Supplementary

Sticking to your roots: Cyclical population bottlenecks prompted the extinction and emergence of lithic traditions with Late Mesolithic ancestry at the Early Neolithic transition in Western Norway.

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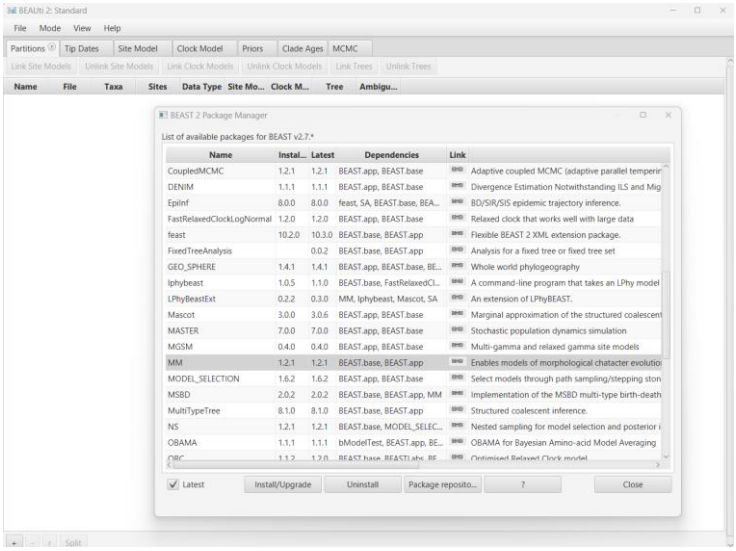
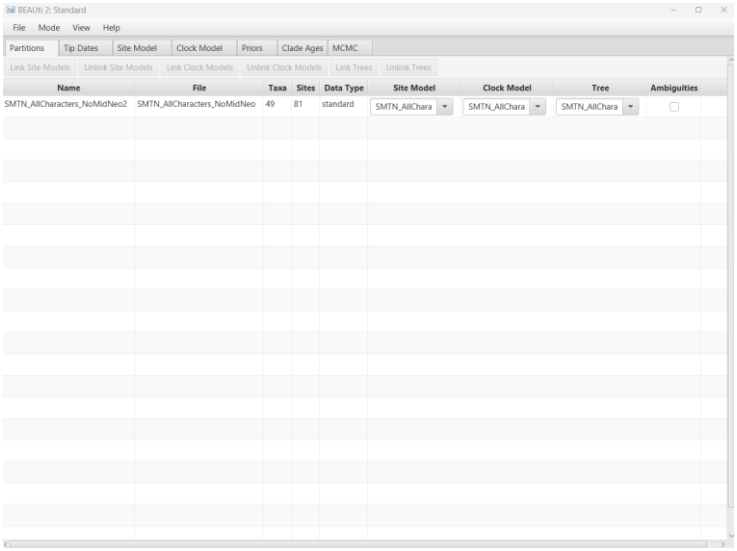
1. Extract BEAUti2 and BEAST2 after downloading it from here: https://github.com/CompEvol/beast2/releases. This analysis used "BEAST v2.7.4".

2. In the folder you will also find programs such as "TreeAnnotator", "Tracer" and "FigTree", all of which are needed for the analysis.

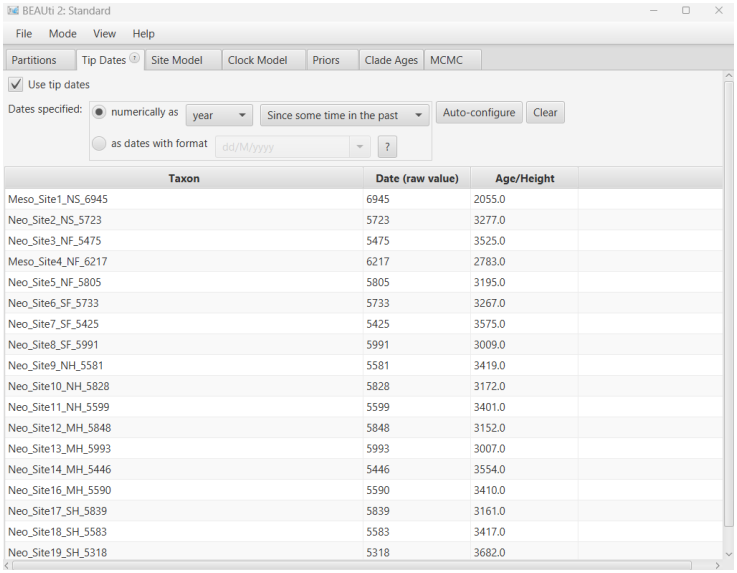
3. Go to "file" and "Manage packages" to install the "MM" addon so that morphological data can be analysed.



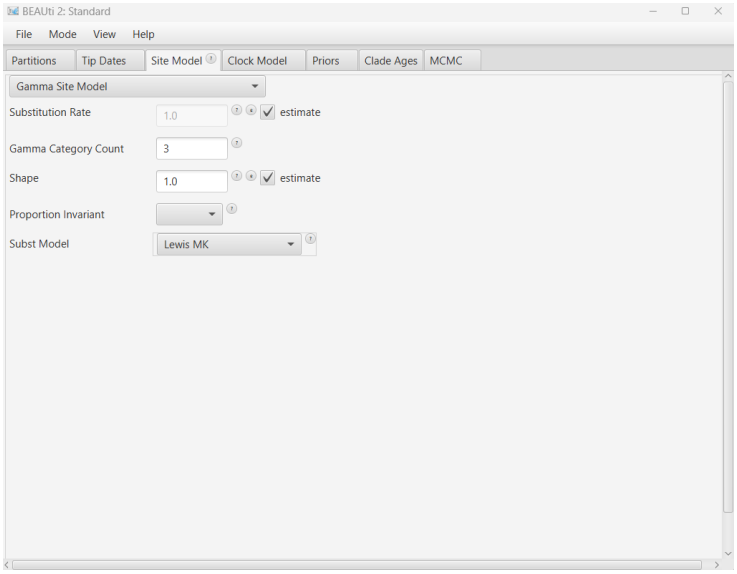
4. Go to "file", then "Add Morphological Data" and select the nexus file that you've downloaded and stored in your preferred directory. Click "yes" when asked about "conditioning on variable characters". The nexus file can be downloaded here: https://github.com/VicluUiB/Sticking-to-your-roots



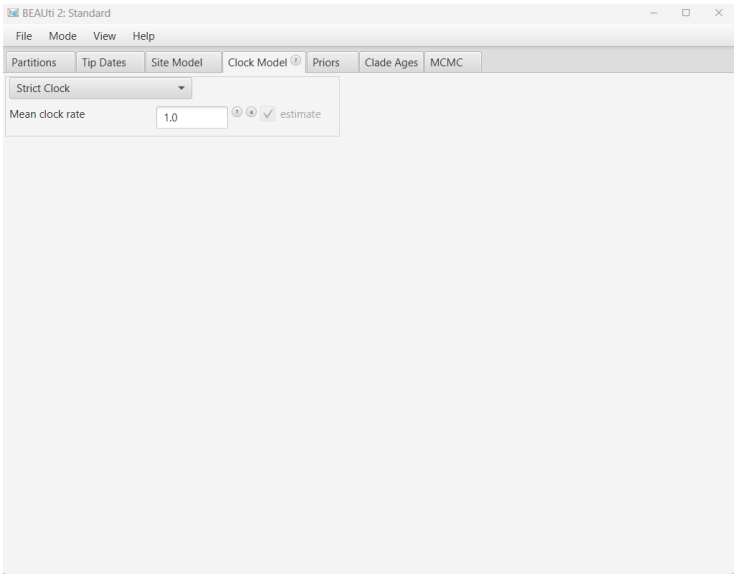
5. Next, open the “Tip Dates” tab. Check “Use tip dates”, change “since some time in the past” to “before the present” and then click “autoconfigure”. In the new window under the heading “use everything”, change “after first” to “after last” and click ok. The tip date window should now have created a column called “Date (raw value)” with the corresponding date for each assemblage.



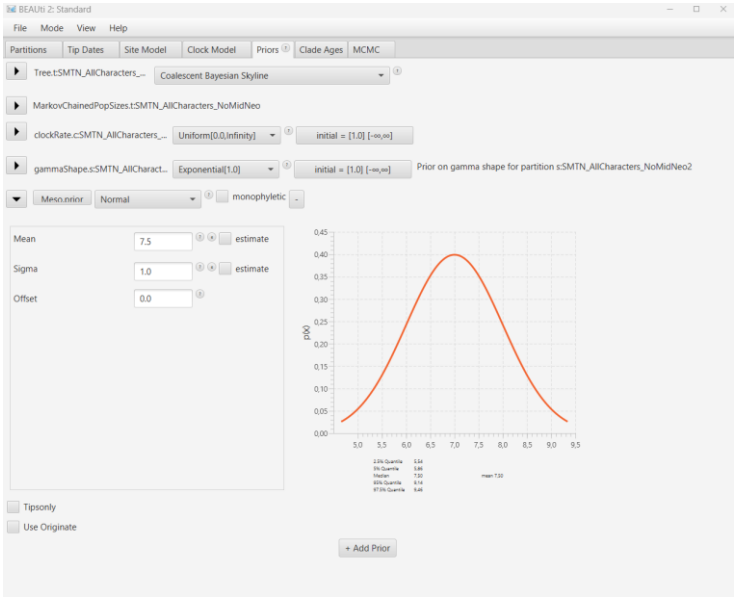
6. Next, open the “Site Model” tab and assign the settings in the screenshot below. This examples replicates the settings from model 3 (M3).



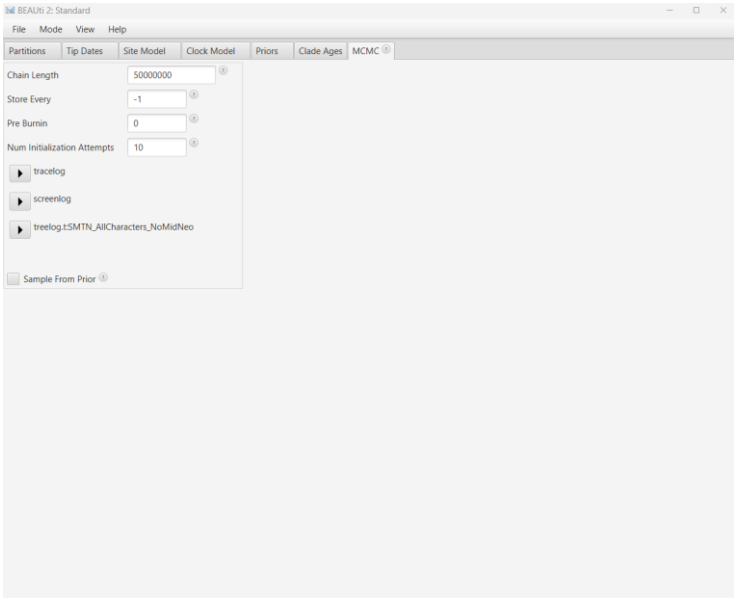
7. Open the “Clock Model” tab and assign a “Strict Clock”. Do not change the “Mean clock rate”.



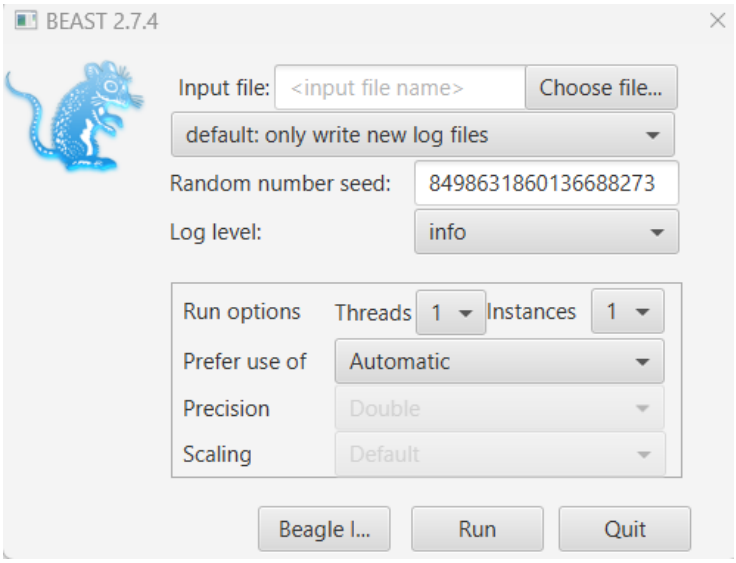
8. Open the “Priors” tab and select a “Coalescent Bayesian Skyline” prior from the roll-down menu at the top. Next, click “+ Add prior” and create a MRCA prior for all Late Mesolithic sites. The settings for this prior include a normal distribution with a mean of 7.5 and a sigma of 1.0. When finished, add another MRCA prior for all Neolithic sites. Again, use a normal distribution, but change the mean to “6.0” and the sigma to “1.5”.



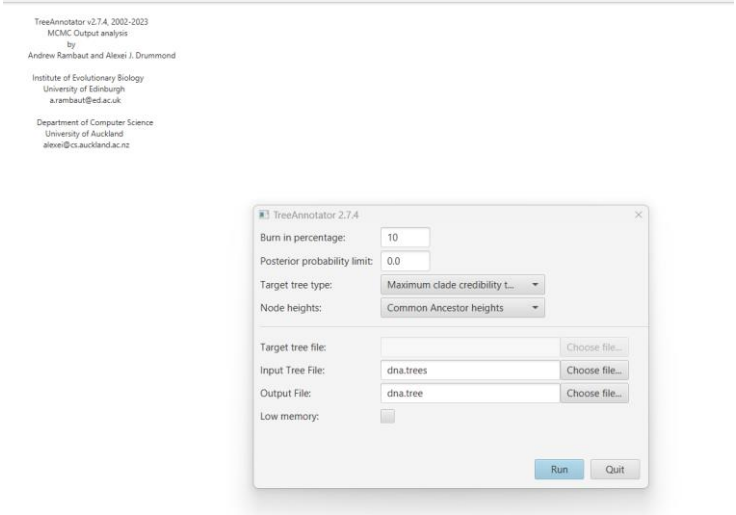
9. Skip the tab “Clade Ages” and go straight to the “MCM” tab instead. Here, change the “Chain Length” to “50,000,000” and then close the BEAUti interface. When closing you will be prompted to save the model settings as an XML-file in your preferred directory, thus wrapping up the procedure in BEAUti.



10. Next, open “BEAST2” and select the xml-file that was created in step 8. In step 8, we specified that BEAST2 should produce a total of 50,000,000 samples for the Markov Chain Monte Carlo procedure. It could therefore be necessary to experiment with the number of threads and preferred use of processing unit. This analysis was performed on a Ryzen 7 4800 HS cpu with 16 threads and therefore assigned a total of 15 threads for BEAST2, making sure to reserve one for overall system operability.



11. Once BEAST2 is finished, open the software called “TreeAnnotator 2.7.4”. Under “Input tree file”, select the tree file that was produced by BEAST2. Save the output file, preferably with the name “MCCT” in it to indicate that this is the so-called “Maximum Clade Credibility Tree”. Check the box “Low memory” in case TreeAnnotator is unable to process the size of the file.



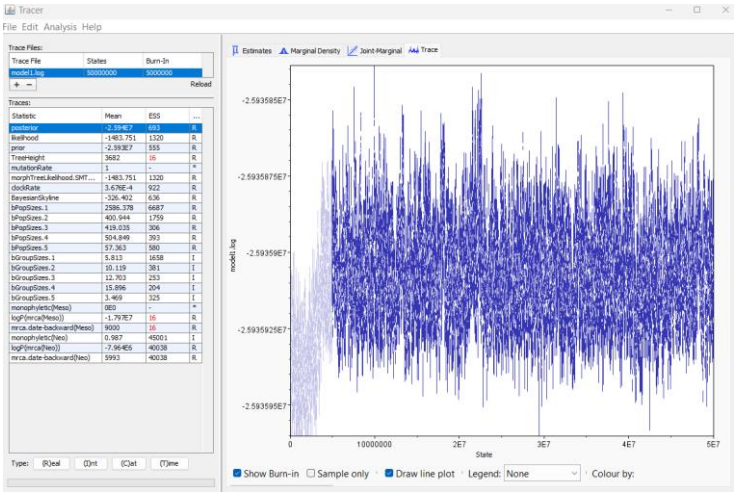
12. This marks the end of the supplementary for running BEAUti2, BEAST2 and TreeAnnotator. The following will simply be a presentation of the results from each model using the software “Tracer”. The results are inspected by opening the logfile that was created after using BEAST2, and it should be stored in the same directory where you saved the tree file.

Model results

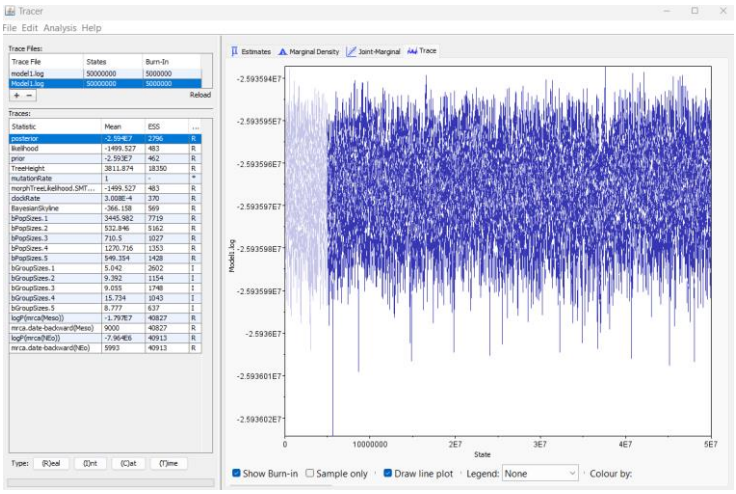
Table 1. Model settings, mean likelihood scores, and the posterior effective sample size (ESS) for each hypothesis. The best performing models are highlighted with bold font.

Model	γ rate	Clock	Prior	Likelihood (H_0)	Posterior ESS (H_0)	Likelihood (H_1)	Posterior ESS (H_1)
M1	1	Strict	CBS	-1483.751	693	-1499.527	2796
M2	2	Strict	CBS	-1417.485	920	-1431.119	2829
M3	**3**	**Strict**	**CBS**	**-1412.354**	**222**	**-1427.36**	**3047**
M4	4	Strict	CBS	-1408.2137	94	-1423.163	3287
M5	1	Rlx.log	CBS	-1299.815	65	-1312.652	1160
M6	2	Rlx.log	CBS	-1272.619	39	-1279.713	1243
M7	3	Rlx.log	CBS	-1269.013	65	-1277.184	1131
M8	4	Rlx.log	CBS	-1265.455	16	-1274.221	1700

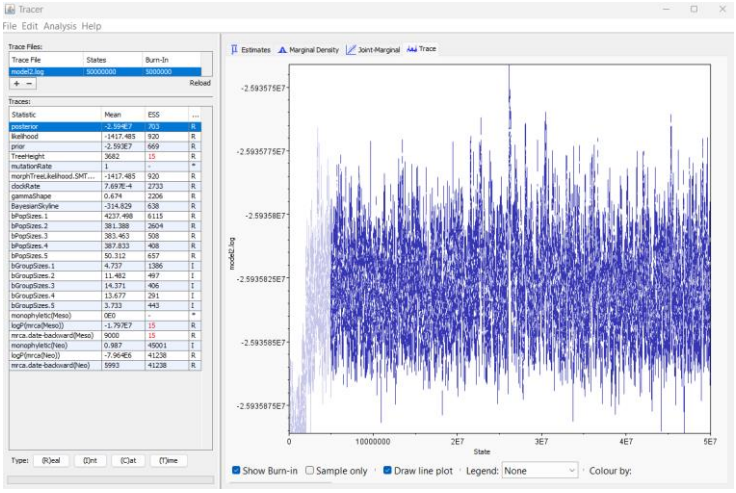
M1 (H_0)



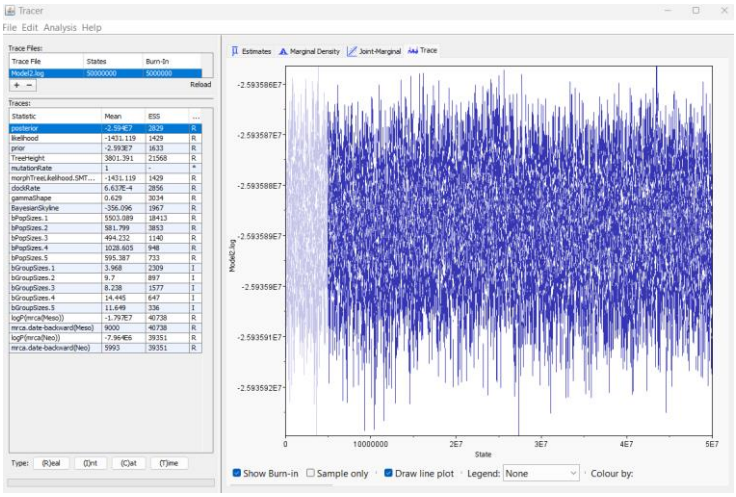
M1 (H_1)



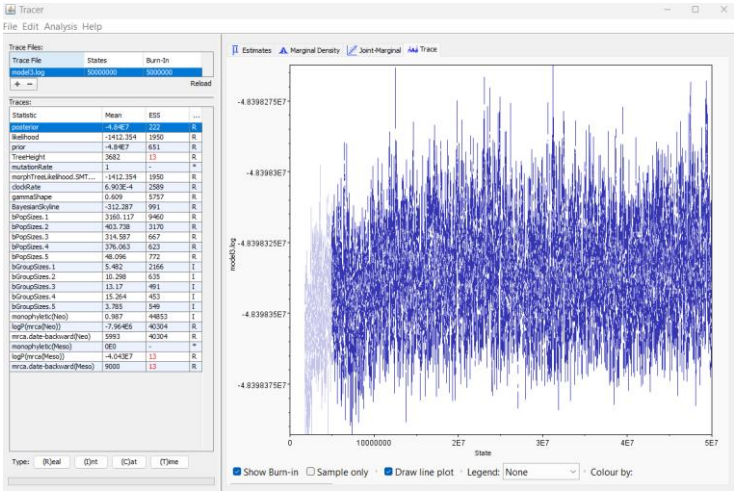
M2 (H_0)


Tracer
File Edit Analysis Help
Trace Files:
Trace File States Burn-In
model2.log 50000000 5000000
Reload
Traces:
Statistic Mean ESS
posterior -2.59HE7 703
likelihood -1417.485 920
prior -2.593E7 669
TreeHeight 3682 15
mutationRate 1 -
morphTreeLikelihood.SMT... -1417.485 920
clockRate 7.697E-4 2733
gammaShape 0.674 2206
BayesianSkyline -314.829 638
bPopSizes.1 4237.498 6115
bPopSizes.2 381.388 2604
bPopSizes.3 383.463 508
bPopSizes.4 387.833 408
bPopSizes.5 50.312 657
bGroupSizes.1 4.737 1386
bGroupSizes.2 11.482 497
bGroupSizes.3 14.371 406
bGroupSizes.4 13.677 291
bGroupSizes.5 3.733 443
monophyletic(Meso) 0E0 -
logP(mrca[Meso]) -1.79E7 15
mrca.date-backward(Meso) 9000 15
monophyletic(Neo) 0.987 45001
logP(mrca[Neo]) -7.96E6 41238
mrca.date-backward(Neo) 5993 41238
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-2.593575E7
-2.5935775E7
-2.59358E7
-2.5935825E7
-2.593585E7
-2.5935875E7
model2.log
0
10000000
2E7
3E7
4E7
5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

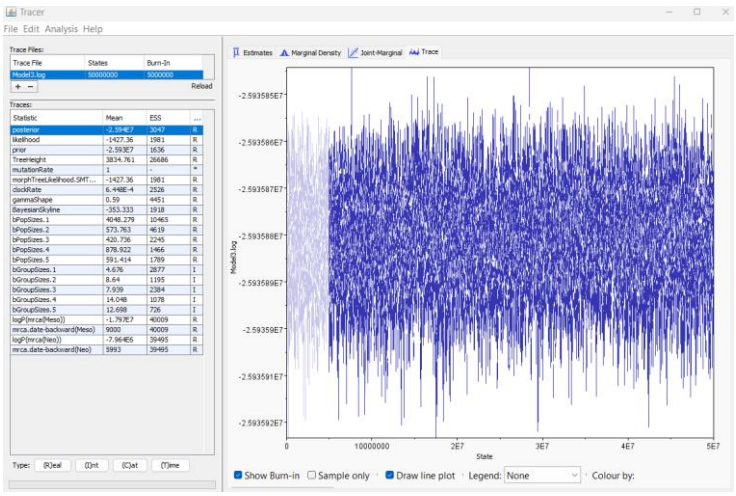
M2 (H_1)


Tracer
File Edit Analysis Help
Trace Files:
Trace File States Burn-In
Model2.log 50000000 5000000
Reload
Traces:
Statistic Mean ESS
posterior -2.59HE7 2829
likelihood -1431.119 1429
prior -2.593E7 1633
TreeHeight 3801.391 21568
mutationRate 1 -
morphTreeLikelihood.SMT... -1431.119 1429
clockRate 6.63E-4 2856
gammaShape 0.629 3034
BayesianSkyline -356.096 1967
bPopSizes.1 5503.089 18413
bPopSizes.2 581.799 3853
bPopSizes.3 494.232 1140
bPopSizes.4 1028.605 948
bPopSizes.5 595.387 713
bGroupSizes.1 3.968 2309
bGroupSizes.2 9.7 897
bGroupSizes.3 8.238 1577
bGroupSizes.4 14.445 647
bGroupSizes.5 11.649 336
logP(mrca[Neo]) -1.79E7 40738
mrca.date-backward(Meso) 9000 40738
logP(mrca[Neo]) -7.96E6 39351
mrca.date-backward(Neo) 5993 39351
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-2.593586E7
-2.593587E7
-2.593588E7
-2.593589E7
-2.59359E7
-2.593591E7
-2.593592E7
Model2.log
0
10000000
2E7
3E7
4E7
5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

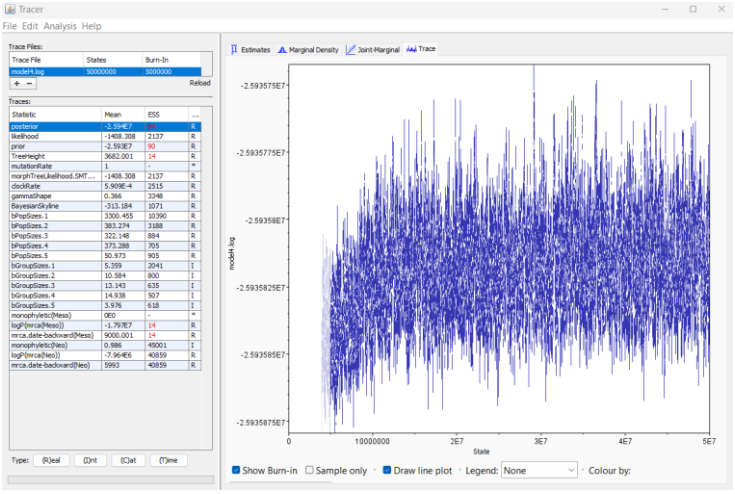
M3 (H_0)


Tracer
File Edit Analysis Help
Trace Files:
Trace File | States | Burn-In
model3.log | 50000000 | 5000000
Reload
Traces:
Statistic | Mean | ESS
posterior | -4.84E7 | 222
likelihood | -1412.354 | 1950
prior | -4.84E7 | 651
TreeHeight | 3682 | 13
mutationRate | 1 | -
morphTreeLikelihood.SMT... | -1412.354 | 1950
clockRate | 6.903E-4 | 2589
gammaShape | 0.609 | 5757
BayesianSkyline | -312.287 | 991
bPopSizes.1 | 3160.117 | 9460
bPopSizes.2 | 403.738 | 3170
bPopSizes.3 | 314.587 | 667
bPopSizes.4 | 376.063 | 623
bPopSizes.5 | 48.096 | 772
bGroupSizes.1 | 5.482 | 2166
bGroupSizes.2 | 10.298 | 635
bGroupSizes.3 | 13.17 | 491
bGroupSizes.4 | 15.264 | 453
bGroupSizes.5 | 3.785 | 549
monophyletic(Neo) | 0.987 | 44853
logP(mrca[Neo]) | -7.964E6 | 40304
mrca.date-backward(Neo) | 5993 | 40304
monophyletic(Meso) | 0E0 | -
logP(mrca[Meso]) | -4.04E7 | 13
mrca.date-backward(Meso) | 9000 | 13
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-4.8398275E7
-4.83983E7
-4.8398325E7
-4.839835E7
-4.8398375E7
model3.log
0 10000000 2E7 3E7 4E7 5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

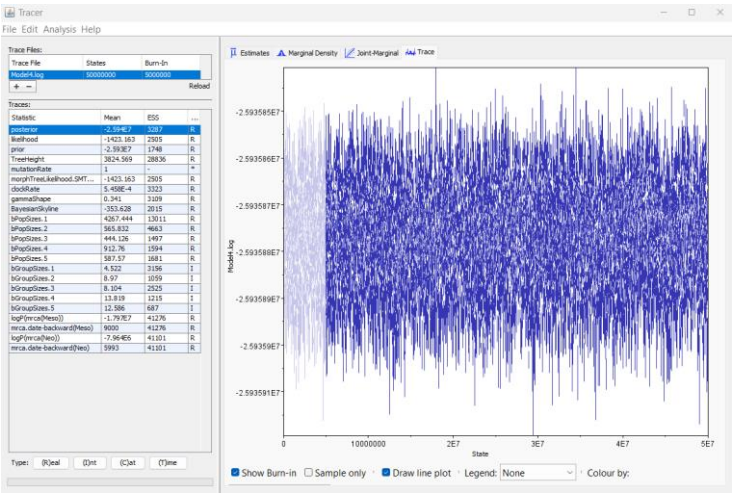
M3 (H_1)


Tracer
File Edit Analysis Help
Trace Files:
Trace File | States | Burn-In
Model3.log | 50000000 | 5000000
Reload
Traces:
Statistic | Mean | ESS
posterior | -2.59E7 | 3047
likelihood | -1427.36 | 1981
prior | -2.593E7 | 1636
TreeHeight | 3834.761 | 26686
mutationRate | 1 | -
morphTreeLikelihood.SMT... | -1427.36 | 1981
clockRate | 6.44E-4 | 2526
gammaShape | 0.59 | 4451
BayesianSkyline | -353.333 | 1918
bPopSizes.1 | 4048.279 | 10465
bPopSizes.2 | 573.763 | 4619
bPopSizes.3 | 420.736 | 2245
bPopSizes.4 | 878.922 | 1466
bPopSizes.5 | 591.414 | 1789
bGroupSizes.1 | 4.676 | 2877
bGroupSizes.2 | 8.64 | 1195
bGroupSizes.3 | 7.939 | 2384
bGroupSizes.4 | 14.048 | 1078
bGroupSizes.5 | 12.698 | 726
logP(mrca[Meso]) | -1.79E7 | 40009
mrca.date-backward(Meso) | 9000 | 40009
logP(mrca[Neo]) | -7.96E6 | 39495
mrca.date-backward(Neo) | 5993 | 39495
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-2.593585E7
-2.593586E7
-2.593587E7
-2.593588E7
-2.593589E7
-2.59359E7
-2.593591E7
-2.593592E7
Model3.log
0 10000000 2E7 3E7 4E7 5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

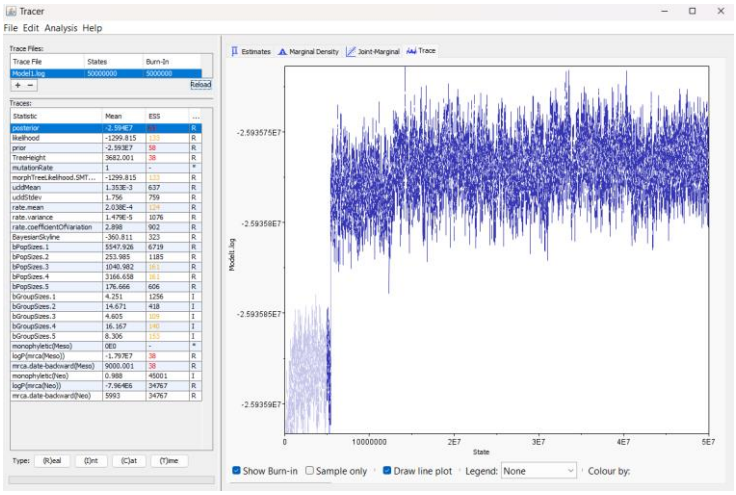
M4 (H_0)


Tracer
File Edit Analysis Help
Trace Files:
Trace File | States | Burn-In
model4.log | 50000000 | 5000000
Reload
Traces:
Statistic | Mean | ESS
posterior | -2.59HE7 | 90
likelihood | -1408.308 | 2137
prior | -2.593E7 | 90
TreeHeight | 3682.001 | 14
mutationRate | 1 | -
morphTreeLikelihood.SMT... | -1408.308 | 2137
clockRate | 5.909E-4 | 2515
gammaShape | 0.366 | 3348
BayesianSkyline | -313.184 | 1071
bPopSizes.1 | 3300.455 | 10390
bPopSizes.2 | 383.274 | 3188
bPopSizes.3 | 322.148 | 884
bPopSizes.4 | 373.288 | 705
bPopSizes.5 | 50.873 | 905
bGroupSizes.1 | 5.359 | 2041
bGroupSizes.2 | 10.584 | 800
bGroupSizes.3 | 13.143 | 635
bGroupSizes.4 | 14.938 | 507
bGroupSizes.5 | 3.976 | 618
monophyletic(Meso) | 0E0 | -
logP(mrca(Meso)) | -1.79E7 | 14
mrca.date-backward(Meso) | 9000.001 | 14
monophyletic(Neo) | 0.986 | 45001
logP(mrca(Neo)) | -7.964E6 | 40859
mrca.date-backward(Neo) | 5993 | 40859
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-2.593575E7
-2.5935775E7
-2.59358E7
-2.5935825E7
-2.593585E7
-2.5935875E7
model4.log
0
10000000
2E7
3E7
4E7
5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

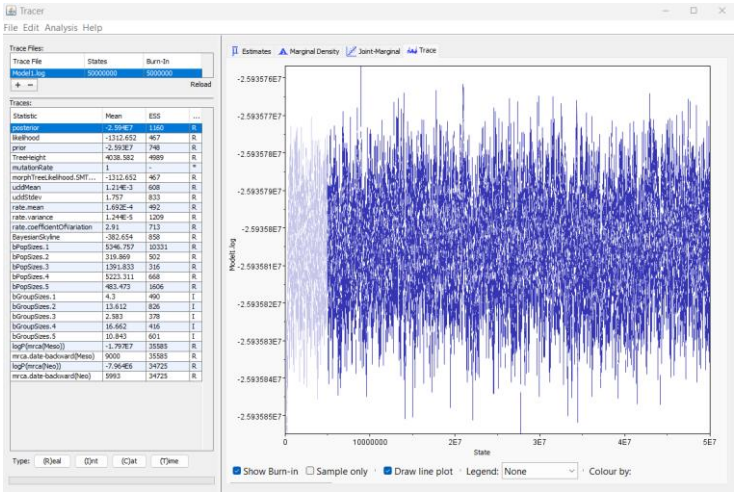
M4 (H_1)


Tracer
File Edit Analysis Help
Trace Files:
Trace File | States | Burn-In
Model4.log | 50000000 | 5000000
Reload
Traces:
Statistic | Mean | ESS
posterior | -2.59HE7 | 3287
likelihood | -1423.163 | 2505
prior | -2.593E7 | 1748
TreeHeight | 3824.569 | 28836
mutationRate | 1 | -
morphTreeLikelihood.SMT... | -1423.163 | 2505
clockRate | 5.458E-4 | 3323
gammaShape | 0.341 | 3109
BayesianSkyline | -353.628 | 2015
bPopSizes.1 | 4267.444 | 13011
bPopSizes.2 | 565.832 | 4663
bPopSizes.3 | 444.126 | 1497
bPopSizes.4 | 912.76 | 1594
bPopSizes.5 | 587.57 | 1681
bGroupSizes.1 | 4.522 | 3196
bGroupSizes.2 | 8.97 | 1059
bGroupSizes.3 | 8.104 | 2525
bGroupSizes.4 | 13.819 | 1215
bGroupSizes.5 | 12.586 | 687
logP(mrca(Meso)) | -1.79E7 | 41276
mrca.date-backward(Meso) | 9000 | 41276
logP(mrca(Neo)) | -7.96+E6 | 41101
mrca.date-backward(Neo) | 5993 | 41101
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-2.593585E7
-2.593586E7
-2.593587E7
-2.593588E7
-2.593589E7
-2.59359E7
-2.593591E7
Model4.log
0
10000000
2E7
3E7
4E7
5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

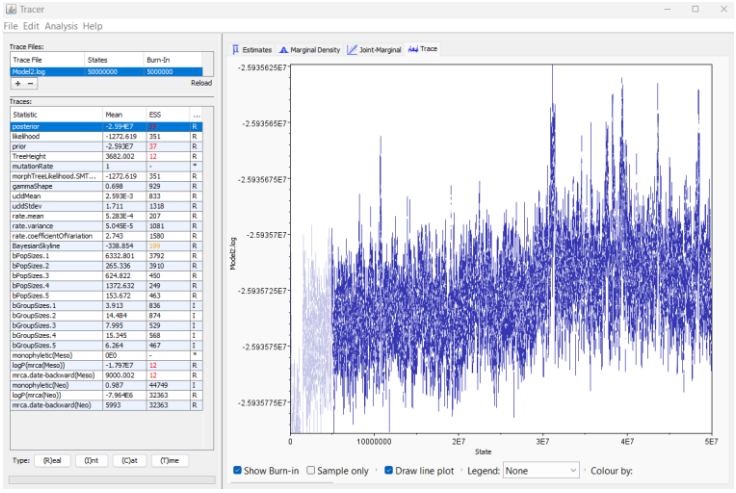
M5 (H_0)


Tracer
File Edit Analysis Help
Trace Files:
Trace File
States
Burn-In
Model1.log
50000000
5000000
Reload
Traces:
Statistic
Mean
ESS
posterior
-2.59E7
likelihood
-1299.815
prior
-2.593E7
TreeHeight
3682.001
mutationRate
1
morphTreeLikelihood.SMT...
-1299.815
ucldMean
1.353E-3
ucldStdev
1.756
rate.mean
2.038E-4
rate.variance
1.479E-5
rate.coefficientOfVariation
2.898
BayesianSkyline
-360.811
bPopSizes.1
5547.926
bPopSizes.2
253.985
bPopSizes.3
1040.982
bPopSizes.4
3166.658
bPopSizes.5
176.666
bGroupSizes.1
4.251
bGroupSizes.2
14.671
bGroupSizes.3
4.605
bGroupSizes.4
16.167
bGroupSizes.5
8.306
monophyletic(Meso)
0E0
logP(mrca(Meso))
-1.797E7
mrca.date-backward(Meso)
9000.001
monophyletic(Neo)
0.988
logP(mrca(Neo))
-7.964E6
mrca.date-backward(Neo)
5993
Type: (R)eal (I)nt (C)at (T)ime
Estimates
Marginal Density
Joint-Marginal
Trace
-2.593575E7
-2.59358E7
-2.593585E7
-2.59359E7
Model1.log
0
10000000
2E7
3E7
4E7
5E7
State
Show Burn-in
Sample only
Draw line plot
Legend:
None
Colour by:

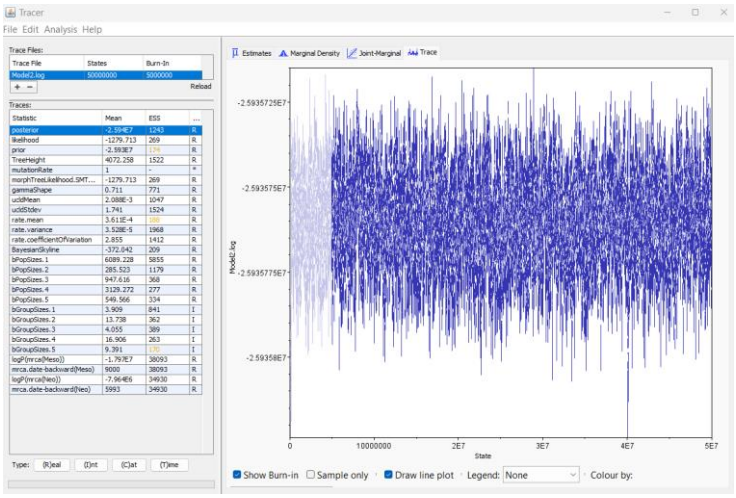
M5 (H_1)


Tracer
File Edit Analysis Help
Trace Files:
Trace File
States
Burn-In
Model1.log
50000000
5000000
Reload
Traces:
Statistic
Mean
ESS
posterior
-2.59E7
1160
likelihood
-1312.652
467
prior
-2.593E7
748
TreeHeight
4038.582
4989
mutationRate
1
morphTreeLikelihood.SMT...
-1312.652
467
ucldMean
1.214E-3
608
ucldStdev
1.757
833
rate.mean
1.693E-4
492
rate.variance
1.24E-5
1209
rate.coefficientOfVariation
2.91
713
BayesianSkyline
-382.654
858
bPopSizes.1
5346.757
10331
bPopSizes.2
319.869
502
bPopSizes.3
1391.833
316
bPopSizes.4
5223.311
668
bPopSizes.5
483.473
1606
bGroupSizes.1
4.3
490
bGroupSizes.2
13.612
826
bGroupSizes.3
2.583
378
bGroupSizes.4
16.462
416
bGroupSizes.5
10.843
601
logP(mrca(Meso))
-1.797E7
35585
mrca.date-backward(Meso)
9000
35585
logP(mrca(Neo))
-7.964E6
34725
mrca.date-backward(Neo)
5993
34725
Type: (R)eal (I)nt (C)at (T)ime
Estimates
Marginal Density
Joint-Marginal
Trace
-2.593576E7
-2.593577E7
-2.593578E7
-2.593579E7
-2.59358E7
-2.593581E7
-2.593582E7
-2.593583E7
-2.593584E7
-2.593585E7
Model1.log
0
10000000
2E7
3E7
4E7
5E7
State
Show Burn-in
Sample only
Draw line plot
Legend:
None
Colour by:

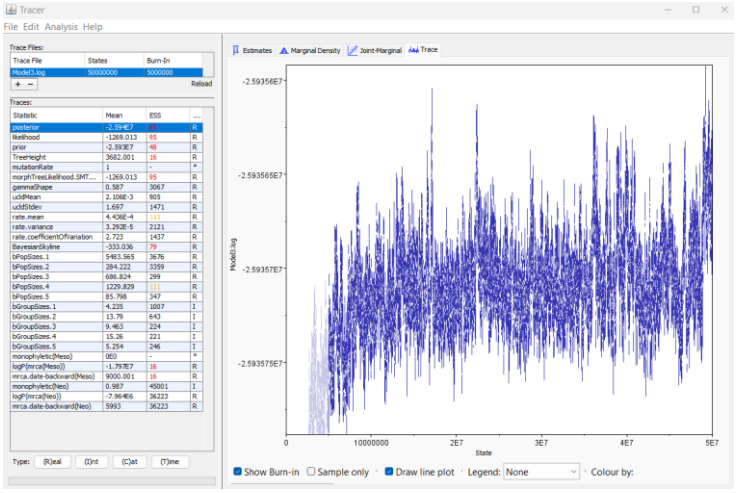
M6 (H_0)


Tracer
File Edit Analysis Help
Trace Files:
Trace File | States | Burn-In
Model2.log | 50000000 | 5000000
Reload
Traces:
Statistic | Mean | ESS
posterior | -2.59E7 | 35
likelihood | -1272.619 | 351
prior | -2.593E7 | 37
TreeHeight | 3682.002 | 12
mutationRate | 1 | -
morphTreeLikelihood.SMT... | -1272.619 | 351
gammaShape | 0.698 | 929
ucldMean | 2.593E-3 | 833
ucldStdev | 1.711 | 1318
rate.mean | 5.283E-4 | 207
rate.variance | 5.048E-5 | 1081
rate.coefficientOfVariation | 2.743 | 1580
BayesianSkyline | -338.854 | 109
bPopSizes.1 | 6332.801 | 3792
bPopSizes.2 | 265.336 | 3910
bPopSizes.3 | 624.822 | 450
bPopSizes.4 | 1372.632 | 249
bPopSizes.5 | 153.672 | 463
bGroupSizes.1 | 3.913 | 836
bGroupSizes.2 | 14.484 | 874
bGroupSizes.3 | 7.995 | 529
bGroupSizes.4 | 15.345 | 568
bGroupSizes.5 | 6.264 | 467
monophyletic(Meso) | 0E0 | -
logP(mrca(Meso)) | -1.797E7 | 12
mrca.date-backward(Meso) | 9000.002 | 12
monophyletic(Neo) | 0.987 | 44749
logP(mrca(Neo)) | -7.964E6 | 32363
mrca.date-backward(Neo) | 5993 | 32363
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-2.5935625E7
-2.593565E7
-2.5935675E7
-2.59357E7
-2.5935725E7
-2.593575E7
-2.5935775E7
Model2.log
0 10000000 2E7 3E7 4E7 5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

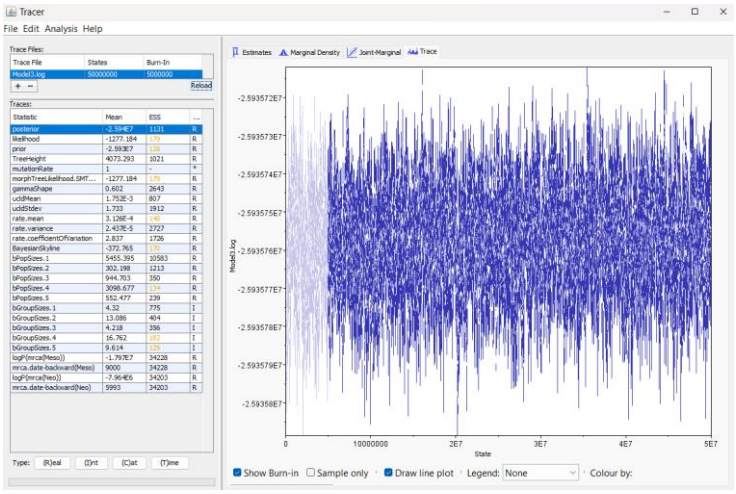
M6 (H_1)


Tracer
File Edit Analysis Help
Trace Files:
Trace File | States | Burn-In
Model2.log | 50000000 | 5000000
Reload
Traces:
Statistic | Mean | ESS
posterior | -2.59E7 | 1243
likelihood | -1279.713 | 269
prior | -2.593E7 | 1357
TreeHeight | 4072.258 | 1522
mutationRate | 1 | -
morphTreeLikelihood.SMT... | -1279.713 | 269
gammaShape | 0.711 | 771
ucldMean | 2.088E-3 | 1047
ucldStdev | 1.741 | 1524
rate.mean | 3.613E-4 | 1357
rate.variance | 3.528E-5 | 1968
rate.coefficientOfVariation | 2.855 | 1412
BayesianSkyline | -372.042 | 209
bPopSizes.1 | 6089.228 | 5855
bPopSizes.2 | 285.523 | 1179
bPopSizes.3 | 947.616 | 368
bPopSizes.4 | 3128.272 | 277
bPopSizes.5 | 549.566 | 334
bGroupSizes.1 | 3.909 | 841
bGroupSizes.2 | 13.738 | 362
bGroupSizes.3 | 4.055 | 389
bGroupSizes.4 | 16.906 | 263
bGroupSizes.5 | 9.391 | 530
logP(mrca(Meso)) | -1.797E7 | 38093
mrca.date-backward(Meso) | 9000 | 38093
logP(mrca(Neo)) | -7.964E6 | 34930
mrca.date-backward(Neo) | 5993 | 34930
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-2.5935725E7
-2.593575E7
-2.5935775E7
-2.59358E7
Model2.log
0 10000000 2E7 3E7 4E7 5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

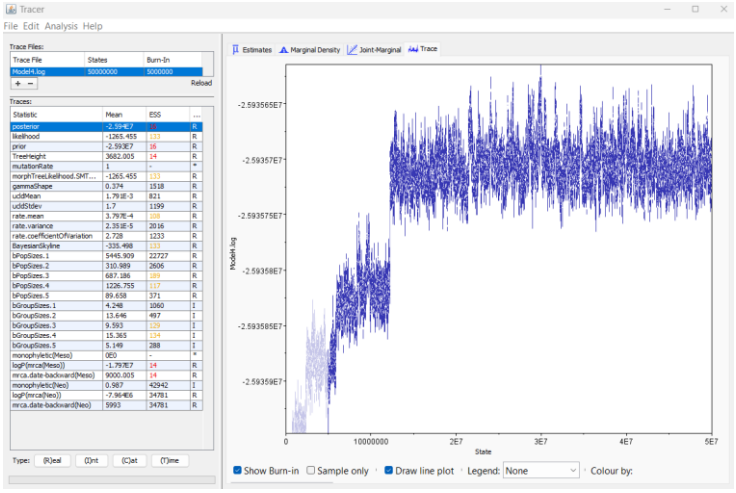
M7 (H_0)


Tracer
File Edit Analysis Help
Trace Files:
Trace File | States | Burn-In
Model3.log | 50000000 | 5000000
Reload
Traces:
Statistic | Mean | ESS
posterior | -2.59HE7 | 83
likelihood | -1269.013 | 95
prior | -2.593E7 | 48
TreeHeight | 3682.001 | 16
mutationRate | 1 | -
morphTreeLikelihood.SMT... | -1269.013 | 95
gammaShape | 0.587 | 3067
uddMean | 2.108E-3 | 903
uddStdev | 1.697 | 1471
rate.mean | 4.436E-4 | 111
rate.variance | 3.292E-5 | 2121
rate.coefficientOfVariation | 2.723 | 1437
BayesianSkyline | -333.036 | 79
bPopSizes.1 | 5483.565 | 3676
bPopSizes.2 | 284.222 | 3359
bPopSizes.3 | 686.824 | 299
bPopSizes.4 | 1229.829 | 111
bPopSizes.5 | 85.798 | 347
bGroupSizes.1 | 4.235 | 1007
bGroupSizes.2 | 13.79 | 643
bGroupSizes.3 | 9.463 | 224
bGroupSizes.4 | 15.26 | 221
bGroupSizes.5 | 5.254 | 246
monophyletic(Meso) | DE0 | -
logP(mrca(Meso)) | -1.79?E7 | 16
mrca.date-backward(Meso) | 9000.001 | 16
monophyletic(Neo) | 0.987 | 45001
logP(mrca(Neo)) | -7.96HE6 | 36223
mrca.date-backward(Neo) | 5993 | 36223
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-2.59356E7
-2.593565E7
-2.59357E7
-2.593575E7
Model3.log
0
10000000
2E7
3E7
4E7
5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

M7 (H_1)


Tracer
File Edit Analysis Help
Trace Files:
Trace File | States | Burn-In
Model3.log | 50000000 | 5000000
Reload
Traces:
Statistic | Mean | ESS
posterior | -2.59HE7 | 1131
likelihood | -1277.184 | 179
prior | -2.593E7 | 128
TreeHeight | 4073.293 | 1021
mutationRate | 1 | -
morphTreeLikelihood.SMT... | -1277.184 | 179
gammaShape | 0.602 | 2643
uddMean | 1.752E-3 | 807
uddStdev | 1.733 | 1912
rate.mean | 3.128E-4 | 140
rate.variance | 2.453E-5 | 2727
rate.coefficientOfVariation | 2.837 | 1726
BayesianSkyline | -372.768 | 1202
bPopSizes.1 | 5455.395 | 10583
bPopSizes.2 | 302.198 | 1213
bPopSizes.3 | 944.703 | 350
bPopSizes.4 | 3098.677 | 139
bPopSizes.5 | 552.477 | 239
bGroupSizes.1 | 4.32 | 775
bGroupSizes.2 | 13.086 | 404
bGroupSizes.3 | 4.218 | 356
bGroupSizes.4 | 16.762 | 182
bGroupSizes.5 | 9.614 | 142
logP(mrca(Meso)) | -1.79?E7 | 34228
mrca.date-backward(Meso) | 9000 | 34228
logP(mrca(Neo)) | -7.96HE6 | 34203
mrca.date-backward(Neo) | 5993 | 34203
Type: (R)eal (I)nt (C)at (T)ime
Estimates Marginal Density Joint-Marginal Trace
-2.593572E7
-2.593573E7
-2.593574E7
-2.593575E7
-2.593576E7
-2.593577E7
-2.593578E7
-2.593579E7
-2.59358E7
Model3.log
0
10000000
2E7
3E7
4E7
5E7
State
Show Burn-in Sample only Draw line plot Legend: None Colour by:

M8 (H_0)


Tracer
File Edit Analysis Help
Trace Files:
Traces:
Estimates
Marginal Density
Joint-Marginal
Trace
Model4.log
State
Show Burn-in
Sample only
Draw line plot
Legend: None
Colour by:

M8 (H_1)

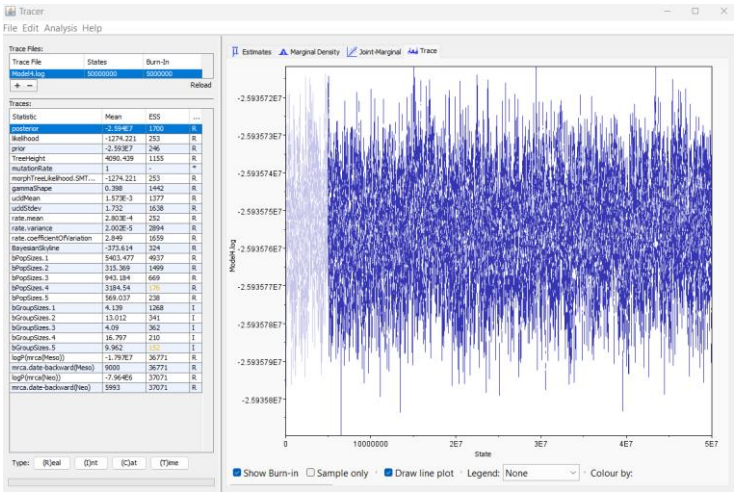

Tracer
File Edit Analysis Help
Trace Files:
Traces:
Estimates
Marginal Density
Joint-Marginal
Trace
Model4.log
State
Show Burn-in
Sample only
Draw line plot
Legend: None
Colour by:

Table 2
Character matrix for raw materials.

Site#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
46	0	0	0	0	1	0	0	0	0	1	0	0	1	1	0
19	0	0	0	0	0	0	1	0	0	1	1	0	1	1	0
27	0	1	0	0	0	0	1	0	0	1	1	1	1	0	0
42	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0
28	0	1	0	0	0	0	1	0	0	1	1	1	1	0	0
22	0	0	0	0	0	0	1	0	0	1	1	1	1	0	0
31	0	1	1	0	0	0	0	0	0	1	1	1	0	0	1
44	0	0	0	0	1	0	1	0	0	1	1	1	1	0	0
32	0	1	0	0	1	0	0	0	1	1	1	1	1	0	1
29	0	1	0	0	0	0	1	0	0	1	1	1	1	1	0
43	0	0	0	0	1	0	0	0	0	1	0	1	1	1	0
38	0	0	0	0	1	0	0	0	1	1	1	1	0	0	1
20	0	0	0	0	0	0	1	0	0	1	1	1	1	1	0
21	0	0	0	0	0	0	1	0	0	1	1	1	1	1	0
23	0	1	0	0	1	0	0	0	0	1	1	1	1	1	1
35	0	1	0	0	1	0	1	0	0	1	1	1	0	1	1
34	0	1	0	0	1	0	1	0	0	1	1	1	0	0	1
1	0	1	0	0	0	0	0	1	0	1	1	1	1	1	0
24	0	1	0	0	0	0	0	0	0	1	1	0	1	0	1
41	0	1	0	0	1	0	1	0	1	1	1	1	1	1	1
25	0	1	0	0	0	0	1	0	0	1	1	1	1	0	1
39	0	1	0	0	0	0	0	0	0	1	1	1	0	1	1
40	0	1	0	0	0	0	0	0	1	1	1	1	0	1	0
45	0	0	0	0	1	0	0	0	0	1	1	1	0	1	1
30	0	1	1	0	0	0	1	0	0	1	1	1	1	1	1
37	0	1	0	0	0	0	0	0	0	1	1	1	1	0	1

36	0	1	0	0	0	0	1	0	0	1	1	1	1	1	1
33	0	1	0	0	1	0	0	0	0	1	1	1	1	1	1
4	0	1	0	0	1	0	1	1	0	1	1	1	1	0	0
8	0	1	0	0	0	0	0	0	0	1	1	1	1	1	0
13	0	1	0	0	1	0	0	1	0	1	1	1	0	1	0
26	1	1	1	1	0	0	0	0	0	1	1	1	1	0	1
5	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0
10	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0
12	1	1	1	0	0	1	0	1	0	0	1	1	1	0	0
16	1	0	0	0	1	0	0	1	0	1	1	1	0	1	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	1	1	1	1	0	0	1	0	1	1	0	1	1	0
6	1	1	1	0	1	0	1	1	0	1	1	1	1	1	0
9	1	1	1	0	0	1	0	0	0	1	1	1	0	0	0
11	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0
15	1	1	1	0	1	1	1	0	0	1	1	1	1	1	0
17	1	0	0	0	1	0	0	1	0	0	1	1	1	1	0
47	1	0	0	0	0	0	0	0	0	1	1	1	0	1	0
3	1	1	1	1	1	1	0	1	0	1	1	1	1	1	0
49	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
7	0	1	0	1	0	0	1	1	0	0	1	1	1	0	0
14	1	0	1	0	1	0	0	1	0	1	1	1	1	1	0
18	1	0	0	0	1	0	0	1	0	1	1	1	0	1	0

1. Rhyolite, 2. Mylonite, 3. Slate, 4. Chert, 5. Greenstone, 6. Anorthosite, 7. Diabase, 8. Basaltic rock, 9. Jasper, 10. Rock crystal/Quartz crystal, 11. Quartz, 12. Quartzite, 13. Sandstone, 14. Pumice, 15. Soapstone.

Table 3
Character matrix for blade cores.

Site#	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
46	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	1	1	0	1
19	0	0	1	0	0	0	0	1	0	1	0	1	1	1	0	0	0	0	0	1
27	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
42	1	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	1
28	0	0	1	0	1	0	0	1	0	1	0	1	0	1	0	0	1	0	0	1
22	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1
31	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1
44	0	0	1	0	1	0	0	1	1	1	1	0	0	1	0	1	0	0	0	1
32	0	0	1	0	0	0	1	1	0	1	0	1	0	1	0	0	1	0	0	1
29	0	0	0	0	0	0	1	1	0	1	1	1	1	1	0	0	1	0	0	1
43	1	0	1	1	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0	1
38	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1
20	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	1	0	0	1
21	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1
35	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1
34	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1
1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	0	1
41	0	0	1	0	1	1	1	1	0	1	0	0	0	1	0	0	0	0	0	1
25	0	0	1	0	0	0	0	0	0	1	1	0	0	1	0	1	0	0	0	1
39	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	1	0	1
40	0	0	1	0	1	0	0	1	0	1	0	1	0	1	0	0	1	0	0	1
45	1	0	1	0	1	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0
30	0	0	1	0	1	0	1	0	0	0	0	1	1	1	0	1	1	1	0	0
37	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0	1

36	0	1	1	0	0	0	1	1	0	0	0	1	0	1	0	1	1	0	0	1
33	0	0	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1
4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1
26	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	1	1	0	1
12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
9	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	0	0	0	0	1
15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	1
17	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1
47	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1
49	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	1
7	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
18	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1

16. Micro blade core (handle core), 17. Micro blade core (keel-shaped), 18. Micro blade core (multifacial & conical), 19. Micro blade core (multifacial & one platform), 20. Micro blade core (unifacial & one platform), 21. Micro blade core (unifacial & two platforms),22. Micro blade core (other & one platform), 23. Micro blade core (fragments), 24. Multifacial blade core (one platform), 25. Unifacial blade core (one platform), 26. Unifacial blade core (two platforms), 27. Unidentified blade core (one platform), 28. Unidentified blade core (two platforms), 29. Bipolar blade core, 30. Cylindrical core, 31. Conical core, 32. One platform, 33. Two platforms, 34. One-sided, 35. Fragments.

Table 4
Character matrix for flakes, blades, and other production residues.

Site#	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
46	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1
19	1	0	0	1	1	1	1	0	0	0	0	0	0	0	1	1
27	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
42	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
28	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
22	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
31	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
44	1	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0
32	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
29	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
43	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	1
38	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
20	1	0	0	1	1	1	1	0	0	0	0	0	0	0	1	1
21	1	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0
23	1	0	0	1	1	1	1	0	0	0	0	0	0	0	1	0
35	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0
34	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
1	1	1	0	0	1	1	1	1	0	0	0	0	1	0	0	0
24	1	0	0	1	1	1	1	0	0	0	0	0	0	0	1	1
41	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
25	1	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0
39	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
40	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
45	1	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0
30	1	0	0	1	1	1	1	0	0	0	0	0	0	0	1	1
37	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0

36	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
33	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
4	1	0	0	0	1	1	1	1	0	0	1	0	0	0	0	1
8	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0
13	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	1
26	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
5	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
10	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1
12	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
16	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1
48	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0
6	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
9	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1
15	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1
17	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1
47	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1
49	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
7	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	1
18	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1

36. Microblade <8mm, 37. Microblade <8mm (Microblade technique), 38. Small blade 8><12mm, 39. Regular blade >12mm, 40. Macro flake, 41. Regular flake, 42. Micro flake, 43. Flakes struck from ground-stone artefacts, 44. Flakes struck from ground flint artefacts, 45. Struck blanks (long and slim), 46. Struck blanks (short and broad), 47. Struck adze blanks (short and broad), 48. struck chisels/blanks (not ground), 49. Struck chisels/blanks ground at edge, 50. ground pieces, 51. Crested blades.

Table 5.
Character matrix for projectile technologies

Site#	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
10	1	0	0	0	0	1	0	1	1	0	1	0	0	1	1	0	0
12	1	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0
16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0
6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
11	1	1	0	0	1	1	1	1	0	1	1	1	0	1	1	1	1
15	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0
17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	1	1	1	1	1	1	0	0	1	0	0	0
49	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

52. Tanged points (a-type), 53. Transverse points, 54. Single-edged points, 55. Triangular (skewed), 56. Slate points (preforms), 57. Slate points (chipped blanks), 58. Slate points (ground blanks), 59. Slate points, 60. Slate points(other/undetermined cross-section), 61. Slate points with triangular cross section (contracting shoulders), 62. Slate point with diamond cross-section (undetermined shoulders), 63. Slate point with diamond cross-section (square shoulders), 64. Slate point with bi-convex cross section, 65. Slate point with bi-convex cross section (contracting shoulders), 66. Slate point with bi-convex cross section (undetermined shoulders) 67. Slate point with bi-convex cross section (square shoulders) 68. Slate point with bi-convex cross section (hanging shoulders)

Table 6.
Character matrix for axes, adzes and other finished objects.

Site#	69	70	71	72	73	74	75	76	77	78	79
46	0	0	0	0	0	0	0	0	1	0	0
19	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	1	0	0
42	0	0	0	0	0	0	1	0	0	0	0
28	0	0	0	0	0	0	0	0	1	0	0
22	0	0	0	0	0	0	1	0	1	0	0
31	0	0	0	0	0	0	0	0	0	0	1
44	0	0	0	0	0	0	1	0	1	1	0
32	0	0	0	0	0	0	0	0	1	0	1
29	0	0	0	0	0	0	1	0	1	0	0
43	0	0	0	0	0	0	1	0	1	0	0
38	0	0	0	0	0	0	0	0	0	0	1
20	0	0	0	0	0	0	0	0	1	0	0
21	0	0	0	0	0	0	0	0	1	0	0
23	0	0	0	0	0	0	0	0	1	0	1
35	0	0	0	0	0	0	0	0	0	0	1
34	0	0	0	0	0	0	0	0	0	0	1
1	0	0	0	0	0	0	0	0	1	0	1
24	0	0	0	0	0	0	0	0	1	0	1
41	0	0	0	0	0	0	1	0	1	1	1
25	0	0	0	0	0	0	0	0	1	0	0
39	0	0	0	0	0	0	0	0	0	0	1
40	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	1	0	1
30	0	0	0	0	0	0	1	0	1	0	1
37	0	0	0	0	0	0	1	0	1	0	1

36	0	0	0	0	0	0	1	0	0	0	1
33	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	1	0	0	0	0	1	0	0
8	0	0	0	0	0	0	0	0	1	0	0
13	0	0	0	0	0	0	0	0	1	0	0
26	0	0	0	0	0	0	0	0	0	0	0
5	1	0	0	0	0	0	0	0	1	0	0
10	0	1	0	0	0	0	0	0	1	0	0
12	1	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	1	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0
2	1	0	1	0	1	0	0	0	1	0	0
6	1	0	0	1	0	0	0	0	1	0	0
9	0	0	0	0	0	0	0	0	0	0	0
11	1	0	0	0	0	0	0	1	1	0	0
15	1	0	0	0	0	0	0	0	1	0	0
17	0	0	0	0	1	0	0	0	1	0	0
47	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	1	0	0	1	0	0
49	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	1	0	0
14	1	0	0	0	0	1	0	0	1	0	0
18	0	0	0	0	0	0	0	0	0	0	0

69. Ground adzes - rectangular cross section (Vestland/Vespestad adzes), Ground adzes - round cross section, 71. Othe bi-convex chisels, 72. Other four-sided chisels, 73. Vespestad adzes, 74. Vestland chisels, 75. Chubby stone adze, 76. Pottery (FBC), 76. Grindstone slabs, 78. Cross-shaped club, 79. Soapstone line sinkers