AUTO

POPULATION SIZE, MIGRATION, DIVERGENCE, ASSIGNMENT, HISTORY
Bayesian inference using the structured coalescent
Migrate-n version 4.2.8 [June-24-2016]
  Using Intel AVX (Advanced Vector Extensions)
  Compiled for PARALLEL computer architectures
  One master and 4 compute nodes are available.
  Compiled for a SYMMETRIC multiprocessors (Grandcentral)
Program started at   Mon Aug 8 15:59:40 2016
Program finished at   Mon Aug 8 16:05:01 2016 [Runtime:0000:00:05:21]

Options

Inheritance scalers in use for Thetas:
All loci use an inheritance scaler of 1.0
[The locus with a scaler of 1.0 used as reference]

Random number seed:	(with internal timer)	1802310174
Start parameters:		
Theta values were generated		Using a percent value of the prior
M values were generated		Using a percent value of the prior

Connection matrix:
  m = average (average over a group of Thetas or M,
  s = symmetric migration M, S = symmetric 4Nm,
  0 = zero, and not estimated,
  * = migration free to vary, Thetas are on diagonal
  d = row population split off column population, D = split and then migration

Population	1	2	3	4
1 Romanshorn_0	*	*	0	t
2 Arbon_1	*	*	0	t
3 Kreuzlingen_2	0	0	*	0
4 ancestor	0	0	d	*

Order of parameters:

1	Θ_1	<displayed>
2	Θ_2	<displayed>
3	Θ_3	<displayed>
4	Θ_4	<displayed>
5	$M_{2->1}$	<displayed>
6	$M_{1->2}$	<displayed>
7	$\Delta_{4->1}$	<displayed>
8	$\sigma_{4->1}$	<displayed>
9	$\Delta_{4->2}$	<displayed>
10	$\sigma_{4->2}$	<displayed>
11	$\Delta_{3->4}$	<displayed>
12	$\sigma_{3->4}$	<displayed>

Mutation rate among loci: Mutation rate is constant for all loci

Analysis strategy: Bayesian inference

Proposal distributions for parameter

Parameter	Proposal
Theta	Metropolis sampling
M	Metropolis sampling

Prior distribution for parameter

Parameter	Prior	Minimum	Mean*	Maximum	Delta	Bins
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
M	Uniform	0.000000	500.000000	1000.000000	100.000000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
M	Uniform	0.000000	500.000000	1000.000000	100.000000	1500
Splittime mean	Gamma	0.000000	0.100000	0.500000	0.050000	1500

M	Uniform	0.000000	500.000000	1000.000000	100.000000	1500
Theta	Gamma	0.000000	0.020000	0.200000	0.020000	1500
Splittime std	Gamma	0.000000	0.100000	0.500000	0.050000	1500

Markov chain settings:	Long chain
Number of chains	1
Recorded steps [a]	50000
Increment (record every x step [b]	5
Number of concurrent chains (replicates) [c]	2
Visited (sampled) parameter values [a*b*c]	500000
Number of discard trees per chain (burn-in)	10000

Multiple Markov chains:

Static heating scheme — 4 chains with temperatures

1000000.00 3.00 1.50 1.00

Swapping interval is 1

Print options:	
Data file:	infile_2_0.25_10
Haplotyping is turned on:	NO
Output file:	outfile_2_0.25_10
Posterior distribution raw histogram file:	bayesfile
Raw data from the MCMC run:	bayesallfile_2_0.25_10
Print data:	No
Print genealogies [only some for some data type]:	None

Data summary

Data file:	infile_2_0.25_10
Datatype:	Haplotype data
Number of loci:	10

Mutationmodel:

Locus	Sublocus	Mutationmodel	Mutationmodel parameters
1	1	Felsenstein 84	[Bf:0.25 0.25 0.25 0.26, t/t ratio=2.000]
2	1	Felsenstein 84	[Bf:0.23 0.26 0.25 0.26, t/t ratio=2.000]
3	1	Felsenstein 84	[Bf:0.26 0.24 0.24 0.26, t/t ratio=2.000]
4	1	Felsenstein 84	[Bf:0.23 0.26 0.25 0.26, t/t ratio=2.000]
5	1	Felsenstein 84	[Bf:0.25 0.24 0.27 0.24, t/t ratio=2.000]
6	1	Felsenstein 84	[Bf:0.25 0.25 0.25 0.24, t/t ratio=2.000]
7	1	Felsenstein 84	[Bf:0.25 0.24 0.25 0.26, t/t ratio=2.000]
8	1	Felsenstein 84	[Bf:0.27 0.26 0.25 0.23, t/t ratio=2.000]
9	1	Felsenstein 84	[Bf:0.24 0.25 0.26 0.25, t/t ratio=2.000]
10	1	Felsenstein 84	[Bf:0.24 0.26 0.24 0.26, t/t ratio=2.000]

Sites per locus

Locus	Sites
1	1000
2	1000
3	1000
4	1000
5	1000
6	1000
7	1000
8	1000
9	1000
10	1000

Site rate variation and probabilities:

Locus	Sublocus	Region type	Rate of change	Probability	Patch size
1	1	1	1.000	1.000	1.000
2	1	1	1.000	1.000	1.000
3	1	1	1.000	1.000	1.000
4	1	1	1.000	1.000	1.000
5	1	1	1.000	1.000	1.000
6	1	1	1.000	1.000	1.000

7	1	1	1.000	1.000	1.000
8	1	1	1.000	1.000	1.000
9	1	1	1.000	1.000	1.000
10	1	1	1.000	1.000	1.000

Population	Locus	Gene copies	
		data	(missing)
1 Romanshorn_0	1	20	
	2	20	
	3	20	
	4	20	
	5	20	
	6	20	
	7	20	
	8	20	
	9	20	
	10	20	
2 Arbon_1	1	20	
	2	20	
	3	20	
	4	20	
	5	20	
	6	20	
	7	20	
	8	20	
	9	20	
	10	20	
3 Kreuzlingen_2	1	1	
	2	1	
	3	1	
	4	1	
	5	1	
	6	1	
	7	1	
	8	1	
	9	1	
	10	1	
4 ancestor	1	0	
	2	0	
	3	0	
	4	0	
	5	0	
	6	0	
	7	0	
	8	0	
	9	0	

	10	0	
Total of all populations	1	41	(0)
	2	41	(0)
	3	41	(0)
	4	41	(0)
	5	41	(0)
	6	41	(0)
	7	41	(0)
	8	41	(0)
	9	41	(0)
	10	41	(0)

Bayesian Analysis: Posterior distribution table

Locus	Parameter	2.5%	25.0%	Mode	75.0%	97.5%	Median	Mean
1	Θ_1	0.00160	0.00560	0.00847	0.01093	0.01707	0.00900	0.00707
1	Θ_2	0.00227	0.00653	0.00913	0.01160	0.01693	0.00953	0.00793
1	Θ_3	0.00000	0.00173	0.00593	0.01533	0.04827	0.01407	0.01323
1	Θ_4	0.00000	0.00013	0.00580	0.01573	0.05560	0.01553	0.01535
1	$M_{2->1}$	40.667	107.333	177.667	264.667	474.667	221.000	213.788
1	$M_{1->2}$	0.000	0.000	0.005	0.015	0.054	0.015	0.015
1	$D_{4->1}$	0.00000	0.00027	0.00553	0.01587	0.05600	0.01553	0.01566
1	$S_{4->1}$	0.00000	0.00000	0.33333	8.66667	218.00000	9.00000	79.59827
1	$D_{4->2}$	0.00000	0.00000	0.00717	0.01667	0.05800	0.01683	0.01566
1	$S_{4->2}$	0.00000	0.00000	0.33333	8.66667	218.00000	9.00000	79.59828
1	$D_{3->4}$	0.00000	0.00013	0.00540	0.01587	0.05467	0.01567	0.01520
1	$S_{3->4}$	0.09833	0.10000	0.11050	0.12100	0.12300	0.14083	104.58132
2	Θ_1	0.00120	0.00507	0.00767	0.01000	0.01507	0.00807	0.00743
2	Θ_2	0.00147	0.00520	0.00780	0.01000	0.01467	0.00807	0.00738
2	Θ_3	0.00000	0.00120	0.00553	0.01480	0.05040	0.01380	0.01535
2	Θ_4	0.00133	0.00133	0.00553	0.01227	0.01227	0.01553	0.01800
2	$M_{2->1}$	16.667	34.667	99.000	276.667	363.333	161.667	162.836
2	$M_{1->2}$	0.001	0.001	0.006	0.014	0.014	0.016	0.018
2	$D_{4->1}$	0.00000	0.00027	0.00580	0.01600	0.05613	0.01567	0.01876
2	$S_{4->1}$	0.00000	0.00000	0.33333	9.33333	239.33333	9.66667	112.01376
2	$D_{4->2}$	0.00000	0.00000	0.00717	0.01667	0.05833	0.01683	0.01876
2	$S_{4->2}$	0.00000	0.00000	0.33333	9.33333	239.33333	9.66667	112.01377
2	$D_{3->4}$	0.00120	0.00120	0.00527	0.01187	0.01187	0.01540	0.01755
2	$S_{3->4}$	0.10533	0.13767	0.14183	0.14600	0.18433	0.14317	94.04497
3	Θ_1	0.00267	0.00467	0.00660	0.00840	0.01880	0.01087	0.00985
3	Θ_2	0.00640	0.00987	0.01260	0.01520	0.01867	0.01273	0.01040
3	Θ_3	0.00467	0.01080	0.01260	0.01600	0.01947	0.01380	0.01100
3	Θ_4	0.00413	0.01120	0.01473	0.01760	0.01960	0.01513	0.01190
3	$M_{2->1}$	425.333	437.333	447.000	456.000	467.333	447.667	364.513
3	$M_{1->2}$	0.003	0.005	0.007	0.009	0.019	0.011	0.010
3	$D_{4->1}$	0.00560	0.00987	0.01193	0.01387	0.01800	0.01207	0.01020
3	$S_{4->1}$	109.33333	121.33333	131.00000	140.00000	152.00000	131.66667	315.52266
3	$D_{4->2}$	0.00000	0.00667	0.01183	0.01633	0.02300	0.01250	0.01020
3	$S_{4->2}$	109.33333	121.33333	131.00000	140.00000	152.00000	131.66667	315.52312

Locus	Parameter	2.5%	25.0%	Mode	75.0%	97.5%	Median	Mean
3	$D_{3->4}$	0.01013	0.01133	0.01500	0.01800	0.01907	0.01180	0.00947
[illegible]	$S_{3->4}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	334.68799
4	Θ_1	0.00000	0.00253	0.00473	0.00667	0.01000	0.00500	0.00465
4	Θ_2	0.00213	0.00613	0.00873	0.01120	0.01653	0.00913	0.00941
4	Θ_3	0.00000	0.00133	0.00513	0.01493	0.04853	0.01380	0.01574
4	Θ_4	0.00027	0.00027	0.00553	0.01453	0.01453	0.01527	0.02016
4	$M_{2->1}$	0.000	46.000	69.000	118.000	368.667	131.667	183.983
4	$M_{1->2}$	0.000	0.000	0.005	0.016	0.017	0.015	0.020
4	$D_{4->1}$	0.00133	0.00133	0.00527	0.01267	0.01267	0.01593	0.02058
4	$S_{4->1}$	0.00000	0.00000	0.33333	10.00000	235.33333	10.33333	115.15010
4	$D_{4->2}$	0.00000	0.00000	0.00750	0.01700	0.05800	0.01717	0.02058
4	$S_{4->2}$	0.00000	0.00000	0.33333	10.00000	235.33333	10.33333	115.15006
4	$D_{3->4}$	0.00147	0.00147	0.00527	0.01267	0.01267	0.01580	0.02020
4	$S_{3->4}$	0.17600	0.18233	0.19050	0.19833	0.20467	0.18783	150.90581
5	Θ_1	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00243
5	Θ_2	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00243
5	Θ_3	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00243
5	Θ_4	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00243
5	$M_{2->1}$	0.000	0.000	0.333	1000.000	1000.000	0.333	81.432
5	$M_{1->2}$	0.011	0.013	0.015	0.017	0.019	0.015	0.002
5	$D_{4->1}$	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00243
5	$S_{4->1}$	0.00000	0.00000	0.33333	1000.00000	1000.00000	0.33333	81.43201
5	$D_{4->2}$	0.00400	0.00967	0.01483	0.01967	0.02533	0.01517	0.00243
5	$S_{4->2}$	0.00000	0.00000	0.33333	1000.00000	1000.00000	0.33333	81.43201
5	$D_{3->4}$	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00243
[illegible]	$S_{3->4}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	81.43201
6	Θ_1	0.00347	0.00560	0.00793	0.01053	0.01613	0.00913	0.00154
6	Θ_2	0.00000	0.00240	0.00567	0.00840	0.01787	0.00700	0.00122
6	Θ_3	0.00000	0.00960	0.01273	0.01547	0.01933	0.01207	0.00191
6	Θ_4	0.00427	0.02040	0.02327	0.02600	0.02827	0.02020	0.00320
6	$M_{2->1}$	297.333	306.667	321.667	336.667	346.667	314.333	89.199
6	$M_{1->2}$	0.000	0.000	0.001	0.005	0.005	0.011	0.001
6	$D_{4->1}$	0.01040	0.01320	0.01553	0.01773	0.02053	0.01500	0.00230
6	$S_{4->1}$	0.00000	0.00000	0.33333	6.00000	17.33333	6.33333	38.24194
6	$D_{4->2}$	0.00300	0.00900	0.01350	0.01900	0.02633	0.01450	0.00230
6	$S_{4->2}$	0.00000	0.00000	0.33333	6.00000	17.33333	6.33333	38.24186
6	$D_{3->4}$	0.00827	0.01760	0.02153	0.02427	0.02640	0.02020	0.00331
6	$S_{3->4}$	0.00000	0.00000	0.00017	0.50000	0.50000	0.00017	35.55933

Locus	Parameter	2.5%	25.0%	Mode	75.0%	97.5%	Median	Mean
7	Θ_1	0.00253	0.00680	0.00940	0.01200	0.01813	0.00993	0.00157
7	Θ_2	0.00333	0.00800	0.01100	0.01387	0.02253	0.01180	0.00190
7	Θ_3	0.00000	0.00227	0.00927	0.01547	0.04480	0.01380	0.00266
7	Θ_4	0.00000	0.00253	0.00513	0.01307	0.04867	0.01607	0.00307
7	$M_{2->1}$	447.333	466.667	478.333	490.000	508.667	479.000	75.581
7	$M_{1->2}$	0.000	0.000	0.006	0.020	0.052	0.016	0.003
7	$D_{4->1}$	0.00000	0.00093	0.00500	0.01133	0.05387	0.01500	0.00306
7	$S_{4->1}$	422.66667	458.66667	461.66667	464.66667	510.00000	463.66667	81.06474
7	$D_{4->2}$	0.00000	0.00000	0.00250	0.01767	0.06133	0.01583	0.00306
7	$S_{4->2}$	422.66667	458.66667	461.66667	464.66667	510.00000	463.66667	81.06474
7	$D_{3->4}$	0.00000	0.00000	0.00033	0.01480	0.05507	0.01487	0.00297
[illegible]	$S_{3->4}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	75.02283
8	Θ_1	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00231
8	Θ_2	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00231
8	Θ_3	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00231
8	Θ_4	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00231
8	$M_{2->1}$	0.000	0.000	0.333	1000.000	1000.000	0.333	77.457
8	$M_{1->2}$	0.011	0.013	0.015	0.017	0.019	0.015	0.002
8	$D_{4->1}$	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00231
8	$S_{4->1}$	0.00000	0.00000	0.33333	1000.00000	1000.00000	0.33333	77.45724
8	$D_{4->2}$	0.00400	0.00967	0.01483	0.01967	0.02533	0.01517	0.00231
8	$S_{4->2}$	0.00000	0.00000	0.33333	1000.00000	1000.00000	0.33333	77.45724
8	$D_{3->4}$	0.01067	0.01293	0.01500	0.01693	0.01920	0.01513	0.00231
[illegible]	$S_{3->4}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	77.45724
9	Θ_1	0.00027	0.00373	0.00620	0.00827	0.01227	0.00647	0.00068
9	Θ_2	0.00307	0.00720	0.00980	0.01240	0.01787	0.01033	0.00111
9	Θ_3	0.00000	0.00080	0.00527	0.01347	0.04507	0.01273	0.00172
9	Θ_4	0.00027	0.00027	0.00567	0.01667	0.01667	0.01567	0.00214
9	$M_{2->1}$	30.667	38.667	114.333	314.000	346.000	171.667	22.074
9	$M_{1->2}$	0.000	0.000	0.005	0.016	0.054	0.016	0.002
9	$D_{4->1}$	0.00120	0.00120	0.00513	0.01200	0.01200	0.01580	0.00217
9	$S_{4->1}$	0.00000	0.00000	0.33333	9.33333	220.00000	9.66667	10.99100
9	$D_{4->2}$	0.00000	0.00000	0.00683	0.01667	0.05833	0.01683	0.00217
9	$S_{4->2}$	0.00000	0.00000	0.33333	9.33333	220.00000	9.66667	10.99099
9	$D_{3->4}$	0.00133	0.00133	0.00580	0.01400	0.01400	0.01567	0.00215
9	$S_{3->4}$	0.08700	0.14500	0.16050	0.17300	0.20733	0.15850	9.13497
10	Θ_1	0.00000	0.00227	0.00433	0.00613	0.00920	0.00473	0.00047

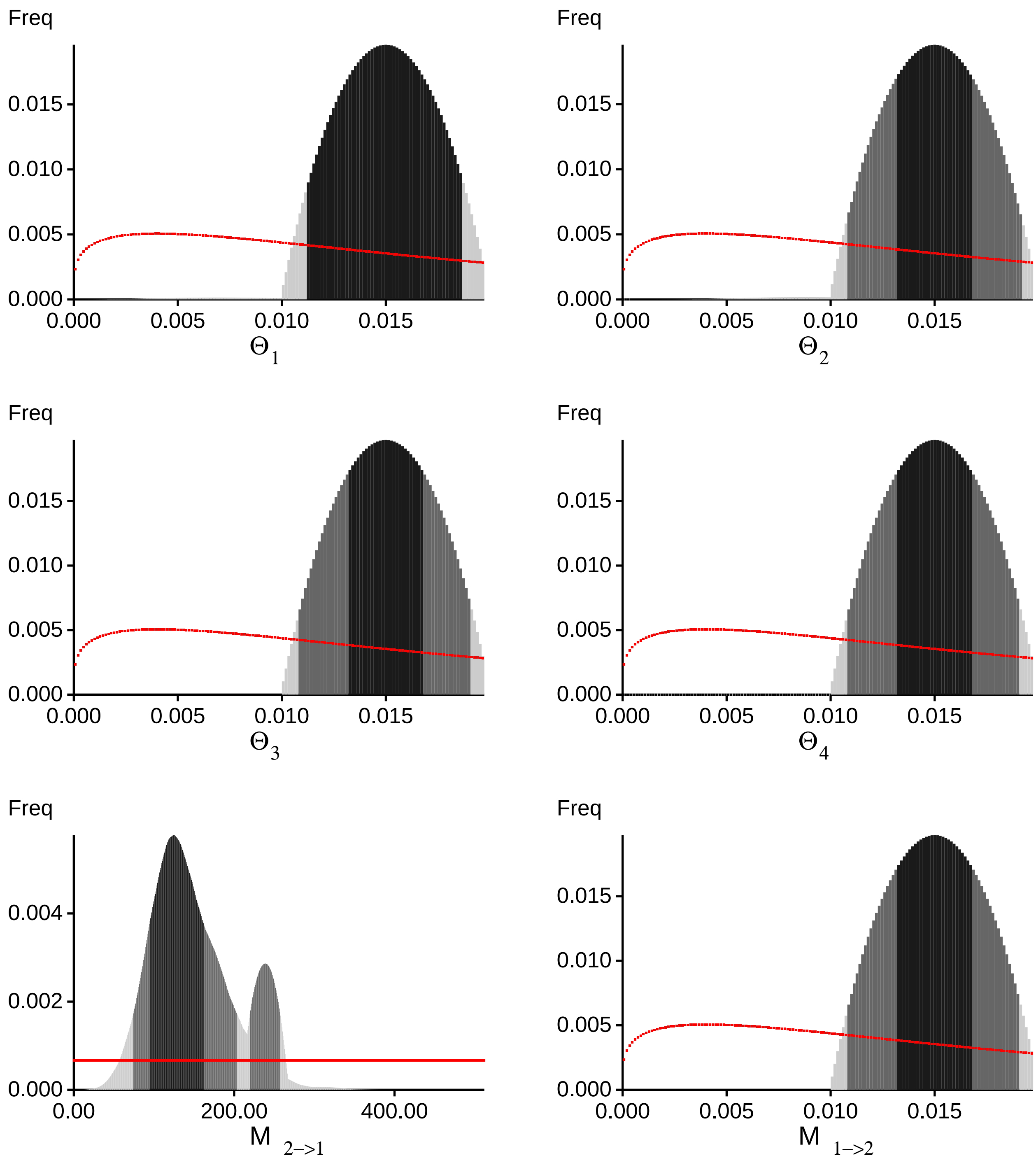
Locus	Parameter	2.5%	25.0%	Mode	75.0%	97.5%	Median	Mean
10	Θ_2	0.00053	0.00400	0.00620	0.00840	0.01227	0.00647	0.00068
10	Θ_3	0.00000	0.00133	0.00580	0.01493	0.04813	0.01380	0.00185
10	Θ_4	0.00120	0.00120	0.00620	0.01187	0.01187	0.01527	0.00213
10	$M_{2->1}$	27.333	86.667	130.333	224.000	388.667	182.333	21.987
10	$M_{1->2}$	0.000	0.000	0.005	0.017	0.017	0.016	0.002
10	$D_{4->1}$	0.00133	0.00133	0.00567	0.01333	0.01333	0.01593	0.00216
10	$S_{4->1}$	0.00000	0.00000	0.33333	8.66667	198.00000	9.00000	10.93885
10	$D_{4->2}$	0.00000	0.00000	0.00783	0.01700	0.05800	0.01717	0.00216
10	$S_{4->2}$	0.00000	0.00000	0.33333	8.66667	198.00000	9.00000	10.93885
10	$D_{3->4}$	0.00120	0.00120	0.00553	0.01280	0.01280	0.01567	0.00214
10	$S_{3->4}$	0.08767	0.15567	0.17583	0.19267	0.25033	0.16683	8.63440
All	Θ_1	0.01107	0.01107	0.01500	0.01867	0.01867	0.01513	0.01494
All	Θ_2	0.01067	0.01307	0.01500	0.01680	0.01920	0.01513	0.01494
All	Θ_3	0.01067	0.01307	0.01500	0.01680	0.01907	0.01513	0.01500
All	Θ_4	0.01067	0.01307	0.01500	0.01680	0.01907	0.01513	0.01500
All	$M_{2->1}$	73.333	94.000	125.000	162.000	203.333	143.667	500.332
All	$M_{1->2}$	0.011	0.013	0.015	0.017	0.019	0.015	0.015
All	$D_{4->1}$	0.01080	0.01307	0.01500	0.01693	0.01907	0.01513	0.01500
All	$S_{4->1}$	0.00000	0.00000	0.33333	6.00000	17.33333	6.33333	0.33435
All	$D_{4->2}$	0.00400	0.01000	0.01483	0.01933	0.02500	0.01517	0.01483
All	$S_{4->2}$	0.00000	0.00000	0.33333	6.00000	17.33333	6.33333	0.33435
All	$D_{3->4}$	0.01067	0.01307	0.01500	0.01680	0.01907	0.01513	0.01500
All	$S_{3->4}$	0.10167	0.13433	0.14717	0.15900	0.20467	0.15083	0.44974

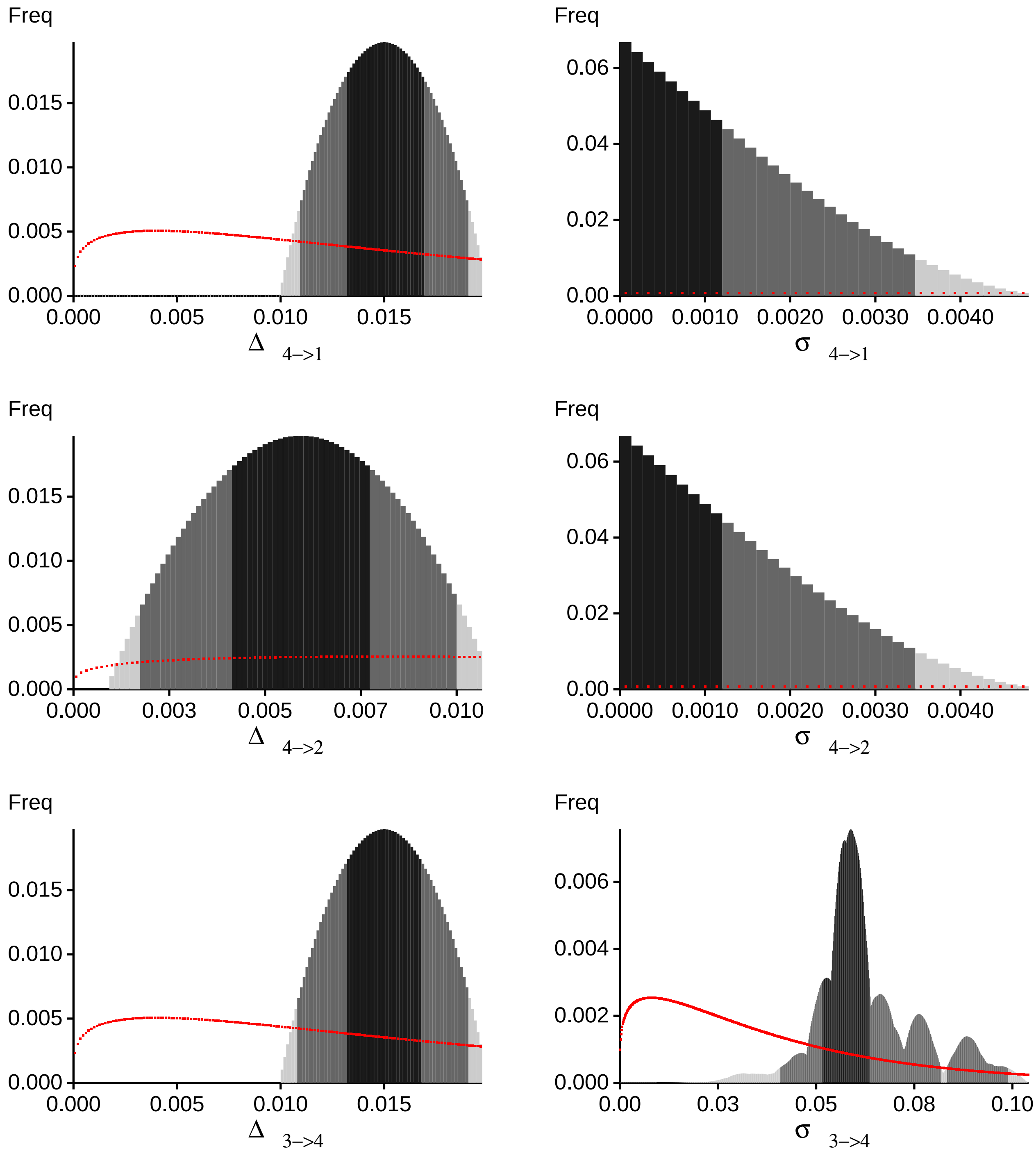
Citation suggestions:

Beerli P., 2006. Comparison of Bayesian and maximum-likelihood inference of population genetic parameters. Bioinformatics 22:341-345

Beerli P., 2009. How to use MIGRATE or why are Markov chain Monte Carlo programs difficult to use? In Population Genetics for Animal Conservation, G. Bertorelle, M. W. Bruford, H. C. Hauffe, A. Rizzoli, and C. Vernesi, eds., vol. 17 of Conservation Biology, Cambridge University Press, Cambridge UK, pp. 42-79.

Bayesian Analysis: Posterior distribution over all loci




Freq
0.015
0.010
0.005
0.000
0.000
0.005
0.010
0.015
Δ 4–>1
Freq
0.06
0.04
0.02
0.00
0.0000
0.0010
0.0020
0.0030
0.0040
σ 4–>1
Freq
0.015
0.010
0.005
0.000
0.000
0.003
0.005
0.007
0.010
Δ 4–>2
Freq
0.06
0.04
0.02
0.00
0.0000
0.0010
0.0020
0.0030
0.0040
σ 4–>2
Freq
0.015
0.010
0.005
0.000
0.000
0.005
0.010
0.015
Δ 3–>4
Freq
0.006
0.004
0.002
0.000
0.00
0.03
0.05
0.08
0.10
σ 3–>4

Log-Probability of the data given the model (marginal likelihood)

Use this value for Bayes factor calculations:
BF = Exp[ln(Prob(D | thisModel) - ln(Prob(D | otherModel)
or as LBF = 2 (ln(Prob(D | thisModel) - ln(Prob(D | otherModel))
shows the support for thisModel]

Locus	Raw thermodynamic score(1a)	Bezier approximation score(1b)	Harmonic mean(2)
1	-3270.39	-2906.41	-2862.56
2	-3100.40	-2812.97	-2780.19
3	-3516.45	-2975.26	-2887.39
4	-2968.22	-2728.80	-2703.79
5	-3395.69	-3014.76	-2950.88
6	-3045.38	-2779.62	-2738.32
7	-3337.81	-2990.00	-2947.00
8	-3118.67	-2778.91	-2730.40
9	-3116.28	-2843.93	-2809.03
10	-3072.19	-2726.67	-2680.80
All	-31903.15	-28518.98	-28052.02

(1a, 1b and 2) are approximations to the marginal likelihood, make sure that the program run long enough!
(1a, 1b) and (2) should give similar results, in principle.
But (2) is overestimating the likelihood, it is presented for historical reasons and should not be used
(1a, 1b) needs heating with chains that span a temperature range of 1.0 to at least 100,000.
(1b) is using a Bezier-curve to get better approximations for runs with low number of heated chains
[Scaling factor = 38.342301]
Citation suggestions:

Beerli P. and M. Palczewski, 2010. Unified framework to evaluate panmixia and migration direction among multiple sampling locations, Genetics, 185: 313-326.

Acceptance ratios for all parameters and the genealogies

Parameter	Accepted changes	Ratio
Θ_1	21918/208636	0.10505
Θ_2	24379/208268	0.11706
Θ_3	76883/208537	0.36868
Θ_4	115886/208704	0.55526
$M_{2\text{->}1}$	84449/208348	0.40533
$M_{1\text{->}2}$	115250/208121	0.55376
$\Delta_{4\text{->}1}$	114289/208555	0.54800
$\sigma_{4\text{->}1}$	66060/208907	0.31622
$\Delta_{4\text{->}2}$	114674/208937	0.54884
$\sigma_{4\text{->}2}$	66033/208202	0.31716
$\Delta_{3\text{->}4}$	114847/208328	0.55128
$\sigma_{3\text{->}4}$	65205/208616	0.31256
Genealogies	293444/2497841	0.11748

MCMC-Autocorrelation and Effective MCMC Sample Size

Parameter	Autocorrelation	Effective Sampe Size
Θ_1	0.97693	31209.71
Θ_2	0.97534	34119.22
Θ_3	0.94066	84888.03
Θ_4	0.89463	158076.70
$M_{2->1}$	0.98240	25191.75
$M_{1->2}$	0.89531	156681.64
$\Delta_{4->1}$	0.78855	344669.95
$\sigma_{4->1}$	0.99647	4707.31
$\Delta_{4->2}$	0.78855	344669.95
$\sigma_{4->2}$	0.99647	4707.31
$\Delta_{3->4}$	0.84633	305124.18
$\sigma_{3->4}$	0.99687	4573.75
Ln[Prob(D|G)]	0.90026	137591.27

Potential Problems

This section reports potential problems with your run, but such reporting is often not very accurate. Whith many parameters in a multilocus analysi s, it is very common that some parameters for some loci will not be very informative, triggering suggestions (for example to increase the prior ran ge) that are not sensible. This suggestion tool will improve with time, therefore do not blindly follow its suggestions. If some parameters are fla gged, inspect the tables carefully and judge wether an action is required. For example, if you run a Bayesian inference with sequence data, for mac roscopic species there is rarely the need to increase the prior for Theta beyond 0.1; but if you use microsatellites it is rather common that your prior distribution for Theta should have a range from 0.0 to 100 or more. With many populations (>3) it is also very common that some migration rou tes are estimated poorly because the data contains little or no information for that route. Increasing the range will not help in such situations, reducing number of parameters may help in such situations.

Param 5 (Locus 5): Upper prior boundary seems too low!
Param 18 (Locus 5): Upper prior boundary seems too low!
Param 20 (Locus 5): Upper prior boundary seems too low!
Param 22 (Locus 6): Upper prior boundary seems too low!
Param 5 (Locus 8): Upper prior boundary seems too low!
Param 18 (Locus 8): Upper prior boundary seems too low!
Param 20 (Locus 8): Upper prior boundary seems too low!