0.92	0.94	0.96	0.98	0.99	1.00

Table A4. Individual environments' contributions to total morphological dissimilarity, i.e. the percentage of total morphospace volume uniquely occupied by lizards from each environment.

All

Environment	Unique Volume (%)	P-value	P CI_{95}
A	10.9	0.46	0.43 – 0.49
B	3.8	0.51	0.48 – 0.54
C	17.7	0.041	0.029 – 0.053
D	3.2	0.34	0.31 – 0.37

Males only

Environment	Dissimilarity (%)	P-value	P CI_{95}
A	17.5	0.93	0.39 – 0.45
B	13.2	0.42	0.91 – 0.94
C	26.9	0.078	0.061 – 0.095
D	3.3	0.36	0.33 – 0.39

Females only

Environment	Dissimilarity (%)	P-value	P CI_{95}
A	10.5	0.86	0.83 – 0.88
B	6.6	0.66	0.63 – 0.69
C	20.2	0.068	0.052 – 0.084
D	4.7	0.46	0.43 – 0.49

Table A5. Morphological turnover (% non-overlap) among pairs of environments (below diagonal) for all individuals, males only and females only. P-values are given above the diagonal.

All

	Env A	**Env B**	**Env C**	**Env D**
Env A	-	0.19	0.16	0.017
Env B	50	-	0.10	0.001
Env C	51	53	-	0.001
Env D	58	74	64	-

Males

	Env A	**Env B**	**Env C**	**Env D**
Env A	-	0.48	0.24	0.008
Env B	69	-	0.27	0.001
Env C	74	73	-	0.003
Env D	86	94	0.88	-

Females

	Env A	**Env B**	**Env C**	**Env D**
Env A	-	0.23	0.24	0.63
Env B	66	-	0.15	0.005
Env C	65	69	-	0.31
Env D	60	81	65	-

Table A6. Individual trait dissimilarity (% non-overlap) among lizard populations in four environments on Tenerife. P-values and their 95% confidence intervals are based on a null model.

All

Trait	Dissimilarity	P-value	P CI_{95}
Body Size	20	0.004	0.00009 – 0.008
Head Size	14	0.83	0.81 – 0.86
Leg Length	11	0.89	0.88 – 0.91

Males only

Trait	Dissimilarity	P-value	P CI_{95}
Body Size	32	0.002	0.001 – 0.005
Head Size	20	0.88	0.86 – 0.9
Leg Length	16	0.83	0.8 – 0.85

Females only

Trait	Dissimilarity	P-value	P CI_{95}
Body Size	13	0.99	0.99 – 1.0
Head Size	13	0.78	0.75 – 0.80
Leg Length	10	0.97	0.96 – 0.98

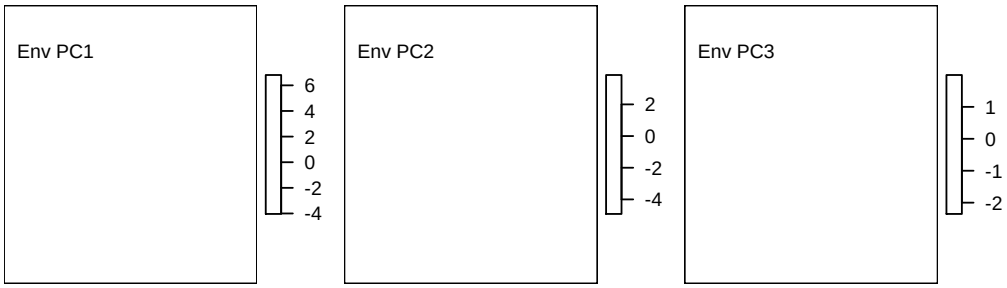
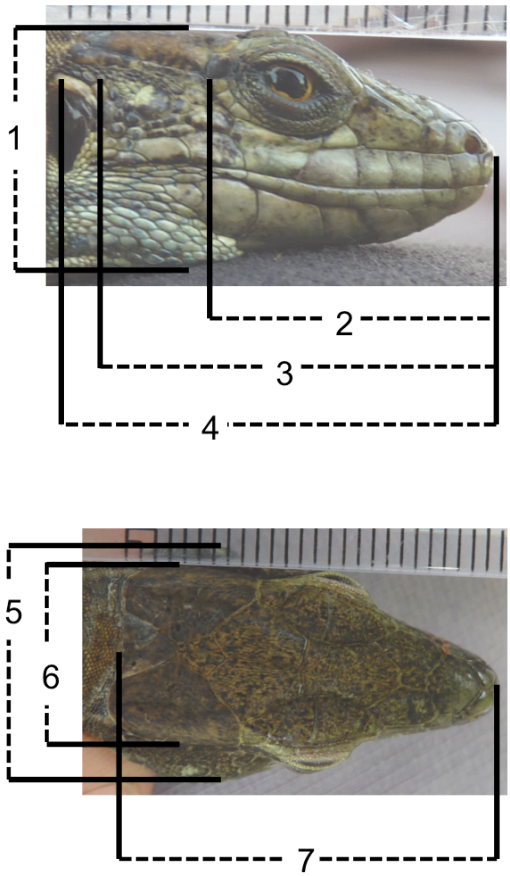


Figure A2. The first three principal components of environmental conditions on Tenerife. Env PC1 covaries with elevation/temperature, Env PC2 with aridity and northness, and Env PC3 with eastness. Together they explain 88% of the total environmental variance on Tenerife (Table A1).



1. Head height
2. Snout length
3. Lower jaw I
4. Lower jaw II
5. Head width
6. Pileus width
7. Head length

Figure A3. Measurements used to quantify head size of *Gallotia galloti* on Tenerife.

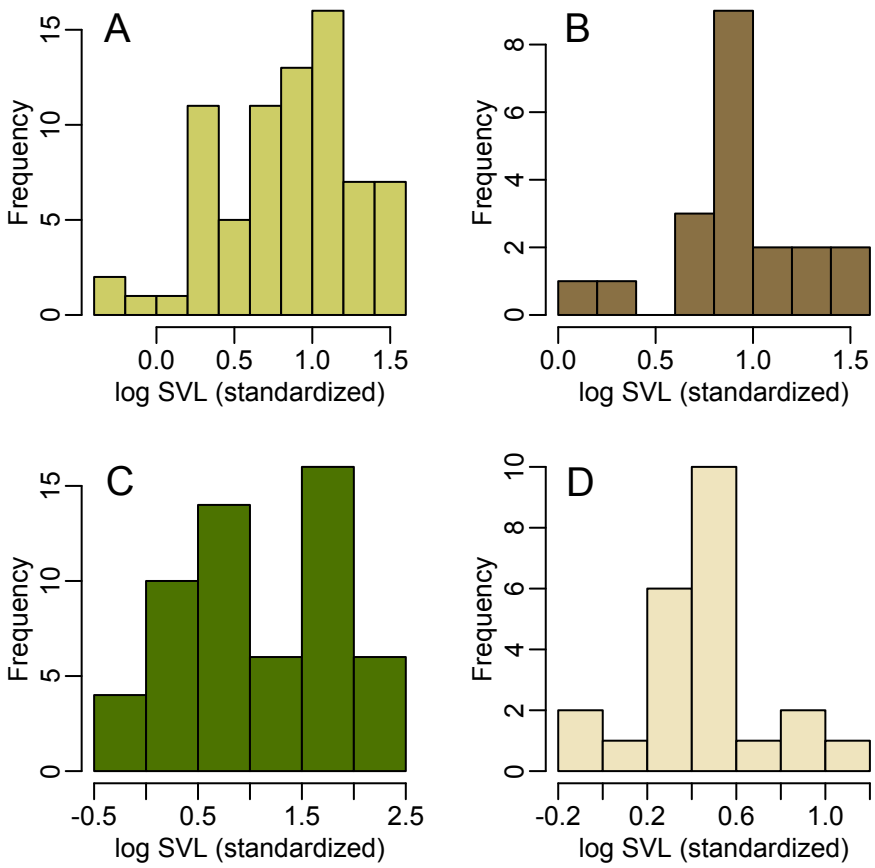


Figure A4. The distribution of body size (log transformed, then standardized to have zero mean and unit variance) for all male lizards caught in the four environments (A – D) on Tenerife.