

Hopkins and Davis

Morphological proxies for fossoriality

SUPPLEMENTARY APPENDIX II

Eigenvectors from discriminant analyses

Table 1. Eigenvalues and eigenvectors for quadratic discriminant analyses of burrowing (Y/N).

Sign in parenthesis indicates in which direction values associate with increased burrowing.

Models shown include the one including all characters (Y/N), the models limited to head, limb, and foot characters, respectively, and the analysis including the characters of the skull and humerus.

Character	Y/N	head	limbs	feet	head + humerus
	(+)	only	only	only	
		(-)	(+)	(-)	(+)
Eigenvalue	0.917	0.354	0.536	0.399	0.730
UIAP	0.010	-0.002			0.007
LIAP	-0.020	0.000			-0.012
OCA	-0.013	0.039			-0.014
ln DHW	-2.395		-1.528		-0.336
ln HL	-4.627		-3.941		-5.340
ln DPC	1.471		1.095		1.809
ln UL	-1.447		0.743		
ln LOP	2.921		3.996		
ln L3MC	0.009			0.415	
ln L3P	0.652			-1.999	
ln W3P	-1.255			0.062	

Hopkins and Davis

Morphological proxies for fossoriality

ln D3P	1.254		1.378
ln L3MT	-0.729		1.230
ln CSAH	0.215	-0.029	0.601
ln CSAF	0.214	-0.527	
ln SL	0.900	5.090	-1.775
ln SW	3.544	-4.825	5.130
ln OH	-1.881	1.319	-1.415

Table 2a. Eigenvalues and eigenvectors for discussed degree of fossoriality (S/F/N) quadratic discriminant analyses. Each analysis has two canonical axes for distinguishing the three groups. In each case, the first axis discriminates subterranean species from the rest and the second axis discriminates fossorial from non-burrowing species. Notes in parenthesis indicate which group is discriminated in which direction. Models shown include the one including all characters (S/F/N) and the model limited to head characters.

Characters	S/F/N 1 (sub +)	S/F/N 2 (fos -)	head only 1 (sub +)	head only 2 (fos -)
Eigenvalue	2.651	0.281	0.509	0.105
UIAP	0.019	0.003	0.014	0.029
LIAP	0.003	0.038	0.000	-0.001
OCA	-0.009	0.012	-0.039	0.009
ln DHW	-4.381	-0.718		
ln HL	-3.174	4.443		
ln DPC	2.614	0.356		
ln UL	-2.663	-0.451		
ln LOP	5.610	1.168		
ln L3MC	0.508	0.545		
ln L3P	1.095	0.088		
ln W3P	-0.263	1.863		
ln D3P	1.588	-0.402		
ln L3MT	-1.827	-0.763		
ln CSAH	-0.228	-0.620		

Hopkins and Davis

Morphological proxies for fossoriality

ln CSAF	0.186	-0.162		
ln SL	-1.811	-3.540	-6.200	-1.248
ln SW	4.603	-1.010	4.420	-2.295
ln OH	-3.313	-0.423	0.392	4.450

Table 2b. Eigenvalues and eigenvectors for discussed degree of fossoriality (S/F/N) quadratic discriminant analyses. Each analysis has two canonical axes for distinguishing the three groups. In each case, the first axis discriminates subterranean species from the rest and the second axis discriminates fossorial from non-burrowing species. Notes in parenthesis indicate which group is discriminated in which direction. Models shown include the models limited to limb and foot characters, and the analysis including the characters of the skull and humerus.

Characters	limbs only 1 (sub +)	limbs only 2 (fos +)	feet only 1 (sub -)	feet only 2 (fos -)	head + humerus 1 (sub +)	head + humerus 2 (fos -)
Eigenvalue	1.289	0.132	0.469	0.103	1.238	0.178
UIAP					0.015	0.014
LIAP					-0.010	0.009
OCA					-0.019	-0.004
ln DHW	-0.233	-0.212			-0.174	0.460
ln HL	2.893	3.384			-4.793	3.258
ln DPC	-1.535	1.826			2.074	-0.206
ln UL	2.435	-2.389				
ln LOP	-6.342	1.105				
ln L3MC			-1.282	1.993		
ln L3P			-0.989	-2.085		
ln W3P			-0.324	1.011		
ln D3P			1.187	1.301		
ln L3MT			2.790	-1.928		

Hopkins and Davis

Morphological proxies for fossoriality

ln CSAH	0.943	-0.285	0.964	0.478
ln CSAF	0.584	-1.087		
ln SL			-4.596	-4.903
ln SW			5.368	-1.608
ln OH			-0.788	1.826

Table 3. Eigenvectors for quadratic discriminant analyses of specific digging modes.

Comparisons were made only among burrowing taxa.

	humeral	head-lift	incisor	scratch
	rotation			
UIAP			0.035	
LIAP			0.050	-0.040
OCA		0.049	-0.020	
ln DHW	1.020		-7.906	3.744
ln HL				-7.959
ln DPC	0.851		1.582	2.564
ln UL	3.497		-1.177	-9.234
ln LOP	2.885		3.684	2.892
ln L3MC			2.069	1.915
ln L3P		0.750	1.510	-2.279
ln W3P				-2.380
ln D3P			2.362	3.798
ln L3MT		0.937	-5.788	-1.693
ln CSAH	-3.582		-1.998	-1.378
ln CSAF			1.156	0.563
ln SL		3.559	5.455	8.132
ln SW		-1.498		
ln OH		-3.525	-1.657	1.404

Table 4. Eigenvectors for regularized discriminant analysis of overall life habit. Life habit analysis has five categories, and so four discriminant axes. Direction of discrimination is indicated in parentheses for each axis.

	life habit 1 (subterr +)	life habit 2 (aquatic +)	life habit 3 (arboreal -)	life habit 4 (fossorial +)
Eigenvalue	2.706	1.034	0.463	0.273
UIAP	0.017	0.008	-0.001	0.022
LIAP	-0.001	-0.022	-0.005	0.033
OCA	-0.012	-0.005	-0.025	0.004
ln DHW	-3.947	3.743	-2.135	-0.133
ln HL	-3.342	-7.315	4.892	1.585
ln DPC	2.259	-1.717	0.393	1.116
ln UL	-2.518	2.373	-4.321	-0.467
ln LOP	6.183	2.998	-0.370	1.134
ln L3MC	0.130	-1.289	-1.258	-0.523
ln L3P	1.398	-0.492	2.044	0.416
ln W3P	0.072	-0.130	1.646	2.378
ln D3P	0.314	-2.194	-4.033	-1.655
ln L3MT	-1.108	3.892	1.127	1.382
ln CSAH	-0.233	-0.089	0.082	-0.480
ln CSAF	0.106	0.946	-0.617	0.235
ln SL	-0.918	0.845	6.803	-2.193
ln SW	3.543	-0.345	-4.912	-2.093

Hopkins and Davis

Morphological proxies for fossoriality

ln OH	-2.884	-0.307	2.257	-0.083
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