Testing hypotheses for genealogical discordance in a rainforest lizard: Supplementary Information

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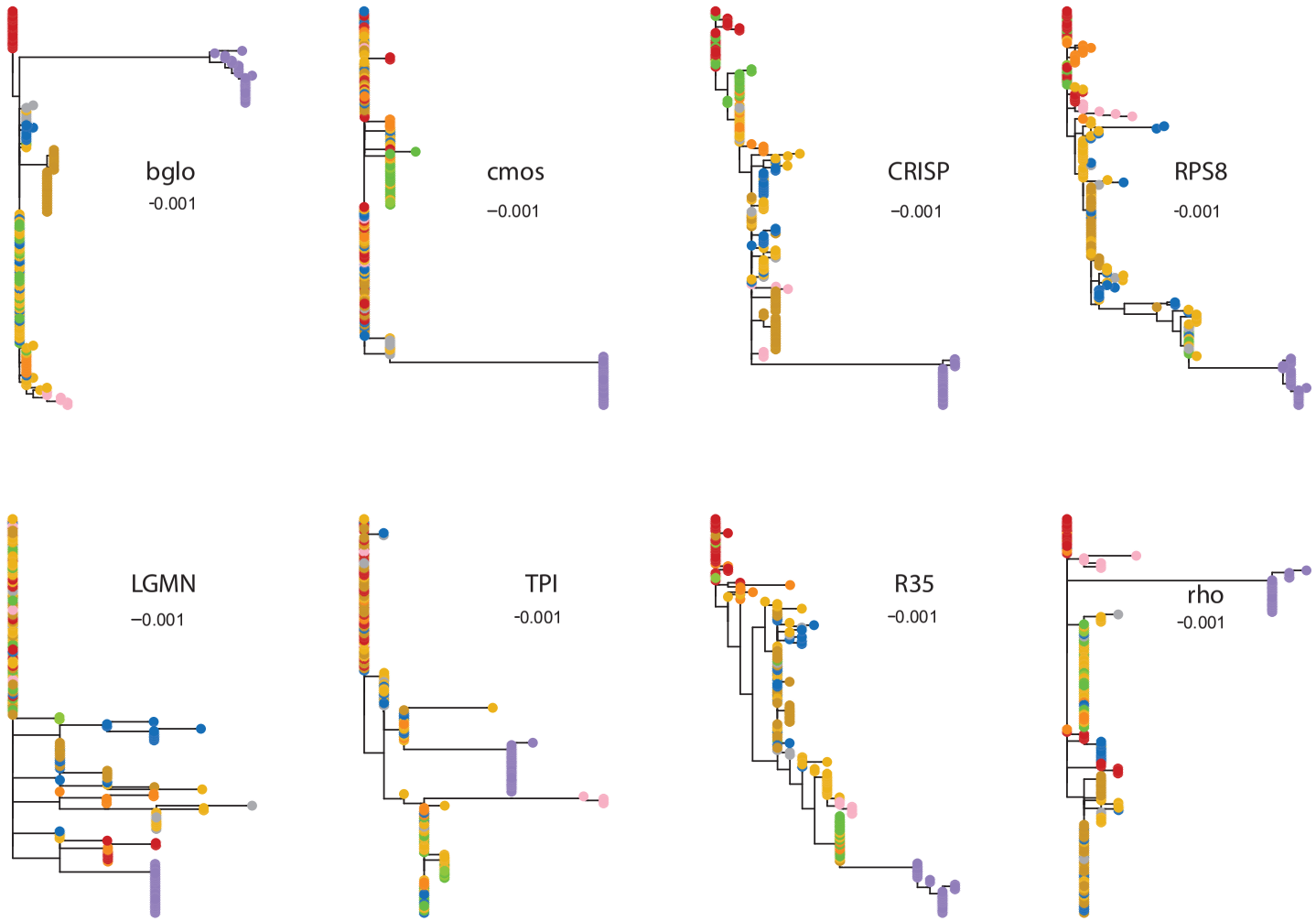

Figure 1: Gene trees for eight nuclear genes for *Saproscincus basiliscus* and *S. lewisi* based on individual haplotypes, as inferred by maximum-likelihood in RAxML. Color scheme follows that used in Figure 1.

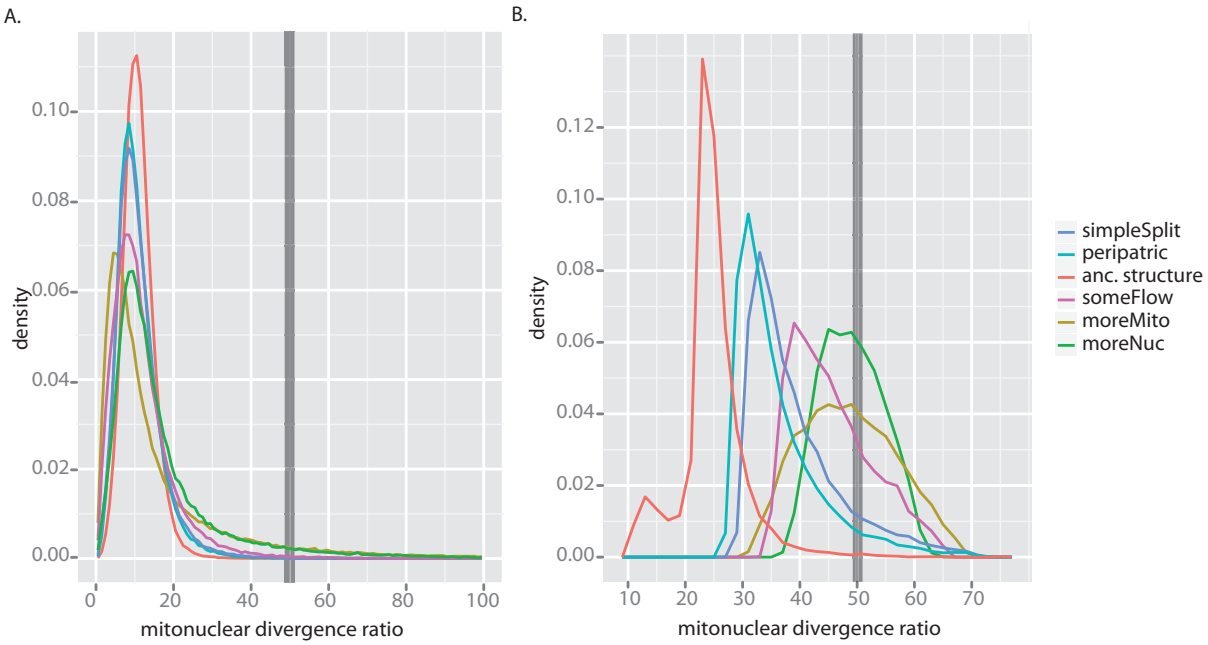

Figure 2: Expected distribution of mito-nuclear divergence ratios for all of the modelled scenarios across the complete parameter space, A. before fitting and B. after fitting. The mito-nuclear divergence ratio found in this study is outlined in darker grey.

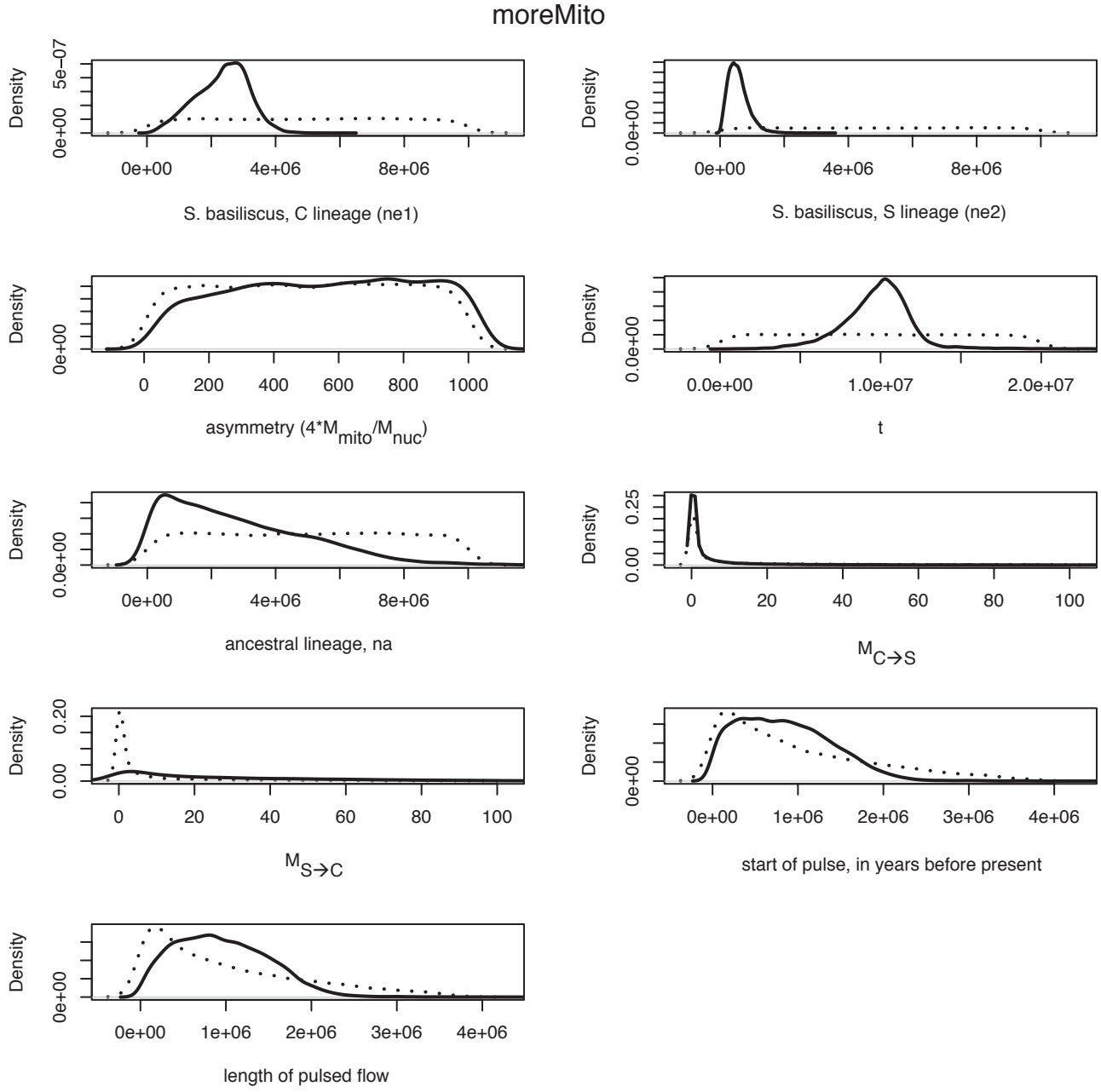

Figure 3: Prior (shown by dotted line) and posterior (shown by bold black line) probability distributions for parameters of the most likely inferred model (model 5), in which there is pulsed introgression with more mitochondrial than nuclear gene flow.

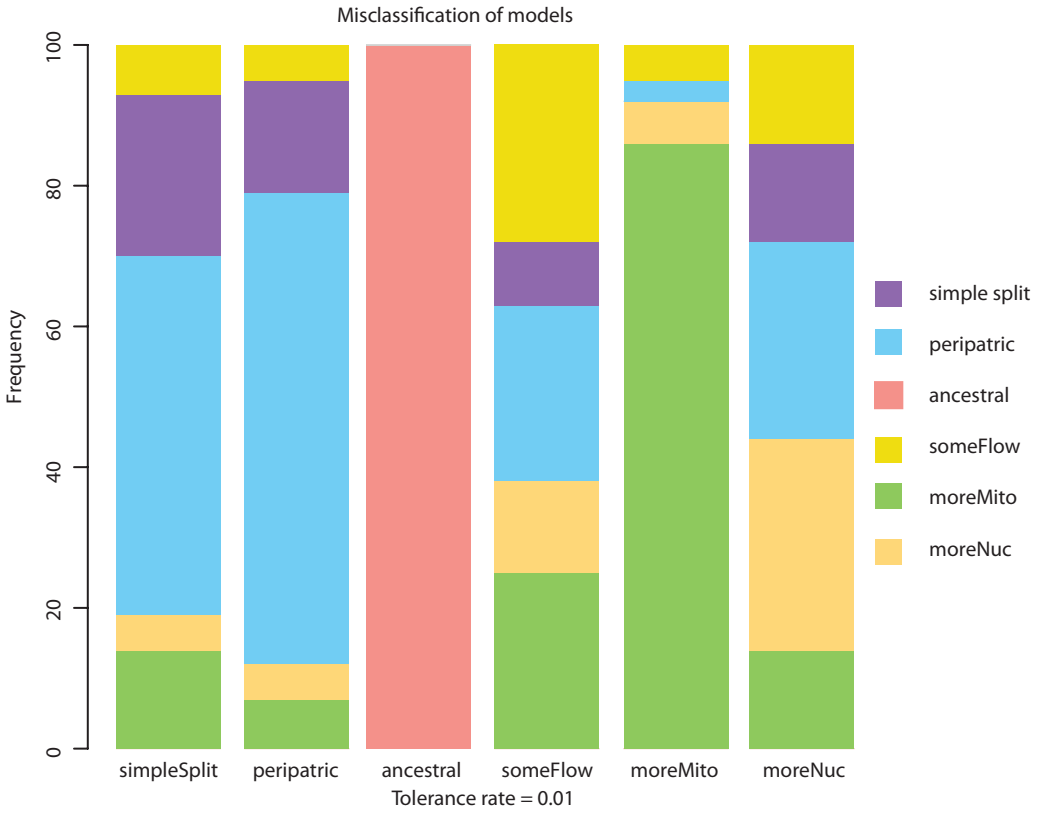

Figure 4: Results from 100 pseudo-observed data sets, showing the frequency of misclassification among the models simulated for the ABC analysis.

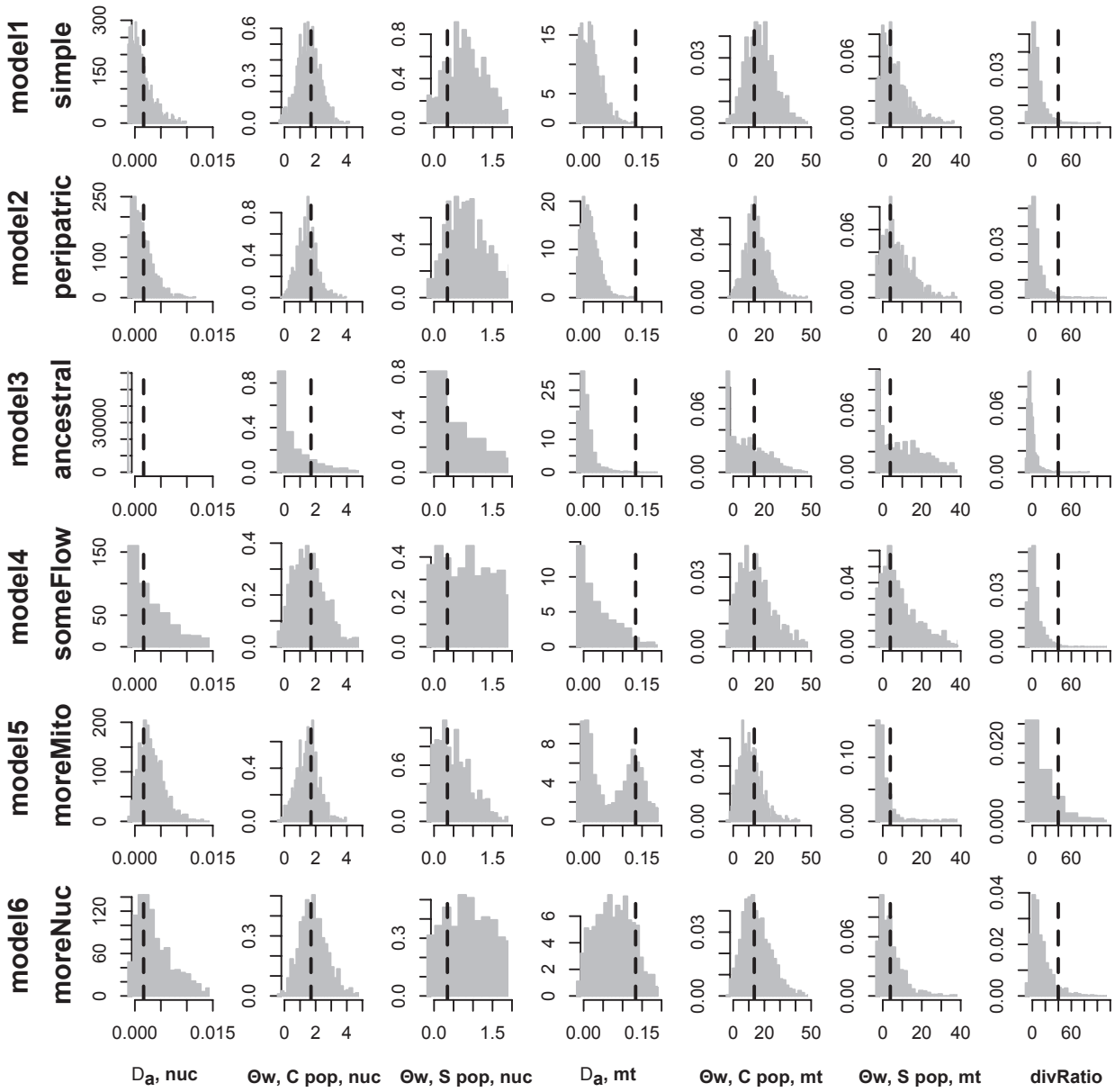

Figure 5: Posterior predictive results for all six models across all seven summary statistics. Dashed black lines reflect true value of summary statistic for the empirical data. Some graphs cropped for ease of visibility.

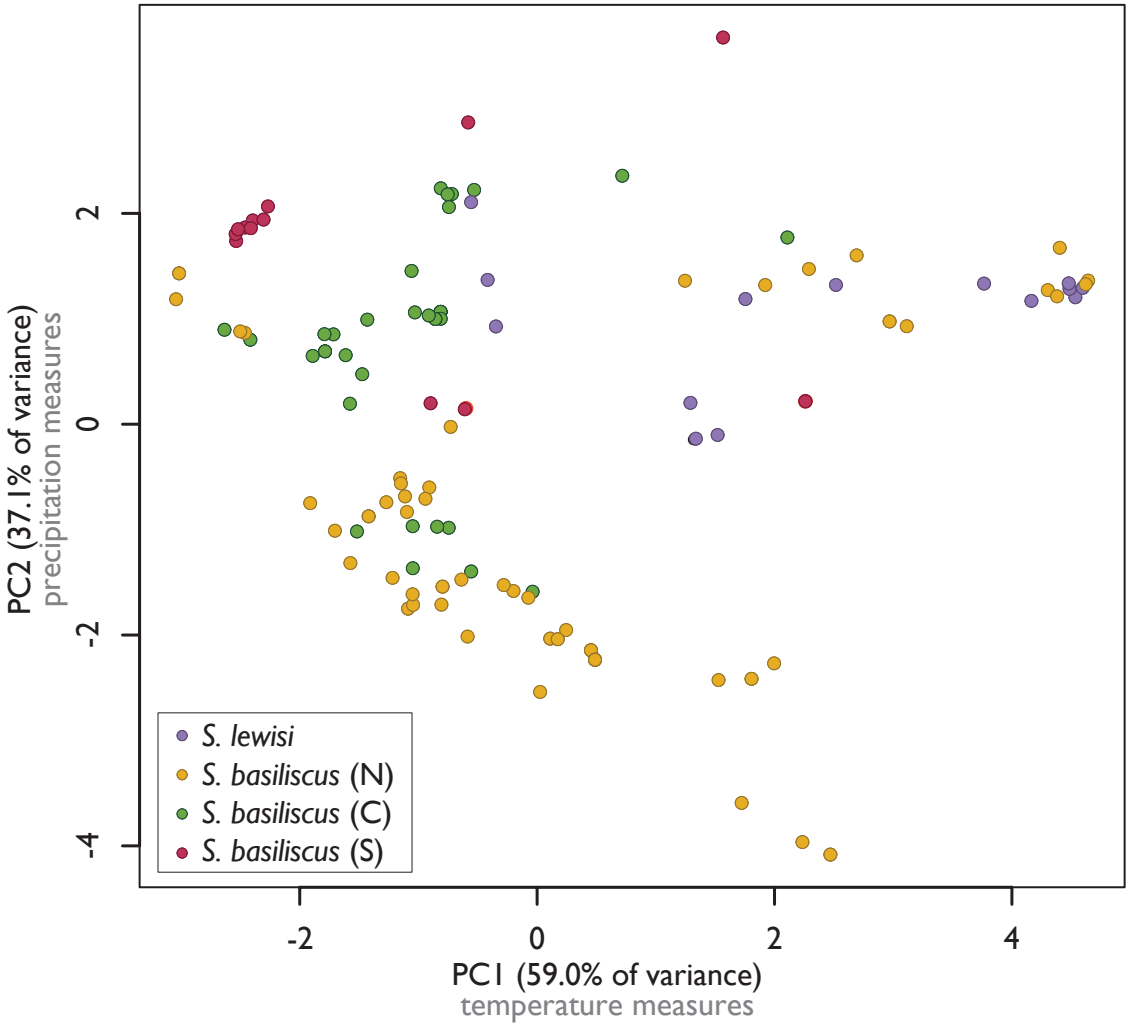

Figure 6: PCA of climatic variables (Bioclim) grouped by mitochondrial lineage; PCA performed using *prcomp* in *R*. Color scheme follows that used in Figure 1.

SampleID	Mito Seq	Nuc Seq	Mito Type	Bioregion	Latitude	Longitude
AA1054	yes	no	C	LE	-18.63355	145.873
AA1078	yes	no	C	LE	-18.63355	145.873
AA1091	yes	no	C	CC	-17.7767	145.555517
AA1098	yes	no	C	LE	-18.626866	145.876
BP185	yes	no	N	AU-EE	-17.217	145.717
BP935	yes	no	N	LU	-17.15200016	145.55732647
CJS1105	yes	no	N	MT-S	-17.0916661	145.8783332
CJS1106	yes	no	N	MT-S	-17.0916661	145.8783332
CJS1107	yes	no	N	MT-S	-17.0916661	145.8783332
CM13	yes	no	N	AU-WR	-17.4393191	145.85802863
CM15	yes	no	N	CC	-17.4393191	145.85802863
CONX1093	yes	yes	S	EU	-19.47726321	146.9863644
CONX1508	yes	no	N	AU-HR	-17.419093	145.837212
CONX1511	yes	no	N	BM	-16.79257934	145.648749
CONX1560	yes	no	N	AU-HR	-17.419093	145.837212
CONX1570	yes	no	N	BM	-16.84452	145.64165
CONX1571	yes	no	N	AU-HR	-17.419093	145.837212
CONX1923	yes	no	N	BM	-16.82672377	145.6474281
CONX1923	yes	yes	N	BM	-16.82672377	145.6474281
CONX582	yes	no	C	CC	-17.7767	145.555517
Elliot1	yes	yes	S	EU	-19.47726321	146.9863644
Elliot1	yes	yes	S	EU	-19.47726321	146.9863644
NSF107	yes	no	N	AU-KO	-17.609193	145.772248
NSF111	yes	no	N	AU-KO	-17.609193	145.772248
NSF156	yes	no	N	CC	-17.86911586	146.0671699
NSF190	yes	no	N	AU-KO	-17.609193	145.772248
NSF54	yes	no	N	BM	-16.73142476	145.56873628
NSF95b	yes	no	SL	FUS	-15.80077343	145.30805244
S3324	yes	no	S	EU	-19.455117	146.955233
S3831	yes	no	C	AU-WR	-17.607714	145.771707
SEW00002	yes	no	C	KU	-18.18893517	145.7430523
SEW00004	yes	no	C	KU	-18.20429394	145.759158
SEW00064	yes	no	C	AU-KO	-17.7026933	145.52683015
SEW00090	yes	no	C	AU-KO	-17.7467055	145.53227959
SEW00094	yes	no	C	AU-KO	-17.74641775	145.5336776
SEW00103	yes	no	C	AU-KO	-17.7467285	145.5293183
SEW00134	yes	no	C	AU-KO	-17.73954783	145.5663896
SEW00146	yes	no	C	AU-KO	-17.70066965	145.5244897
SEW00153	yes	no	C	AU-KO	-17.69954396	145.5238012
SEW00207	yes	no	C	KU	-18.19161507	145.7493582
SEW00246	yes	no	C	KU	-18.20755576	145.7618865
SEW00286	yes	no	C	KU	-18.20735781	145.7606209
SEW00299	yes	no	C	KU	-18.22828306	145.8113783
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SEW00530	yes	no	S	SU	-19.01432954	146.2094526
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SEW00544	yes	no	C	AU-KO	-17.74739204	145.5274268
SEW00602	yes	yes	S	SU	-19.0113899	146.1737139
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SEW00671	yes	no	S	SU	-18.93975617	146.1482446
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SEW00686	yes	no	S	SU	-18.93280954	146.1429618
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SEW00763	yes	no	N	AU-EE	-17.37413903	145.7179621
SEW00764	yes	no	N	AU-EE	-17.37413903	145.7179621
SEW00865	yes	no	N	AU-EE	-17.37939275	145.7628676
SEW00867	yes	no	N	AU-EE	-17.38038636	145.7613267
SEW00891	yes	no	C	KU	-18.16899315	145.7255172
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SEW00914	yes	no	C	KU	-18.21463992	145.7972869

SampleID	Mito Seq	Nuc Seq	Mito Type	Bioregion	Latitude	Longitude
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SEW00970	yes	no	N	TL	-16.26076434	145.44197545
SEW00971	yes	no	N	TL	-16.18733066	145.41198963
SEW00976	yes	no	SL	TL	-15.96592289	145.3565003
SEW01199	yes	yes	C	KU	-18.16639336	145.7286651
SEW01200	yes	yes	C	KU	-18.16639336	145.7286651
SEW01201	yes	no	C	KU	-18.16639336	145.7286651
SEW01202	yes	no	C	KU	-18.16639336	145.7286651
SEW01253	yes	no	C	KU	-18.20718751	145.7636384
SEW01260	yes	no	S	SU	-18.94566319	146.1919688
SEW01263	yes	no	S	SU	-18.94488885	146.190548
SEW01276	yes	yes	S	SU	-18.93573731	146.1647133
SEW01315	yes	yes	S	HIU	-18.41273076	146.2808844
SEW01338	yes	no	S	HIU	-18.41419035	146.2820808
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SEW01365	yes	no	S	HIU	-18.41527554	146.2822562
SEW01413	yes	no	S	HIU	-18.36104827	146.2468732
SEW01454	yes	no	S	HIU	-18.36059899	146.2452472
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SEW01532	yes	no	SL	FUN	-15.70887087	145.2605143
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SEW01603	yes	no	N	AU-HR	-17.30141511	145.422632
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SEW02107	yes	yes	C	KU	-18.19010301	145.7447552
SEW02110	yes	yes	C	KU	-18.19010301	145.7447552
SEW02149	yes	no	C	KU	-18.2060096	145.7645544
SEW02156	yes	no	C	KU	-18.19300284	145.7459919
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SEW03673	yes	no	N	AU-WR	-17.646815	145.716994
SEW03808	yes	no	N	AU-WR	-17.60822594	145.76978113
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SEW03824	yes	no	N	AU-WR	-17.60771377	145.77170705

SampleID	Mito Seq	Nuc Seq	Mito Type	Bioregion	Latitude	Longitude
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SEW04273	yes	no	N	TU	-16.17365844	145.36560323
SEW04280	yes	yes	N	AU-CE	-17.29164954	145.633634
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SEW04317	yes	no	N	AU-CE	-17.29164954	145.633634
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SEW04425	yes	no	N	CC	-17.27028595	145.9000977
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SEW04446	yes	yes	N	CC	-17.27028595	145.9000977
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SEW04498	yes	no	C	LE	-18.56287121	145.7781074
SEW04499	yes	no	C	LE	-18.56287121	145.7781074
SEW04500	yes	yes	C	LE	-18.56287121	145.7781074
SEW04502	yes	no	C	LE	-18.56287121	145.7781074
SEW04503	yes	no	C	LE	-18.56287121	145.7781074
SEW04509	yes	yes	C	LE	-18.64804384	145.8743075
SEW04510	yes	yes	C	LE	-18.64804384	145.8743075
SEW04511	yes	no	C	LE	-18.64804384	145.87430752
SEW04521	yes	no	C	LE	-18.60066521	145.7997491
SEW04522	yes	yes	C	LE	-18.60066521	145.7997491
SEW04523	yes	yes	C	LE	-18.60066521	145.7997491
SEW04526	yes	no	C	LE	-18.60066521	145.79974907
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SEW04540	yes	yes	C	IL	-18.41659035	145.9443368
SEW04549	yes	no	N	AU-WR	-17.60041464	145.75773438
SEW04550	yes	no	N	AU-WR	-17.60041464	145.75773438
SEW04552	yes	no	N	AU-WR	-17.60041464	145.75773438
SEW04553	yes	yes	N	AU-WR	-17.60041464	145.7577344
SEW04560	yes	no	N	AU-WR	-17.60041464	145.75773438
SEW04663	yes	no	N	AU-CE	-17.270286	145.900098
SEW04709	yes	no	N	AU-EE	-17.37596268	145.72898
SEW04733	yes	no	N	CC	-17.27028595	145.9000977
SEW06069	yes	yes	C	AU-KO	-17.70066965	145.5244897
SEW06140	yes	yes	N	CC	-17.71884301	145.8582907
SEW06142	yes	no	N	CC	-17.71884301	145.85829071
SEW06149	yes	yes	N	CC	-17.71884301	145.8582907
SEW06164	yes	yes	C	AU-KO	-17.70066965	145.5244897
SEW06165	yes	yes	C	AU-KO	-17.70066965	145.5244897
SEW06166	yes	yes	C	AU-KO	-17.70066965	145.5244897
SEW06185	yes	yes	N	CC	-17.71884301	145.8582907
SEW06217	yes	no	N	AU-WR	-17.46244433	145.47372287
SEW06226	yes	yes	C	AU-KO	-17.70066965	145.5244897
SEW06227	yes	yes	C	AU-KO	-17.70066965	145.5244897
SEW06239	yes	no	S	SU	-19.00970563	146.2359729
SEW06240	yes	no	S	SU	-19.00970563	146.2359729
SEW06241	yes	yes	S	SU	-19.00970563	146.2359729
SEW06554	yes	yes	N	CU	-16.58640134	145.2976211
SEW06585	yes	no	N	AU-WR	-17.60822594	145.76978113
SEW06587	yes	no	N	AU-WR	-17.60822594	145.76978113
SEW06590	yes	no	N	AU-WR	-17.60822594	145.76978113
SEW06593	yes	no	N	AU-WR	-17.60834065	145.76788616
SEW06676	yes	yes	N	WU	-16.2933914	145.0550757
SEW06677	yes	yes	N	WU	-16.2933914	145.0550757

SampleID	Mito Seq	Nuc Seq	Mito Type	Bioregion	Latitude	Longitude
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SEW06682	yes	no	SL	FUS	-15.798097	145.292914
SEW06684	yes	no	SL	TL	-16.06932544	145.462103
SEW06685	yes	no	SL	TL	-16.06932544	145.462103
SEW06686	yes	no	SL	TL	-16.06932544	145.462103
SEW06687	yes	no	SL	TL	-16.06932544	145.462103
SEW06688	yes	no	SL	TL	-16.07247659	145.4629481
SEW06689	yes	no	SL	TL	-16.07247659	145.4629481
SEW06708	yes	yes	N	ML	-16.39489254	145.3263035
SEW06709	yes	yes	N	ML	-16.39489254	145.3263035
SEW06710	yes	yes	N	BM	-16.59619409	145.3386099
SEW06711	yes	yes	N	BM	-16.59619409	145.3386099
SEW06748	yes	no	SL	TL	-16.12400242	145.4570634
SEW06749	yes	yes	SL	TL	-16.12400242	145.4570634
SEW06750	yes	no	SL	TL	-16.12400242	145.4570634
SEW06751	yes	no	N	TL	-16.13770459	145.44109023
SEW06752	yes	no	SL	TL	-16.13530768	145.451983
SEW06753	yes	no	SL	TL	-16.06932544	145.462103
SEW06842	yes	no	N	AU-WR	-17.60771377	145.77170705
SEW06847	yes	no	N	AU-WR	-17.60822594	145.76978113
SEW06848	yes	no	N	AU-WR	-17.60929842	145.76640954
SEW06849	yes	no	N	AU-WR	-17.60834065	145.76788616
SEW06851	yes	no	N	AU-WR	-17.60929842	145.76640954
SEW07192	yes	yes	N	CC	-17.34212279	145.8715333
SEW07463	yes	no	N	AU-WR	-17.60822594	145.76978113
SEW07464	yes	yes	N	AU-WR	-17.60782846	145.7741659
SEW07467	yes	no	N	CC	-17.71700607	145.85944334
SEW07469	yes	no	C	AU-WR	-17.67300424	145.71450386
SEW07476	yes	yes	N	AU-WR	-17.65453809	145.7167559
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SEW07510	yes	no	N	AU-WR	-17.59933189	145.63606075
SEW07518	yes	no	C	AU-WR	-17.67300424	145.71450386
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SEW07561	yes	no	C	AU-WR	-17.67465474	145.71400192
SEW07673	yes	yes	S	SU	-19.01401504	146.1179481
SEW07780	yes	no	N	AU-WR	-17.60834065	145.76788616
SEW07781	yes	no	N	AU-WR	-17.60929842	145.76640954
SEW07784	yes	no	N	AU-WR	-17.57892097	145.69414024
SEW07785	yes	yes	N	AU-WR	-17.65745561	145.7193086
SEW07786	yes	no	C	AU-WR	-17.65745561	145.71930856
SEW07787	yes	no	C	AU-WR	-17.65633657	145.71677141
SEW07788	yes	yes	N	AU-WR	-17.65837891	145.7209328
SEW07789	yes	yes	N	AU-WR	-17.65645828	145.717421
SEW07790	yes	no	N	AU-WR	-17.599331	145.63606
SEW07791	yes	yes	N	AU-WR	-17.57942142	145.69739669
SEW07812	yes	yes	S	SU	-19.01490811	146.166295
SEW07814	yes	yes	S	SU	-19.00228035	146.208778
SEW07817	yes	yes	S	SU	-19.01118481	146.2244222
SEW07820	yes	yes	S	SU	-19.00300099	146.2449817
SEW07853	yes	yes	N	AU-EE	-17.215078	145.68531418
SEW07857	yes	yes	N	AU-CE	-17.25901629	145.6523658
SEW07858	yes	no	N	AU-CE	-17.25901629	145.6523658
SEW08016	yes	yes	N	AU-CE	-17.24900958	145.6306001
SEW08037	yes	no	N	AU-EE	-17.37479509	145.7429832
SEW08042	yes	yes	N	AU-EE	-17.21500597	145.6881263
SEW08047	yes	yes	N	AU-EE	-17.17218046	145.6569432
SEW08049	yes	no	N	AU-EE	-17.17470235	145.65837287
SEW08071	yes	yes	N	AU-CE	-17.25942694	145.6091822
SEW08400	yes	no	N	AU-WR	-17.645835	145.732304
SEW08401	yes	no	N	AU-WR	-17.645835	145.732304
SEW08402	yes	no	N	AU-WR	-17.645835	145.732304
SEW08403	yes	no	N	AU-WR	-17.645835	145.732304

SampleID	Mito Seq	Nuc Seq	Mito Type	Bioregion	Latitude	Longitude
SEW08404	yes	yes	SL	TL	-16.069117	145.462404
SEW08405	yes	yes	SL	TL	-16.174416	145.430684
SEW08406	yes	no	SL	TL	-16.174416	145.430684
SEW08437	yes	yes	S	HIL	-18.401477	146.32485
SEW08439	yes	yes	S	HIL	-18.401477	146.32485
SEW08440	yes	yes	S	HIL	-18.401477	146.32485
SEW08558	yes	no	C	AU-WR	-17.63499	145.630958
SEW08559	yes	no	C	AU-WR	-17.63499	145.630958
SEW08560	yes	no	C	AU-WR	-17.63499	145.630958
SEW08561	yes	no	C	AU-WR	-17.652706	145.639373
SEW08562	yes	no	C	AU-WR	-17.652706	145.639373
SEW08563	yes	yes	C	AU-WR	-17.652706	145.639373
SEW08564	yes	no	C	AU-WR	-17.652706	145.639373
SEW08565	yes	no	C	AU-WR	-17.652706	145.639373
SEW08566	yes	no	C	AU-WR	-17.652706	145.639373
SEW08567	yes	no	C	AU-WR	-17.652706	145.639373
SEW08568	yes	no	C	AU-WR	-17.668272	145.64922
SEW08569	yes	no	C	AU-KO	-17.70004	145.672186
SEW08583	yes	no	SL	TL	-16.138241	145.441993
SEW08587	yes	no	SL	TL	-16.138241	145.441993
SEW08588	yes	no	SL	TL	-16.138241	145.441993
SEW08589	yes	yes	SL	TL	-16.138349	145.44807
SEW08590	yes	no	SL	TL	-16.138349	145.44807
SEW08591	yes	no	SL	TL	-16.138349	145.44807
SEW08593	yes	no	SL	TL	-16.138349	145.44807
SEW08594	yes	no	SL	TL	-16.138349	145.44807
SEW08595	yes	no	SL	TL	-16.138349	145.44807
SEW08596	yes	no	SL	TL	-16.138349	145.44807
SEW08597	yes	yes	SL	TU	-16.076997	145.459913
SEW08598	yes	no	SL	TU	-16.076997	145.459913
SEW08599	yes	no	SL	TU	-16.075896	145.447611
SEW08609	yes	yes	N	TU	-16.076054	145.443226
SEW08611	yes	yes	N	TL	-16.22903	145.446856
SEW08612	yes	no	SL	TU	-16.170097	145.443099
SEW08613	yes	yes	SL	TU	-16.170097	145.443099
SEW08626	yes	no	N	AU-WR	-17.613102	145.757893
SWS14	yes	no	C	LE	-18.49666612	145.7649959

Table 1: Data on sampled individuals

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locus	primer sequence	annealing temperature	length	reference
B-globin	Bglo1CR 5′GCG AAC TGC ACT GYG ACA AG 3' Bglo2CR 5′GCT GCC AAG CGG GTG GTG A 3′	61°C	660 bp	Dolman and Phillips 2004
cmos	G73 5′GCG GTA AAG CAG GTG AAG AAA 3′ G74 5′ TGA GCA TCC AAA GTC TCC AAT 3′	57°C	380 bp	Saint 1998
TPI triosephosphate isomerase (intron 5)	LC5 5′TTC TAG CCT ATG AAC CAGTTT GG 3′ LC6 5′CCT CAA CTT GTC ATG AAC TTC C 3′	57°C	230 bp	Bell *et al.*, 2010
CRISP cysteine-rich secretory protein	LC13 5′TGCTGTAGCCTACTGTCCTCAA 3' LC14 5′TGCTTATCATGCTCGCTAAGTT 3′	57°C	730 bp	this paper
RPS8 40S ribosomal protein S8 (intron 3)	LC17 5′CTC TTG GGC GTA AGA AAG GAG 3′ LC18 5′CCG CTC ATC GTA TTT CTT CTG 3′	57°C	670 bp	Bell *et al.*, 2010
LGMN legumain precursor asparaginyl endopeptidase	LC29 5′CATTGCCTATATGTATCGTCACAA 3′ LC30 5′AtCCAGATTCACATGCTTCAAT 3′	57°C	300 bp	this paper
r35	r35F 5′ GAC TGT GGA YGA YCT GAT CAG TGT GGT GCC 3′ r35R 5′ GCC AAA ATG AGS GAG AAR CGC TTC TGA GC 3′	65°C	640 bp	Leache 2009
rho	Rho3CR 5′CCTTGCCTGGACACCCTATGCTG 3′ Rho4CR 5′ CAGGAGAGACCCTCACATTG 3′	61°C	370 bp	Dolman and Phillips 2004
ND4	ND4 5′ CACCTATGACTACCAAAAGCTCATGTAGAAGC 3′ LEU 5′ CATTACTTTTACTTGGATTTGCACCA 3′	57°C	850 bp	Arevalo *et al*, 1994

Table 2: Loci used in this study, including their associated information.

model	parameter	prior distribution
all	generation time	1 $\frac{gen}{year}$
all	nuclear mutation rate	5e-10 $\frac{mutation}{site \cdot year}$
all	standard deviation in nuclear mutation rate	0.2
all	mitochondrial mutation rate	7.3e-9 $\frac{mutation}{site \cdot year}$
all	standard deviation in mitochondrial mutation rate	0.2
all	nuclear recombination rate	1e-8 $\frac{recombinations}{site \cdot year}$
all	length of mitochondrial locus	850 bp
all	lengths of nuclear loci	200, 200, 280, 350, 500, 550, 560, 600
all	population size of *S. basiliscus* C lineage, N_e	U∼[1e4,1e7]
all	population size of *S. basiliscus* S lineage, N_e	U∼[1e4,1e7]
all	population size of ancestral lineage, N_a	U∼[1e4,1e7]
all	split time, τ	U∼[1e3,2e7]
model 2	relative size of peripatric lineage	U∼[0.001,0.5]
model 2	growth rate of peripatric lineage	$10^{U\sim[0.3,2.7]}$
model 3	migration rate between ancestral populations, M	U∼[0,1.0]
model 3	length for ancestral population structure in years	U∼[1e3,2e7]
models 4 - 6	length of pulsed gene flow in years	$\tau \cdot$ U∼[0.0001,0.2]
models 4 - 6	start of pulsed gene flow, years before present	$\tau \cdot$ U∼[0.0001,0.2]
models 4 - 6	gene flow from *S. basiliscus* C lineage to S lineage, M	$10^{U\sim[-2,2]}$
models 4 - 6	gene flow from *S. basiliscus* S lineage to C lineage, M	$10^{U\sim[-2,2]}$
model 5	asymmetry in gene flow, $\frac{M_{mito} \cdot 4}{M_{nuc}}$	U∼[10,1000]
model 6	asymmetry in gene flow, $\frac{M_{nuc}}{M_{mito} \cdot 4}$	U∼[10,1000]

Table 3: Prior distributions for parameters used in simulating data sets for the Approximate Bayesian Computation (ABC) analysis.

model	Type I error	Type II error
model 1, simple split	0.48	0.638
model 2, peripatric	0.36	0.632
model 3, ancestral structure	0	0
model 4, some gene flow	0.77	0.558
model 5, more mitochondrial	0.16	0.475
model 6, more nuclear	0.77	0.597

Table 4: Type I and Type II errors for model mis-classification based on pseudo-observed data set analysis.