

# AUTO

POPULATION SIZE, MIGRATION, DIVERGENCE, ASSIGNMENT, HISTORY

Bayesian inference using the structured coalescent

Migrate-n version 5.0.0a [May-20-2017]

Using Intel AVX (Advanced Vector Extensions)

Compiled for PARALLEL computer architectures

One master and 100 compute nodes are available.

Program started at Sun Aug 13 23:14:57 2017

Program finished at Mon Aug 14 00:49:47 2017 [Runtime:0000:01:34:50]



## Options

Datatype:

DNA sequence data

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)

1174099892

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

1 Romanshorn\_0 \*

Order of parameters:

1  $\Theta_1$

<displayed>

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

Analysis strategy: Bayesian inference  
 -Population size estimation: Exponential Distribution

#### Proposal distributions for parameter

Parameter	Proposal
Theta	Metropolis sampling
M	Metropolis sampling
Divergence	Metropolis sampling
Divergence Spread	Metropolis sampling
Genealogy	Metropolis-Hastings

#### Prior distribution for parameter

Parameter	Prior	Minimum	Mean	Maximum	Delta	Bins	UpdateFreq
1	Theta -11 Uniform	0.000000	0.050	0.100	0.010	1500	0.20000

[-1 -1 means priors were set globally]

Markov chain settings: Long chain

Number of chains	1
Recorded steps [a]	50000
Increment (record every x step [b])	200
Number of concurrent chains (replicates) [c]	2
Visited (sampled) parameter values [a*b*c]	20000000
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.1.0  
 Haplotyping is turned on: NO  
 Output file: outfile\_1.0\_0.5  
 Posterior distribution raw histogram file: bayesfile  
 Raw data from the MCMC run: bayesallfile\_1.0\_0.5  
 Print data: No  
 Print genealogies [only some for some data type]: None

## Data summary

Data file: infile.1.0  
 Datatype: Sequence data  
 Number of loci: 100

Mutationmodel:

Locus	Sublocus	Mutationmodel	Mutationmodel parameters
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1	1	Jukes-Cantor	[Basefreq: =0.25]
2	1	Jukes-Cantor	[Basefreq: =0.25]
3	1	Jukes-Cantor	[Basefreq: =0.25]
4	1	Jukes-Cantor	[Basefreq: =0.25]
5	1	Jukes-Cantor	[Basefreq: =0.25]
6	1	Jukes-Cantor	[Basefreq: =0.25]
7	1	Jukes-Cantor	[Basefreq: =0.25]
8	1	Jukes-Cantor	[Basefreq: =0.25]
9	1	Jukes-Cantor	[Basefreq: =0.25]
10	1	Jukes-Cantor	[Basefreq: =0.25]
11	1	Jukes-Cantor	[Basefreq: =0.25]
12	1	Jukes-Cantor	[Basefreq: =0.25]
13	1	Jukes-Cantor	[Basefreq: =0.25]
14	1	Jukes-Cantor	[Basefreq: =0.25]
15	1	Jukes-Cantor	[Basefreq: =0.25]
16	1	Jukes-Cantor	[Basefreq: =0.25]
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18	1	Jukes-Cantor	[Basefreq: =0.25]
19	1	Jukes-Cantor	[Basefreq: =0.25]
20	1	Jukes-Cantor	[Basefreq: =0.25]
21	1	Jukes-Cantor	[Basefreq: =0.25]
22	1	Jukes-Cantor	[Basefreq: =0.25]
23	1	Jukes-Cantor	[Basefreq: =0.25]
24	1	Jukes-Cantor	[Basefreq: =0.25]
25	1	Jukes-Cantor	[Basefreq: =0.25]
26	1	Jukes-Cantor	[Basefreq: =0.25]
27	1	Jukes-Cantor	[Basefreq: =0.25]
28	1	Jukes-Cantor	[Basefreq: =0.25]
29	1	Jukes-Cantor	[Basefreq: =0.25]
30	1	Jukes-Cantor	[Basefreq: =0.25]
31	1	Jukes-Cantor	[Basefreq: =0.25]
32	1	Jukes-Cantor	[Basefreq: =0.25]
33	1	Jukes-Cantor	[Basefreq: =0.25]
34	1	Jukes-Cantor	[Basefreq: =0.25]

35	1	Jukes-Cantor	[Basefreq: =0.25]
36	1	Jukes-Cantor	[Basefreq: =0.25]
37	1	Jukes-Cantor	[Basefreq: =0.25]
38	1	Jukes-Cantor	[Basefreq: =0.25]
39	1	Jukes-Cantor	[Basefreq: =0.25]
40	1	Jukes-Cantor	[Basefreq: =0.25]
41	1	Jukes-Cantor	[Basefreq: =0.25]
42	1	Jukes-Cantor	[Basefreq: =0.25]
43	1	Jukes-Cantor	[Basefreq: =0.25]
44	1	Jukes-Cantor	[Basefreq: =0.25]
45	1	Jukes-Cantor	[Basefreq: =0.25]
46	1	Jukes-Cantor	[Basefreq: =0.25]
47	1	Jukes-Cantor	[Basefreq: =0.25]
48	1	Jukes-Cantor	[Basefreq: =0.25]
49	1	Jukes-Cantor	[Basefreq: =0.25]
50	1	Jukes-Cantor	[Basefreq: =0.25]
51	1	Jukes-Cantor	[Basefreq: =0.25]
52	1	Jukes-Cantor	[Basefreq: =0.25]
53	1	Jukes-Cantor	[Basefreq: =0.25]
54	1	Jukes-Cantor	[Basefreq: =0.25]
55	1	Jukes-Cantor	[Basefreq: =0.25]
56	1	Jukes-Cantor	[Basefreq: =0.25]
57	1	Jukes-Cantor	[Basefreq: =0.25]
58	1	Jukes-Cantor	[Basefreq: =0.25]
59	1	Jukes-Cantor	[Basefreq: =0.25]
60	1	Jukes-Cantor	[Basefreq: =0.25]
61	1	Jukes-Cantor	[Basefreq: =0.25]
62	1	Jukes-Cantor	[Basefreq: =0.25]
63	1	Jukes-Cantor	[Basefreq: =0.25]
64	1	Jukes-Cantor	[Basefreq: =0.25]
65	1	Jukes-Cantor	[Basefreq: =0.25]
66	1	Jukes-Cantor	[Basefreq: =0.25]
67	1	Jukes-Cantor	[Basefreq: =0.25]
68	1	Jukes-Cantor	[Basefreq: =0.25]
69	1	Jukes-Cantor	[Basefreq: =0.25]
70	1	Jukes-Cantor	[Basefreq: =0.25]
71	1	Jukes-Cantor	[Basefreq: =0.25]
72	1	Jukes-Cantor	[Basefreq: =0.25]
73	1	Jukes-Cantor	[Basefreq: =0.25]
74	1	Jukes-Cantor	[Basefreq: =0.25]
75	1	Jukes-Cantor	[Basefreq: =0.25]
76	1	Jukes-Cantor	[Basefreq: =0.25]
77	1	Jukes-Cantor	[Basefreq: =0.25]
78	1	Jukes-Cantor	[Basefreq: =0.25]
79	1	Jukes-Cantor	[Basefreq: =0.25]

80	1	Jukes-Cantor	[Basefreq: =0.25]
81	1	Jukes-Cantor	[Basefreq: =0.25]
82	1	Jukes-Cantor	[Basefreq: =0.25]
83	1	Jukes-Cantor	[Basefreq: =0.25]
84	1	Jukes-Cantor	[Basefreq: =0.25]
85	1	Jukes-Cantor	[Basefreq: =0.25]
86	1	Jukes-Cantor	[Basefreq: =0.25]
87	1	Jukes-Cantor	[Basefreq: =0.25]
88	1	Jukes-Cantor	[Basefreq: =0.25]
89	1	Jukes-Cantor	[Basefreq: =0.25]
90	1	Jukes-Cantor	[Basefreq: =0.25]
91	1	Jukes-Cantor	[Basefreq: =0.25]
92	1	Jukes-Cantor	[Basefreq: =0.25]
93	1	Jukes-Cantor	[Basefreq: =0.25]
94	1	Jukes-Cantor	[Basefreq: =0.25]
95	1	Jukes-Cantor	[Basefreq: =0.25]
96	1	Jukes-Cantor	[Basefreq: =0.25]
97	1	Jukes-Cantor	[Basefreq: =0.25]
98	1	Jukes-Cantor	[Basefreq: =0.25]
99	1	Jukes-Cantor	[Basefreq: =0.25]
100	1	Jukes-Cantor	[Basefreq: =0.25]

#### Sites per locus

Locus	Sites
1	10000
2	10000
3	10000
4	10000
5	10000
6	10000
7	10000
8	10000
9	10000
10	10000
11	10000
12	10000
13	10000
14	10000
15	10000
16	10000
17	10000
18	10000
19	10000
20	10000

21	10000
22	10000
23	10000
24	10000
25	10000
26	10000
27	10000
28	10000
29	10000
30	10000
31	10000
32	10000
33	10000
34	10000
35	10000
36	10000
37	10000
38	10000
39	10000
40	10000
41	10000
42	10000
43	10000
44	10000
45	10000
46	10000
47	10000
48	10000
49	10000
50	10000
51	10000
52	10000
53	10000
54	10000
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57	10000
58	10000
59	10000
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63	10000
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65	10000

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71	10000
72	10000
73	10000
74	10000
75	10000
76	10000
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78	10000
79	10000
80	10000
81	10000
82	10000
83	10000
84	10000
85	10000
86	10000
87	10000
88	10000
89	10000
90	10000
91	10000
92	10000
93	10000
94	10000
95	10000
96	10000
97	10000
98	10000
99	10000
100	10000

Site rate variation and probabilities:

Locus	Sublocus	Region	type	Rate of change	Probability	Patch size
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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
11	1	1	1.000	1.000	1.000
12	1	1	1.000	1.000	1.000
13	1	1	1.000	1.000	1.000
14	1	1	1.000	1.000	1.000
15	1	1	1.000	1.000	1.000
16	1	1	1.000	1.000	1.000
17	1	1	1.000	1.000	1.000
18	1	1	1.000	1.000	1.000
19	1	1	1.000	1.000	1.000
20	1	1	1.000	1.000	1.000
21	1	1	1.000	1.000	1.000
22	1	1	1.000	1.000	1.000
23	1	1	1.000	1.000	1.000
24	1	1	1.000	1.000	1.000
25	1	1	1.000	1.000	1.000
26	1	1	1.000	1.000	1.000
27	1	1	1.000	1.000	1.000
28	1	1	1.000	1.000	1.000
29	1	1	1.000	1.000	1.000
30	1	1	1.000	1.000	1.000
31	1	1	1.000	1.000	1.000
32	1	1	1.000	1.000	1.000
33	1	1	1.000	1.000	1.000
34	1	1	1.000	1.000	1.000
35	1	1	1.000	1.000	1.000
36	1	1	1.000	1.000	1.000
37	1	1	1.000	1.000	1.000
38	1	1	1.000	1.000	1.000
39	1	1	1.000	1.000	1.000
40	1	1	1.000	1.000	1.000
41	1	1	1.000	1.000	1.000
42	1	1	1.000	1.000	1.000
43	1	1	1.000	1.000	1.000
44	1	1	1.000	1.000	1.000
45	1	1	1.000	1.000	1.000
46	1	1	1.000	1.000	1.000
47	1	1	1.000	1.000	1.000
48	1	1	1.000	1.000	1.000
49	1	1	1.000	1.000	1.000
50	1	1	1.000	1.000	1.000
51	1	1	1.000	1.000	1.000



52	1	1	1.000	1.000	1.000
53	1	1	1.000	1.000	1.000
54	1	1	1.000	1.000	1.000
55	1	1	1.000	1.000	1.000
56	1	1	1.000	1.000	1.000
57	1	1	1.000	1.000	1.000
58	1	1	1.000	1.000	1.000
59	1	1	1.000	1.000	1.000
60	1	1	1.000	1.000	1.000
61	1	1	1.000	1.000	1.000
62	1	1	1.000	1.000	1.000
63	1	1	1.000	1.000	1.000
64	1	1	1.000	1.000	1.000
65	1	1	1.000	1.000	1.000
66	1	1	1.000	1.000	1.000
67	1	1	1.000	1.000	1.000
68	1	1	1.000	1.000	1.000
69	1	1	1.000	1.000	1.000
70	1	1	1.000	1.000	1.000
71	1	1	1.000	1.000	1.000
72	1	1	1.000	1.000	1.000
73	1	1	1.000	1.000	1.000
74	1	1	1.000	1.000	1.000
75	1	1	1.000	1.000	1.000
76	1	1	1.000	1.000	1.000
77	1	1	1.000	1.000	1.000
78	1	1	1.000	1.000	1.000
79	1	1	1.000	1.000	1.000
80	1	1	1.000	1.000	1.000
81	1	1	1.000	1.000	1.000
82	1	1	1.000	1.000	1.000
83	1	1	1.000	1.000	1.000
84	1	1	1.000	1.000	1.000
85	1	1	1.000	1.000	1.000
86	1	1	1.000	1.000	1.000
87	1	1	1.000	1.000	1.000
88	1	1	1.000	1.000	1.000
89	1	1	1.000	1.000	1.000
90	1	1	1.000	1.000	1.000
91	1	1	1.000	1.000	1.000
92	1	1	1.000	1.000	1.000
93	1	1	1.000	1.000	1.000
94	1	1	1.000	1.000	1.000
95	1	1	1.000	1.000	1.000
96	1	1	1.000	1.000	1.000

97	1	1	1.000	1.000	1.000	
98	1	1	1.000	1.000	1.000	
99	1	1	1.000	1.000	1.000	
100	1	1	1.000	1.000	1.000	
Population					Locus	Gene copies
1 Romanshorn_0					1	10
					2	10
					3	10
					4	10
					5	10
					6	10
					7	10
					8	10
					9	10
					10	10
					11	10
					12	10
					13	10
					14	10
					15	10
					16	10
					17	10
					18	10
					19	10
					20	10
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					22	10
					23	10
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					28	10
					29	10
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41	10
42	10
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53	10
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81	10
82	10
83	10
84	10
85	10

	86	10
	87	10
	88	10
	89	10
	90	10
	91	10
	92	10
	93	10
	94	10
	95	10
	96	10
	97	10
	98	10
	99	10
	100	10
Total of all populations	1	10
	2	10
	3	10
	4	10
	5	10
	6	10
	7	10
	8	10
	9	10
	10	10
	11	10
	12	10
	13	10
	14	10
	15	10
	16	10
	17	10
	18	10
	19	10
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86	10
87	10
88	10
89	10
90	10
91	10
92	10
93	10
94	10
95	10
96	10
97	10
98	10
99	10
100	10

## *Bayesian Analysis: Posterior distribution table*

Locus	Parameter	2.5%	25.0%	Mode	75.0%	97.5%	Median	Mean
1	$\Theta_1$	0.03420	0.04120	0.04797	0.05093	0.05167	0.04623	0.08795
2	$\Theta_1$	0.03600	0.04560	0.04823	0.05033	0.05173	0.04650	0.08890
3	$\Theta_1$	0.03313	0.04407	0.04783	0.04960	0.05160	0.04530	0.08495
4	$\Theta_1$	0.03313	0.04460	0.04790	0.04987	0.05167	0.04577	0.08593
5	$\Theta_1$	0.03387	0.04480	0.04817	0.05007	0.05173	0.04590	0.08709
6	$\Theta_1$	0.03313	0.04447	0.04797	0.04987	0.05187	0.04563	0.08596
7	$\Theta_1$	0.03407	0.04440	0.04790	0.04987	0.05167	0.04557	0.08608
8	$\Theta_1$	0.03413	0.04520	0.04797	0.04993	0.05173	0.04623	0.08715
9	$\Theta_1$	0.03593	0.04493	0.04783	0.04960	0.05167	0.04617	0.08786
10	$\Theta_1$	0.03420	0.04453	0.04803	0.04987	0.05167	0.04570	0.08622
11	$\Theta_1$	0.03260	0.04427	0.04783	0.04980	0.05160	0.04543	0.08563
12	$\Theta_1$	0.03567	0.04480	0.04803	0.04993	0.05167	0.04597	0.08694
13	$\Theta_1$	0.03467	0.04547	0.04797	0.04960	0.05180	0.04563	0.08769
14	$\Theta_1$	0.03480	0.04447	0.04790	0.04960	0.05160	0.04570	0.08751
15	$\Theta_1$	0.03360	0.04453	0.04810	0.05013	0.05167	0.04550	0.08664
16	$\Theta_1$	0.03473	0.04140	0.04777	0.05040	0.05153	0.04537	0.08691
17	$\Theta_1$	0.02787	0.04427	0.04790	0.04973	0.05200	0.04543	0.08612
18	$\Theta_1$	0.03307	0.04400	0.04777	0.04960	0.05160	0.04523	0.08584

19	$\Theta_1$	0.03413	0.04433	0.04797	0.04980	0.05167	0.04550	0.08733
20	$\Theta_1$	0.03393	0.04453	0.04790	0.04993	0.05160	0.04563	0.08609
21	$\Theta_1$	0.03500	0.04547	0.04783	0.04940	0.05160	0.04583	0.08629
22	$\Theta_1$	0.03220	0.04440	0.04803	0.04993	0.05167	0.04550	0.08561
23	$\Theta_1$	0.03387	0.04387	0.04783	0.05007	0.05173	0.04583	0.08765
24	$\Theta_1$	0.03420	0.04520	0.04783	0.04973	0.05173	0.04630	0.08786
25	$\Theta_1$	0.03320	0.04453	0.04797	0.04993	0.05173	0.04563	0.08597
26	$\Theta_1$	0.03380	0.04473	0.04797	0.04980	0.05173	0.04590	0.08736
27	$\Theta_1$	0.03340	0.04440	0.04797	0.04987	0.05167	0.04557	0.08603
28	$\Theta_1$	0.03633	0.04613	0.04823	0.04960	0.05180	0.04630	0.08812
29	$\Theta_1$	0.03407	0.04427	0.04803	0.04980	0.05147	0.04543	0.08811
30	$\Theta_1$	0.03560	0.04527	0.04783	0.04927	0.05167	0.04583	0.08791
31	$\Theta_1$	0.03153	0.04387	0.04790	0.04993	0.05167	0.04497	0.08429
32	$\Theta_1$	0.03567	0.04507	0.04803	0.04973	0.05180	0.04630	0.08804
33	$\Theta_1$	0.03280	0.04420	0.04790	0.04980	0.05167	0.04537	0.08448
34	$\Theta_1$	0.03433	0.04480	0.04797	0.05000	0.05167	0.04583	0.08664
35	$\Theta_1$	0.03340	0.04420	0.04783	0.04973	0.05173	0.04543	0.08723
36	$\Theta_1$	0.03287	0.04407	0.04790	0.04980	0.05153	0.04523	0.08657
37	$\Theta_1$	0.03320	0.04407	0.04777	0.04973	0.05160	0.04523	0.08600
38	$\Theta_1$	0.03387	0.04467	0.04803	0.05007	0.05167	0.04570	0.08609
39	$\Theta_1$	0.03300	0.04453	0.04783	0.04987	0.05160	0.04557	0.08535
40	$\Theta_1$	0.03520	0.04487	0.04797	0.04987	0.05173	0.04603	0.08805
41	$\Theta_1$	0.03340	0.04427	0.04790	0.04993	0.05173	0.04530	0.08517



Locus	Parameter	2.5%	25.0%	Mode	75.0%	97.5%	Median	Mean
42	$\Theta_1$	0.03273	0.04413	0.04790	0.04980	0.05167	0.04530	0.08441
43	$\Theta_1$	0.03220	0.04347	0.04783	0.04960	0.05153	0.04477	0.08321
44	$\Theta_1$	0.03187	0.04387	0.04777	0.04967	0.05167	0.04510	0.08391
45	$\Theta_1$	0.03147	0.04400	0.04790	0.04980	0.05173	0.04523	0.08414
46	$\Theta_1$	0.03373	0.04453	0.04797	0.04980	0.05173	0.04570	0.08759
47	$\Theta_1$	0.03380	0.04433	0.04797	0.04973	0.05167	0.04557	0.08653
48	$\Theta_1$	0.03280	0.04420	0.04797	0.04993	0.05167	0.04537	0.08562
49	$\Theta_1$	0.03340	0.04467	0.04783	0.04960	0.05167	0.04590	0.08711
50	$\Theta_1$	0.03387	0.04493	0.04797	0.04993	0.05160	0.04597	0.08575
51	$\Theta_1$	0.03433	0.04440	0.04803	0.04980	0.05153	0.04563	0.08783
52	$\Theta_1$	0.03133	0.04373	0.04790	0.04987	0.05167	0.04490	0.08457
53	$\Theta_1$	0.03440	0.04580	0.04830	0.05007	0.05173	0.04610	0.08799
54	$\Theta_1$	0.03247	0.04413	0.04790	0.04980	0.05153	0.04530	0.08663
55	$\Theta_1$	0.03307	0.04487	0.04817	0.05007	0.05180	0.04597	0.08809
56	$\Theta_1$	0.03240	0.04400	0.04783	0.04967	0.05160	0.04523	0.08509
57	$\Theta_1$	0.03480	0.04493	0.04797	0.04980	0.05160	0.04603	0.08873
58	$\Theta_1$	0.03460	0.04473	0.04817	0.05013	0.05173	0.04577	0.08687
59	$\Theta_1$	0.03433	0.04467	0.04783	0.04973	0.05167	0.04583	0.08649
60	$\Theta_1$	0.03373	0.04460	0.04797	0.04980	0.05180	0.04583	0.08664
61	$\Theta_1$	0.03300	0.04407	0.04803	0.04987	0.05160	0.04523	0.08489

62	$\Theta_1$	0.03247	0.04413	0.04797	0.04993	0.05153	0.04523	0.08418
63	$\Theta_1$	0.03313	0.04447	0.04797	0.04987	0.05167	0.04557	0.08532
64	$\Theta_1$	0.03340	0.04553	0.04790	0.04933	0.05173	0.04603	0.08710
65	$\Theta_1$	0.03393	0.04447	0.04790	0.04973	0.05173	0.04570	0.08640
66	$\Theta_1$	0.03180	0.04447	0.04777	0.04947	0.05153	0.04497	0.08336
67	$\Theta_1$	0.03380	0.04427	0.04770	0.04953	0.05167	0.04550	0.08589
68	$\Theta_1$	0.03633	0.04507	0.04810	0.04987	0.05167	0.04630	0.08799
69	$\Theta_1$	0.03227	0.04493	0.04783	0.04940	0.05160	0.04510	0.08417
70	$\Theta_1$	0.03347	0.04533	0.04790	0.04927	0.05160	0.04550	0.08538
71	$\Theta_1$	0.03373	0.04427	0.04797	0.04973	0.05167	0.04550	0.08604
72	$\Theta_1$	0.03287	0.04407	0.04790	0.04980	0.05160	0.04523	0.08555
73	$\Theta_1$	0.03273	0.04413	0.04797	0.04993	0.05167	0.04530	0.08457
74	$\Theta_1$	0.03300	0.04427	0.04797	0.04980	0.05160	0.04543	0.08630
75	$\Theta_1$	0.03487	0.04460	0.04803	0.04987	0.05153	0.04570	0.08669
76	$\Theta_1$	0.03480	0.04493	0.04797	0.04980	0.05167	0.04603	0.08728
77	$\Theta_1$	0.03400	0.04507	0.04790	0.04987	0.05167	0.04617	0.08786
78	$\Theta_1$	0.03460	0.04453	0.04790	0.04967	0.05160	0.04577	0.08685
79	$\Theta_1$	0.03613	0.04507	0.04817	0.05000	0.05180	0.04623	0.08710
80	$\Theta_1$	0.03480	0.04480	0.04803	0.04993	0.05160	0.04590	0.08625
81	$\Theta_1$	0.03260	0.04413	0.04790	0.04987	0.05167	0.04530	0.08569
82	$\Theta_1$	0.03467	0.04453	0.04790	0.04973	0.05167	0.04570	0.08717
83	$\Theta_1$	0.03320	0.04407	0.04783	0.04973	0.05160	0.04523	0.08453
84	$\Theta_1$	0.03407	0.04487	0.04797	0.04987	0.05167	0.04597	0.08803

Locus	Parameter	2.5%	25.0%	Mode	75.0%	97.5%	Median	Mean
85	$\Theta_1$	0.03433	0.04533	0.04803	0.04960	0.05160	0.04550	0.08680
86	$\Theta_1$	0.03280	0.04453	0.04803	0.04993	0.05187	0.04570	0.08648
87	$\Theta_1$	0.03580	0.04493	0.04777	0.04967	0.05160	0.04610	0.08815
88	$\Theta_1$	0.03393	0.04447	0.04797	0.04993	0.05167	0.04557	0.08682
89	$\Theta_1$	0.03467	0.04453	0.04777	0.04960	0.05160	0.04577	0.08699
90	$\Theta_1$	0.03360	0.04553	0.04803	0.04960	0.05180	0.04577	0.08588
91	$\Theta_1$	0.03460	0.04473	0.04797	0.04967	0.05180	0.04597	0.08811
92	$\Theta_1$	0.03500	0.04507	0.04810	0.05013	0.05160	0.04610	0.08816
93	$\Theta_1$	0.03480	0.04593	0.04810	0.04967	0.05167	0.04617	0.08705
94	$\Theta_1$	0.03420	0.04473	0.04803	0.05000	0.05173	0.04583	0.08484
95	$\Theta_1$	0.03273	0.04427	0.04783	0.04973	0.05173	0.04543	0.08596
96	$\Theta_1$	0.03647	0.04507	0.04803	0.04973	0.05167	0.04630	0.08825
97	$\Theta_1$	0.03447	0.04507	0.04797	0.04987	0.05160	0.04623	0.08758
98	$\Theta_1$	0.03327	0.04467	0.04797	0.05000	0.05167	0.04570	0.08658
99	$\Theta_1$	0.02833	0.04440	0.04797	0.04987	0.05207	0.04557	0.08642
100	$\Theta_1$	0.03373	0.04493	0.04810	0.05000	0.05187	0.04603	0.08808
All	$\Theta_1$	0.01133	0.01513	0.01750	0.01907	0.02327	0.01717	0.09972

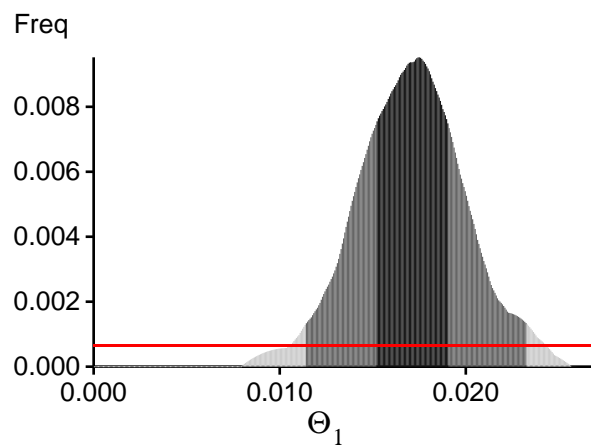
Citation suggestions:

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

Beerli P., 2007. Estimation of the population scaled mutation rate from microsatellite data, *Genetics*, 177:1967-1968.

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*



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

Use this value for Bayes factor calculations:

$BF = \text{Exp}[\ln(\text{Prob}(D \mid \text{thisModel}) - \ln(\text{Prob}(D \mid \text{otherModel}))]$

or as  $LBF = 2 (\ln(\text{Prob}(D \mid \text{thisModel}) - \ln(\text{Prob}(D \mid \text{otherModel})))$

shows the support for thisModel]

Locus	TI(1a)	BTI(1b)	SS(2)	HS(3)
1	-17296.31	-16215.37	-16142.14	-16196.45
2	-17835.15	-16651.80	-16568.24	-16619.55
3	-15702.51	-15257.46	-15290.40	-15350.22
4	-15935.62	-15296.32	-15298.83	-15356.20
5	-16647.04	-15754.48	-15716.33	-15767.92
6	-17566.39	-16341.41	-16245.08	-16297.13
7	-17108.47	-15966.62	-15883.33	-15935.07
8	-16436.33	-15823.44	-15844.23	-15893.92
9	-16144.64	-15410.63	-15403.52	-15450.26
10	-15875.44	-15425.63	-15458.91	-15514.98
11	-15850.57	-15214.22	-15215.45	-15270.65
12	-17077.43	-16014.53	-15945.66	-15995.96
13	-16568.59	-15868.60	-15874.64	-15919.56
14	-16486.43	-15560.12	-15514.49	-15565.99
15	-16705.67	-15847.79	-15816.55	-15870.34
16	-15802.13	-15343.24	-15387.70	-15433.81
17	-15738.63	-15073.51	-15064.77	-15121.96
18	-16845.81	-15823.68	-15752.11	-15813.65
19	-16658.62	-15890.94	-15880.53	-15928.60
20	-15511.75	-15121.54	-15172.15	-15224.55
21	-16859.32	-15829.60	-15769.49	-15819.52
22	-15841.90	-15360.34	-15400.04	-15449.86
23	-17660.14	-16526.45	-16458.41	-16502.44
24	-17119.45	-16296.26	-16286.65	-16329.30
25	-17758.62	-16525.38	-16426.64	-16481.66
26	-17324.32	-16415.11	-16388.17	-16434.48
27	-16145.95	-15590.12	-15614.77	-15666.11
28	-17349.94	-16273.30	-16206.41	-16258.16
29	-17346.44	-16338.23	-16290.77	-16337.79

30	-16582.58	-15689.26	-15649.08	-15702.11
31	-15862.72	-15279.79	-15290.17	-15346.43
32	-15908.93	-15483.79	-15533.33	-15582.27
33	-14979.22	-14604.89	-14643.85	-14705.21
34	-15625.29	-15212.75	-15258.58	-15310.53
35	-15784.04	-15299.21	-15338.10	-15385.24
36	-15762.11	-15282.46	-15315.55	-15370.74
37	-16899.32	-16153.00	-16152.81	-16198.38
38	-15697.76	-15088.35	-15092.83	-15152.08
39	-16668.92	-15488.08	-15388.54	-15444.77
40	-16579.85	-15839.54	-15840.84	-15883.50
41	-15563.77	-15061.47	-15084.46	-15140.70
42	-15979.76	-15364.53	-15367.30	-15425.74
43	-15041.36	-14644.81	-14679.32	-14740.74
44	-15597.30	-15135.90	-15169.56	-15224.47
45	-17862.34	-16122.44	-15917.50	-15977.00
46	-17474.89	-16404.51	-16342.03	-16388.04
47	-16297.04	-15684.54	-15699.65	-15749.72
48	-15429.07	-15080.54	-15135.56	-15190.78
49	-16354.23	-15754.63	-15773.29	-15824.54
50	-15612.92	-15173.67	-15212.82	-15267.36
51	-16452.03	-15660.14	-15637.64	-15689.56
52	-15885.00	-15224.60	-15221.39	-15280.09
53	-18084.83	-16801.19	-16708.79	-16752.01
54	-16169.17	-15637.12	-15670.86	-15719.03
55	-17095.01	-16345.16	-16351.61	-16390.20
56	-16804.68	-15547.25	-15422.82	-15487.41
57	-18375.63	-16921.20	-16791.78	-16840.45
58	-16314.62	-15732.34	-15754.52	-15805.64
59	-17076.98	-15957.15	-15876.50	-15929.57
60	-16128.98	-15396.85	-15385.05	-15435.70
61	-15609.80	-15096.19	-15112.20	-15173.47
62	-15629.16	-15139.26	-15169.28	-15226.20
63	-16452.00	-15530.43	-15479.97	-15536.93
64	-16667.92	-15919.74	-15909.49	-15960.14
65	-15331.58	-14840.07	-14863.62	-14921.37
66	-15949.17	-15419.92	-15437.27	-15497.85
67	-16359.32	-15479.94	-15439.37	-15493.78
68	-17740.73	-16493.97	-16402.84	-16446.28
69	-15295.18	-14863.29	-14894.95	-14954.81
70	-15099.36	-14758.12	-14809.14	-14865.75
71	-16839.02	-15904.18	-15862.83	-15911.68
72	-16133.18	-15417.03	-15404.61	-15460.05
73	-15209.98	-14803.50	-14842.83	-14900.96
74	-16995.80	-16323.52	-16331.84	-16385.30

75	-17665.77	-16353.40	-16240.30	-16292.66
76	-17550.24	-16584.60	-16548.65	-16595.09
77	-16804.43	-16074.09	-16077.33	-16121.78
78	-16592.20	-15717.03	-15669.44	-15731.06
79	-18546.22	-17025.16	-16882.85	-16937.39
80	-15604.84	-15275.57	-15331.73	-15388.86
81	-16131.15	-15398.68	-15381.78	-15440.57
82	-16238.20	-15598.28	-15611.54	-15661.88
83	-15676.62	-14995.97	-14982.41	-15043.84
84	-16999.29	-16013.69	-15957.11	-16013.75
85	-16985.19	-15953.43	-15887.75	-15939.54
86	-16693.41	-15937.21	-15932.99	-15982.51
87	-17612.18	-16427.40	-16343.94	-16392.89
88	-15742.14	-15342.58	-15386.73	-15442.77
89	-16586.59	-15942.67	-15955.48	-16005.80
90	-15826.25	-15275.55	-15299.15	-15351.90
91	-22591.00	-18884.00	-18331.72	-18388.84
92	-17665.98	-16707.39	-16674.65	-16720.77
93	-15808.19	-15250.68	-15271.96	-15323.61
94	-14992.46	-14637.16	-14679.00	-14740.79
95	-15247.84	-14832.16	-14873.54	-14928.74
96	-18156.39	-17020.13	-16958.20	-17002.61
97	-16597.81	-15952.65	-15967.84	-16016.51
98	-16314.94	-15644.67	-15643.18	-15698.46
99	-17810.34	-16288.22	-16137.26	-16186.89
100	-17777.70	-16504.08	-16393.37	-16452.84
All	-1654514.76	-1573588.06	-1571237.87	-1576518.22
(1a) TI: Thermodynamic integration: log(Prob(D Model)): Good approximation with many temperatures				
(1b) BTI: Bezier-approximated Thermodynamic integration: when using few temperatures USE THIS!				
(2) SS: Steppingstone Sampling (Xie et al 2011)				
(3) HS: Harmonic mean approximation: Overestimates the marginal likelihood, poor variance				
[Scaling factor = 164.789782]				
Citation suggestions:				
Beerli P. and M. Palczewski, 2010. Unified framework to evaluate panmixia and migration direction among multiple sampling locations, Genetics, 185: 313-326.				
Palczewski M. and P. Beerli, 2014. Population model comparison using multi-locus datasets.				
In M.-H. Chen, L. Kuo, and P. O. Lewis, editors, Bayesian Phylogenetics: Methods, Algorithms, and Applications, pages 187-200. CRC Press, 2014.				
Xie W., P. O. Lewis, Y. Fan, L. Kuo, and M.-H. Chen. 2011. Improving marginal likelihood estimation for Bayesian phylogenetic model selection. Systematic Biology, 60(2):150â 160, 2011.				



*Acceptance ratios for all parameters and the genealogies*

Parameter	Accepted changes	Ratio
$\Theta_1$	370542203/399993123	0.92637
Genealogies	75587626/1600006877	0.04724

### *MCMC-Autocorrelation and Effective MCMC Sample Size*

Parameter	Autocorrelation	Effective Sampe Size
$\Theta_1$	0.43442	3951566.01
Genealogies	0.47554	3594116.55

## *Average temperatures during the run*

Chain	Temperatures
1	0.00000
2	0.00000
3	0.00000
4	0.00000

Adaptive heating often fails, if the average temperatures are very close together try to rerun using static heating! If you want to compare models using marginal likelihoods then you **MUST** use static heating

## *Potential Problems*

This section reports potential problems with your run, but such reporting is often not very accurate. With many parameters in a multilocus analysis, it is very common that some parameters for some loci will not be very informative, triggering suggestions (for example to increase the prior range) that are not sensible. This suggestion tool will improve with time, therefore do not blindly follow its suggestions. If some parameters are flagged, inspect the tables carefully and judge whether an action is required. For example, if you run a Bayesian inference with sequence data, for macroscopic 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 routes 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.

No warning was recorded during the run