Supplemental Table 2. Log-likelihoods and likelihoods of all 16 possible data patterns for a 2-taxon tree (unit branchlengths) with three geographic areas, under four different sets of DEC/DEC+J parameters. (a) A DEC "cladogenesis-only" model. (b) A DEC model with both anagenetic and cladogenetic processes. (c) A DEC+J model with both anagenetic and cladogenetic processes, with a significant weight on cladogenetic jump dispersal. (d) A DEC+J model with no anagenetic processes, and with jump dispersal dominanting the cladogenetic process. Summing the likelihoods of all possible data patterns shows that, regardless of the model and parameters, the total of all likelihoods is 3. This demonstrates that no models have "unfair" advantages, rather, each data pattern is best fit (grey shading) by one of the four given parameters sets. (Note that none of the four model-parameter sets given here is likely to be the maximum likelihood (ML) inference for any of the 16 data patterns; the purpose is just to demonstrate that any particular model & parameters will prefer some data patterns over others, and vice versa.)

Data (left, right)	**(a) DEC, cladogenetic range-change only: *d*=0.00001, *e*=0.00001, *j*=0**		**(b) DEC, mix of anagenetic and cladogenetic range-change: *d*=0.2, *e*=0.1, *j*=0**		**(c) DEC+J, mix of anagenetic and cladogenetic range-change, with jump dispersal added: *d*=0.2, *e*=0.1, *j*=0.15**		**(c) DEC+J, only cladogenetic range-change, dominated by jump-dispersal: *d*=0.0001, *e*=0.0001, *j*=2.9**	
	Data lnL	**Data likelihood**	**Data lnL**	**Data likelihood**	**Data lnL**	**Data likelihood**	**Data lnL**	**Data likelihood**
00,00	-22.1786	0	-4.0102	0.018	-4.0102	0.018	-22.1786	0
00,10	-11.3588	0	-2.5251	0.08	-2.5251	0.08	-11.3588	0
00,01	-11.3588	0	-2.5251	0.08	-2.5251	0.08	-11.3588	0
00,11	-12.6115	0	-2.8743	0.056	-2.8743	0.056	-12.6115	0
10,00	-11.3588	0	-2.5251	0.08	-2.5251	0.08	-11.3588	0
10,10	0	1	-0.5413	0.582	-0.7979	0.45	-5.1642	0.006
10,01	-1.7918	0.167	-2.0821	0.125	-1.3611	0.256	0.1492	1.161
10,11	-1.7917	0.167	-1.3956	0.248	-1.3956	0.248	-1.7917	0.167
01,00	-11.3588	0	-2.5251	0.08	-2.5251	0.08	-11.3588	0
01,10	-1.7918	0.167	-2.0821	0.125	-1.3611	0.256	0.1492	1.161
01,01	0	1	-0.5413	0.582	-0.7979	0.45	-5.1642	0.006
01,11	-1.7917	0.167	-1.3956	0.248	-1.3956	0.248	-1.7917	0.167
11,00	-12.6115	0	-2.8743	0.056	-2.8743	0.056	-12.6115	0
11,10	-1.7917	0.167	-1.3956	0.248	-1.3956	0.248	-1.7917	0.167
11,01	-1.7917	0.167	-1.3956	0.248	-1.3956	0.248	-1.7917	0.167
11,11	-11.9184	0	-1.9331	0.145	-1.9331	0.145	-11.9184	0
Totals		**3.002**		**3.001**		**2.999**		**3.002**

Note: Deviations from integer 3 are due to rounding errors.