

# Supplementary Information

## Contents

<b>Parameters used</b>	<b>2</b>
Prior set 1 . . . . .	2
Prior set 2 . . . . .	2
Prior set 3 . . . . .	2
Prior set 4 . . . . .	2
Prior set 5 . . . . .	2
MCMCglmm parameters . . . . .	2
<b>Description of Models</b>	<b>3</b>
Model 1 . . . . .	3
Model 2 . . . . .	4
Model 3 . . . . .	4
Model 4 . . . . .	4
Model 5 . . . . .	4
Correlation Analyses . . . . .	4
Ancestral State Reconstructions . . . . .	4
<b>Analyses including data from congeners</b>	<b>5</b>
Analyses with all data points . . . . .	5
Model 1: <i>Number of Cells</i> ~ <i>Presence of Strict Bottleneck</i> . . . . .	5
Model 2: <i>Number of Cell Types</i> ~ <i>Presence of Strict Bottleneck + log(Number of Cells)</i> . . . . .	9
Model 3: <i>Number of Cells</i> ~ <i>Timing of Germline Segregation</i> . . . . .	13
Model 4: <i>Number of Cell Types</i> ~ <i>Timing of Germline Segregation + log(Number of Cells)</i> . . . . .	17
Model 5: <i>Number of Cell Types</i> ~ <i>Timing of Germline Segregation</i> . . . . .	21
Correlation between germline and fission . . . . .	25
Ancestral state reconstruction . . . . .	27
Analyses with data points from only the animals . . . . .	28
Model 1: <i>Number of Cells</i> ~ <i>Presence of Strict Bottleneck</i> . . . . .	28
Model 2: <i>Number of Cell Types</i> ~ <i>Presence of Strict Bottleneck + log(Number of Cells)</i> . . . . .	32
Model 3: <i>Number of Cells</i> ~ <i>Timing of Germline Segregation</i> . . . . .	36

Model 4: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$ . . . . .	40
Model 5: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation}$ . . . . .	44
Correlation between germline and fission . . . . .	48
Ancestral state reconstruction . . . . .	50
Analyses with data points excluding the animals . . . . .	51
Model 1: $\text{Number of Cells} \sim \text{Presence of Strict Bottleneck}$ . . . . .	51
Model 2: $\text{Number of Cell Types} \sim \text{Presence of Strict Bottleneck} + \log(\text{Number of Cells})$ . . . . .	55
Model 3: $\text{Number of Cells} \sim \text{Timing of Germline Segregation}$ . . . . .	59
Model 4: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$ . . . . .	63
Model 5: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation}$ . . . . .	67
Correlation between germline and fission . . . . .	71
Ancestral state reconstruction . . . . .	73
<b>Analyses including only data from species</b>	<b>74</b>
Analyses with all data points . . . . .	74
Model 1: $\text{Number of Cells} \sim \text{Presence of Strict Bottleneck}$ . . . . .	74
Model 2: $\text{Number of Cell Types} \sim \text{Presence of Strict Bottleneck} + \log(\text{Number of Cells})$ . . . . .	78
Model 3: $\text{Number of Cells} \sim \text{Timing of Germline Segregation}$ . . . . .	82
Model 4: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$ . . . . .	86
Model 5: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation}$ . . . . .	90
Correlation between germline and fission . . . . .	94
Ancestral state reconstruction . . . . .	96
Analyses with data points from only the animals . . . . .	97
Model 1: $\text{Number of Cells} \sim \text{Presence of Strict Bottleneck}$ . . . . .	97
Model 2: $\text{Number of Cell Types} \sim \text{Presence of Strict Bottleneck} + \log(\text{Number of Cells})$ . . . . .	101
Model 3: $\text{Number of Cells} \sim \text{Timing of Germline Segregation}$ . . . . .	105
Model 4: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$ . . . . .	109
Model 5: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation}$ . . . . .	113
Correlation between germline and fission . . . . .	117
Ancestral state reconstruction . . . . .	119
Analyses with data points excluding the animals . . . . .	120
Model 1: $\text{Number of Cells} \sim \text{Presence of Strict Bottleneck}$ . . . . .	120
Model 2: $\text{Number of Cell Types} \sim \text{Presence of Strict Bottleneck} + \log(\text{Number of Cells})$ . . . . .	124
Model 3: $\text{Number of Cells} \sim \text{Timing of Germline Segregation}$ . . . . .	128
Model 4: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$ . . . . .	132
Model 5: $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation}$ . . . . .	136
Correlation between germline and fission . . . . .	140
Ancestral state reconstruction . . . . .	142

## List of Tables

1	Estimates of Fixed Effects for *Model 1* with prior set *p1* for *All* taxa, at the *Genus* level	6
2	Comparisons of Fixed Effects for *Model 1* with prior set *p1* for *All* taxa, at the *Genus* level	6
3	Estimates of Fixed Effects for *Model 1* with prior set *p2* for *All* taxa, at the *Genus* level	7
4	Comparisons of Fixed Effects for *Model 1* with prior set *p2* for *All* taxa, at the *Genus* level	7
5	Estimates of Fixed Effects for *Model 1* with prior set *p3* for *All* taxa, at the *Genus* level	8
6	Comparisons of Fixed Effects for *Model 1* with prior set *p3* for *All* taxa, at the *Genus* level	8
7	Estimates of Fixed Effects for *Model 2* with prior set *p1* for *All* taxa, at the *Genus* level	10
8	Comparisons of Fixed Effects for *Model 2* with prior set *p1* for *All* taxa, at the *Genus* level	10
9	Estimates of Fixed Effects for *Model 2* with prior set *p2* for *All* taxa, at the *Genus* level	11
10	Comparisons of Fixed Effects for *Model 2* with prior set *p2* for *All* taxa, at the *Genus* level	11
11	Estimates of Fixed Effects for *Model 2* with prior set *p3* for *All* taxa, at the *Genus* level	12
12	Comparisons of Fixed Effects for *Model 2* with prior set *p3* for *All* taxa, at the *Genus* level	12
13	Estimates of Fixed Effects for *Model 3* with prior set *p1* for *All* taxa, at the *Genus* level	14
14	Comparisons of Fixed Effects for *Model 3* with prior set *p1* for *All* taxa, at the *Genus* level	14
15	Estimates of Fixed Effects for *Model 3* with prior set *p2* for *All* taxa, at the *Genus* level	15
16	Comparisons of Fixed Effects for *Model 3* with prior set *p2* for *All* taxa, at the *Genus* level	15
17	Estimates of Fixed Effects for *Model 3* with prior set *p3* for *All* taxa, at the *Genus* level	16
18	Comparisons of Fixed Effects for *Model 3* with prior set *p3* for *All* taxa, at the *Genus* level	16
19	Estimates of Fixed Effects for *Model 4* with prior set *p1* for *All* taxa, at the *Genus* level	18
20	Comparisons of Fixed Effects for *Model 4* with prior set *p1* for *All* taxa, at the *Genus* level	18
21	Estimates of Fixed Effects for *Model 4* with prior set *p2* for *All* taxa, at the *Genus* level	19
22	Comparisons of Fixed Effects for *Model 4* with prior set *p2* for *All* taxa, at the *Genus* level	19
23	Estimates of Fixed Effects for *Model 4* with prior set *p3* for *All* taxa, at the *Genus* level	20
24	Comparisons of Fixed Effects for *Model 4* with prior set *p3* for *All* taxa, at the *Genus* level	20
25	Estimates of Fixed Effects for Model *5* with prior set *p1* for *All* taxa, at the *Genus* level	22
26	Comparisons of Fixed Effects for Model *5* with prior set *p1* for *All* taxa, at the *Genus* level	22

27	Estimates of Fixed Effects for Model *5* with prior set *p2* for *All* taxa, at the *Genus* level	23
28	Comparisons of Fixed Effects for Model *5* with prior set *p2* for *All* taxa, at the *Genus* level	23
29	Estimates of Fixed Effects for Model *5* with prior set *p3* for *All* taxa, at the *Genus* level	24
30	Comparisons of Fixed Effects for Model *5* with prior set *p3* for *All* taxa, at the *Genus* level	24
31	Estimates of Fixed Effects for *Model 1* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level	29
32	Comparisons of Fixed Effects for *Model 1* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level	29
33	Estimates of Fixed Effects for *Model 1* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level	30
34	Comparisons of Fixed Effects for *Model 1* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level	30
35	Estimates of Fixed Effects for *Model 1* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level	31
36	Comparisons of Fixed Effects for *Model 1* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level	31
37	Estimates of Fixed Effects for *Model 2* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level	33
38	Comparisons of Fixed Effects for *Model 2* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level	33
39	Estimates of Fixed Effects for *Model 2* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level	34
40	Comparisons of Fixed Effects for *Model 2* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level	34
41	Estimates of Fixed Effects for *Model 2* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level	35
42	Comparisons of Fixed Effects for *Model 2* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level	35
43	Estimates of Fixed Effects for *Model 3* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level	37
44	Comparisons of Fixed Effects for *Model 3* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level	37
45	Estimates of Fixed Effects for *Model 3* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level	38
46	Comparisons of Fixed Effects for *Model 3* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level	38
47	Estimates of Fixed Effects for *Model 3* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level	39
48	Comparisons of Fixed Effects for *Model 3* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level	39
49	Estimates of Fixed Effects for *Model 4* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level	41

50	Comparisons of Fixed Effects for *Model 4* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	41
51	Estimates of Fixed Effects for *Model 4* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	42
52	Comparisons of Fixed Effects for *Model 4* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	42
53	Estimates of Fixed Effects for *Model 4* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	43
54	Comparisons of Fixed Effects for *Model 4* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	43
55	Estimates of Fixed Effects for Model *5* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	45
56	Comparisons of Fixed Effects for Model *5* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	45
57	Estimates of Fixed Effects for Model *5* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	46
58	Comparisons of Fixed Effects for Model *5* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	46
59	Estimates of Fixed Effects for Model *5* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	47
60	Comparisons of Fixed Effects for Model *5* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	47
61	Estimates of Fixed Effects for *Model 1* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	52
62	Comparisons of Fixed Effects for *Model 1* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	52
63	Estimates of Fixed Effects for *Model 1* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	53
64	Comparisons of Fixed Effects for *Model 1* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	53
65	Estimates of Fixed Effects for *Model 1* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	54
66	Comparisons of Fixed Effects for *Model 1* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	54
67	Estimates of Fixed Effects for *Model 2* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	56
68	Comparisons of Fixed Effects for *Model 2* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	56
69	Estimates of Fixed Effects for *Model 2* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	57
70	Comparisons of Fixed Effects for *Model 2* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	57
71	Estimates of Fixed Effects for *Model 2* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	58

72	Comparisons of Fixed Effects for *Model 2* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	58
73	Estimates of Fixed Effects for *Model 3* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	60
74	Comparisons of Fixed Effects for *Model 3* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	60
75	Estimates of Fixed Effects for *Model 3* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	61
76	Comparisons of Fixed Effects for *Model 3* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	61
77	Estimates of Fixed Effects for *Model 3* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	62
78	Comparisons of Fixed Effects for *Model 3* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	62
79	Estimates of Fixed Effects for *Model 4* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	64
80	Comparisons of Fixed Effects for *Model 4* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	64
81	Estimates of Fixed Effects for *Model 4* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	65
82	Comparisons of Fixed Effects for *Model 4* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	65
83	Estimates of Fixed Effects for *Model 4* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	66
84	Comparisons of Fixed Effects for *Model 4* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	66
85	Estimates of Fixed Effects for *Model 5* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	68
86	Comparisons of Fixed Effects for Model *5* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	68
87	Estimates of Fixed Effects for *Model 5* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	69
88	Comparisons of Fixed Effects for Model *5* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	69
89	Estimates of Fixed Effects for *Model 5* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	70
90	Comparisons of Fixed Effects for Model *5* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	70
91	Estimates of Fixed Effects for *Model 1* with prior set *p1* for *All* taxa, at the *Species* level . . . . .	75
92	Comparisons of Fixed Effects for *Model 1* with prior set *p1* for *All* taxa, at the *Species* level . . . . .	75
93	Estimates of Fixed Effects for *Model 1* with prior set *p2* for *All* taxa, at the *Species* level . . . . .	76
94	Comparisons of Fixed Effects for *Model 1* with prior set *p2* for *All* taxa, at the *Species* level . . . . .	76

95	Estimates of Fixed Effects for *Model 1* with prior set *p3* for *All* taxa, at the *Species* level	77
96	Comparisons of Fixed Effects for *Model 1* with prior set *p3* for *All* taxa, at the *Species* level	77
97	Estimates of Fixed Effects for *Model 2* with prior set *p1* for *All* taxa, at the *Species* level	79
98	Comparisons of Fixed Effects for *Model 2* with prior set *p1* for *All* taxa, at the *Species* level	79
99	Estimates of Fixed Effects for *Model 2* with prior set *p2* for *All* taxa, at the *Species* level	80
100	Comparisons of Fixed Effects for *Model 2* with prior set *p2* for *All* taxa, at the *Species* level	80
101	Estimates of Fixed Effects for *Model 2* with prior set *p3* for *All* taxa, at the *Species* level	81
102	Comparisons of Fixed Effects for *Model 2* with prior set *p3* for *All* taxa, at the *Species* level	81
103	Estimates of Fixed Effects for *Model 3* with prior set *p1* for *All* taxa, at the *Species* level	83
104	Comparisons of Fixed Effects for *Model 3* with prior set *p1* for *All* taxa, at the *Species* level	83
105	Estimates of Fixed Effects for *Model 3* with prior set *p2* for *All* taxa, at the *Species* level	84
106	Comparisons of Fixed Effects for *Model 3* with prior set *p2* for *All* taxa, at the *Species* level	84
107	Estimates of Fixed Effects for *Model 3* with prior set *p3* for *All* taxa, at the *Species* level	85
108	Comparisons of Fixed Effects for *Model 3* with prior set *p3* for *All* taxa, at the *Species* level	85
109	Estimates of Fixed Effects for *Model 4* with prior set *p1* for *All* taxa, at the *Species* level	87
110	Comparisons of Fixed Effects for *Model 4* with prior set *p1* for *All* taxa, at the *Species* level	87
111	Estimates of Fixed Effects for *Model 4* with prior set *p2* for *All* taxa, at the *Species* level	88
112	Comparisons of Fixed Effects for *Model 4* with prior set *p2* for *All* taxa, at the *Species* level	88
113	Estimates of Fixed Effects for *Model 4* with prior set *p3* for *All* taxa, at the *Species* level	89
114	Comparisons of Fixed Effects for *Model 4* with prior set *p3* for *All* taxa, at the *Species* level	89
115	Estimates of Fixed Effects for Model *5* with prior set *p1* for *All* taxa, at the *Species* level	91
116	Comparisons of Fixed Effects for Model *5* with prior set *p1* for *All* taxa, at the *Species* level	91
117	Estimates of Fixed Effects for Model *5* with prior set *p2* for *All* taxa, at the *Species* level	92
118	Comparisons of Fixed Effects for Model *5* with prior set *p2* for *All* taxa, at the *Species* level	92
119	Estimates of Fixed Effects for Model *5* with prior set *p3* for *All* taxa, at the *Species* level	93
120	Comparisons of Fixed Effects for Model *5* with prior set *p3* for *All* taxa, at the *Species* level	93
121	Estimates of Fixed Effects for *Model 1* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level	98

122 Comparisons of Fixed Effects for *Model 1* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	98
123 Estimates of Fixed Effects for *Model 1* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	99
124 Comparisons of Fixed Effects for *Model 1* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	99
125 Estimates of Fixed Effects for *Model 1* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	100
126 Comparisons of Fixed Effects for *Model 1* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	100
127 Estimates of Fixed Effects for *Model 2* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	102
128 Comparisons of Fixed Effects for *Model 2* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	102
129 Estimates of Fixed Effects for *Model 2* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	103
130 Comparisons of Fixed Effects for *Model 2* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	103
131 Estimates of Fixed Effects for *Model 2* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	104
132 Comparisons of Fixed Effects for *Model 2* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	104
133 Estimates of Fixed Effects for *Model 3* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	106
134 Comparisons of Fixed Effects for *Model 3* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	106
135 Estimates of Fixed Effects for *Model 3* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	107
136 Comparisons of Fixed Effects for *Model 3* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	107
137 Estimates of Fixed Effects for *Model 3* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	108
138 Comparisons of Fixed Effects for *Model 3* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	108
139 Estimates of Fixed Effects for *Model 4* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	110
140 Comparisons of Fixed Effects for *Model 4* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	110
141 Estimates of Fixed Effects for *Model 4* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	111
142 Comparisons of Fixed Effects for *Model 4* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	111
143 Estimates of Fixed Effects for *Model 4* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	112

144 Comparisons of Fixed Effects for *Model 4* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	112
145 Estimates of Fixed Effects for Model *5* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	114
146 Comparisons of Fixed Effects for Model *5* with prior set *p1* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	114
147 Estimates of Fixed Effects for Model *5* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	115
148 Comparisons of Fixed Effects for Model *5* with prior set *p2* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	115
149 Estimates of Fixed Effects for Model *5* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	116
150 Comparisons of Fixed Effects for Model *5* with prior set *p3* for *OnlyAnimals* taxa, at the *Genus* level . . . . .	116
151 Estimates of Fixed Effects for Model *5* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	121
152 Comparisons of Fixed Effects for Model *5* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	121
153 Estimates of Fixed Effects for Model *5* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	122
154 Comparisons of Fixed Effects for Model *5* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	122
155 Estimates of Fixed Effects for Model *5* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	123
156 Comparisons of Fixed Effects for Model *5* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	123
157 Estimates of Fixed Effects for *Model 2* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	125
158 Comparisons of Fixed Effects for *Model 2* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	125
159 Estimates of Fixed Effects for *Model 2* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	126
160 Comparisons of Fixed Effects for *Model 2* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	126
161 Estimates of Fixed Effects for *Model 2* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	127
162 Comparisons of Fixed Effects for *Model 2* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	127
163 Estimates of Fixed Effects for *Model 3* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	129
164 Comparisons of Fixed Effects for *Model 3* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	129
165 Estimates of Fixed Effects for *Model 3* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	130

166 Comparisons of Fixed Effects for *Model 3* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	130
167 Estimates of Fixed Effects for *Model 3* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	131
168 Comparisons of Fixed Effects for *Model 3* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	131
169 Estimates of Fixed Effects for *Model 4* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	133
170 Comparisons of Fixed Effects for *Model 4* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	133
171 Estimates of Fixed Effects for *Model 4* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	134
172 Comparisons of Fixed Effects for *Model 4* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	134
173 Estimates of Fixed Effects for *Model 4* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	135
174 Comparisons of Fixed Effects for *Model 4* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	135
175 Estimates of Fixed Effects for Model *5* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	137
176 Comparisons of Fixed Effects for Model *5* with prior set *p1* for *NoAnimals* taxa, at the *Genus* level . . . . .	137
177 Estimates of Fixed Effects for Model *5* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	138
178 Comparisons of Fixed Effects for Model *5* with prior set *p2* for *NoAnimals* taxa, at the *Genus* level . . . . .	138
179 Estimates of Fixed Effects for Model *5* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	139
180 Comparisons of Fixed Effects for Model *5* with prior set *p3* for *NoAnimals* taxa, at the *Genus* level . . . . .	139

## Parameters used

Priors sets 1, 2, and 3 were used for testing the effects of strict bottlenecks and germline timing on number of cells and number of cell types Prior set 4 was used for testing for a phylogenetic correlation between early germline segregation and the presence of a strict bottleneck

### Prior set 1

```
p1=list(R = list(V = 1, nu=0.002), G = list(G1=list(V = 1, nu = 0.002)))
```

### Prior set 2

```
p2=list(R=list(V=1, nu=1), G=list(G1=list(V=1, nu=1, alpha.mu=0, alpha.var=1000)))
```

### Prior set 3

```
p3=list(R=list(V=1, nu=2), G=list(G1=list(V=1, nu=2, alpha.mu=0, alpha.var=1000)))
```

### Prior set 4

```
p4=list(B=list(mu=c(0,0), V=diag(c(1+pi^2/3,1+pi^2/3))), R = list(V = diag(2),nu=1, fix=1), G = list(G1=list(V = diag(2), nu = 1, alpha.mu = c(0,0), alpha.V = diag(c(1000,1000)))))
```

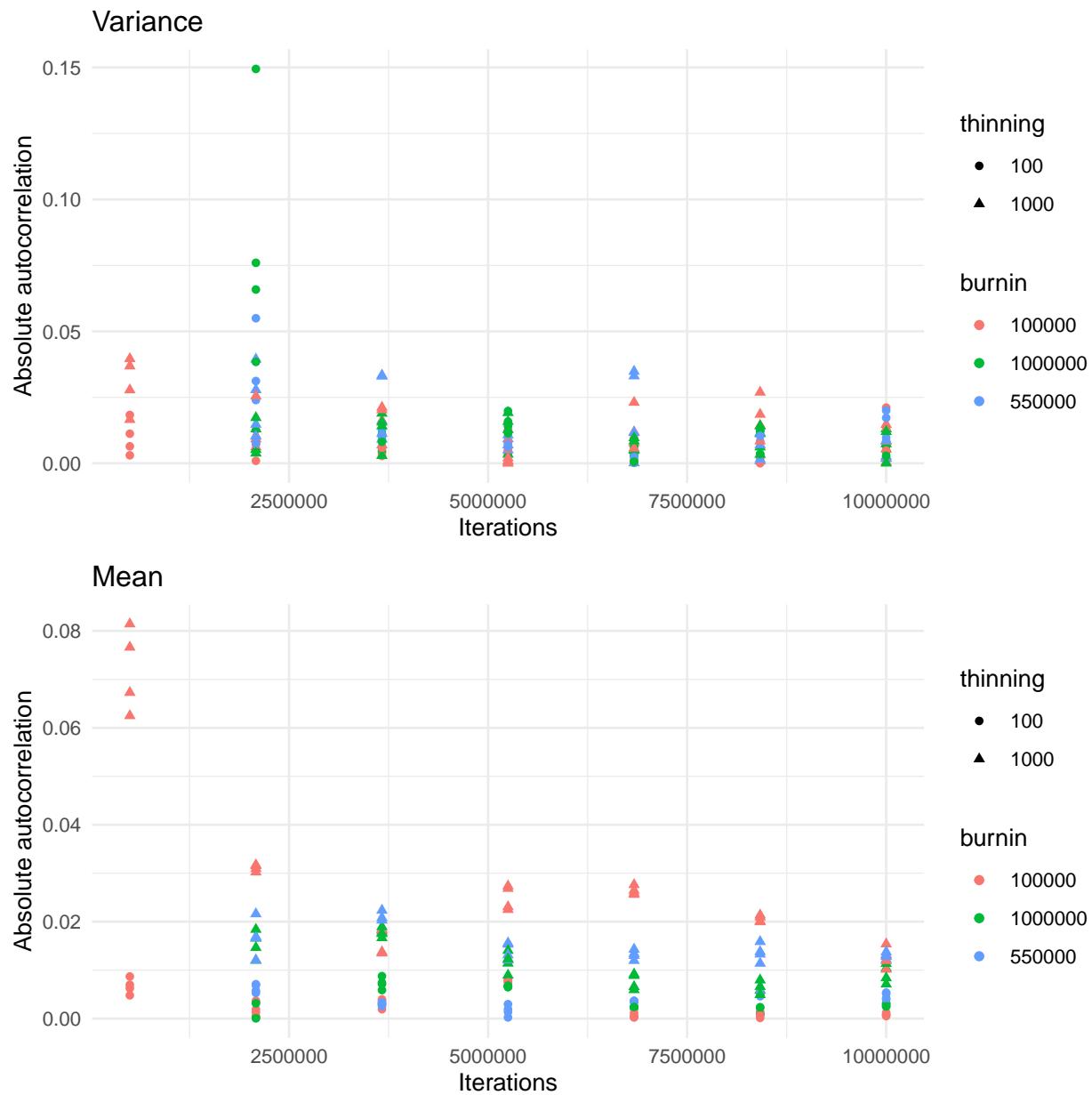
### Prior set 5

```
p5 = list(B=list(mu=c(0), V=1+pi^2/3),R = list(V = 1, nu=1,fix=1), G = list(G1=list(V=1, nu=1, alpha.mu=0, alpha.V=1000)))
```

## MCMCglmm parameters

- iterations:  $8 \times 10^6$
- burnin:  $10^6$
- thinning: 1000
- number of chains: 6

These parameters were decided based on running Model 1 over a range of parameters to determine the combination that limited variance.



## Description of Models

### Model 1

*Number of Cells ~ Presence of Strict Bottleneck.*

Priors used: p1, p2, p3

Family = Poisson.

Code in RScripts/4\_Model1\_ROT.R

## Model 2

$\text{Number of Cell Types} \sim \text{Presence of Strict Bottleneck} + \log(\text{Number of Cells})$  Priors used: p1, p2, p3

Family = Poisson

Code in `RScripts/5_Model2_ROT.R`

The logged values of the number of cells were scaled

## Model 3

$\text{Number of Cells} \sim \text{Timing of Germline Segregation}$  Priors used: p1, p2, p3

Family = Poisson

Code in `RScripts/6_Model3_ROT.R`

## Model 4

$\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$  Priors used: p1, p2, p3

Family = Poisson

Code in `RScripts/7_Model4_ROT.R`

The logged values of the number of cells were scaled

## Model 5

$\text{Number of Cell Types} \sim \text{Timing of Germline Segregation}$

Family = Poisson

Code in `RScripts/9_GermlineWithoutCellNumber.R`

## Correlation Analyses

$(\text{Presence of Strict Bottleneck}, \text{Early vs Late Germline Timing}) \sim \text{trait-1}$

Code in `RScripts/8_Multiresponse_ROT.R`

## Ancestral State Reconstructions

For ancestral state reconstruction, we constructed four models: 1 with each of our explanatory variables as the response variable, and only the phylogeny (as an inverse matrix). This gives the intercept of the trait of interest.

The models run were therefore:

$\text{Number of Cell Types} \sim 1$

$\text{Number of Cells} \sim 1$

$\text{Presence of strict bottleneck} \sim 1$

$\text{Timing of Germline Segregation} \sim 1$

Code in `RScripts/10_AncestralStateReconstructions.R`

Analyses including data from congeners

Analyses with all data points

Model 1: *Number of Cells ~ Presence of Strict Bottleneck*

Table 1: Estimates of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	14.78 (0.6, 26.84)	0.044
Fission1	12.01 (-1.3, 25.1)	0.071

Table 2: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	1.8 (-0.62, 3.74)	0.141

Model 1, prior set p1

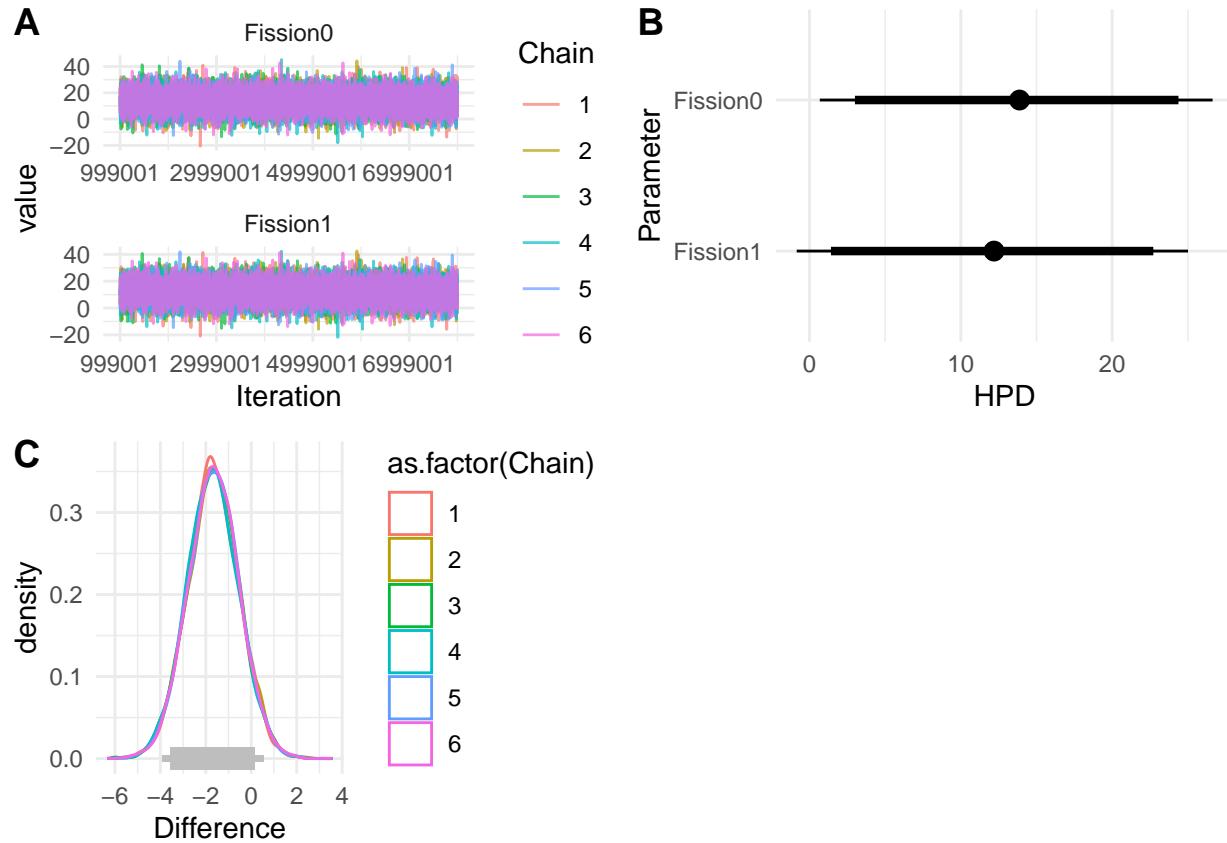


Table 3: Estimates of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	14.08 (0.9, 26.55)	0.035
Fission1	10.99 (-0.52, 25.33)	0.056

Table 4: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	2.05 (-0.53, 3.91)	0.135

Model 1, prior set p2

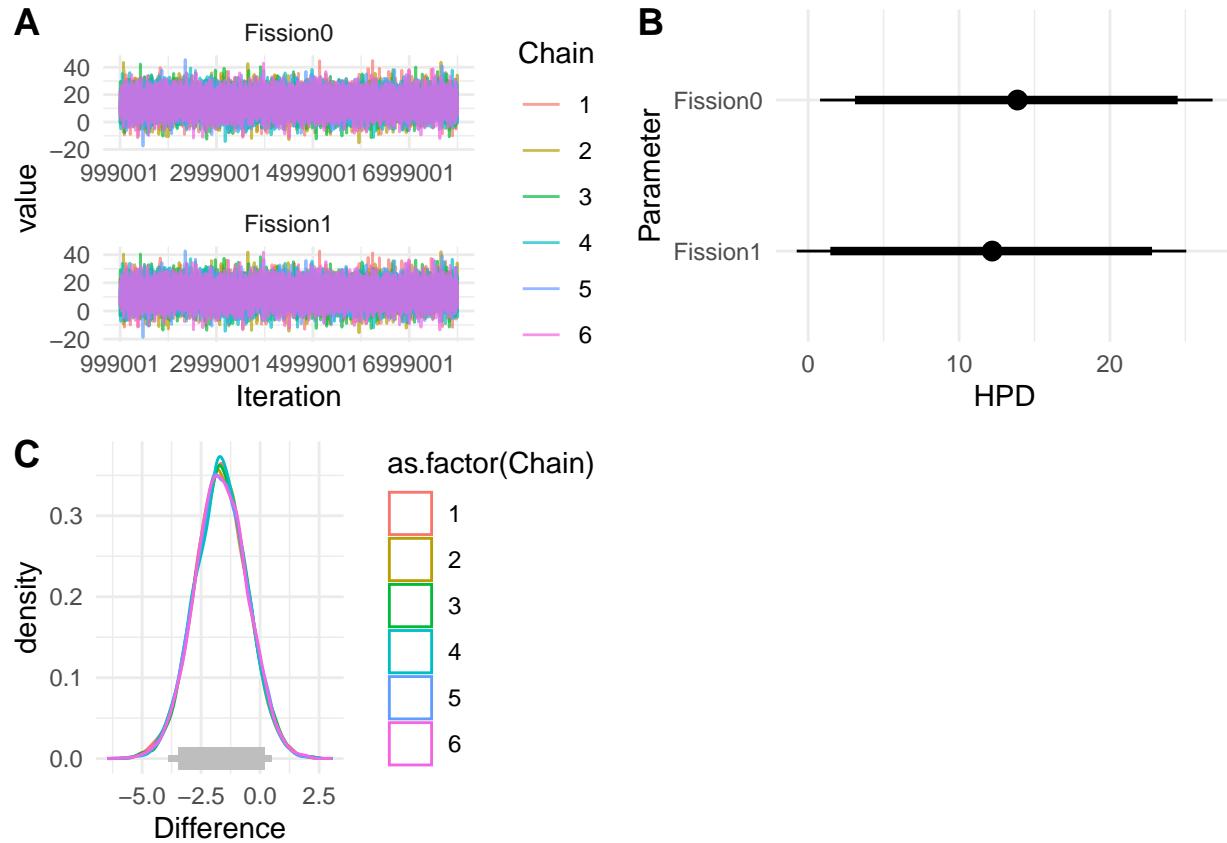


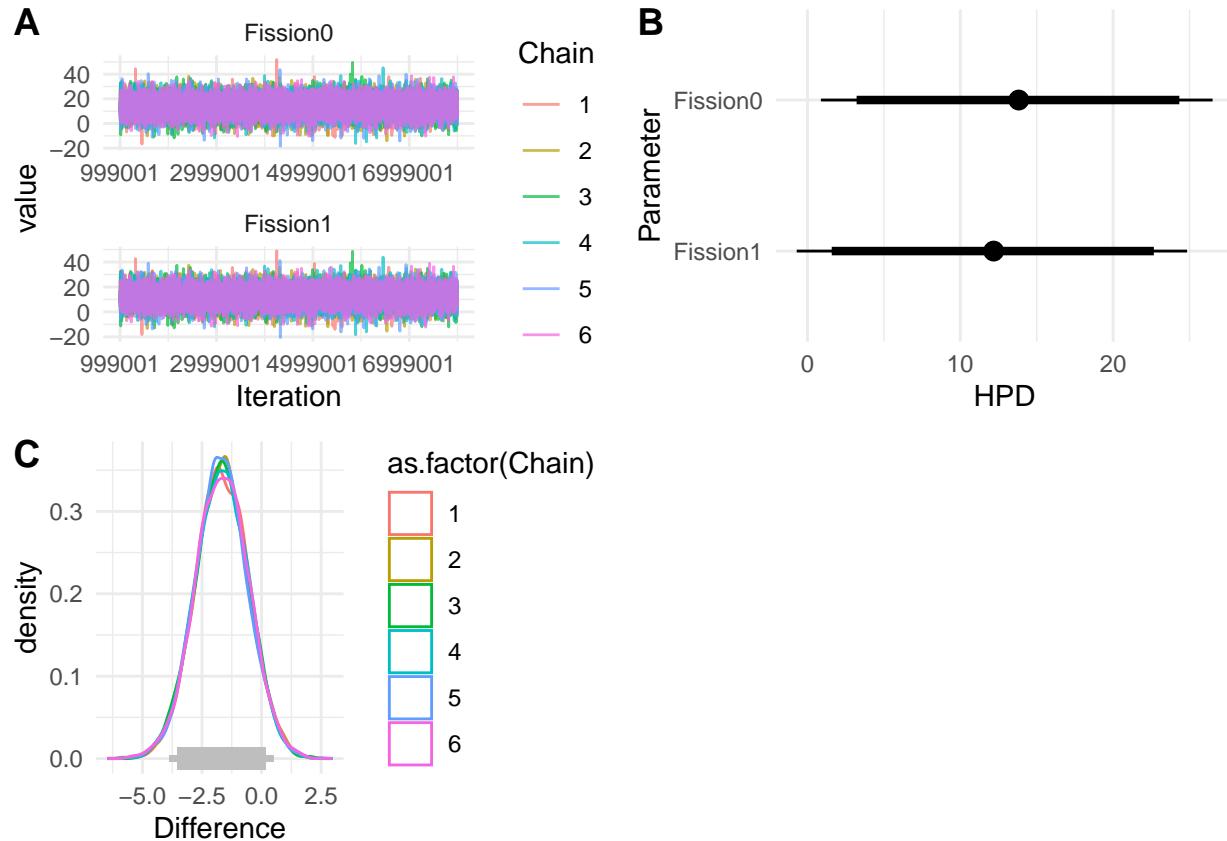
Table 5: Estimates of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	14.26 (0.81, 26.51)	0.042
Fission1	11.77 (-0.75, 24.76)	0.066

Table 6: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	1.89 (-0.6, 3.77)	0.145

Model 1, prior set p3



Model 2:  $\text{Number of Cell Types} \sim \text{Presence of Strict Bottleneck} + \log(\text{Number of Cells})$

Table 7: Estimates of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.31 (1.19, 3.04)	0
Fission1	2.13 (1.28, 3.1)	0
scale(log(Number))	0.52 (0.41, 0.63)	0

Table 8: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	-0.05 (-0.23, 0.15)	0.612
Fission0 vs scale(log(Number))	1.74 (0.64, 2.49)	0.003
Fission1 vs scale(log(Number))	1.72 (0.74, 2.56)	0.002

Model 2, prior set p1

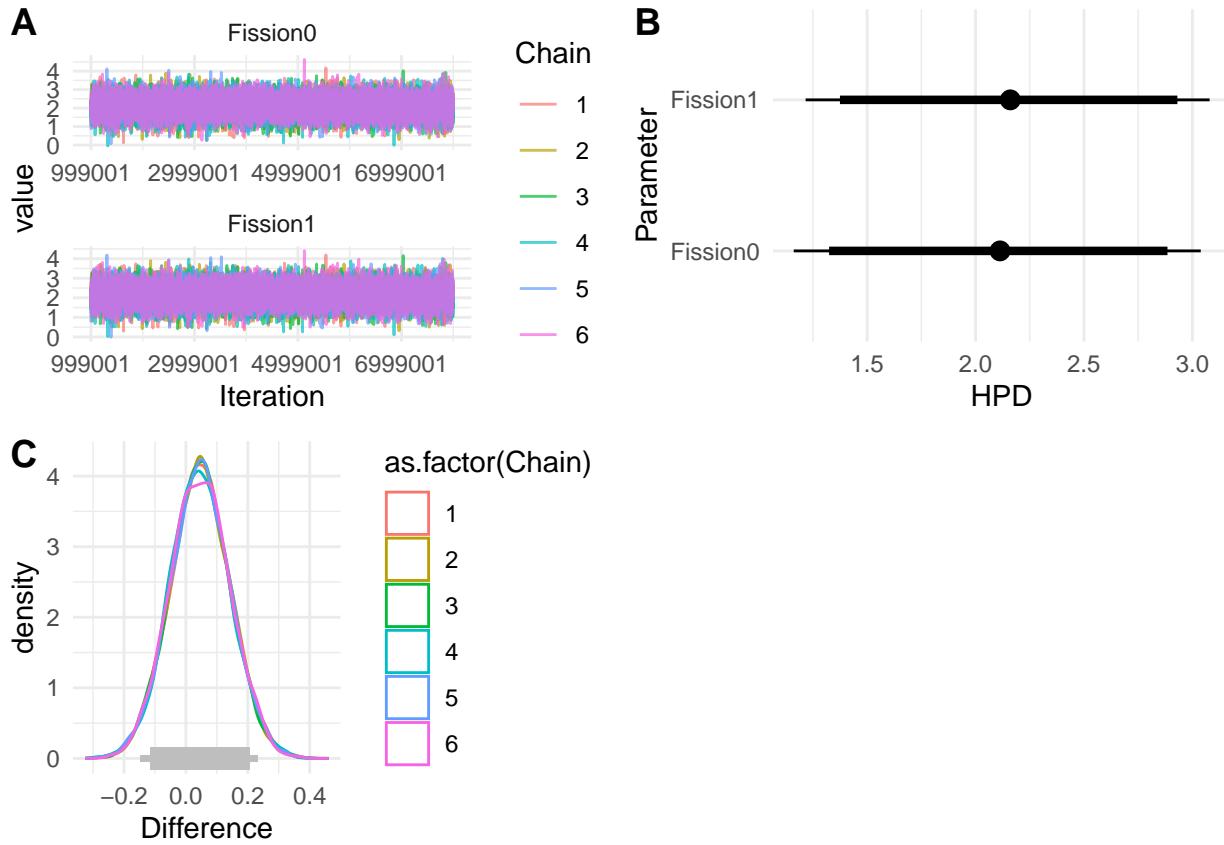


Table 9: Estimates of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.24 (1.29, 2.96)	0
Fission1	2.18 (1.33, 3.02)	0
scale(log(Number))	0.53 (0.43, 0.68)	0

Table 10: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	-0.03 (-0.25, 0.18)	0.702
Fission0 vs scale(log(Number))	1.5 (0.72, 2.42)	0.000
Fission1 vs scale(log(Number))	1.66 (0.77, 2.46)	0.000

Model 2, prior set p2

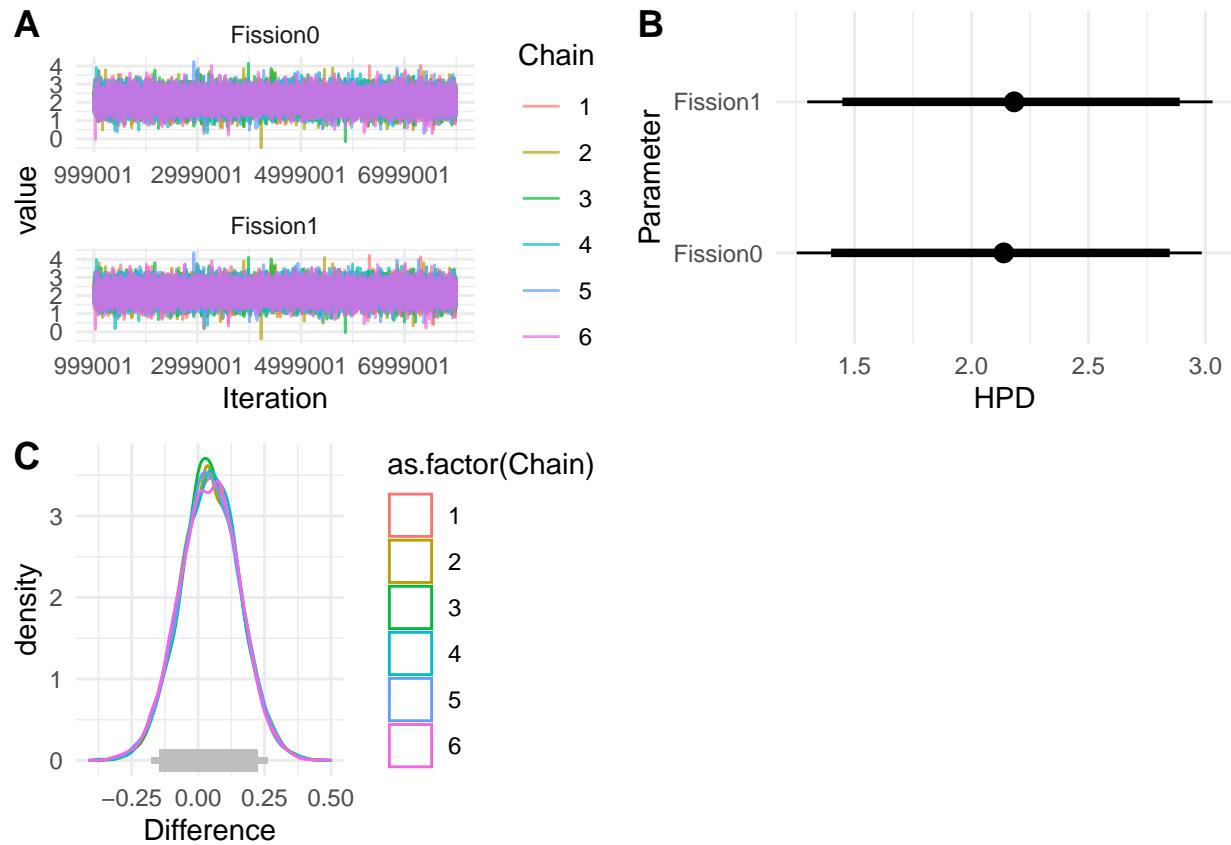


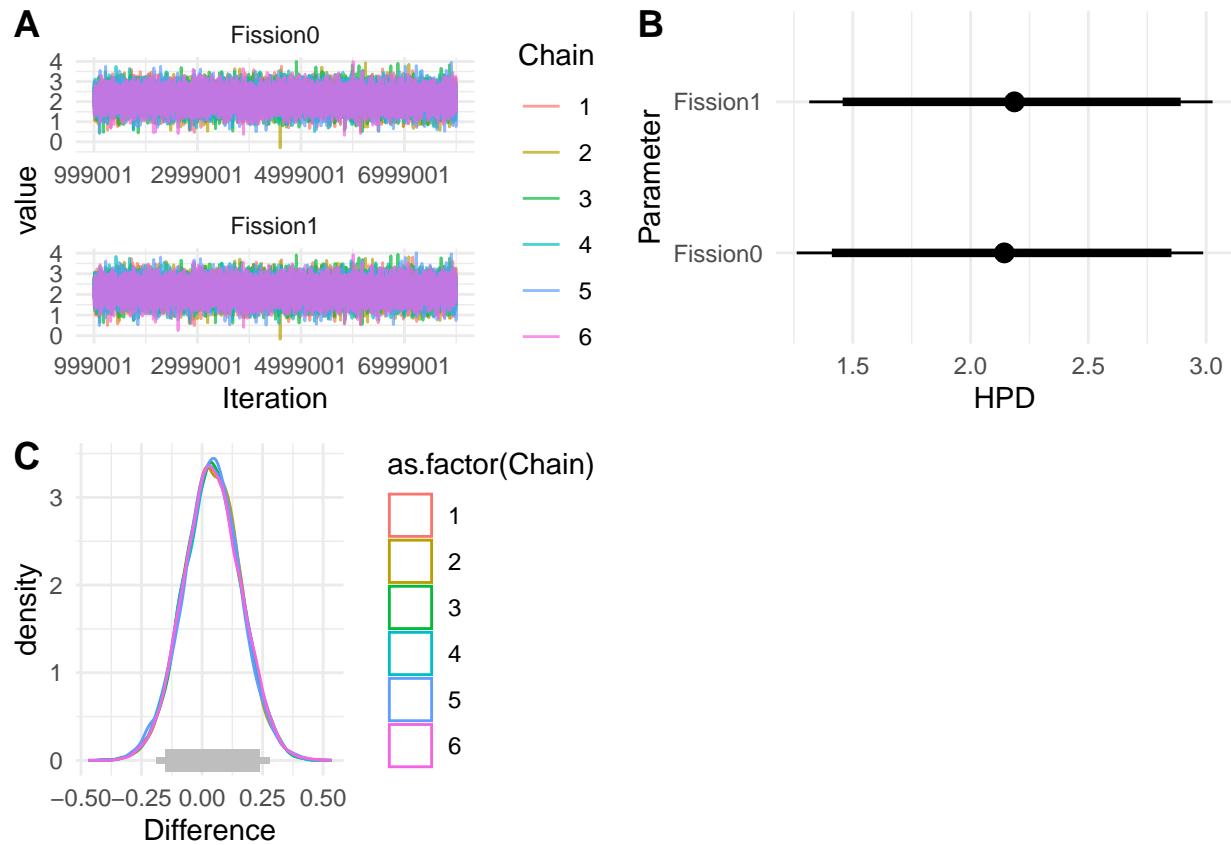
Table 11: Estimates of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.19 (1.31, 3.03)	0
Fission1	2.2 (1.33, 3.03)	0
scale(log(Number))	0.57 (0.43, 0.7)	0

Table 12: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	-0.02 (-0.28, 0.18)	0.720
Fission0 vs scale(log(Number))	1.57 (0.75, 2.48)	0.001
Fission1 vs scale(log(Number))	1.68 (0.74, 2.46)	0.001

Model 2, prior set p3



**Model 3:** *Number of Cells*  $\sim$  *Timing of Germline Segregation*

Table 13: Estimates of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	14.83 (-0.29, 25.84)	0.055
GermTimeSimpearly	14.63 (-1.39, 26.22)	0.068

Table 14: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.5 (-4.81, 4.45)	0.933

Model 3, prior set p1

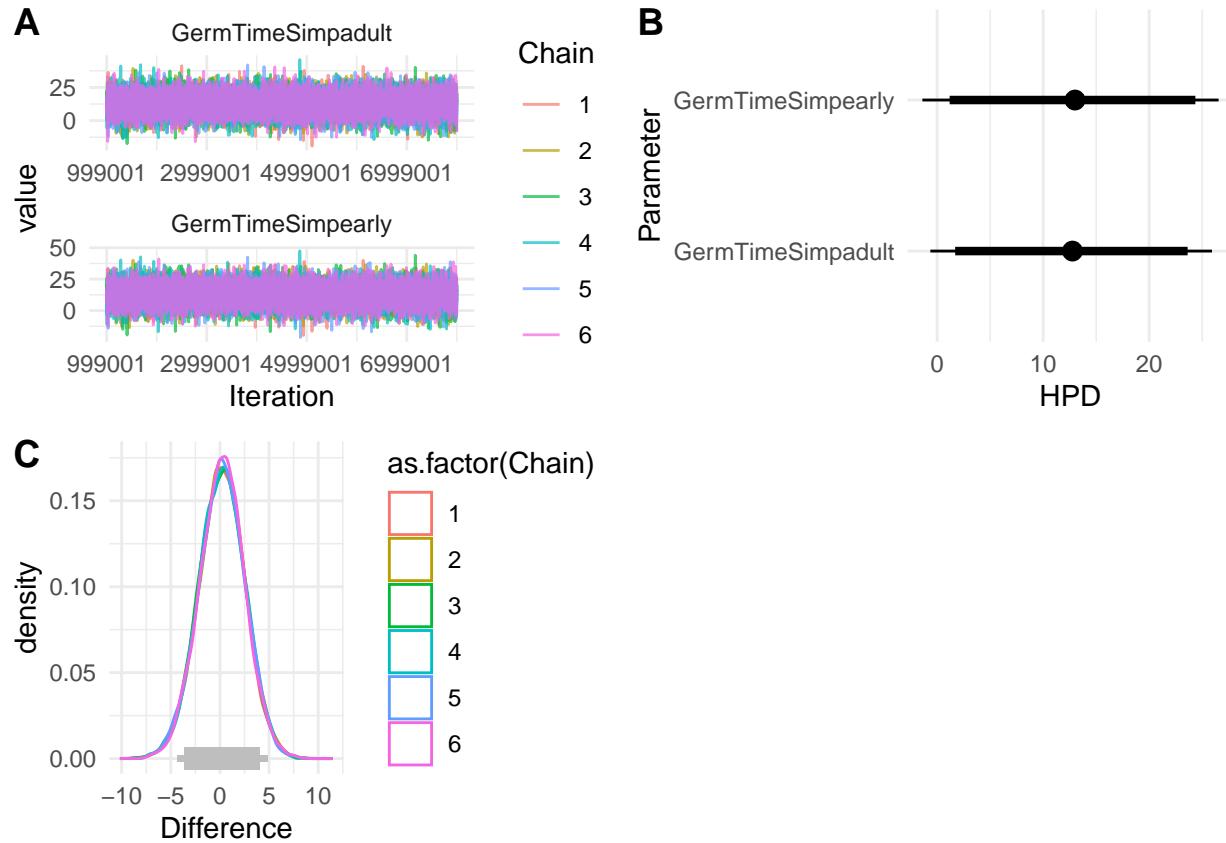


Table 15: Estimates of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	12.19 (0.25, 26.43)	0.059
GermTimeSimpearly	11.93 (-0.9, 26.63)	0.069

Table 16: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.39 (-4.5, 4.6)	0.903

Model 3, prior set p2

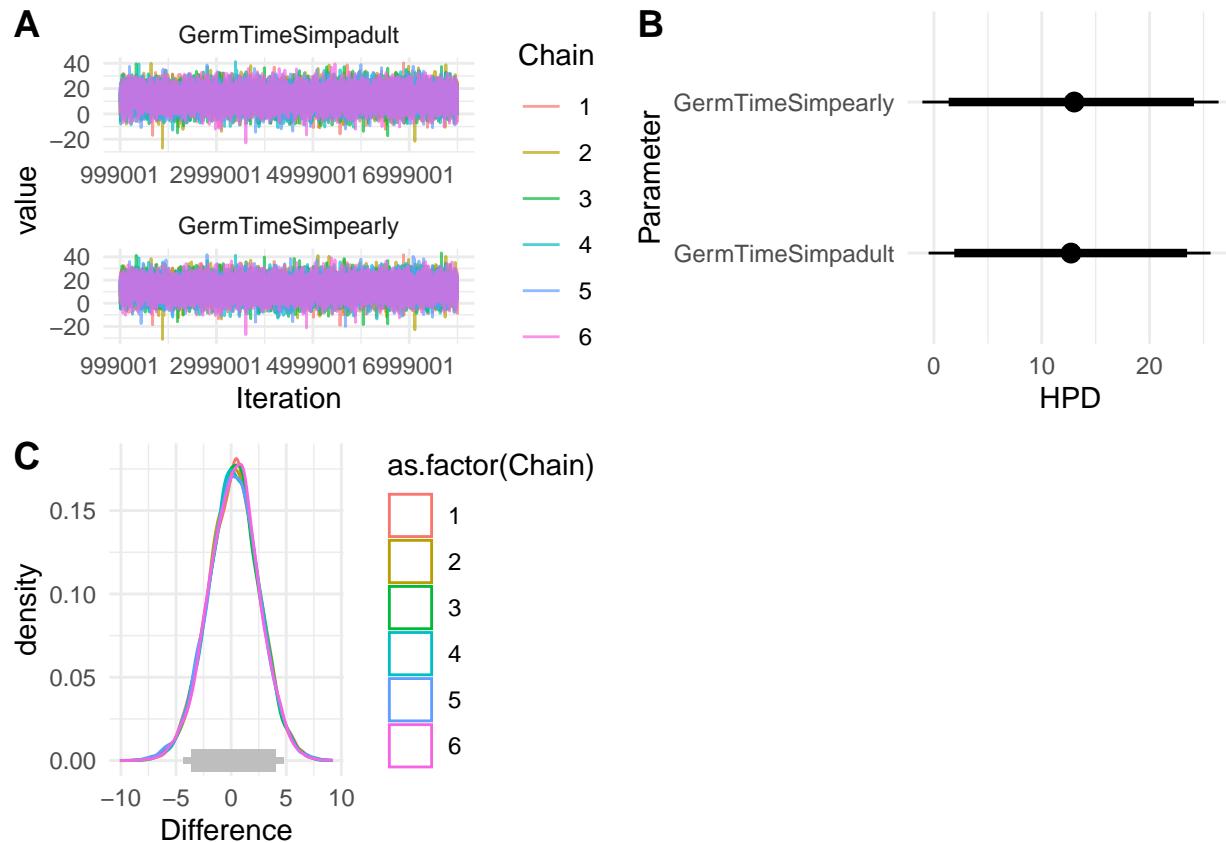


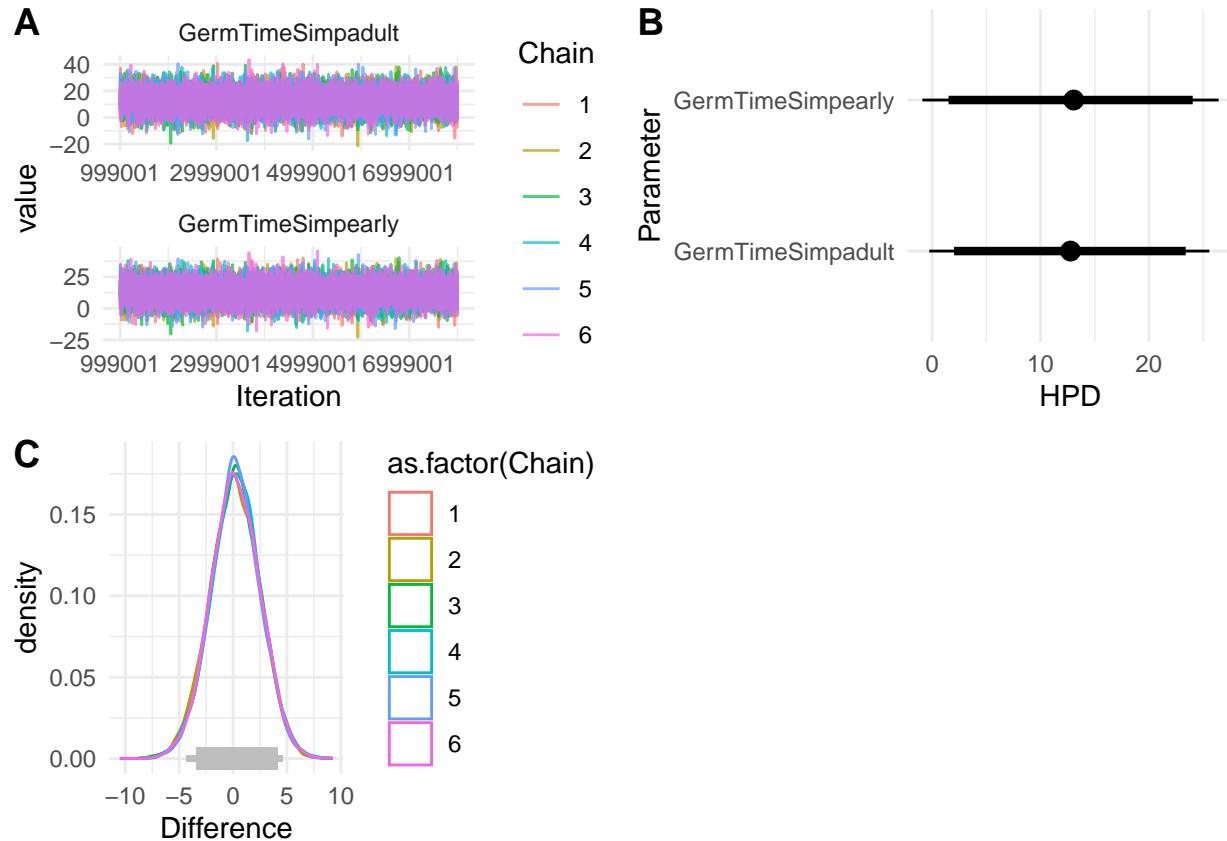
Table 17: Estimates of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	12.11 (-0.31, 25.85)	0.059
GermTimeSimpearly	13.64 (-0.92, 26.35)	0.070

Table 18: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.18 (-4.71, 4.24)	0.914

Model 3, prior set p3



**Model 4:**  $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$

Table 19: Estimates of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.04 (1.25, 2.96)	0
GermTimeSimpearly	2.65 (1.63, 3.44)	0
scale(log(Number))	0.51 (0.42, 0.63)	0

Table 20: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.43 (-0.8, -0.09)	0.014
GermTimeSimpadult vs scale(log(Number))	1.65 (0.66, 2.38)	0.001
GermTimeSimpearly vs scale(log(Number))	2.01 (1.11, 2.91)	0.000

Model 4, prior set p1

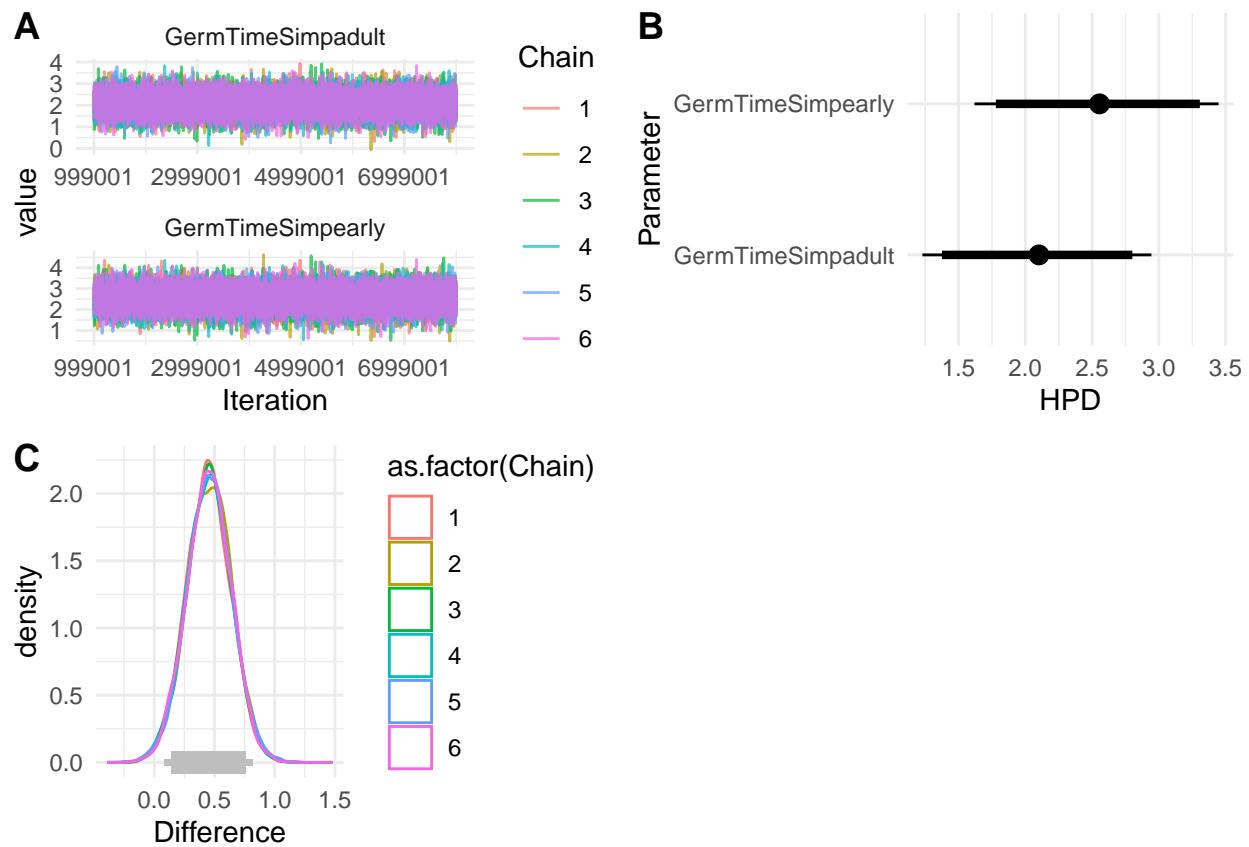


Table 21: Estimates of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.18 (1.35, 2.95)	0
GermTimeSimpearly	2.53 (1.71, 3.43)	0
scale(log(Number))	0.57 (0.43, 0.67)	0

Table 22: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.44 (-0.86, -0.09)	0.02
GermTimeSimpadult vs scale(log(Number))	1.59 (0.78, 2.39)	0.00
GermTimeSimpearly vs scale(log(Number))	1.94 (1.2, 2.92)	0.00

Model 4, prior set p2

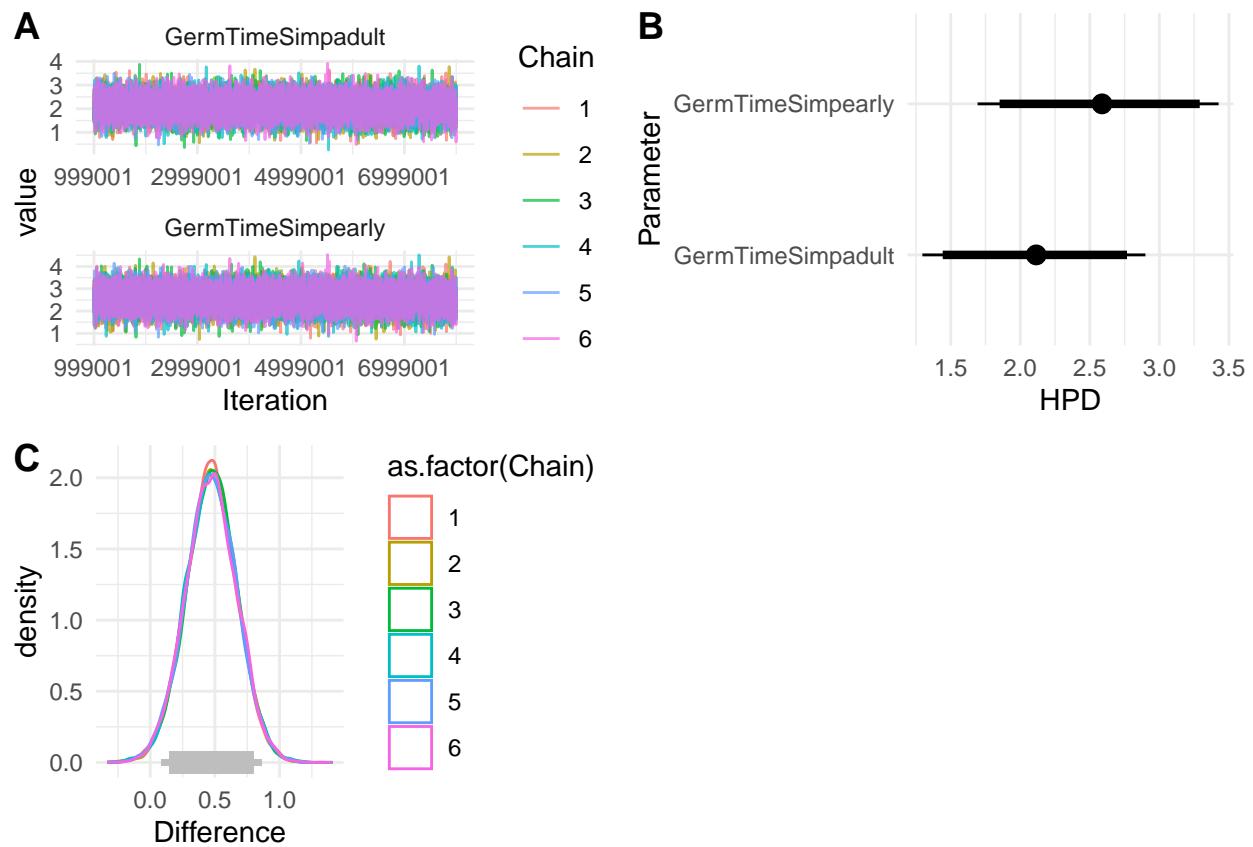


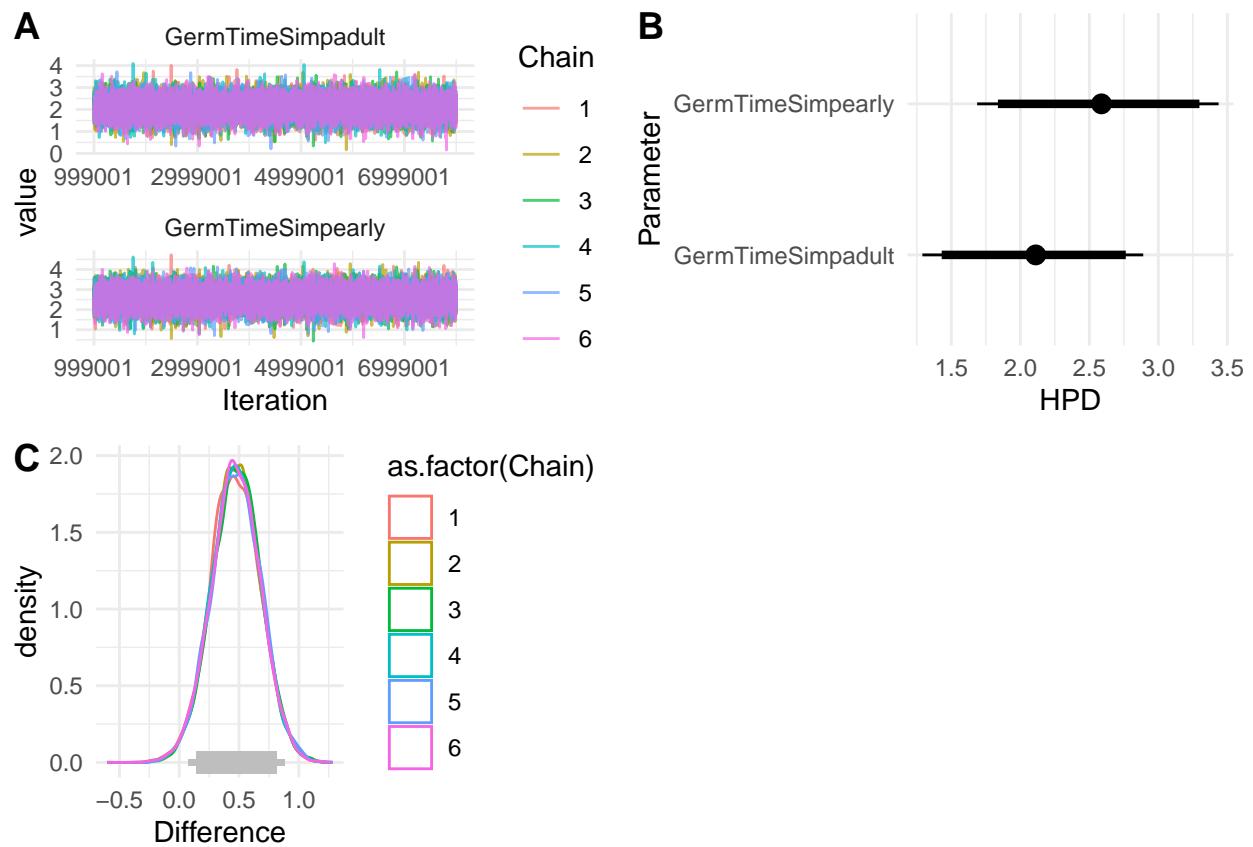
Table 23: Estimates of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.11 (1.37, 2.97)	0
GermTimeSimpearly	2.51 (1.66, 3.44)	0
scale(log(Number))	0.56 (0.42, 0.69)	0

Table 24: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.44 (-0.88, -0.08)	0.025
GermTimeSimpadult vs scale(log(Number))	1.55 (0.74, 2.35)	0.000
GermTimeSimpearly vs scale(log(Number))	2.09 (1.09, 2.87)	0.000

Model 4, prior set p3



*Model 5: Number of Cell Types ~ Timing of Germline Segregation*

Table 25: Estimates of Fixed Effects for Model \*5\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.9 (0.54, 3.29)	0.013
GermTimeSimpearly	2.38 (0.74, 3.66)	0.006

Table 26: Comparisons of Fixed Effects for Model \*5\* with prior set \*p1\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.38 (-0.88, 0.13)	0.122

Model 4WithoutCellNumber, prior set p1

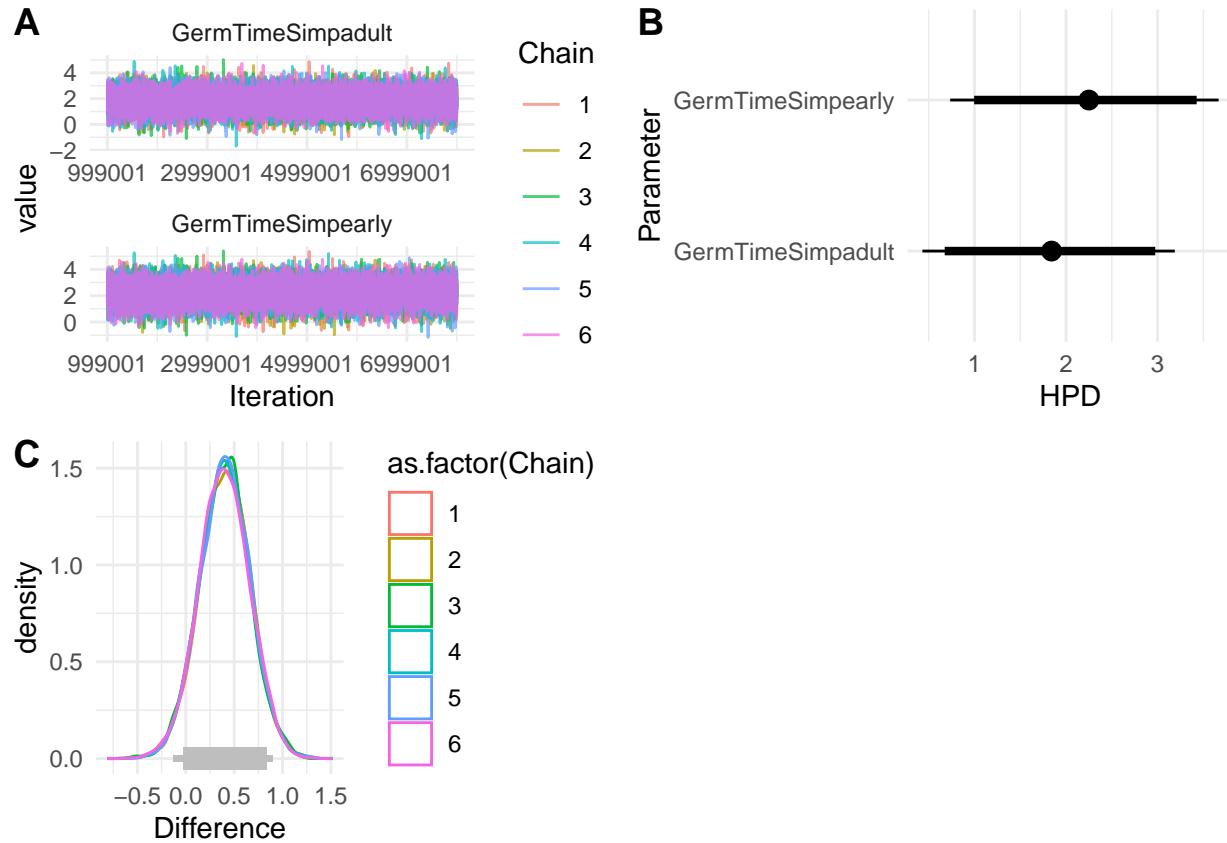


Table 27: Estimates of Fixed Effects for Model \*5\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2 (0.64, 3.06)	0.002
GermTimeSimpearly	2.55 (1.01, 3.62)	0.001

Table 28: Comparisons of Fixed Effects for Model \*5\* with prior set \*p2\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.45 (-0.97, 0.04)	0.081

Model 4WithoutCellNumber, prior set p2

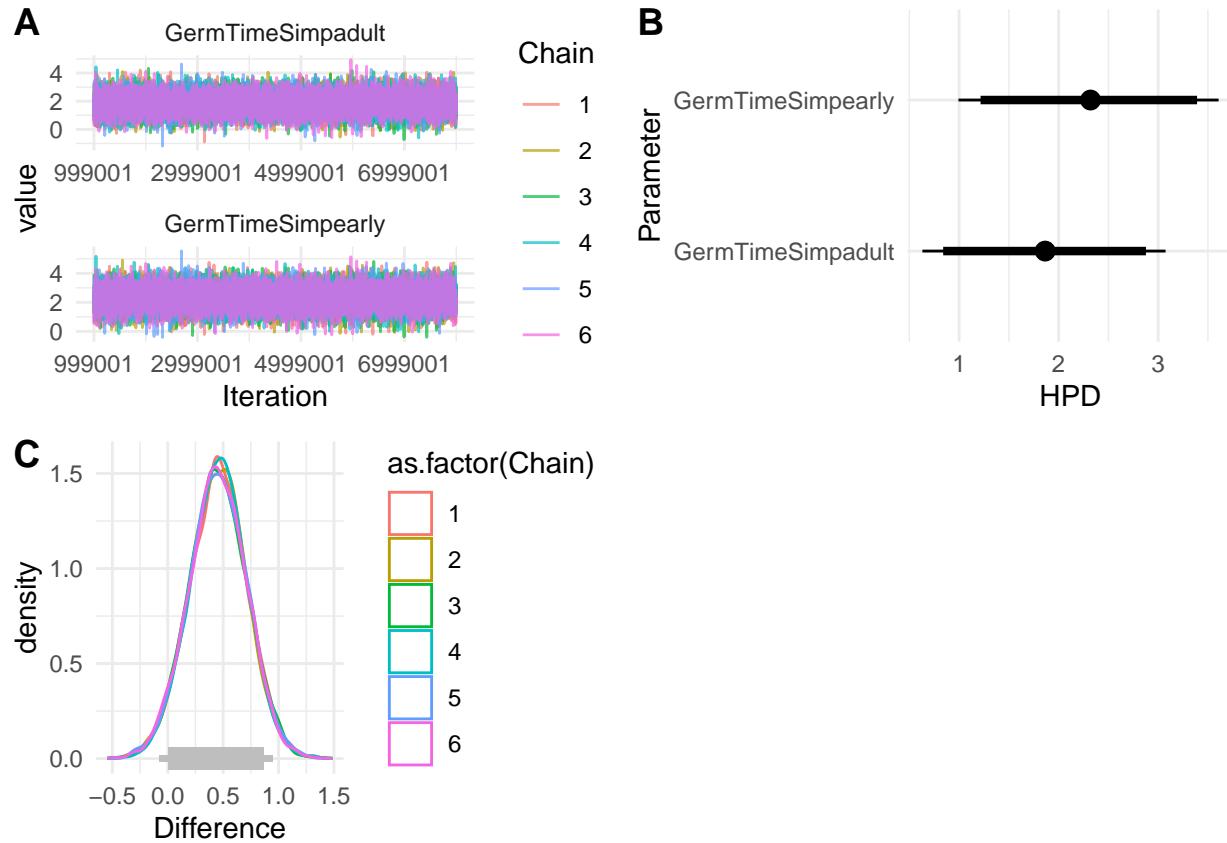


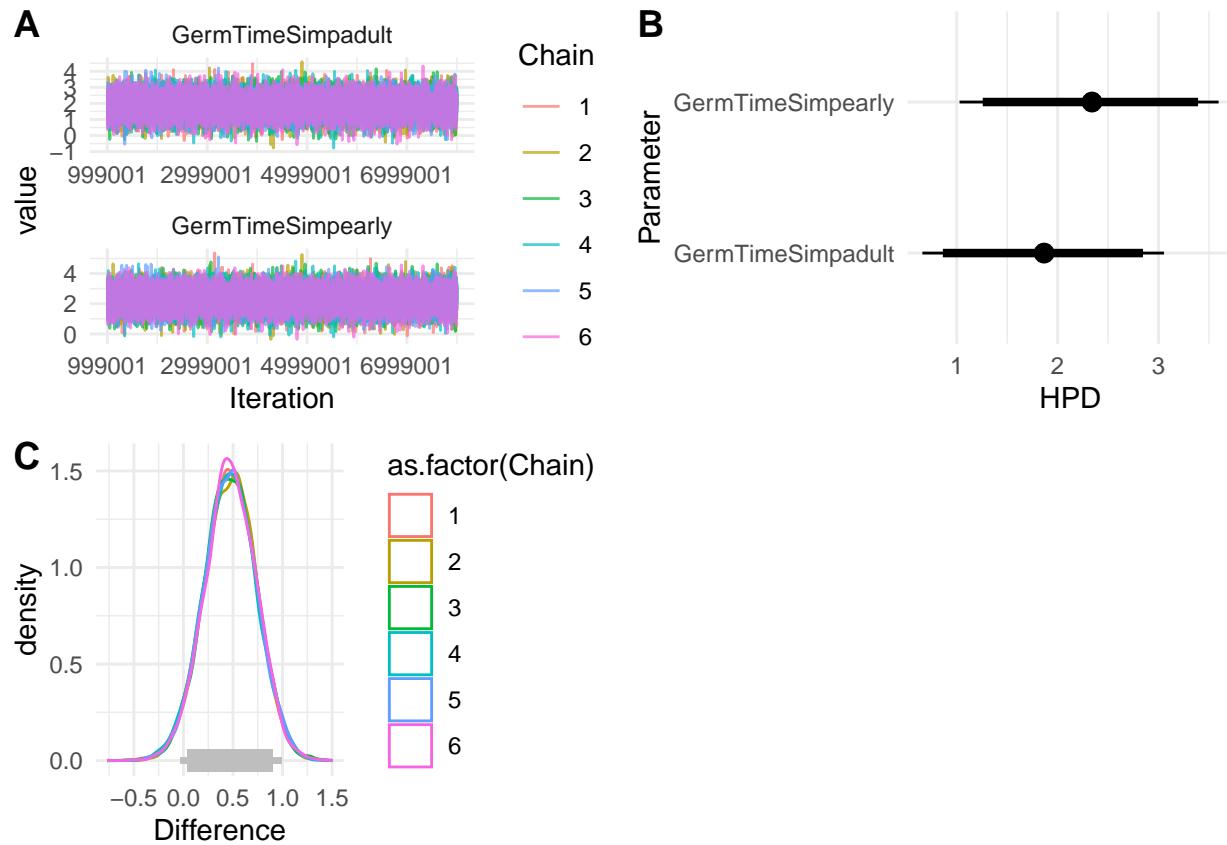
Table 29: Estimates of Fixed Effects for Model \*5\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.03 (0.71, 3.08)	0.003
GermTimeSimpearly	2.33 (1.04, 3.56)	0.000

Table 30: Comparisons of Fixed Effects for Model \*5\* with prior set \*p3\* for \*All\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.49 (-1, 0.03)	0.078

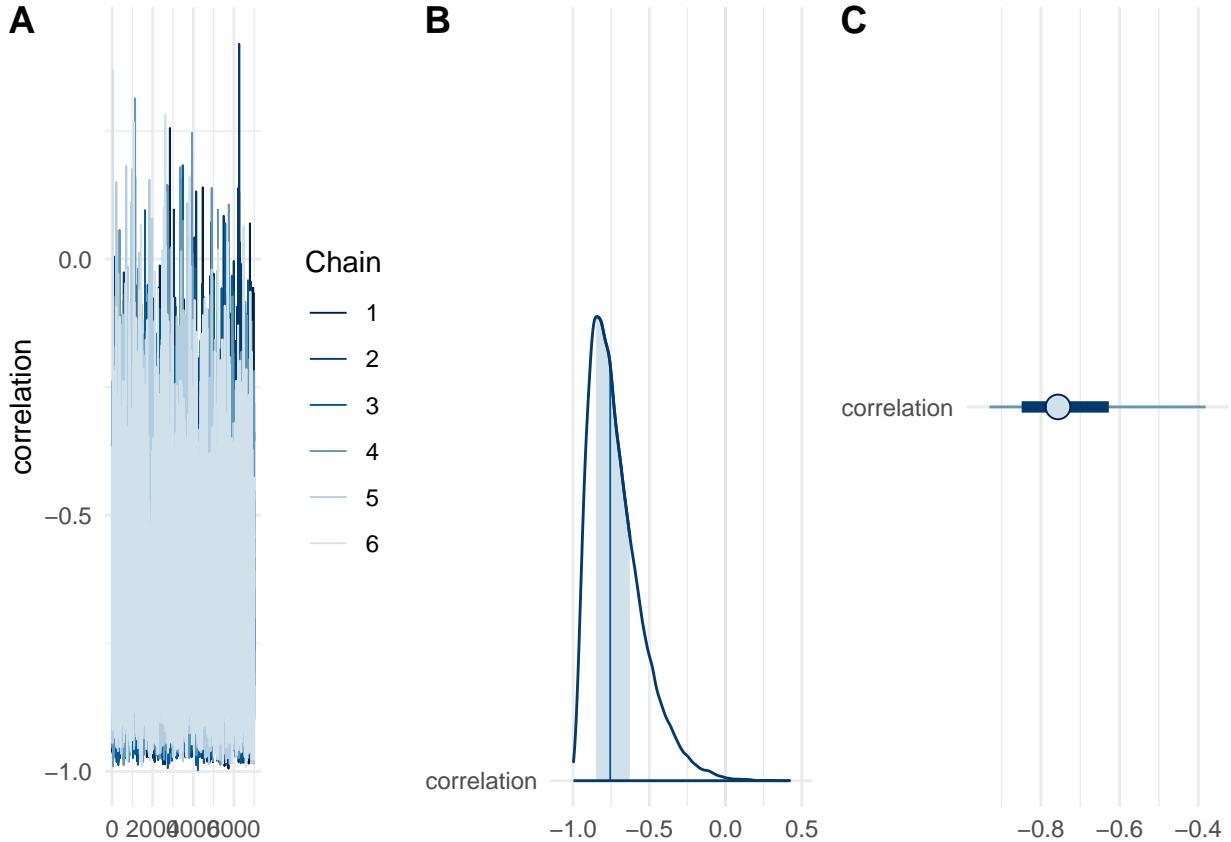
Model 4WithoutCellNumber, prior set p3



## Correlation between germline and fission

This analysis was run to test for a phylogenetic association between early germline segregation and a strict bottleneck separating each generation. Prior set 4 above was used.

Figure: A shows the convergence of all chains, B and C both show the posterior estimates and confidence intervals for the correlation between the *absence* of a strict bottleneck, and the *presence* of early germline segregation. This is shown only for 1 chain.

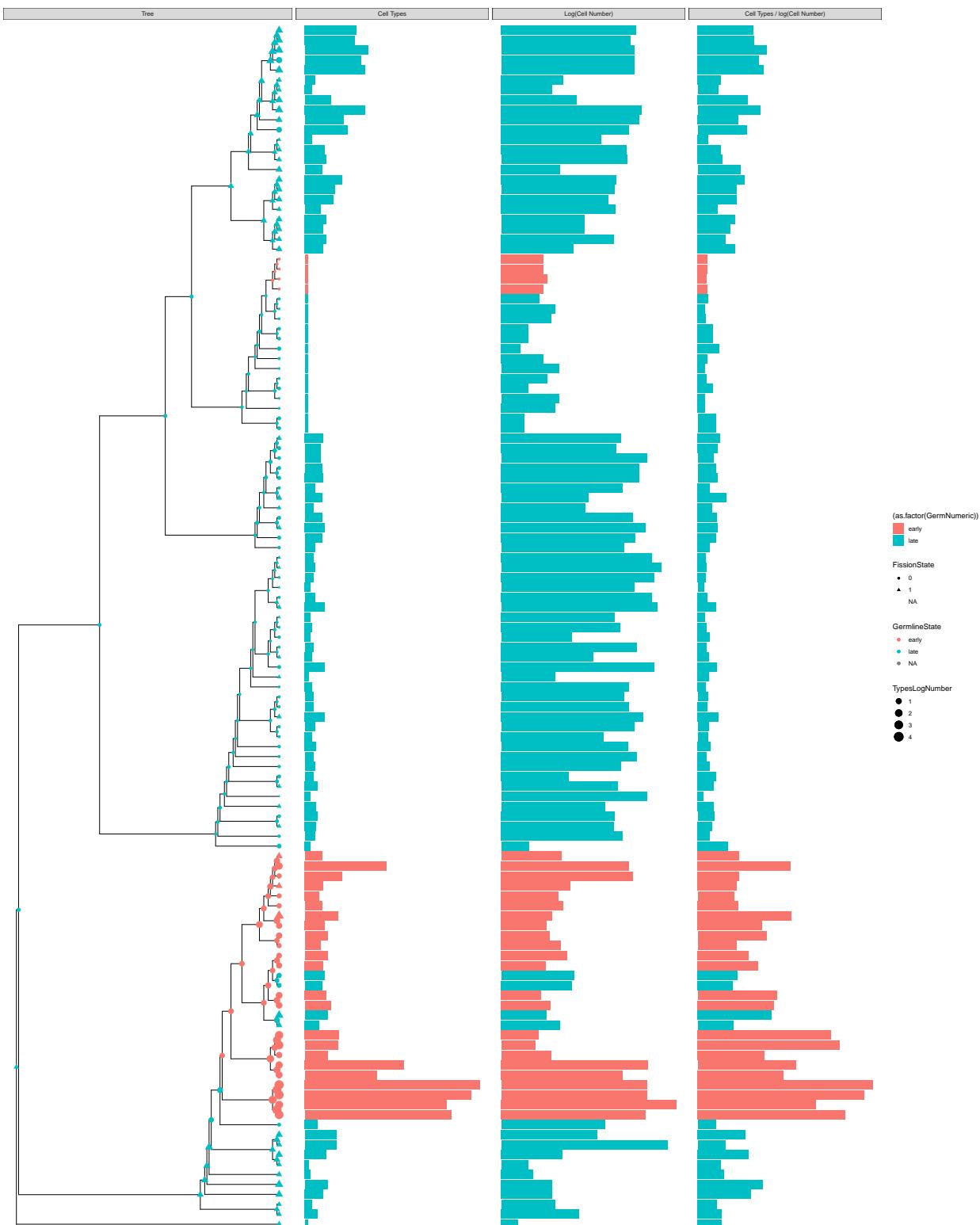


For each chain, the posterior CI were as follows

```
## [[1]]
##           lower      upper
## correlation -0.9818808 -0.3977984
## attr(),"Probability"
## [1] 0.95
##
## [[2]]
##           lower      upper
## correlation -0.9725729 -0.3611913
## attr(),"Probability"
## [1] 0.95
##
## [[3]]
##           lower      upper
## correlation -0.9827137 -0.4297108
## attr(),"Probability")
```

```
## [1] 0.95
##
## [[4]]
##           lower      upper
## correlation -0.966404 -0.3262651
## attr(,"Probability")
## [1] 0.95
##
## [[5]]
##           lower      upper
## correlation -0.9815348 -0.3759841
## attr(,"Probability")
## [1] 0.95
##
## [[6]]
##           lower      upper
## correlation -0.9678642 -0.3653036
## attr(,"Probability")
## [1] 0.95
```

## Ancestral state reconstruction



Analyses with data points from only the animals

Model 1: *Number of Cells ~ Presence of Strict Bottleneck*

Table 31: Estimates of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	14.94 (4.95, 26.95)	0.009
Fission1	11.77 (0.6, 21.95)	0.041

Table 32: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	4.02 (-1.58, 10.26)	0.124

Model 1, prior set p1

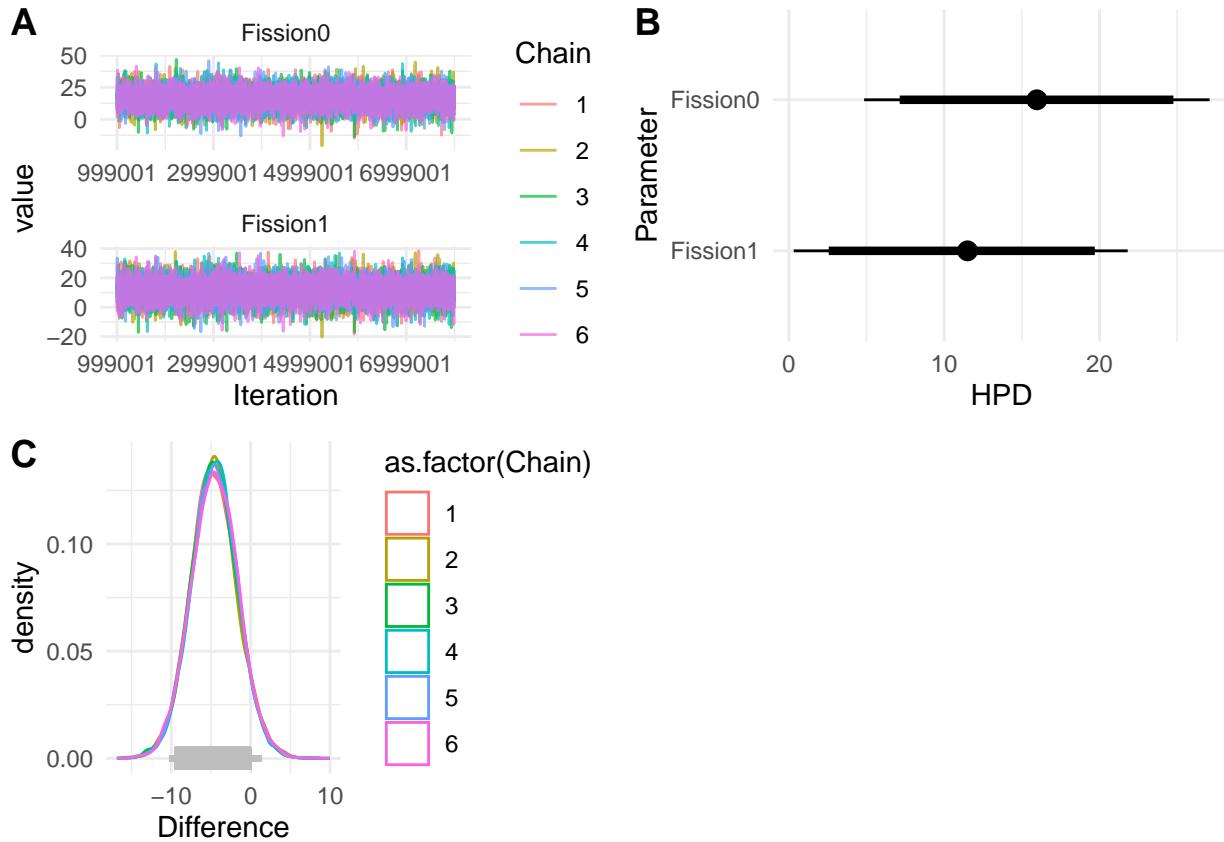


Table 33: Estimates of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	15.65 (5.88, 25.94)	0.004
Fission1	12.08 (1.95, 21.08)	0.027

Table 34: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	4.89 (-1.26, 10.16)	0.127

Model 1, prior set p2

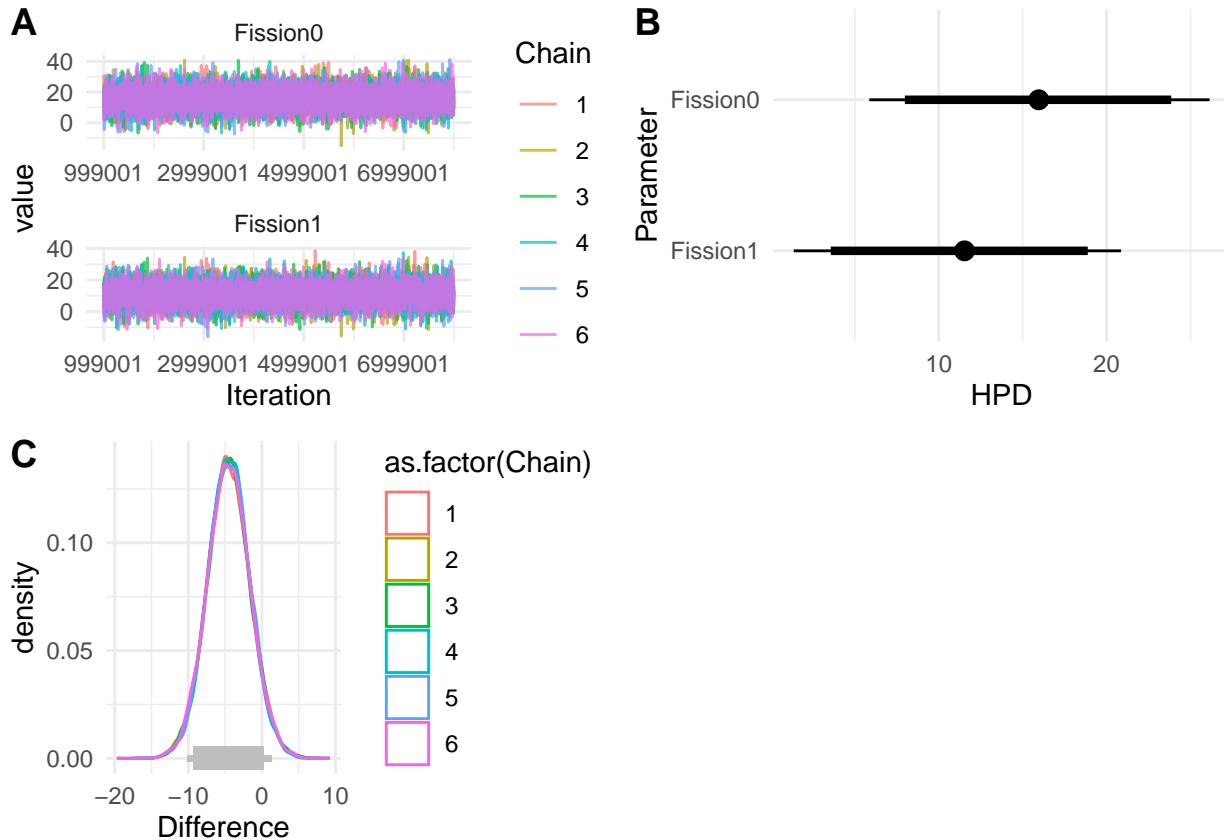


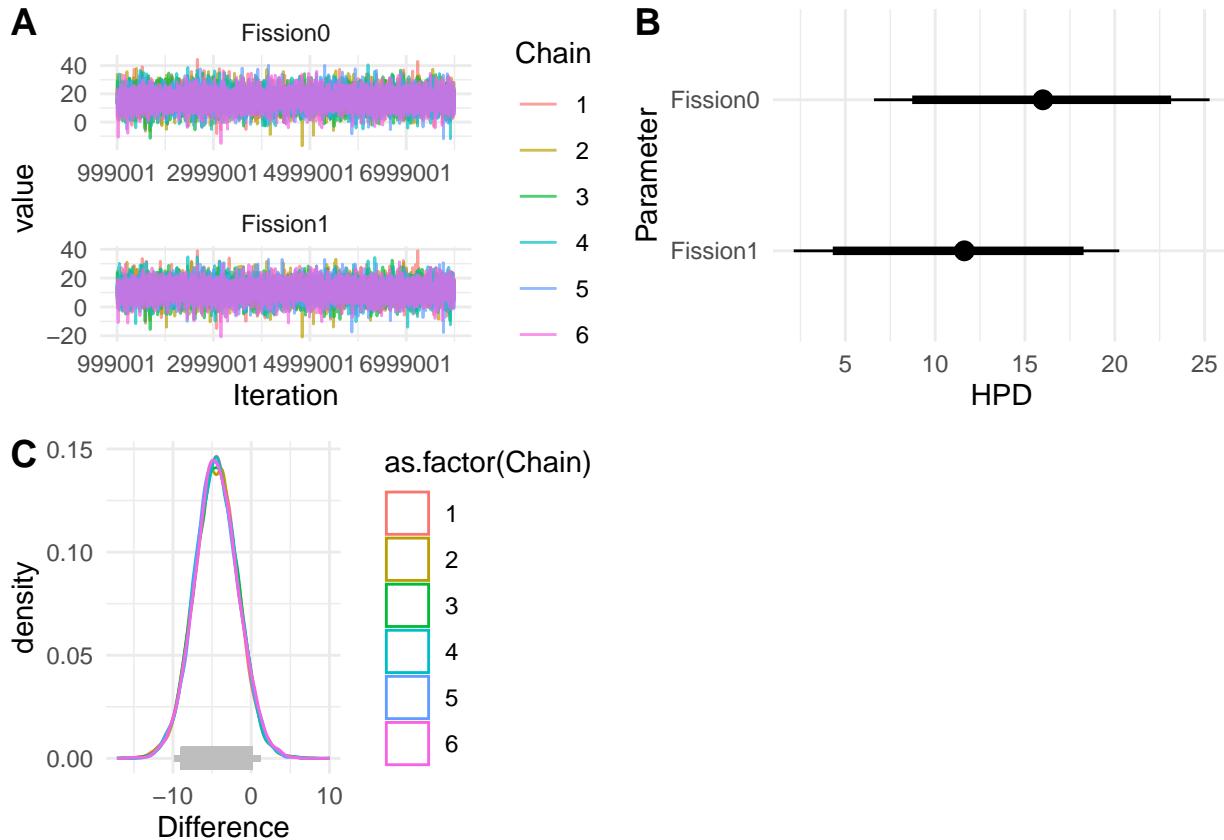
Table 35: Estimates of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	15.77 (6.4, 24.67)	0.004
Fission1	10.83 (2.73, 20.51)	0.021

Table 36: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	4.4 (-1.19, 9.92)	0.108

Model 1, prior set p3



Model 2:  $\text{Number of Cell Types} \sim \text{Presence of Strict Bottleneck} + \log(\text{Number of Cells})$

Table 37: Estimates of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.96 (2.28, 3.49)	0
Fission1	2.74 (2.19, 3.33)	0
scale(log(Number))	0.45 (0.3, 0.67)	0

Table 38: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.12 (-0.25, 0.57)	0.447
Fission0 vs scale(log(Number))	2.53 (1.78, 3.07)	0.000
Fission1 vs scale(log(Number))	2.26 (1.69, 2.85)	0.000

Model 2, prior set p1

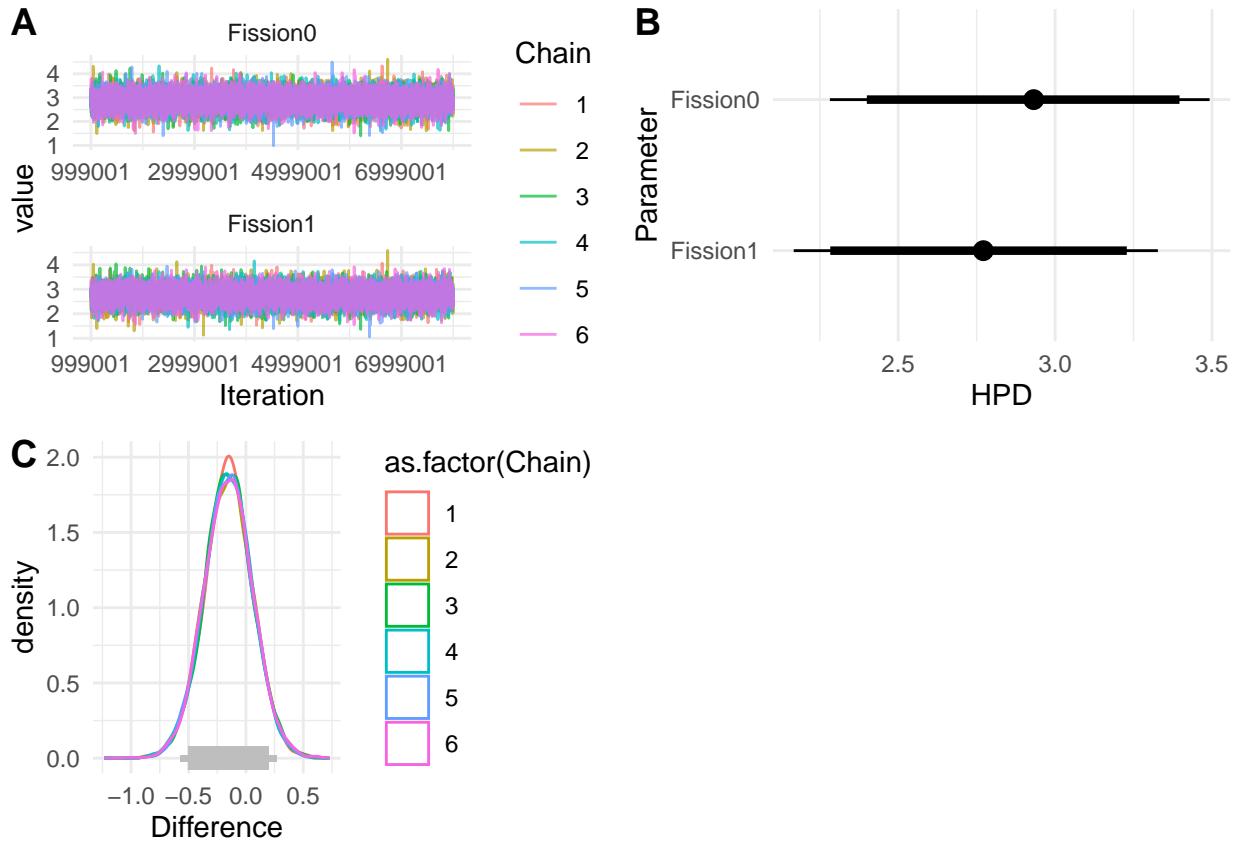


Table 39: Estimates of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.85 (2.25, 3.54)	0
Fission1	2.9 (2.15, 3.38)	0
scale(log(Number))	0.54 (0.27, 0.74)	0

Table 40: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.17 (-0.35, 0.68)	0.585
Fission0 vs scale(log(Number))	2.33 (1.7, 3.11)	0.000
Fission1 vs scale(log(Number))	2.2 (1.63, 2.89)	0.000

Model 2, prior set p2

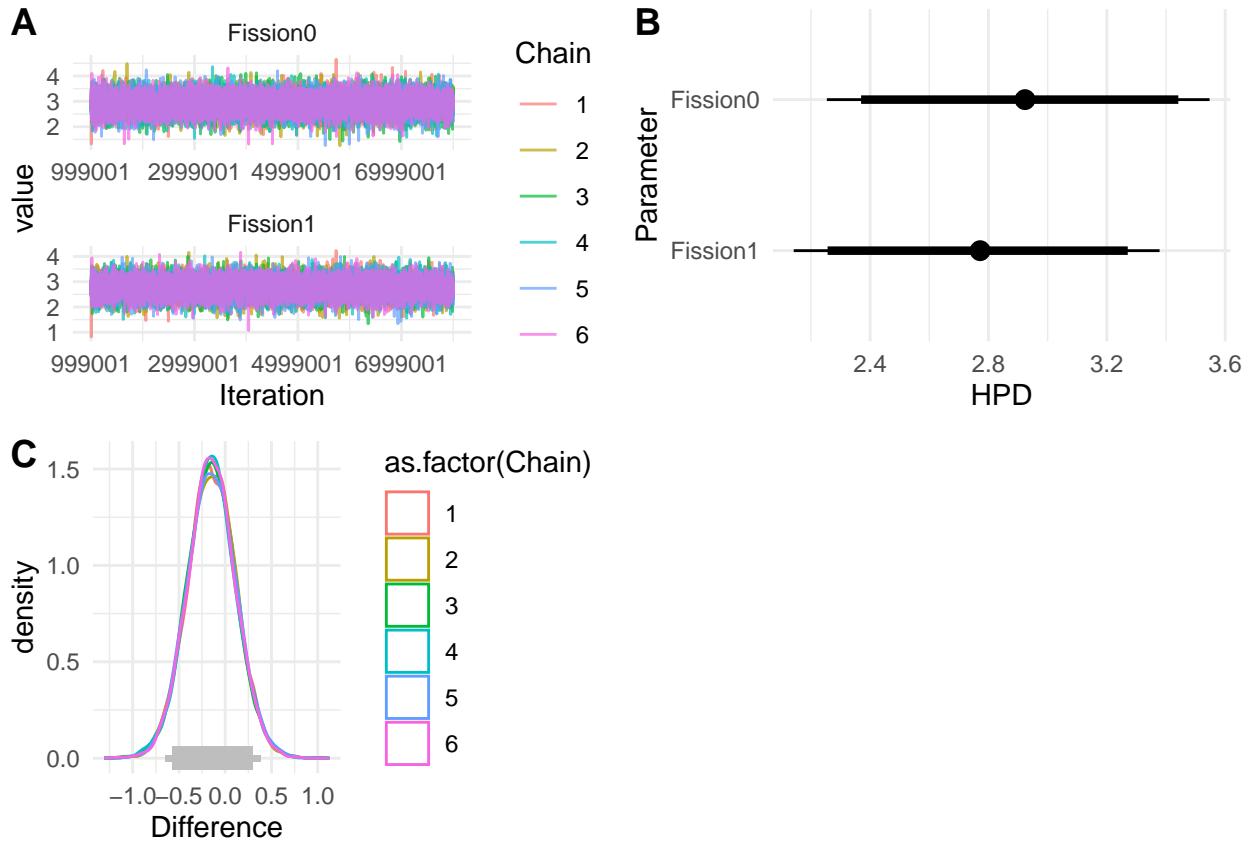


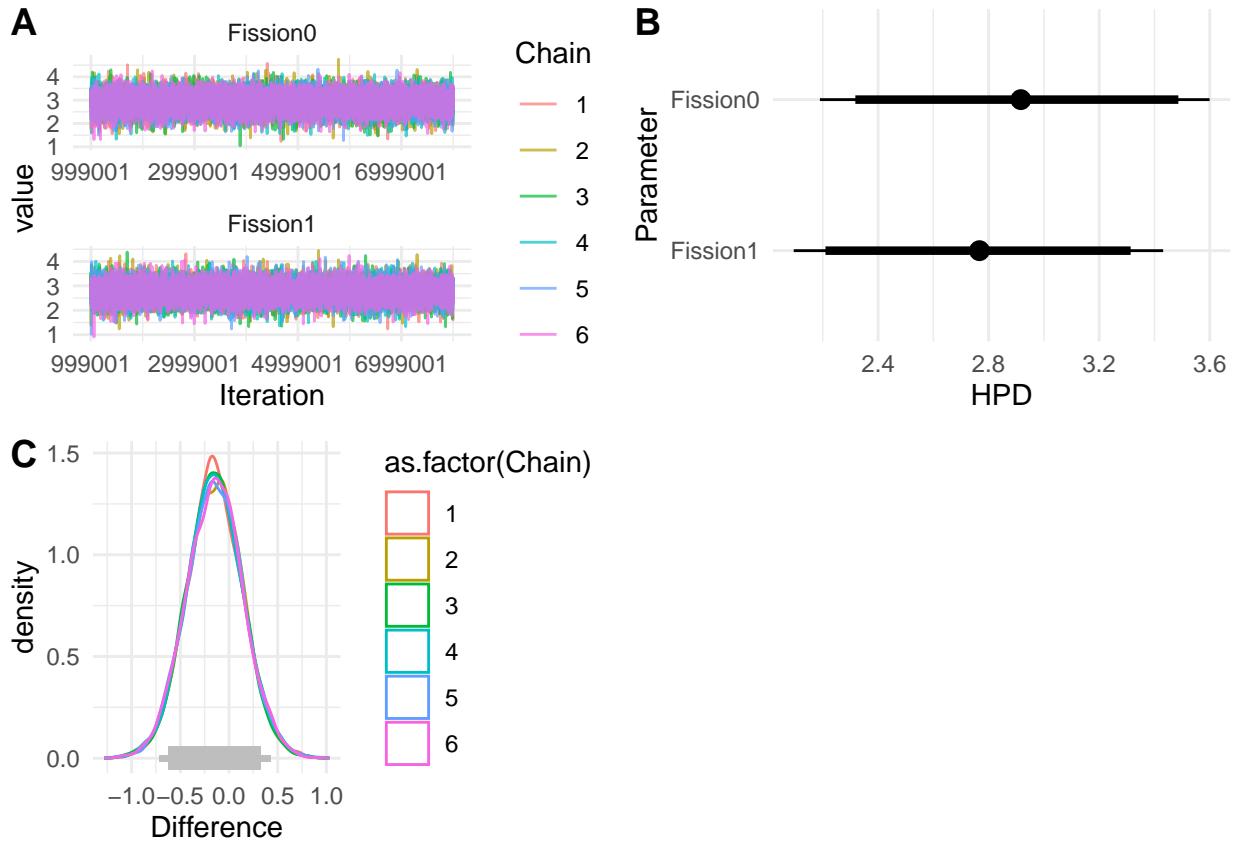
Table 41: Estimates of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.92 (2.2, 3.61)	0
Fission1	2.82 (2.09, 3.42)	0
scale(log(Number))	0.5 (0.27, 0.77)	0

Table 42: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.19 (-0.43, 0.7)	0.587
Fission0 vs scale(log(Number))	2.44 (1.64, 3.18)	0.000
Fission1 vs scale(log(Number))	2.3 (1.59, 2.97)	0.000

Model 2, prior set p3



**Model 3:** *Number of Cells*  $\sim$  *Timing of Germline Segregation*

Table 43: Estimates of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	13.86 (2.13, 23.8)	0.026
GermTimeSimpearly	12.94 (-0.11, 24.43)	0.049

Table 44: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-1.65 (-8.74, 8.8)	0.926

Model 3, prior set p1

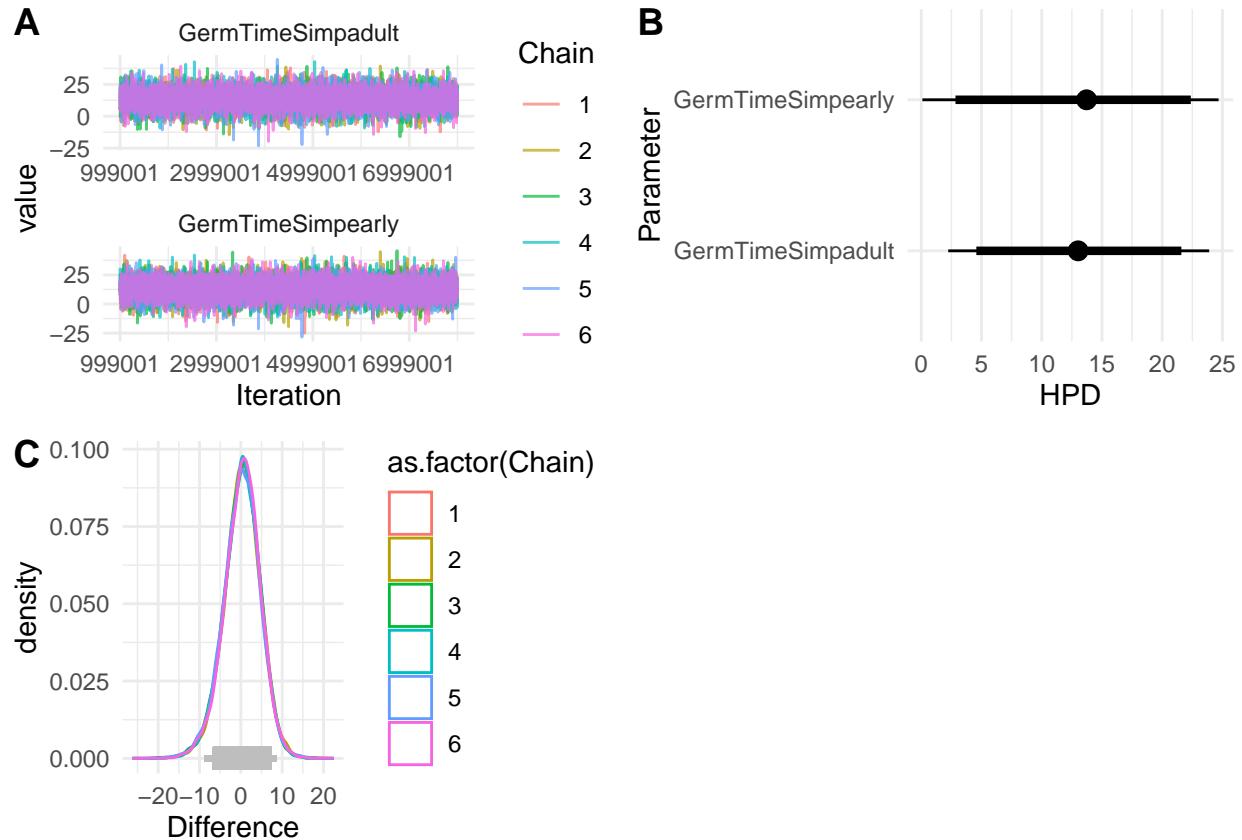


Table 45: Estimates of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	12.93 (3.38, 22.93)	0.019
GermTimeSimpearly	14.63 (1.58, 23.63)	0.033

Table 46: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0 (-8.14, 8.25)	0.834

Model 3, prior set p2

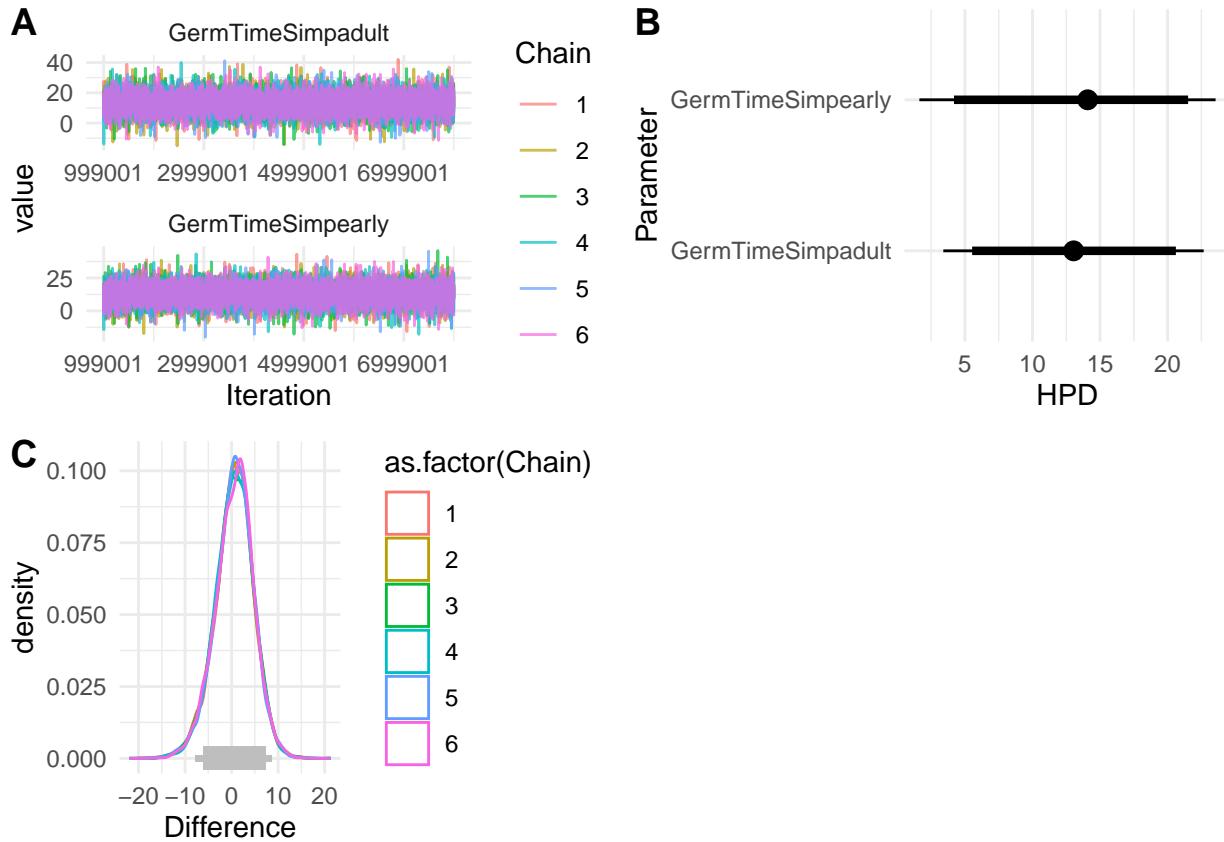


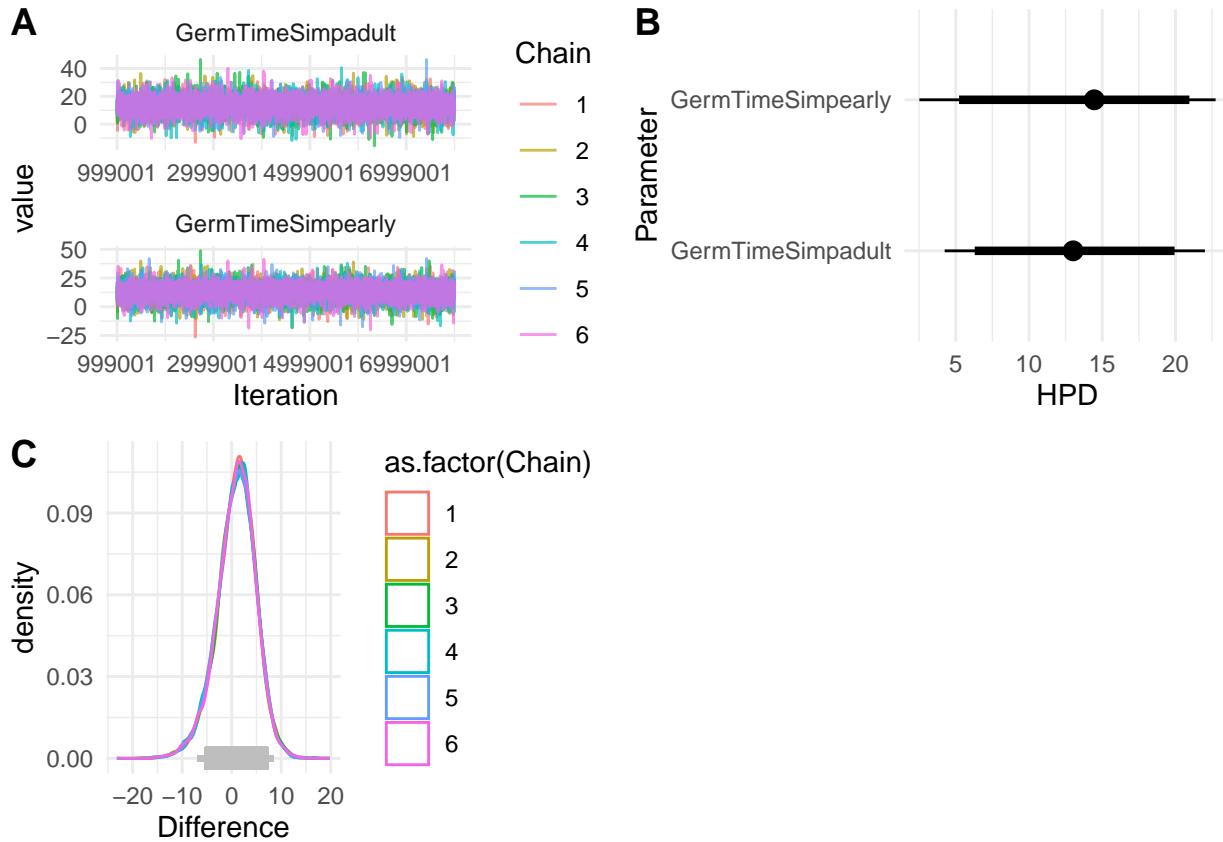
Table 47: Estimates of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	12.67 (3.82, 21.43)	0.011
GermTimeSimpearly	15.15 (3.68, 23.37)	0.021

Table 48: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-1.56 (-8.25, 6.87)	0.756

Model 3, prior set p3



**Model 4:**  $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$

Table 49: Estimates of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.68 (2.15, 3.07)	0
GermTimeSimpearly	3.29 (2.67, 3.7)	0
scale(log(Number))	0.53 (0.35, 0.69)	0

Table 50: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.55 (-1.03, -0.13)	0.018
GermTimeSimpadult vs scale(log(Number))	2.09 (1.67, 2.65)	0.000
GermTimeSimpearly vs scale(log(Number))	2.74 (2.17, 3.23)	0.000

Model 4, prior set p1

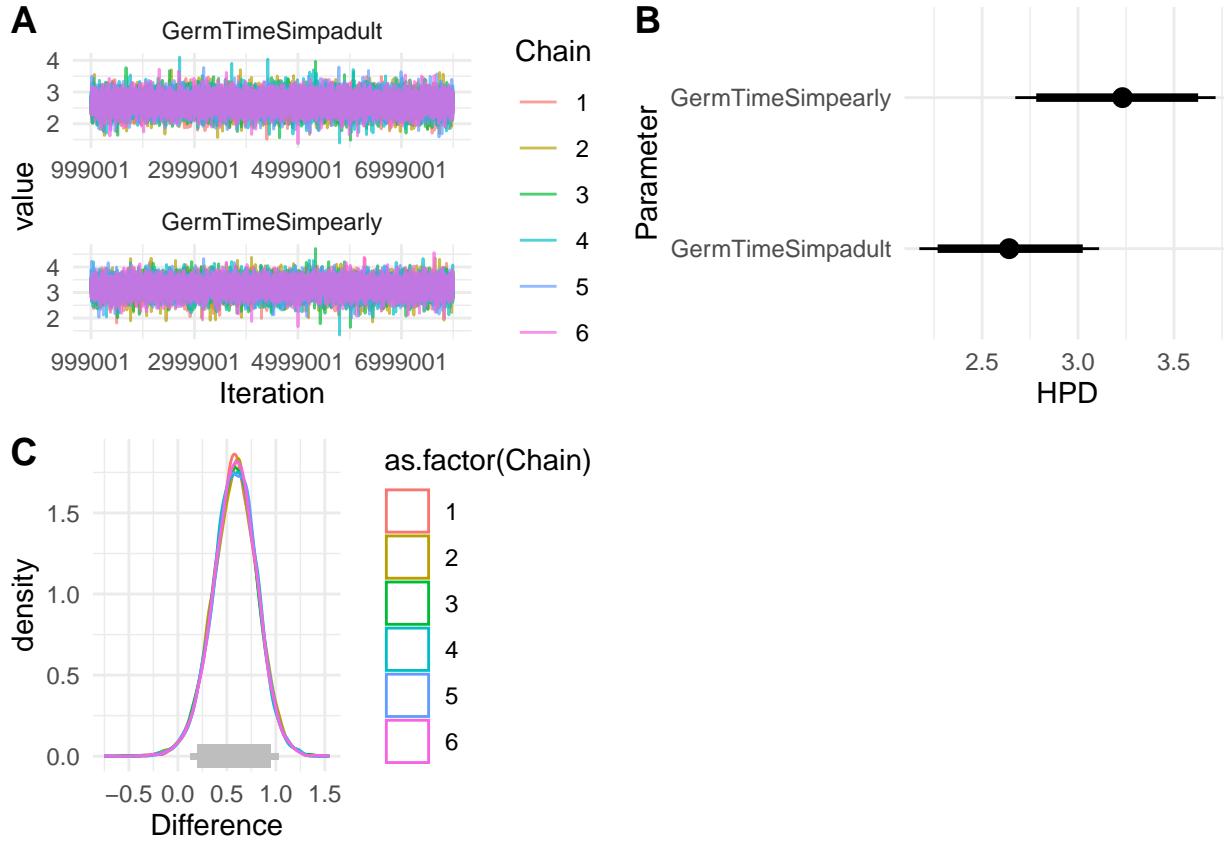


Table 51: Estimates of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.62 (2.06, 3.18)	0
GermTimeSimpearly	3.17 (2.59, 3.84)	0
scale(log(Number))	0.53 (0.32, 0.73)	0

Table 52: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.55 (-1.12, 0.02)	0.046
GermTimeSimpadult vs scale(log(Number))	2.13 (1.51, 2.68)	0.000
GermTimeSimpearly vs scale(log(Number))	2.7 (1.99, 3.33)	0.000

Model 4, prior set p2

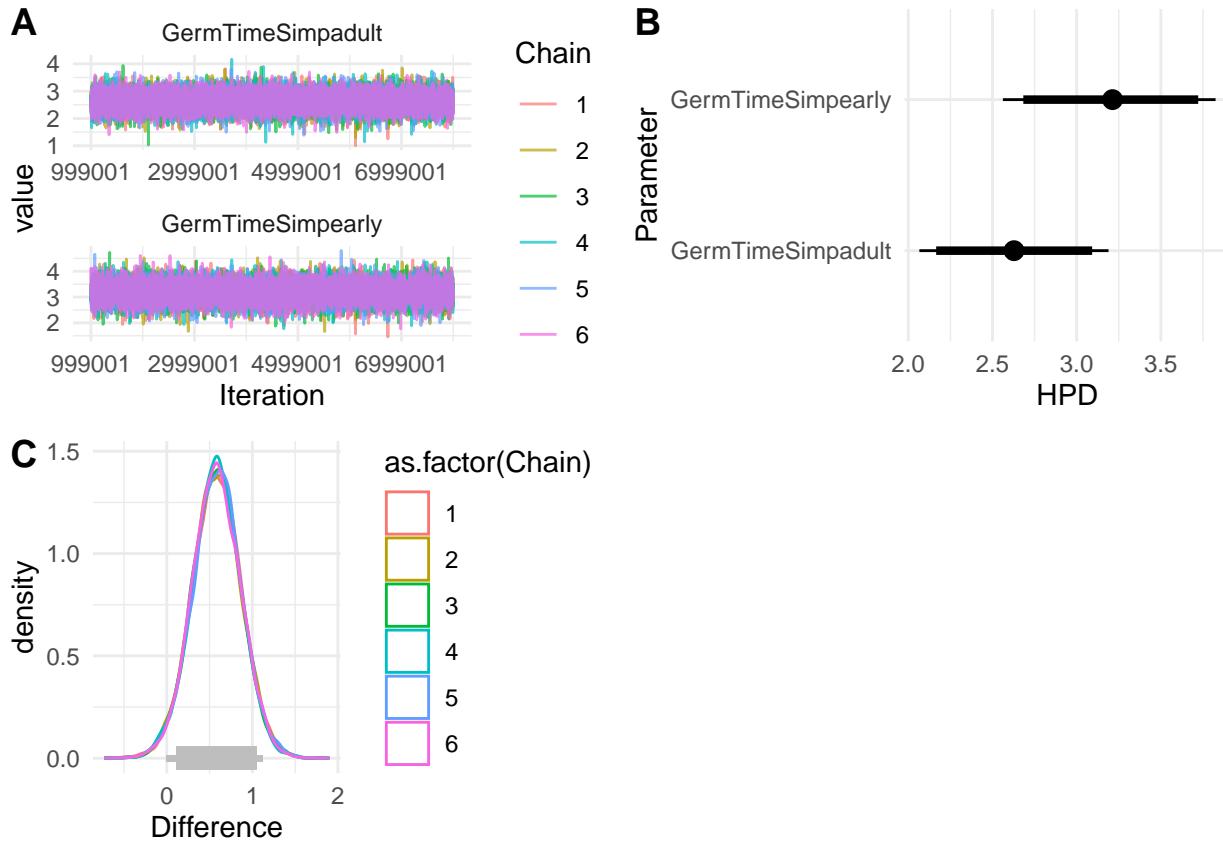


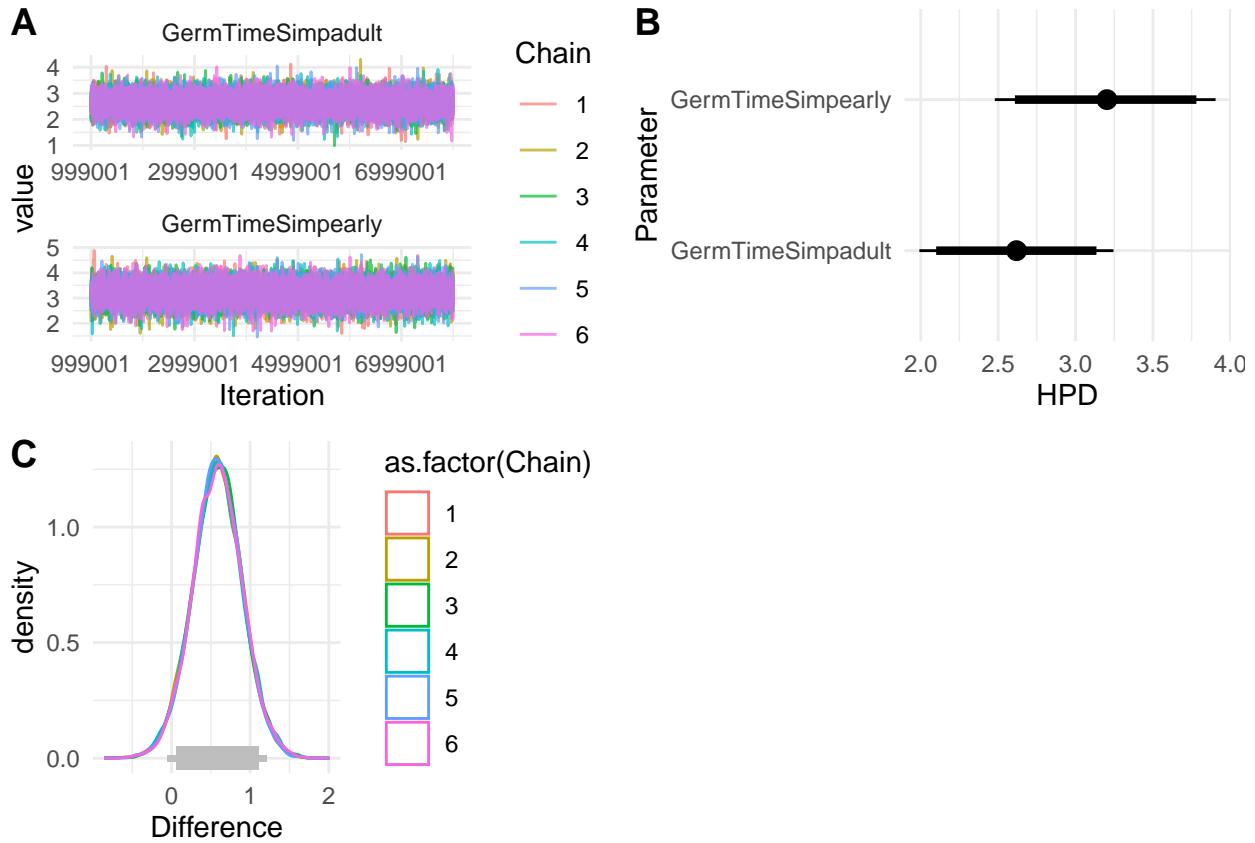
Table 53: Estimates of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.66 (2.02, 3.26)	0
GermTimeSimpearly	3.16 (2.47, 3.88)	0
scale(log(Number))	0.55 (0.3, 0.77)	0

Table 54: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.59 (-1.22, 0.04)	0.075
GermTimeSimpadult vs scale(log(Number))	2.17 (1.42, 2.73)	0.000
GermTimeSimpearly vs scale(log(Number))	2.75 (1.89, 3.39)	0.000

Model 4, prior set p3



*Model 5: Number of Cell Types ~ Timing of Germline Segregation*

Table 55: Estimates of Fixed Effects for Model \*5\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.5 (1.65, 3.44)	0
GermTimeSimpearly	3.14 (2.04, 4.11)	0

Table 56: Comparisons of Fixed Effects for Model \*5\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.67 (-1.26, 0.31)	0.182

Model 4WithoutCellNumber, prior set p1

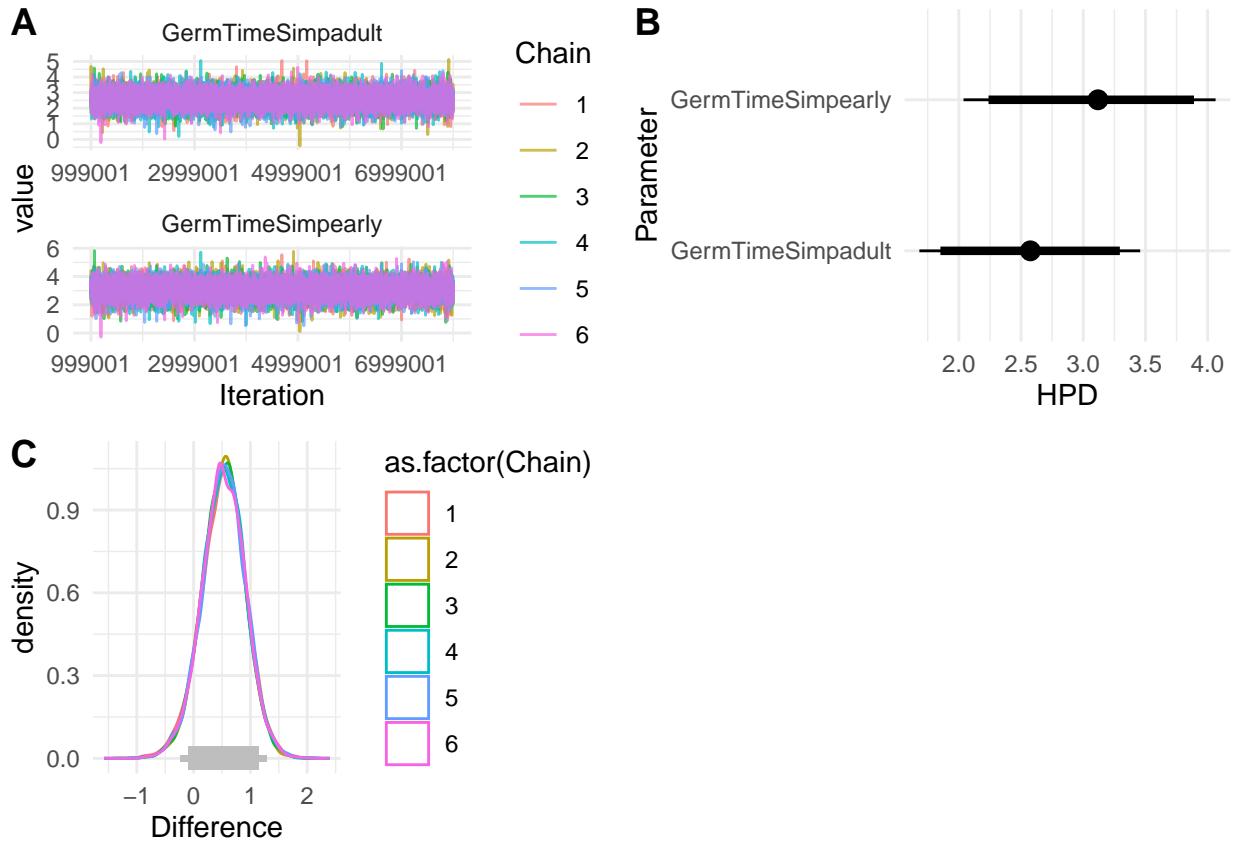


Table 57: Estimates of Fixed Effects for Model \*5\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.52 (1.79, 3.38)	0
GermTimeSimpearly	3.16 (2.29, 4.1)	0

Table 58: Comparisons of Fixed Effects for Model \*5\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.62 (-1.43, 0.12)	0.124

Model 4WithoutCellNumber, prior set p2

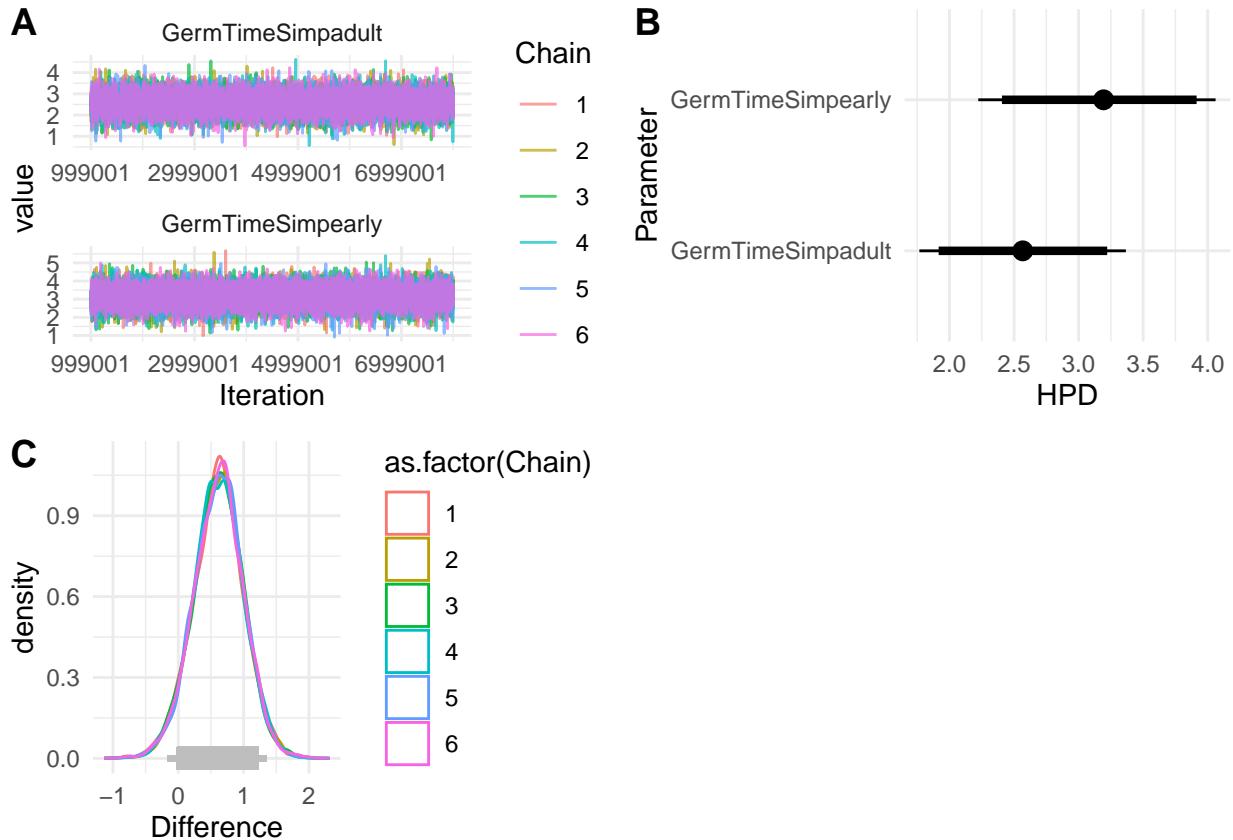


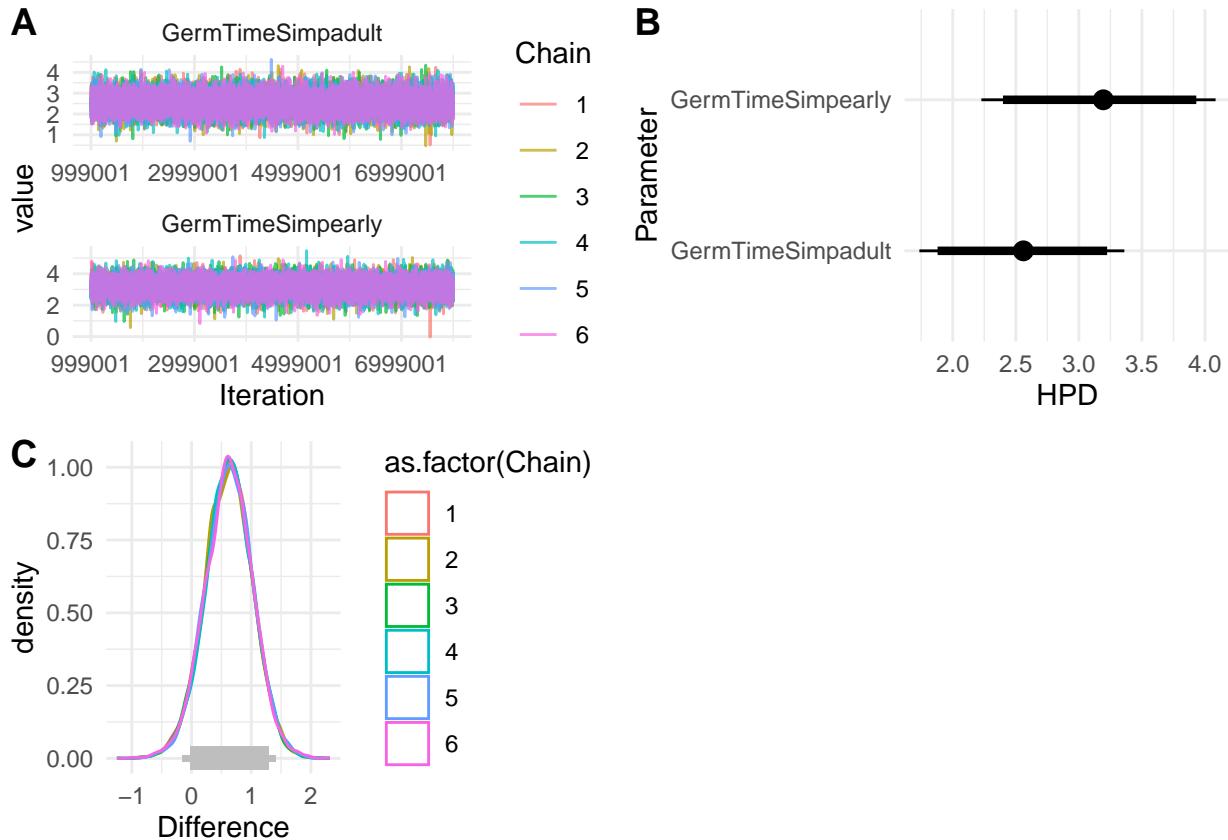
Table 59: Estimates of Fixed Effects for Model \*5\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.49 (1.75, 3.36)	0
GermTimeSimpearly	3.37 (2.23, 4.1)	0

Table 60: Comparisons of Fixed Effects for Model \*5\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.67 (-1.42, 0.15)	0.119

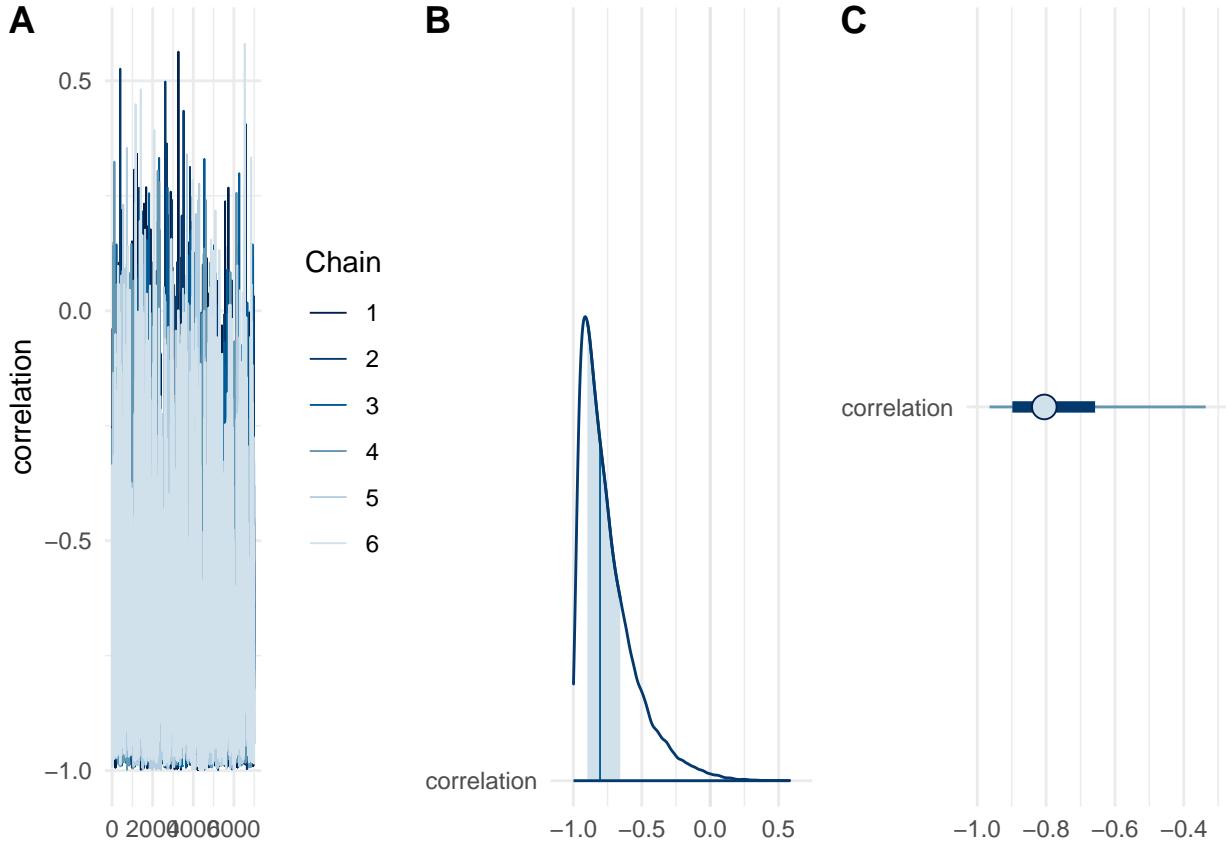
Model 4WithoutCellNumber, prior set p3



## Correlation between germline and fission

This analysis was run to test for a phylogenetic association between early germline segregation and a strict bottleneck separating each generation. Prior set 4 above was used.

Figure: A shows the convergence of all chains, B and C both show the posterior estimates and confidence intervals for the correlation between the *absence* of a strict bottleneck, and the *presence* of early germline segregation. This is shown only for 1 chain.



For each chain, the posterior CI were as follows

```
## [[1]]
##           lower      upper
## correlation -0.9989494 -0.2952171
## attr(),"Probability"
## [1] 0.95
##
## [[2]]
##           lower      upper
## correlation -0.9957889 -0.3631324
## attr(),"Probability"
## [1] 0.95
##
## [[3]]
##           lower      upper
## correlation -0.9946639 -0.3071185
## attr(),"Probability")
```

```
## [1] 0.95
##
## [[4]]
##           lower      upper
## correlation -0.9958155 -0.3744329
## attr(,"Probability")
## [1] 0.95
##
## [[5]]
##           lower      upper
## correlation -0.9986916 -0.4045988
## attr(,"Probability")
## [1] 0.95
##
## [[6]]
##           lower      upper
## correlation -0.9979254 -0.3031731
## attr(,"Probability")
## [1] 0.95
```

## Ancestral state reconstruction



Analyses with data points excluding the animals

Model 1: *Number of Cells ~ Presence of Strict Bottleneck*

Table 61: Estimates of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	15.24 (4.36, 24.69)	0.015
Fission1	12.24 (3.11, 23.22)	0.019

Table 62: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.9 (-0.79, 3.38)	0.256

Model 1, prior set p1

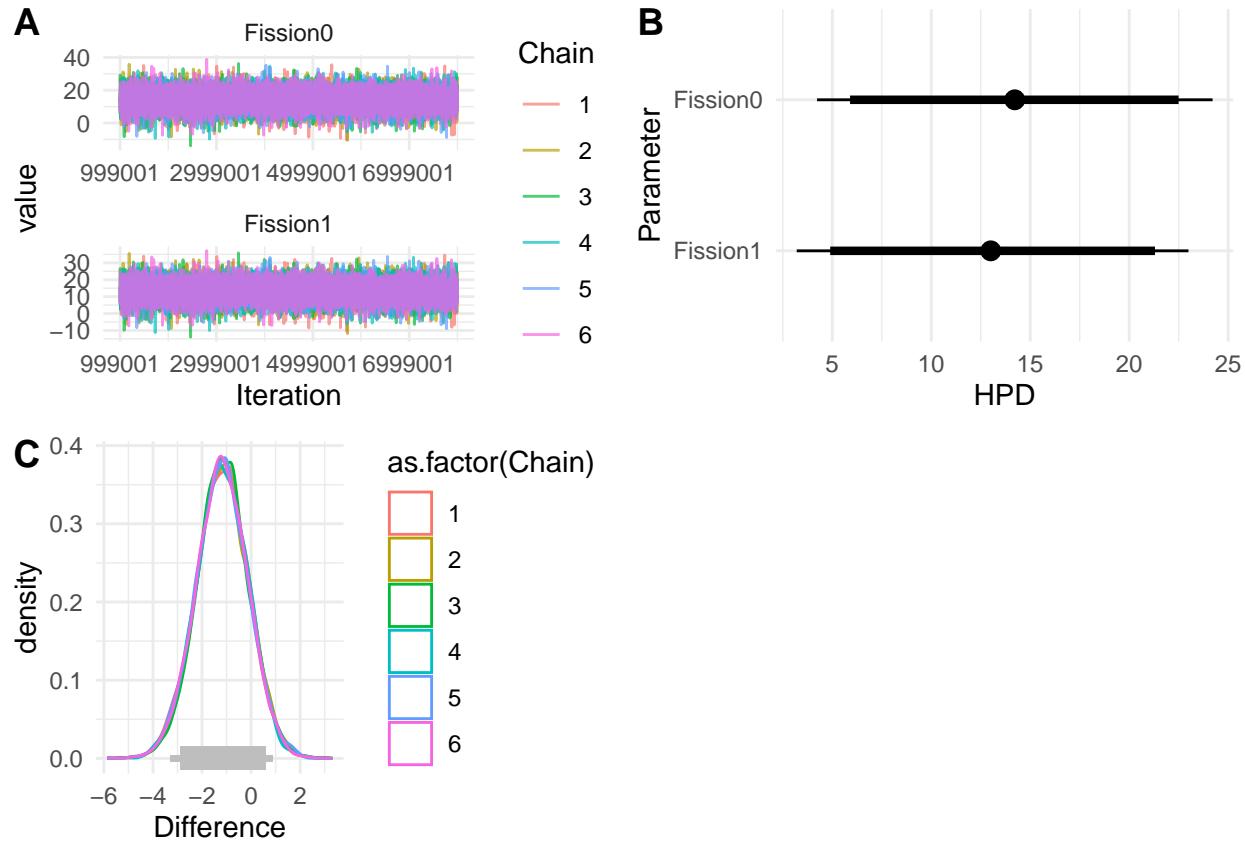


Table 63: Estimates of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	14.79 (4.73, 24.82)	0.009
Fission1	12.73 (2.56, 22.44)	0.013

Table 64: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	1.2 (-0.77, 3.2)	0.253

Model 1, prior set p2

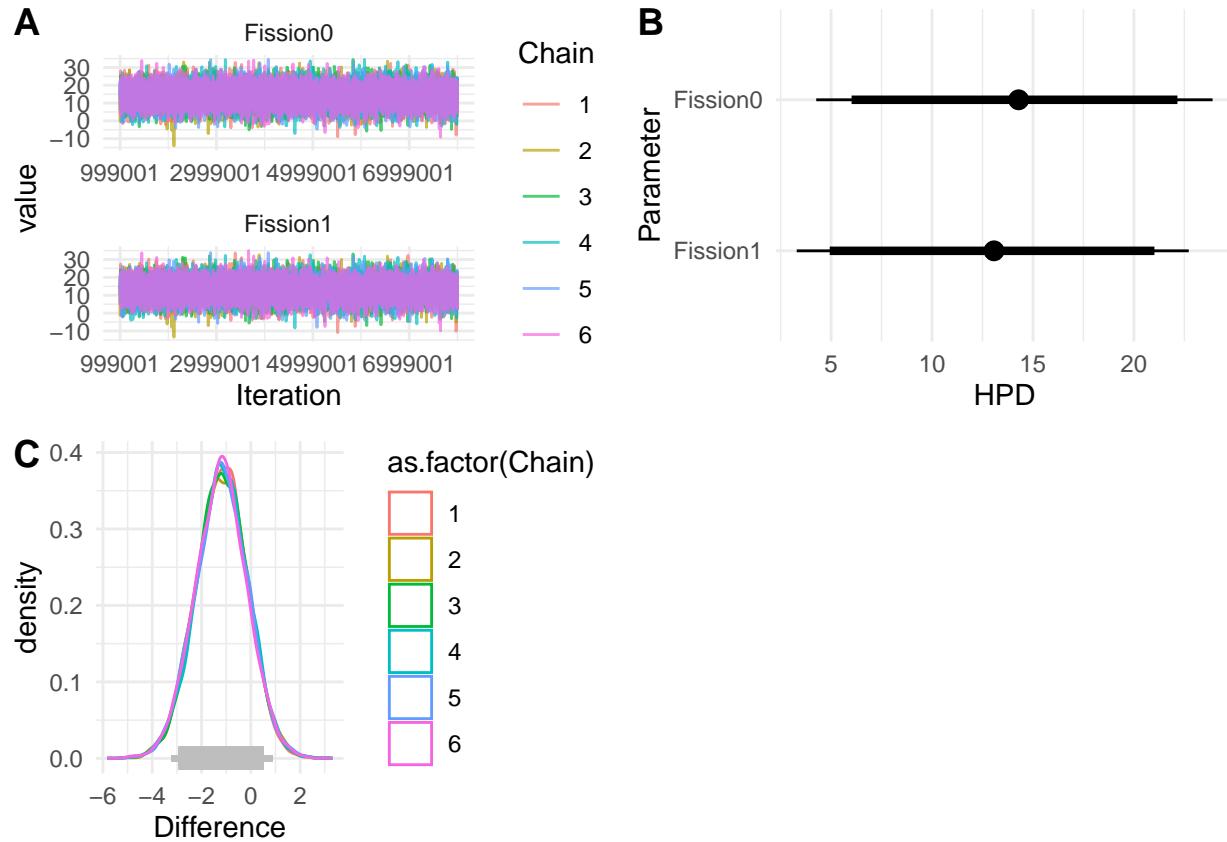


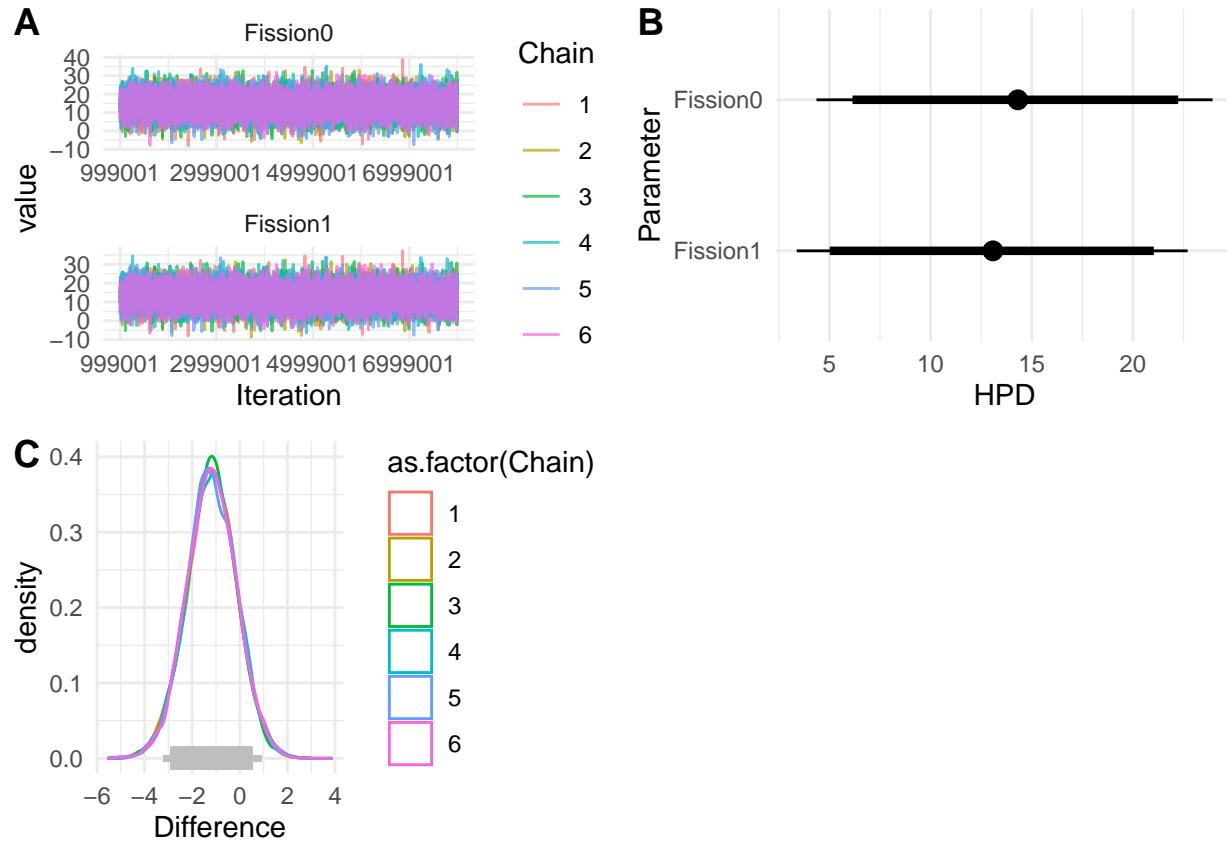
Table 65: Estimates of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	15.04 (4.21, 23.65)	0.008
Fission1	13.48 (3.48, 22.76)	0.012

Table 66: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	1.05 (-0.93, 3.2)	0.25

Model 1, prior set p3



Model 2: *Number of Cell Types*  $\sim$  *Presence of Strict Bottleneck* +  $\log(\text{Number of Cells})$

Table 67: Estimates of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	1.85 (1.26, 2.55)	0
Fission1	2.16 (1.35, 2.62)	0
scale(log(Number))	0.59 (0.43, 0.74)	0

Table 68: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	-0.15 (-0.36, 0.07)	0.214
Fission0 vs scale(log(Number))	1.35 (0.64, 1.95)	0.000
Fission1 vs scale(log(Number))	1.45 (0.77, 2.09)	0.000

Model 2, prior set p1

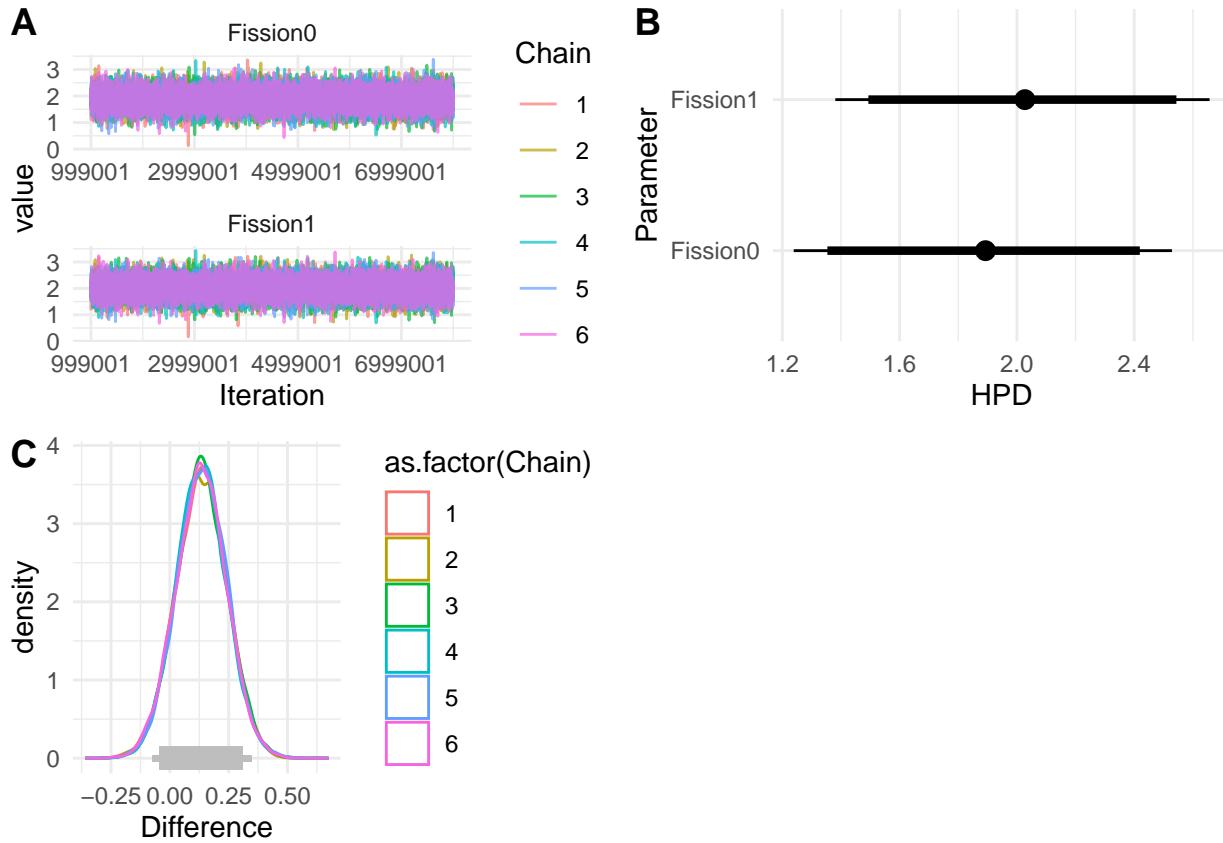


Table 69: Estimates of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2 (1.25, 2.52)	0
Fission1	2.05 (1.4, 2.66)	0
scale(log(Number))	0.58 (0.39, 0.76)	0

Table 70: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	-0.14 (-0.41, 0.12)	0.289
Fission0 vs scale(log(Number))	1.27 (0.63, 1.95)	0.001
Fission1 vs scale(log(Number))	1.39 (0.8, 2.09)	0.000

Model 2, prior set p2

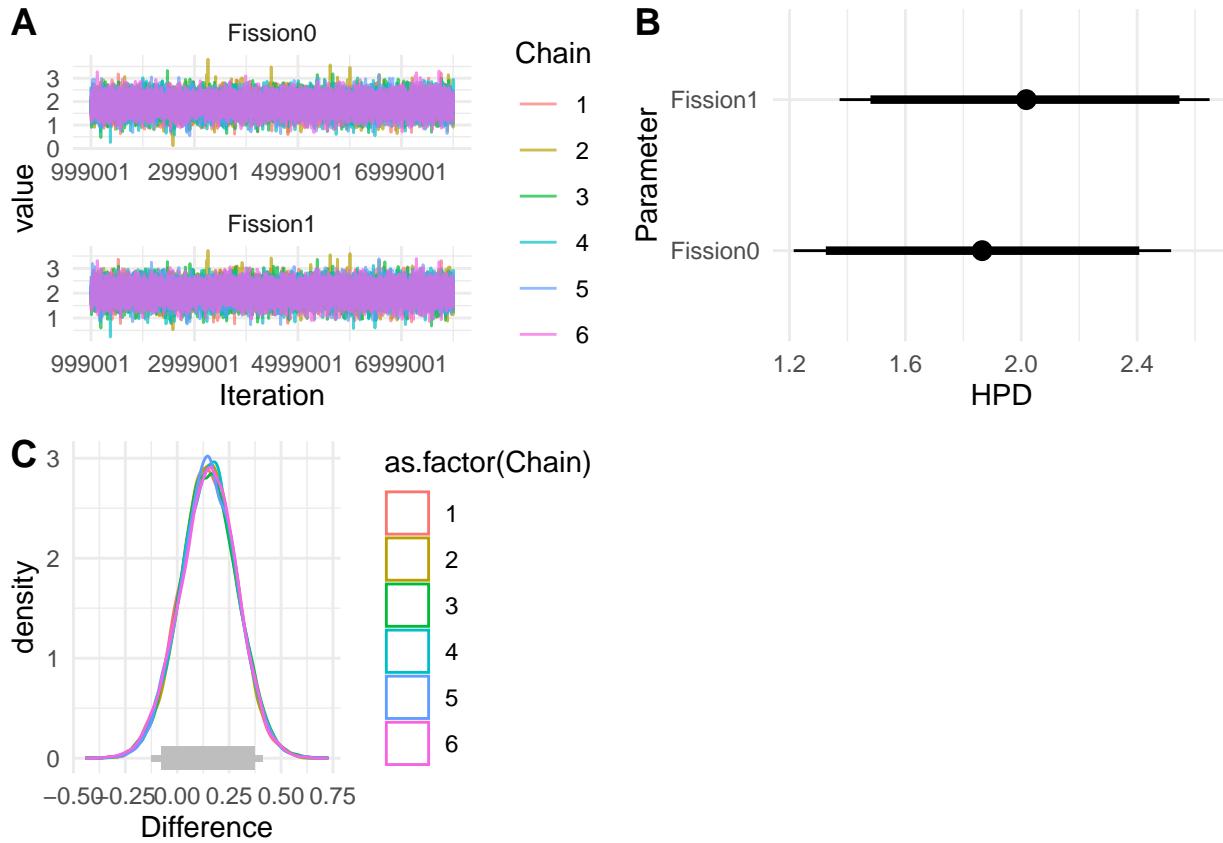


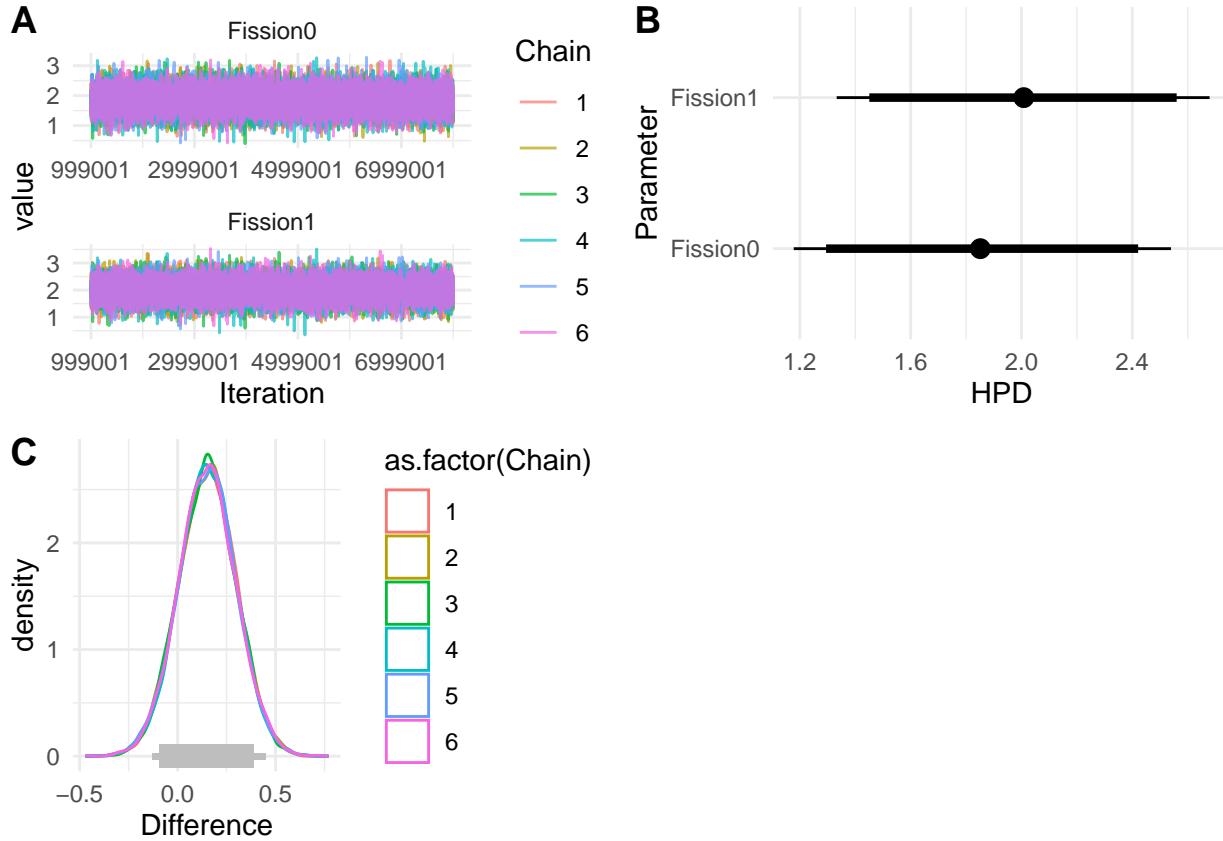
Table 71: Estimates of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	1.87 (1.18, 2.55)	0
Fission1	2.07 (1.36, 2.71)	0
scale(log(Number))	0.57 (0.39, 0.77)	0

Table 72: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	-0.11 (-0.44, 0.13)	0.297
Fission0 vs scale(log(Number))	1.33 (0.56, 1.97)	0.000
Fission1 vs scale(log(Number))	1.39 (0.76, 2.13)	0.000

Model 2, prior set p3



**Model 3:** *Number of Cells*  $\sim$  *Timing of Germline Segregation*

Table 73: Estimates of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	13.19 (3.04, 24.56)	0.018
GermTimeSimpearly	14.3 (0.38, 26.2)	0.039

Table 74: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-1.1 (-7.44, 6.98)	0.943

Model 3, prior set p1

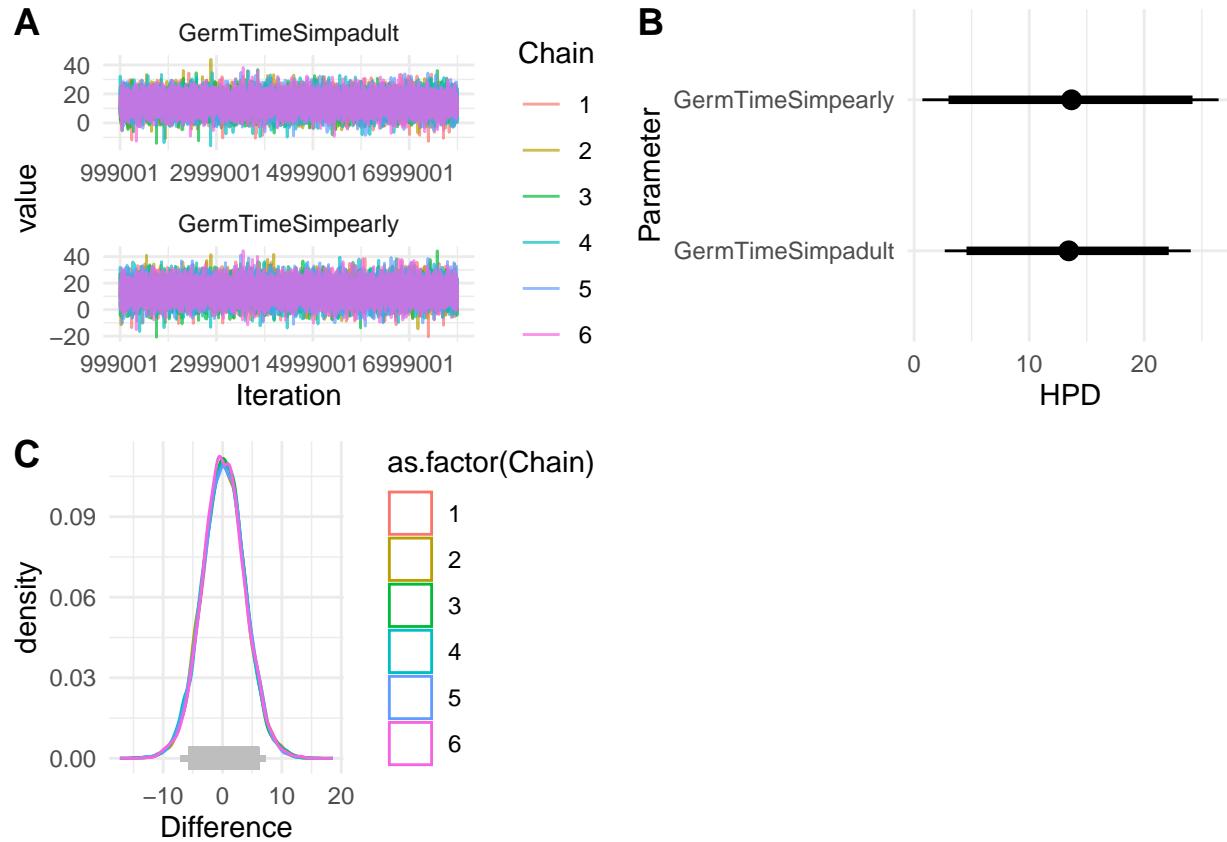


Table 75: Estimates of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	11.23 (3.61, 23.77)	0.014
GermTimeSimpearly	14.08 (1.07, 25.98)	0.034

Table 76: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.48 (-7.18, 6.59)	0.943

Model 3, prior set p2

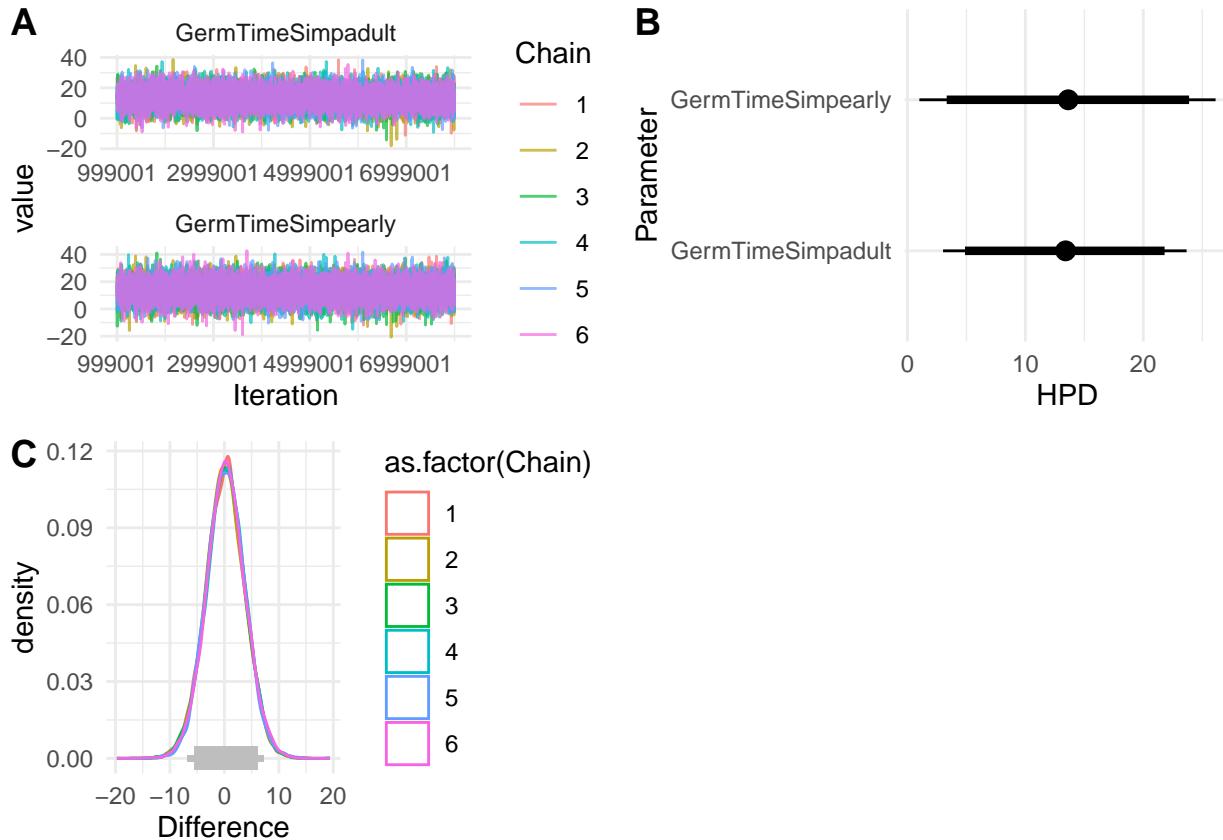


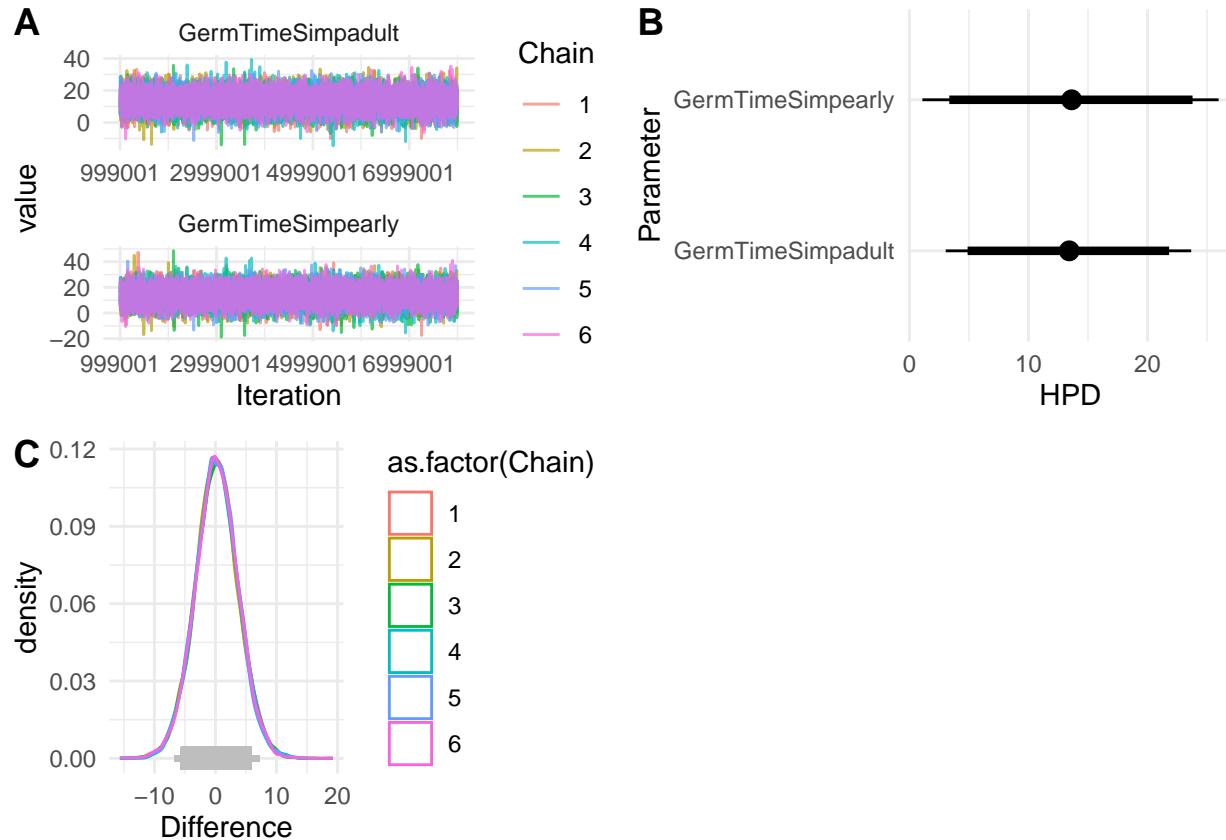
Table 77: Estimates of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	15.42 (3.43, 23.44)	0.017
GermTimeSimpearly	14.52 (1.35, 25.78)	0.032

Table 78: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.69 (-7.32, 6.73)	0.965

Model 3, prior set p3



**Model 4:**  $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$

Table 79: Estimates of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.01 (1.36, 2.63)	0.000
GermTimeSimpearly	1.8 (0.68, 2.84)	0.002
scale(log(Number))	0.55 (0.42, 0.73)	0.000

Table 80: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.22 (-0.66, 1.1)	0.669
GermTimeSimpadult vs scale(log(Number))	1.26 (0.75, 2.04)	0.000
GermTimeSimpearly vs scale(log(Number))	1.38 (0.07, 2.23)	0.032

Model 4, prior set p1

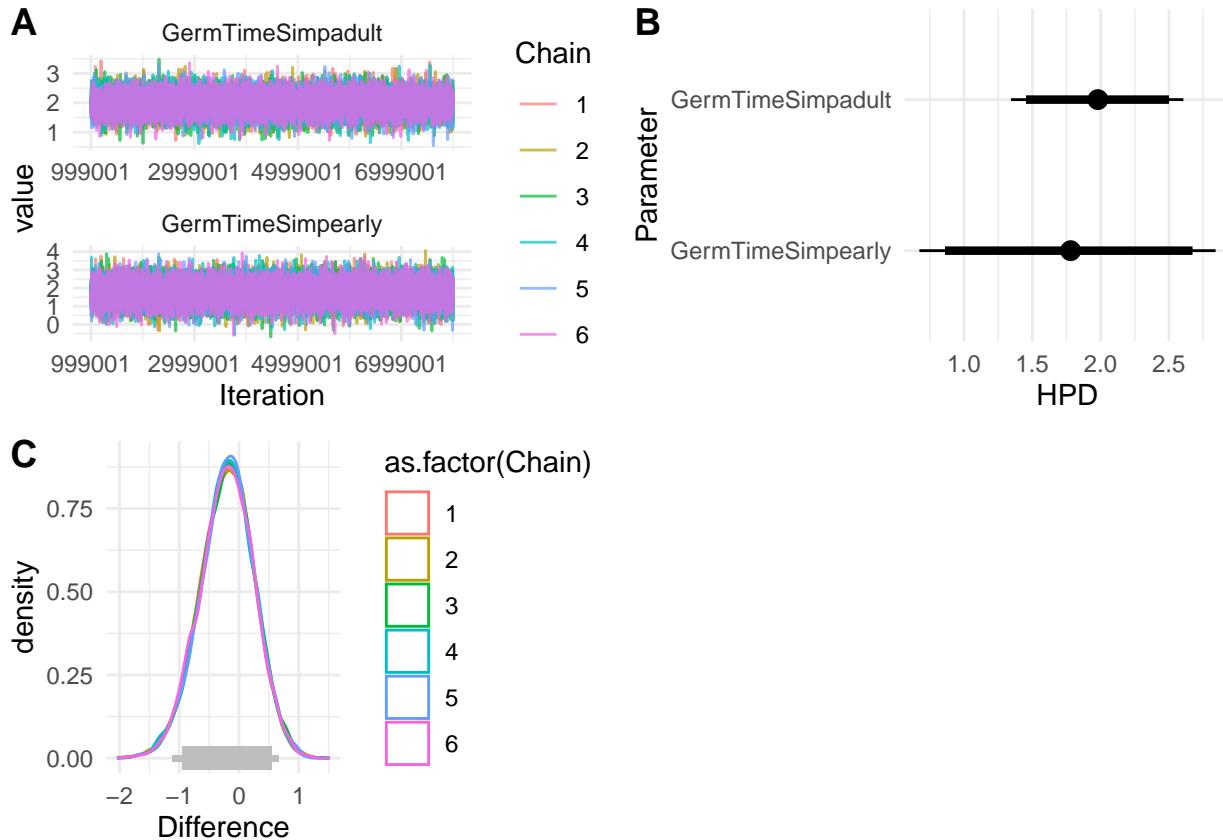


Table 81: Estimates of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.86 (1.33, 2.62)	0.000
GermTimeSimpearly	1.86 (0.58, 2.78)	0.003
scale(log(Number))	0.57 (0.38, 0.75)	0.000

Table 82: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.24 (-0.68, 1.18)	0.643
GermTimeSimpadult vs scale(log(Number))	1.38 (0.73, 2.04)	0.000
GermTimeSimpearly vs scale(log(Number))	1.19 (0.04, 2.24)	0.045

Model 4, prior set p2

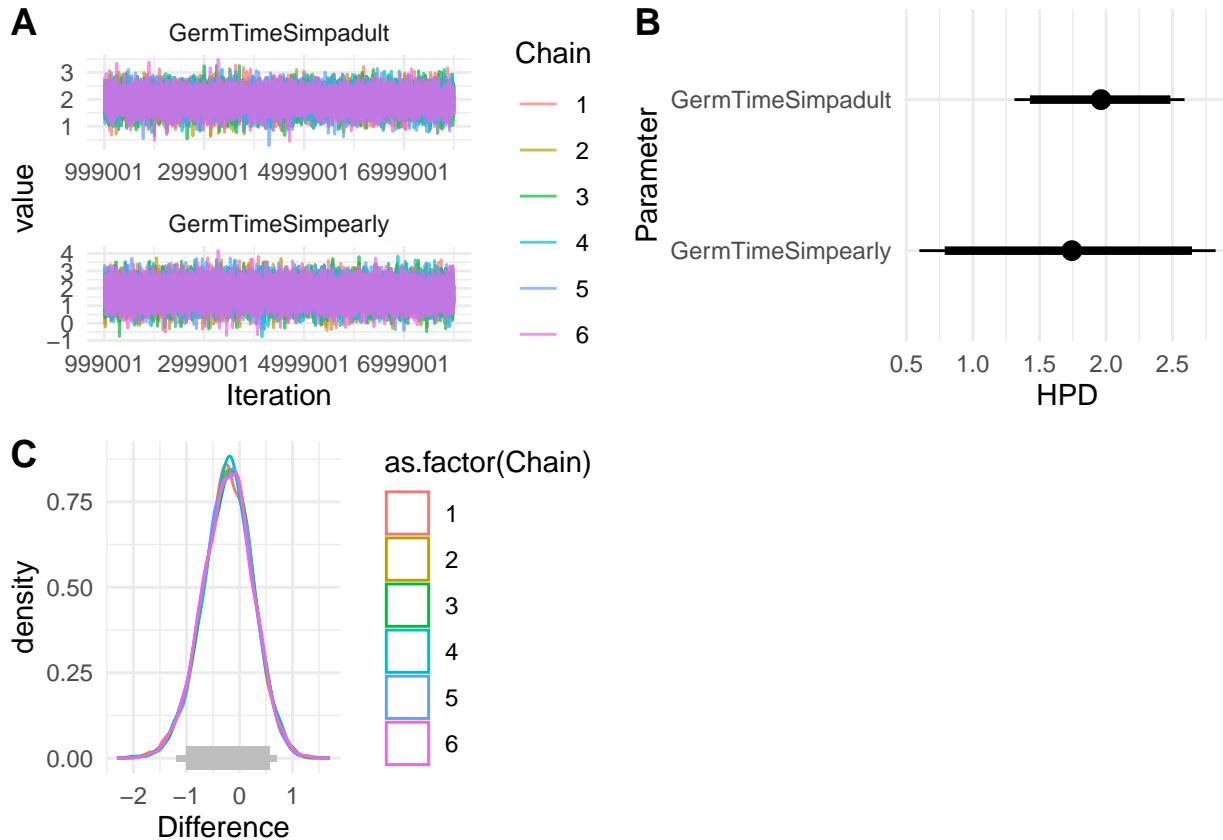


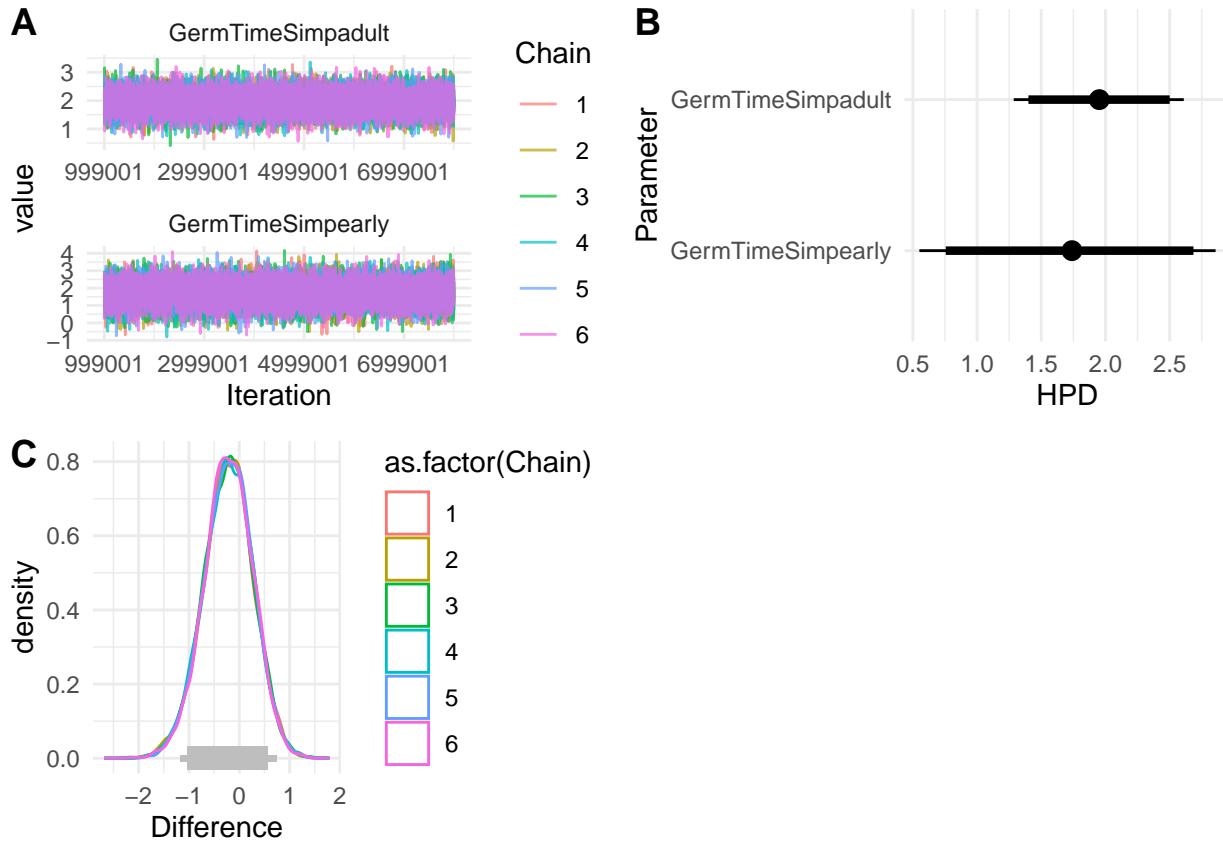
Table 83: Estimates of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.99 (1.26, 2.58)	0.000
GermTimeSimpearly	1.66 (0.61, 2.92)	0.005
scale(log(Number))	0.58 (0.38, 0.77)	0.000

Table 84: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.08 (-0.8, 1.13)	0.664
GermTimeSimpadult vs scale(log(Number))	1.43 (0.71, 2.06)	0.000
GermTimeSimpearly vs scale(log(Number))	1.43 (0.01, 2.32)	0.054

Model 4, prior set p3



**Model 5:** *Number of Cell Types*  $\sim$  *Timing of Germline Segregation*

Table 85: Estimates of Fixed Effects for \*Model 5\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.62 (0.72, 2.67)	0.001
GermTimeSimpearly	1.51 (0.2, 3)	0.033

Table 86: Comparisons of Fixed Effects for Model \*5\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.2 (-0.87, 1.17)	0.806

Model 4WithoutCellNumber, prior set p1

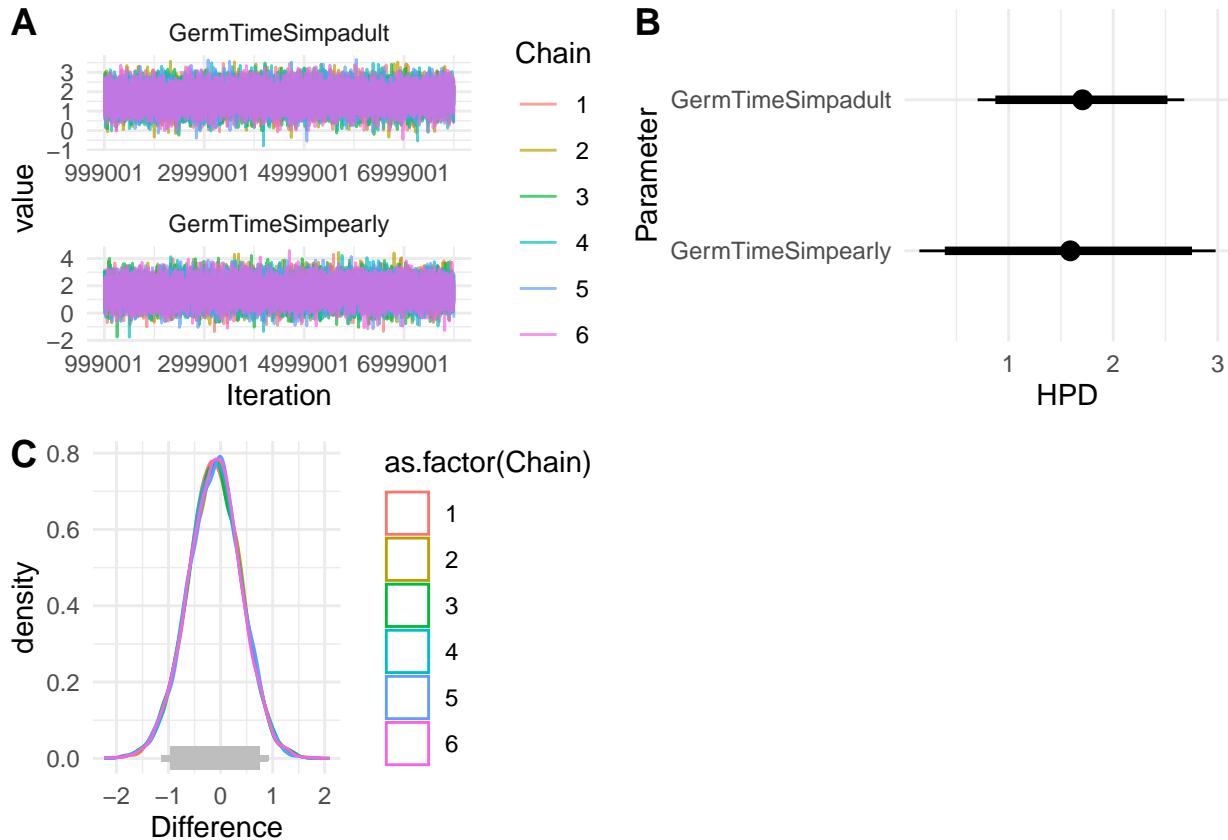


Table 87: Estimates of Fixed Effects for \*Model 5\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.71 (0.89, 2.64)	0.000
GermTimeSimpearly	1.35 (0.22, 2.85)	0.025

Table 88: Comparisons of Fixed Effects for Model \*5\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.28 (-0.82, 1.22)	0.729

Model 4WithoutCellNumber, prior set p2

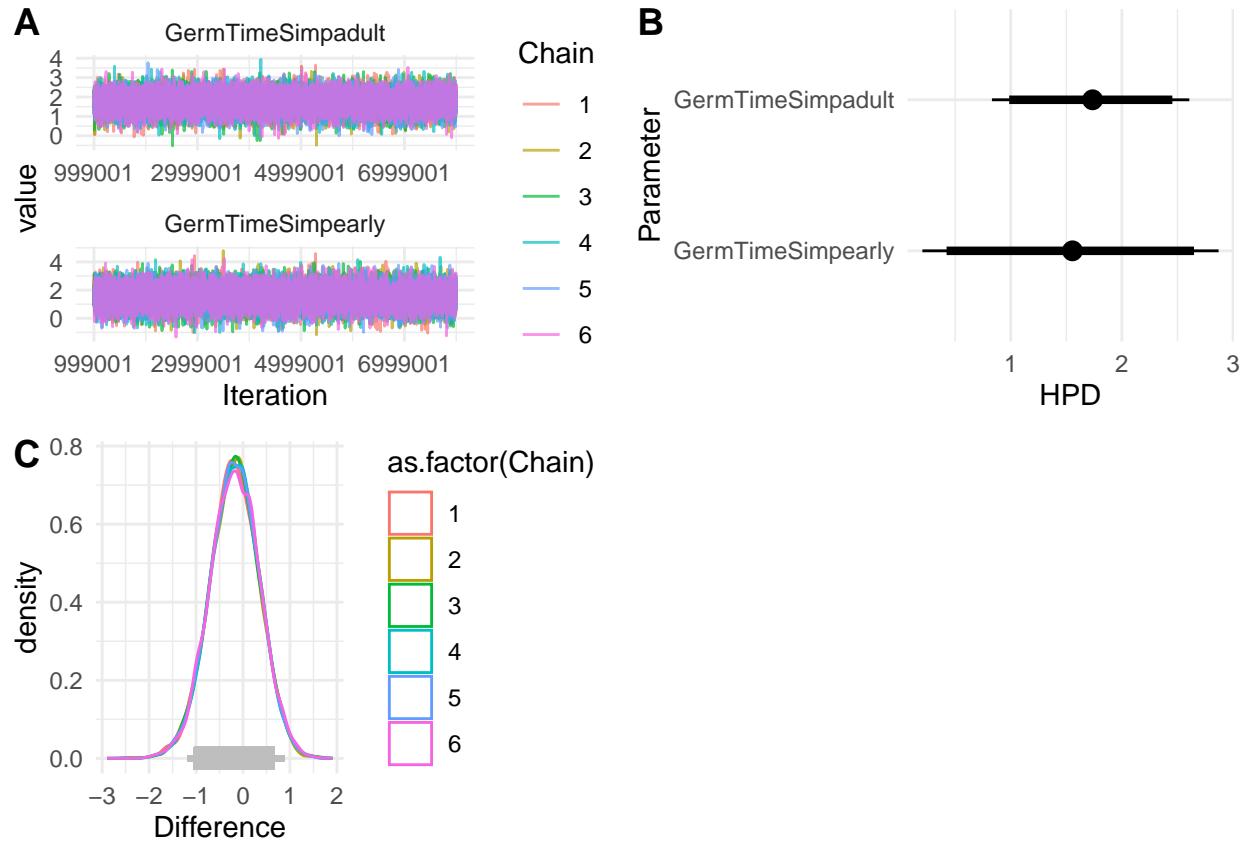


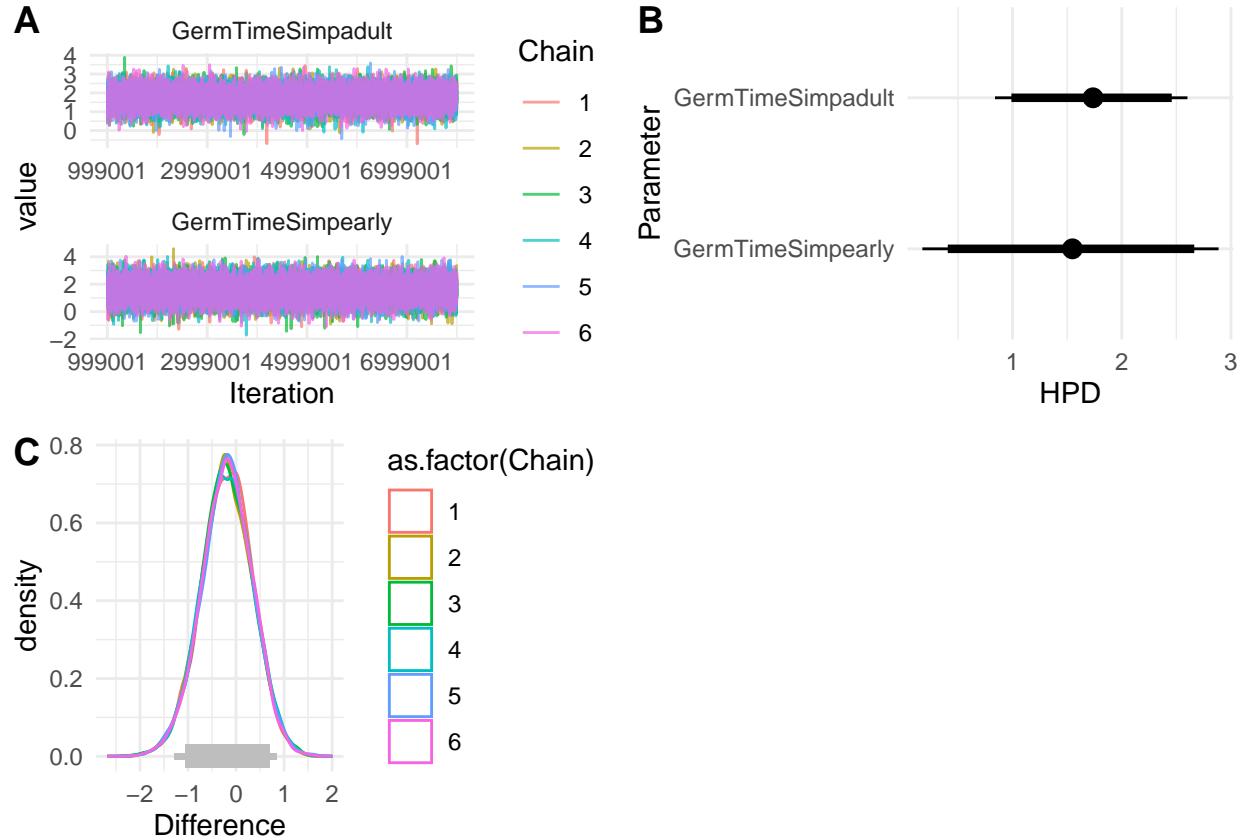
Table 89: Estimates of Fixed Effects for \*Model 5\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.69 (0.82, 2.56)	0.001
GermTimeSimpearly	1.53 (0.19, 2.85)	0.026

Table 90: Comparisons of Fixed Effects for Model \*5\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.02 (-0.82, 1.24)	0.742

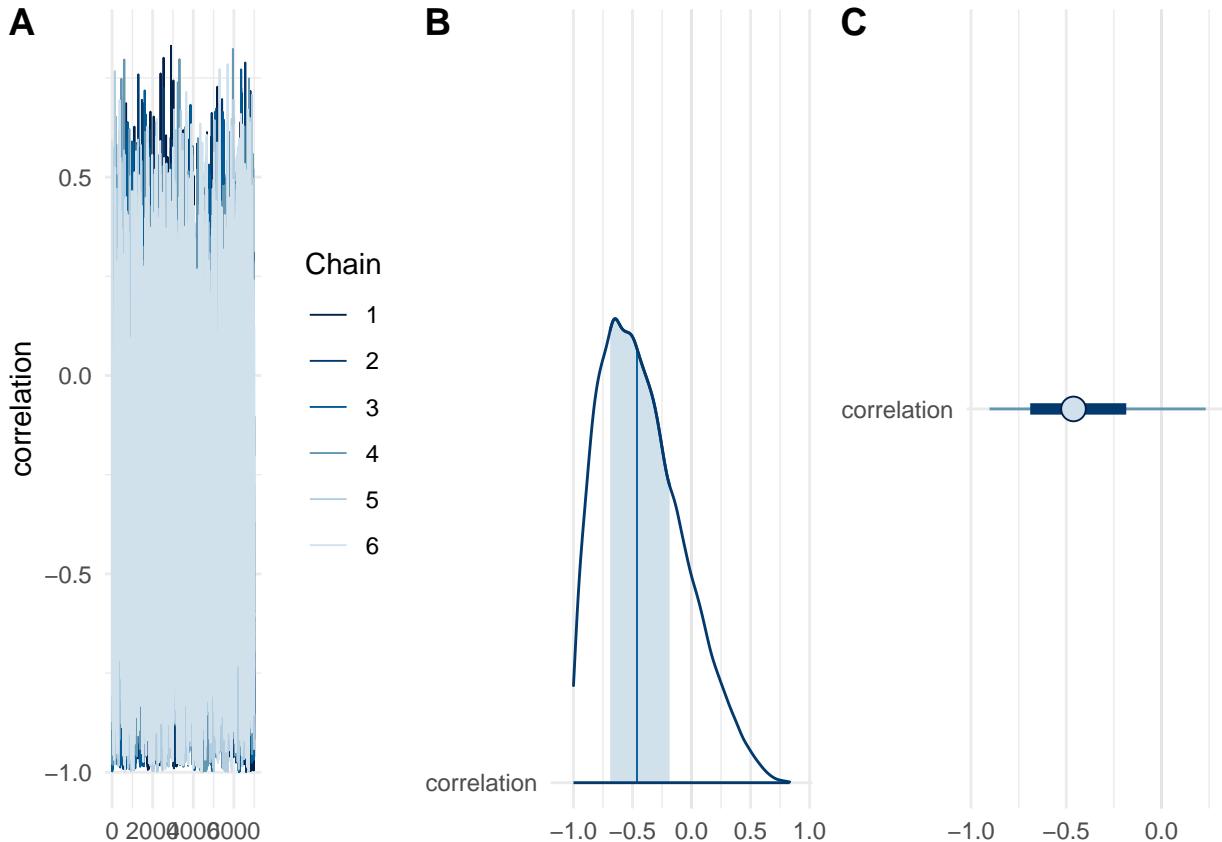
Model 4WithoutCellNumber, prior set p3



## Correlation between germline and fission

This analysis was run to test for a phylogenetic association between early germline segregation and a strict bottleneck separating each generation. Prior set 4 above was used.

Figure: A shows the convergence of all chains, B and C both show the posterior estimates and confidence intervals for the correlation between the *absence* of a strict bottleneck, and the *presence* of early germline segregation. This is shown only for 1 chain.

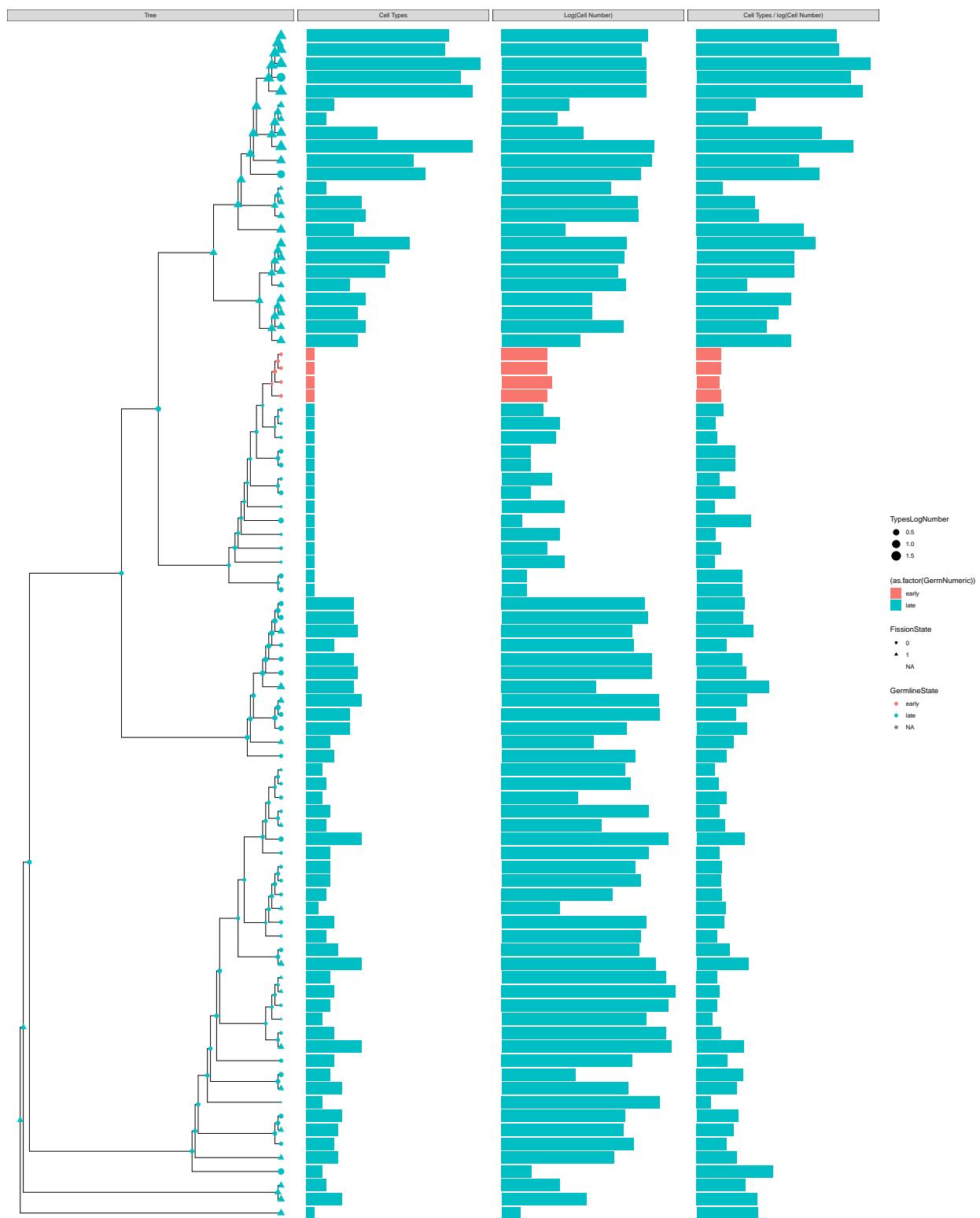


For each chain, the posterior CI were as follows

```
## [[1]]
##           lower      upper
## correlation -0.9883657 0.2615741
## attr(),"Probability"
## [1] 0.95
##
## [[2]]
##           lower      upper
## correlation -0.9768183 0.2319067
## attr(),"Probability"
## [1] 0.95
##
## [[3]]
##           lower      upper
## correlation -0.9988132 0.2562996
## attr(),"Probability")
```

```
## [1] 0.95
##
## [[4]]
##           lower      upper
## correlation -0.9969584 0.2182141
## attr(,"Probability")
## [1] 0.95
##
## [[5]]
##           lower      upper
## correlation -0.9970201 0.2141558
## attr(,"Probability")
## [1] 0.95
##
## [[6]]
##           lower      upper
## correlation -0.9981998 0.2430388
## attr(,"Probability")
## [1] 0.95
```

## Ancestral state reconstruction



Analyses including only data from species

Analyses with all data points

Model 1: *Number of Cells ~ Presence of Strict Bottleneck*

Table 91: Estimates of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	13.02 (0.84, 26.03)	0.035
Fission1	10.84 (-0.87, 24.44)	0.059

Table 92: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	1.57 (-0.83, 3.68)	0.197

Model 1, prior set p1

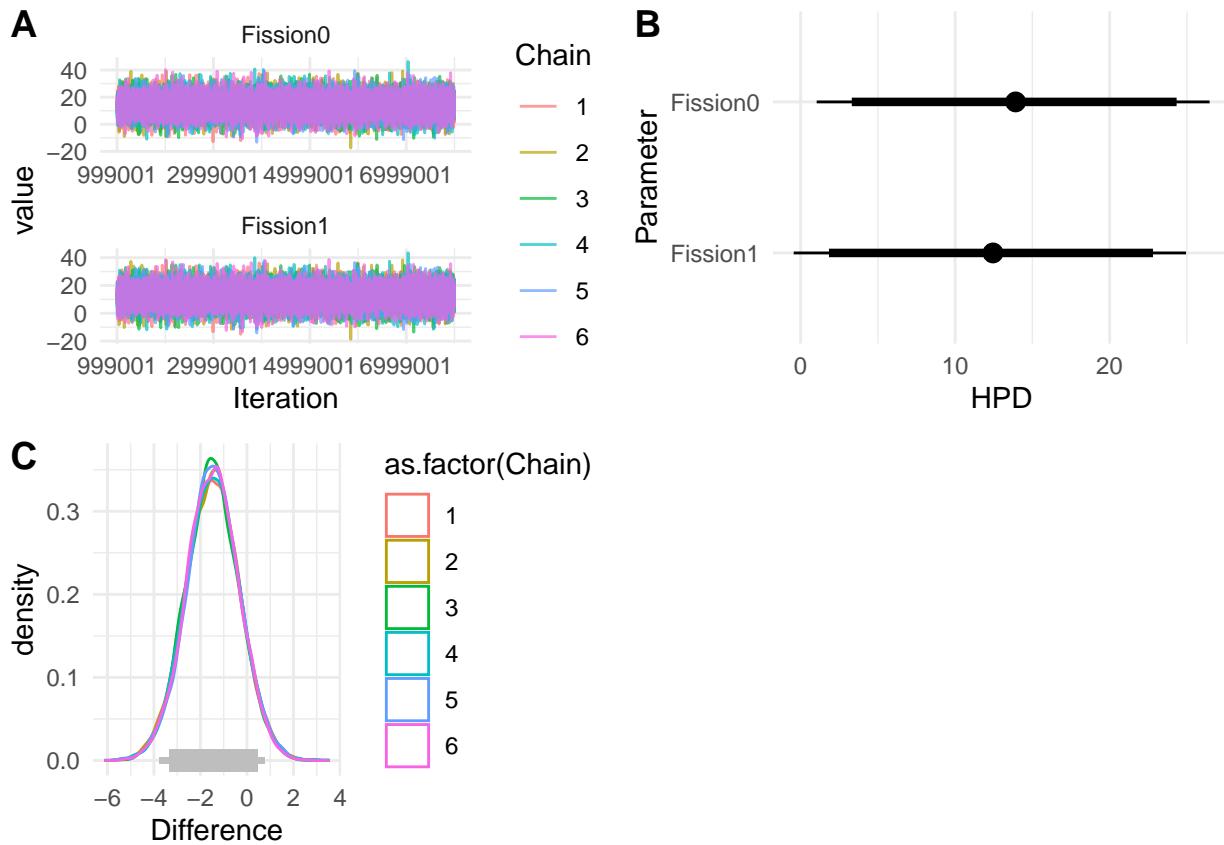


Table 93: Estimates of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	13.1 (1.26, 25.95)	0.030
Fission1	11.55 (-0.37, 24.35)	0.051

Table 94: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	1.53 (-0.81, 3.8)	0.214

Model 1, prior set p2

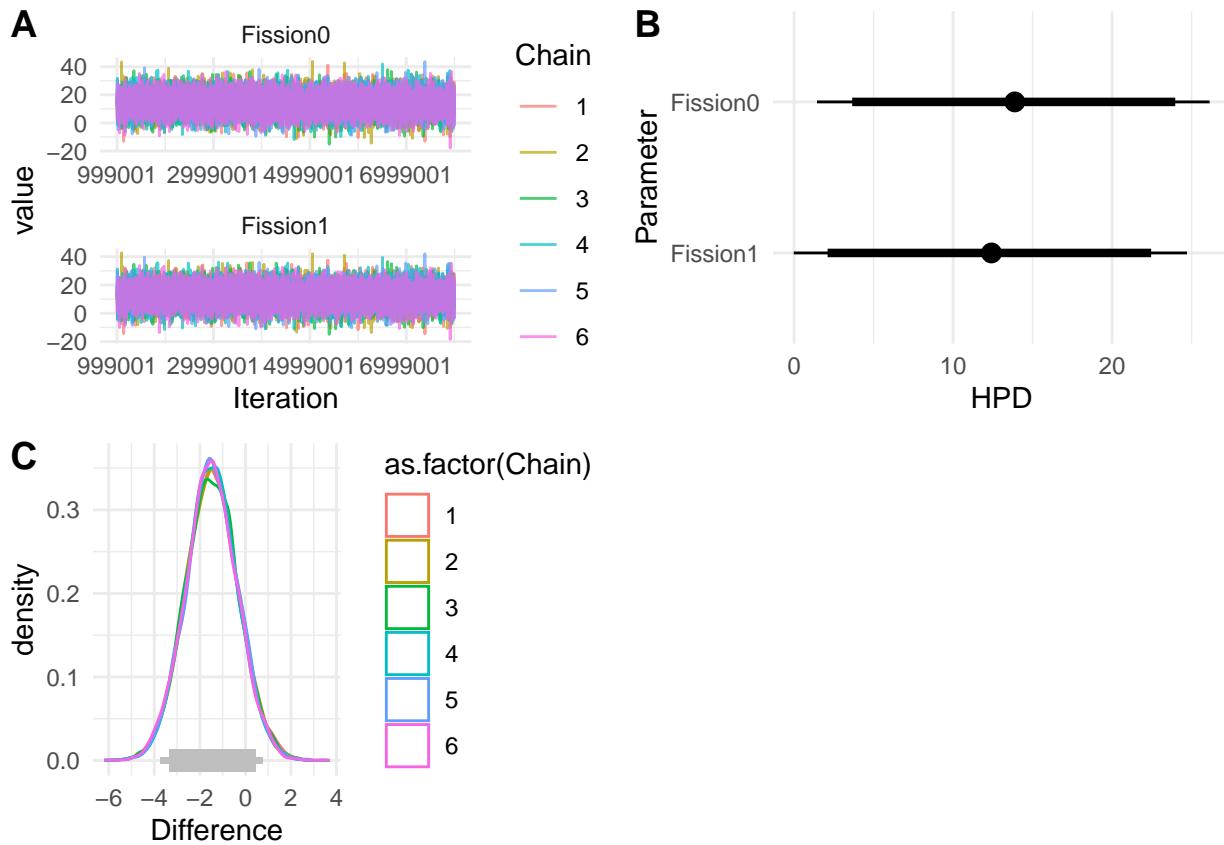


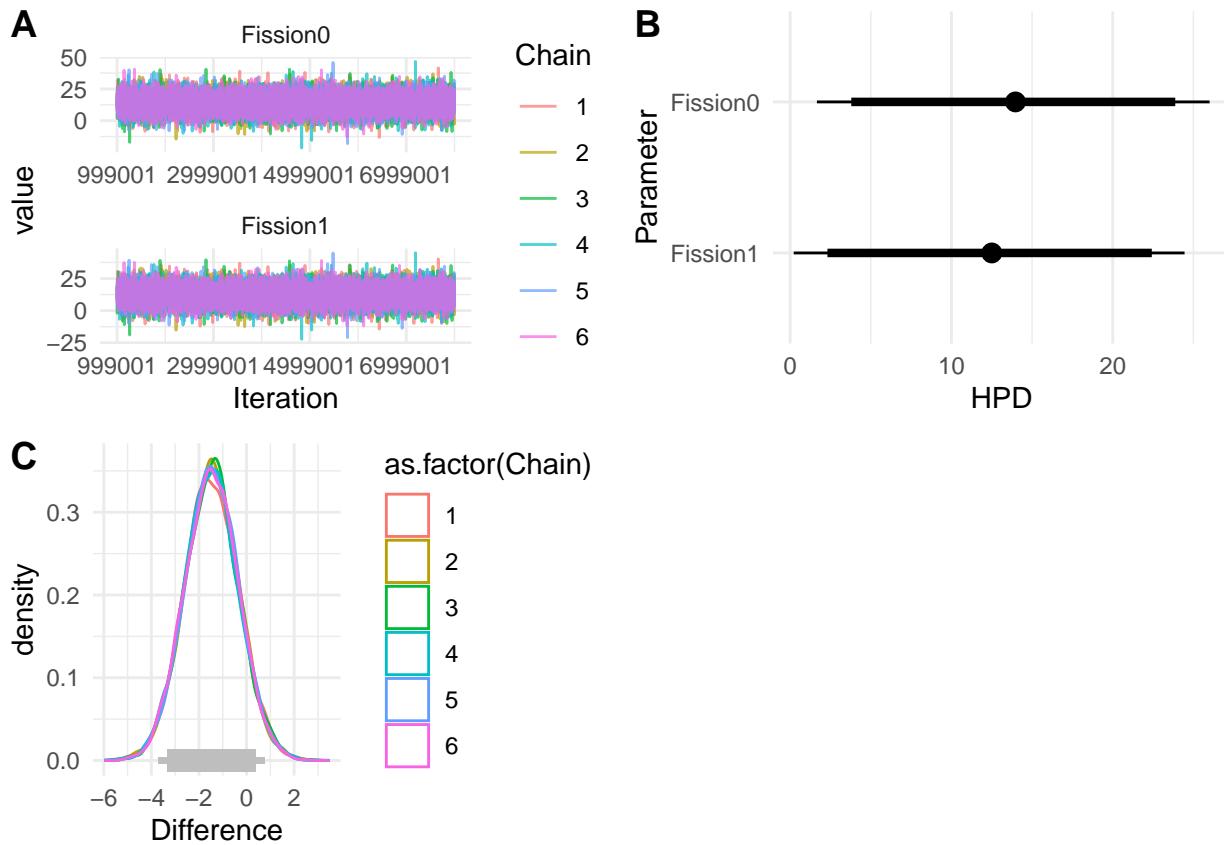
Table 95: Estimates of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	12.78 (2.36, 26.23)	0.030
Fission1	14.05 (0.69, 24.74)	0.049

Table 96: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	1.72 (-0.78, 3.7)	0.196

Model 1, prior set p3



Model 2:  $\text{Number of Cell Types} \sim \text{Presence of Strict Bottleneck} + \log(\text{Number of Cells})$

Table 97: Estimates of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.11 (1.15, 3.1)	0
Fission1	2.15 (1.13, 3.08)	0
scale(log(Number))	0.54 (0.43, 0.65)	0

Table 98: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.04 (-0.13, 0.23)	0.573
Fission0 vs scale(log(Number))	1.56 (0.62, 2.58)	0.001
Fission1 vs scale(log(Number))	1.52 (0.56, 2.52)	0.001

Model 2, prior set p1

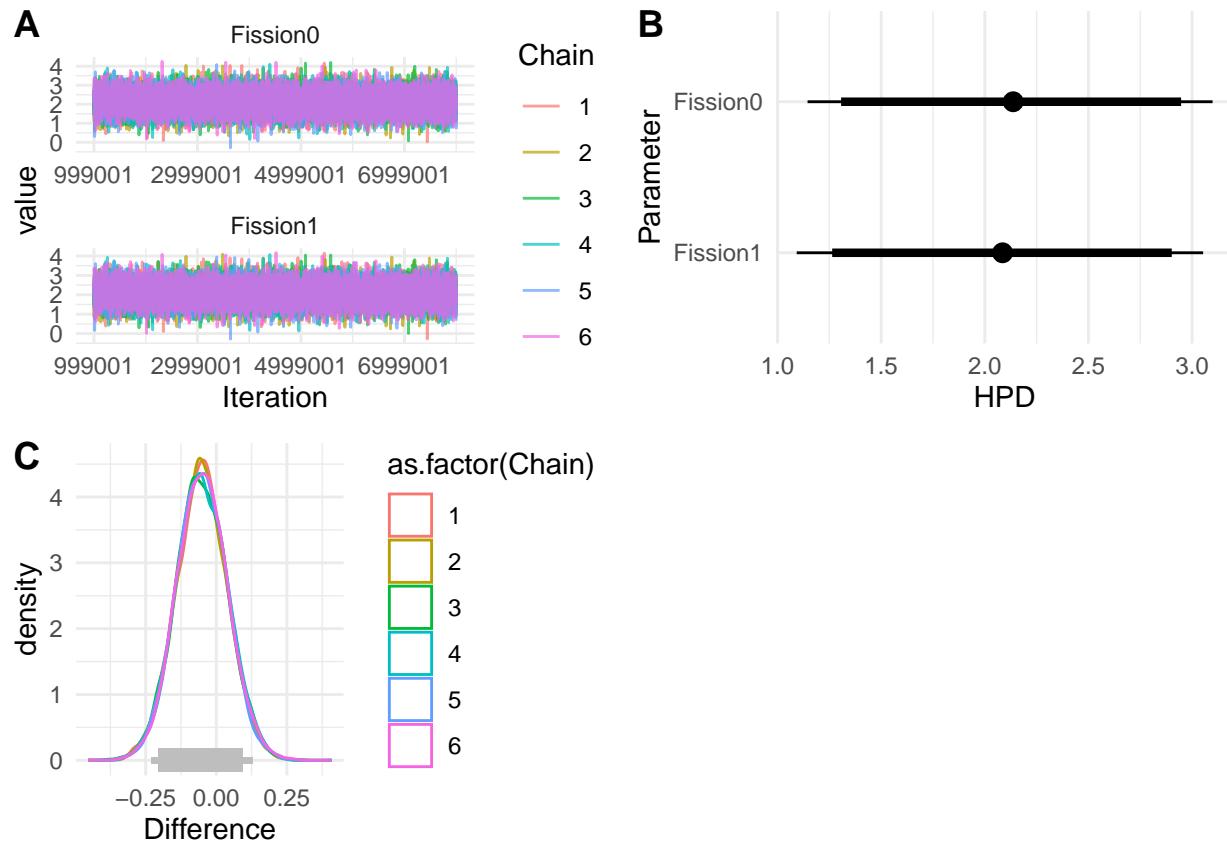


Table 99: Estimates of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.22 (1.28, 3.07)	0
Fission1	2.17 (1.22, 2.99)	0
scale(log(Number))	0.56 (0.43, 0.69)	0

Table 100: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.05 (-0.16, 0.26)	0.609
Fission0 vs scale(log(Number))	1.5 (0.73, 2.55)	0.001
Fission1 vs scale(log(Number))	1.62 (0.69, 2.47)	0.001

Model 2, prior set p2

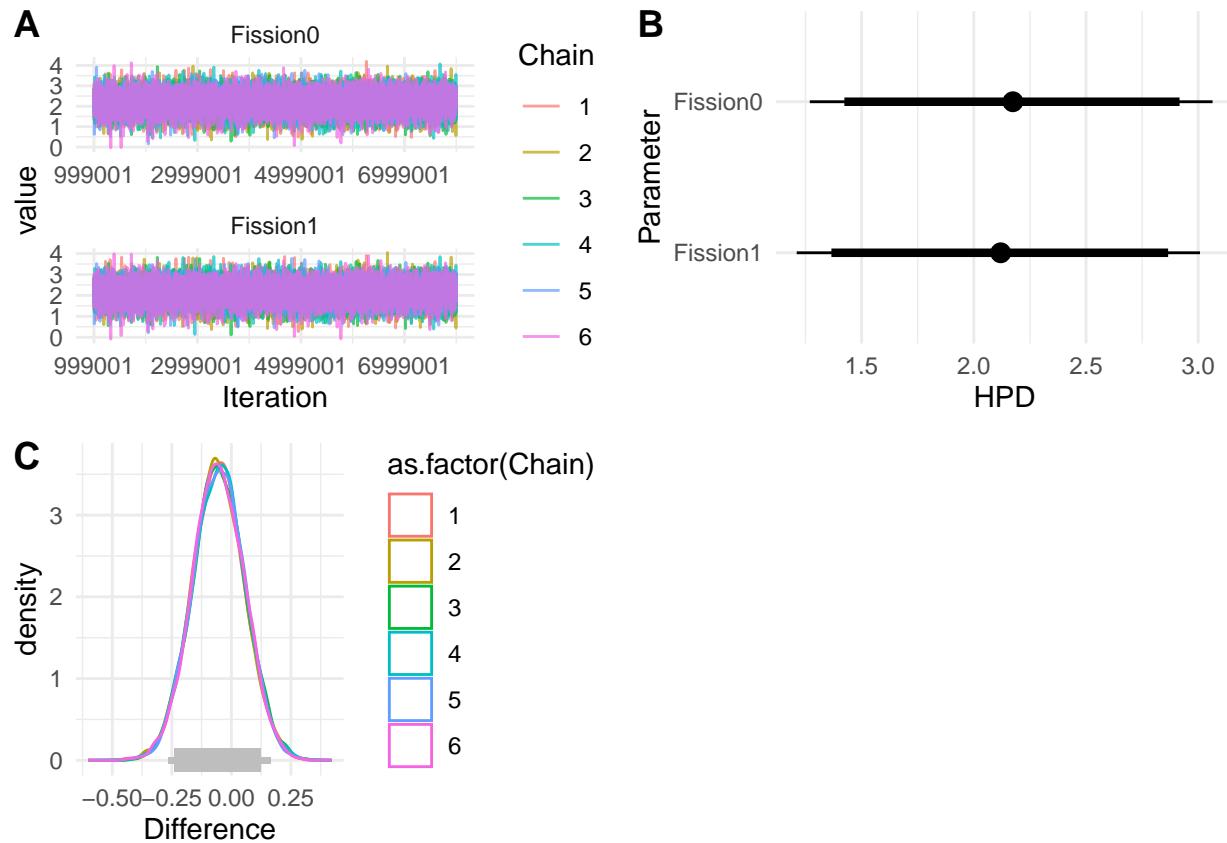


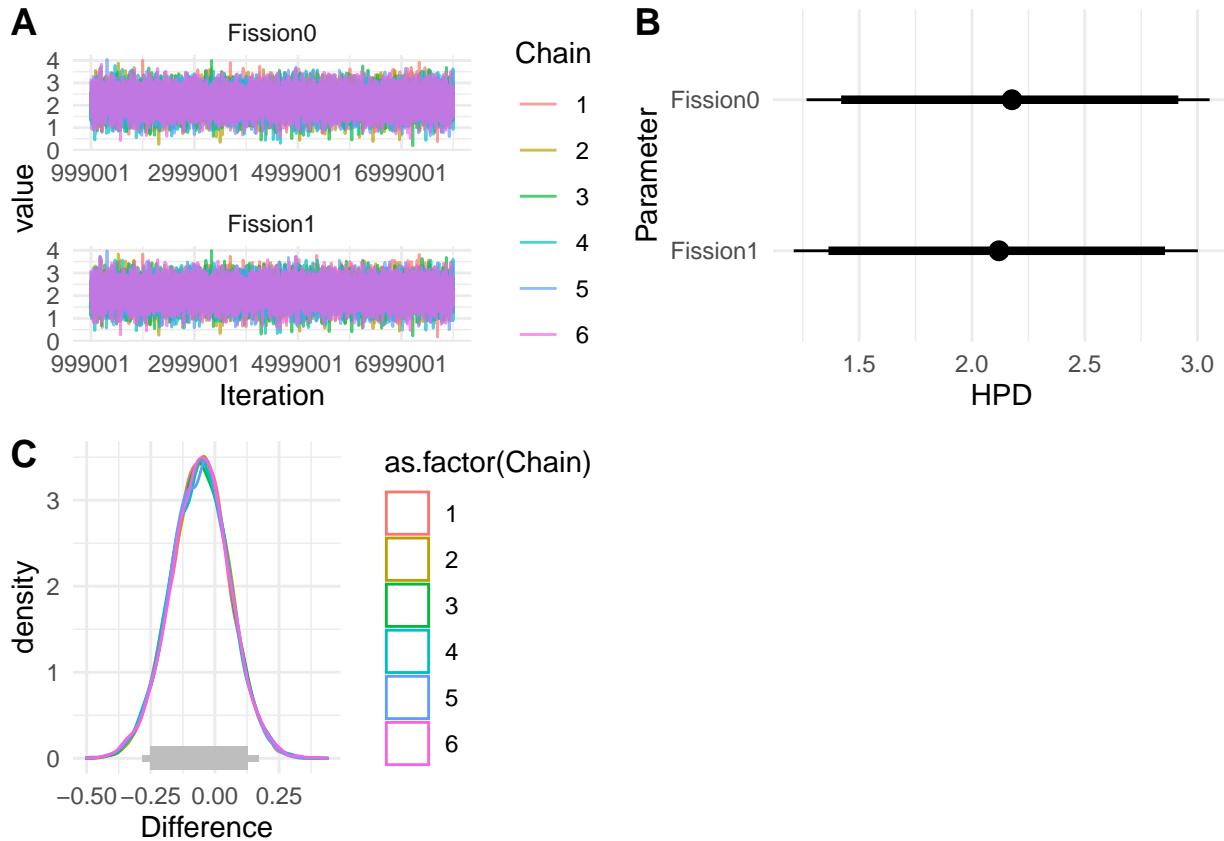
Table 101: Estimates of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.17 (1.24, 3.04)	0
Fission1	2.09 (1.25, 3.04)	0
scale(log(Number))	0.57 (0.43, 0.7)	0

Table 102: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.03 (-0.16, 0.28)	0.615
Fission0 vs scale(log(Number))	1.61 (0.74, 2.53)	0.000
Fission1 vs scale(log(Number))	1.7 (0.68, 2.46)	0.000

Model 2, prior set p3



**Model 3:** *Number of Cells*  $\sim$  *Timing of Germline Segregation*

Table 103: Estimates of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	11.95 (0.11, 25.15)	0.043
GermTimeSimpearly	14.46 (-0.55, 25.78)	0.054

Table 104: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.47 (-4.81, 4.3)	0.929

Model 3, prior set p1

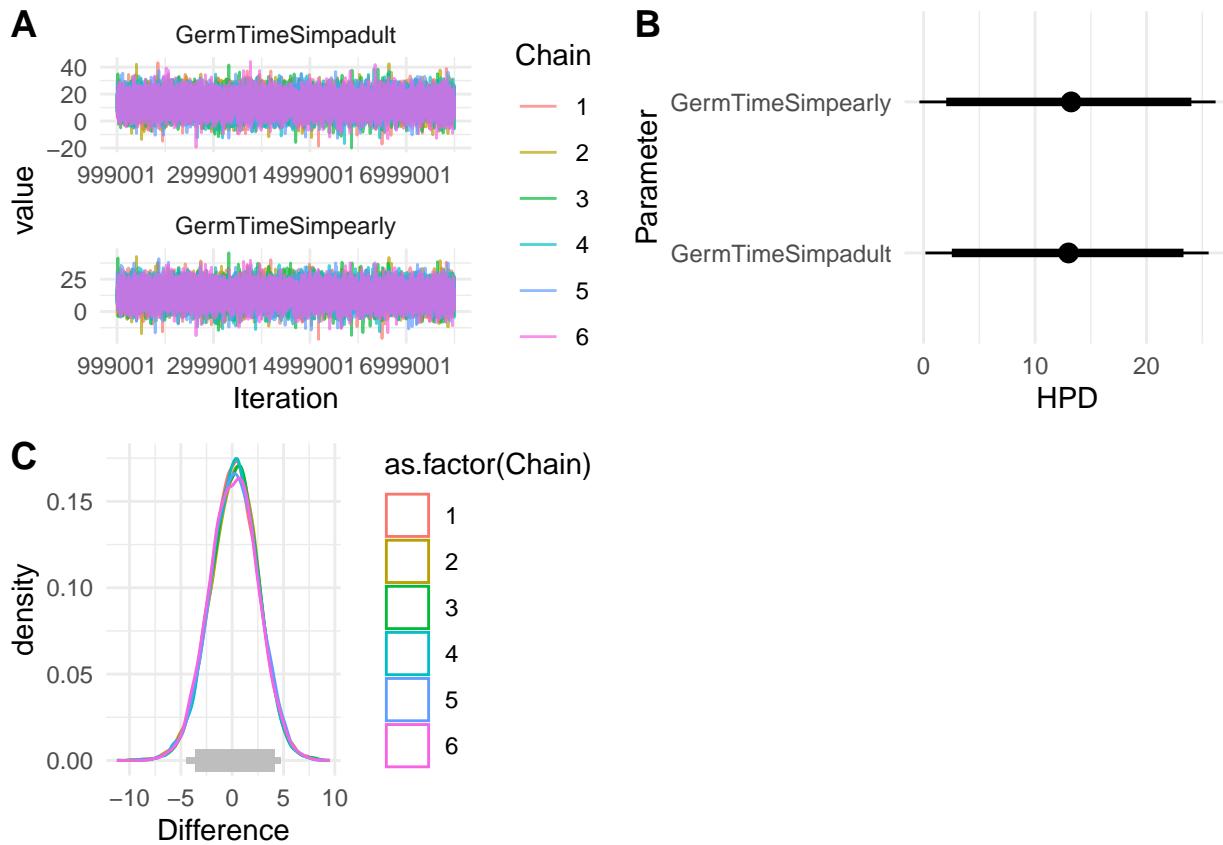


Table 105: Estimates of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	11.47 (0.81, 25.12)	0.042
GermTimeSimpearly	13.34 (-0.33, 25.74)	0.052

Table 106: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.05 (-4.73, 4.54)	0.909

Model 3, prior set p2

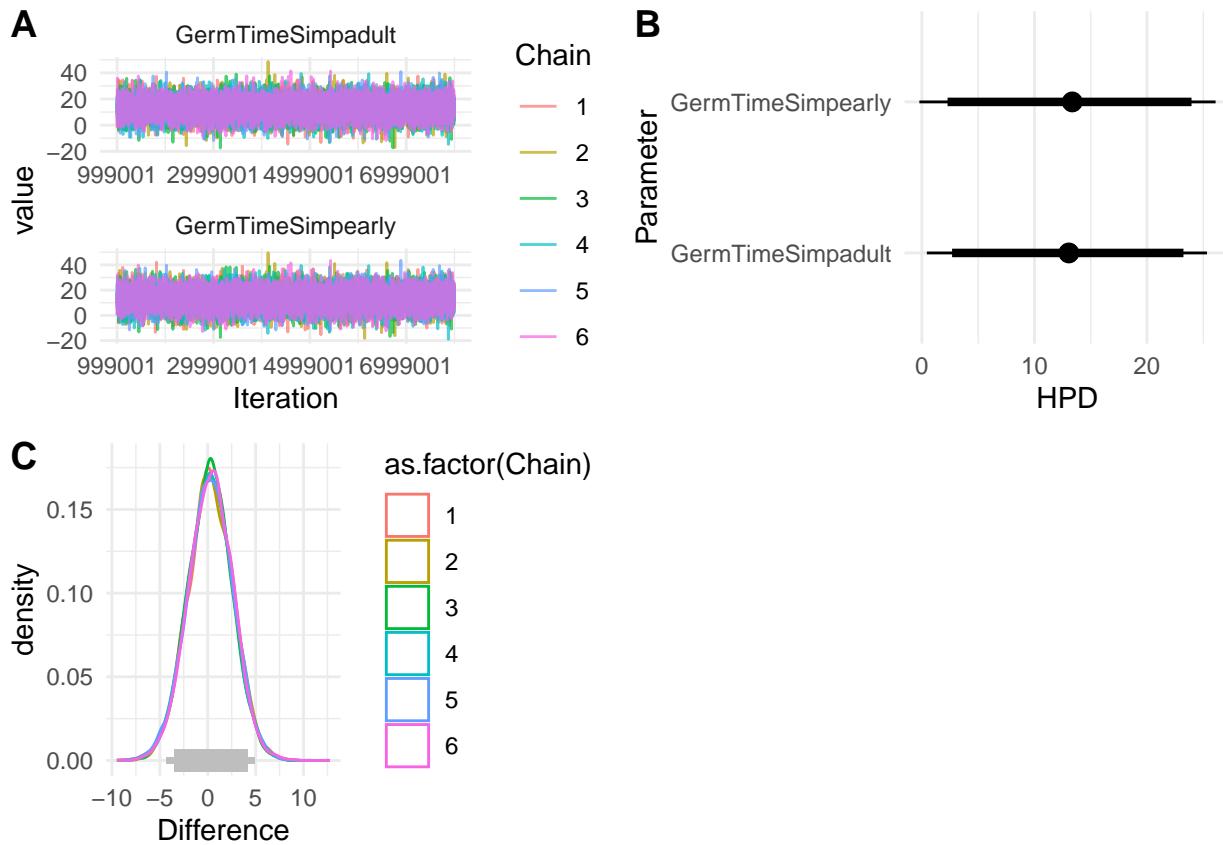


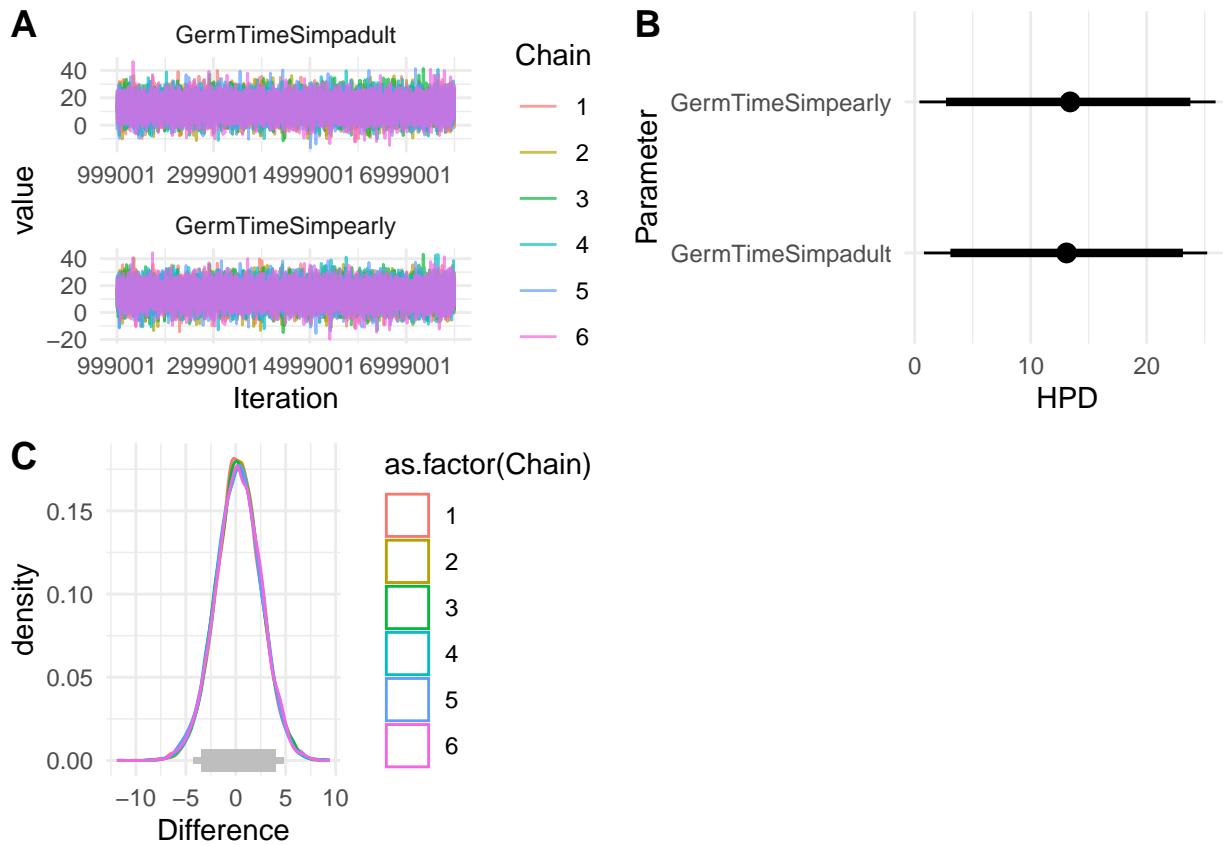
Table 107: Estimates of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	10.42 (0.77, 24.88)	0.041
GermTimeSimpearly	13.89 (0.64, 25.55)	0.039

Table 108: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.51 (-4.57, 4.33)	0.926

Model 3, prior set p3



**Model 4:**  $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$

Table 109: Estimates of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.13 (1.19, 2.99)	0
GermTimeSimpearly	2.65 (1.6, 3.49)	0
scale(log(Number))	0.56 (0.44, 0.64)	0

Table 110: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.44 (-0.84, -0.11)	0.012
GermTimeSimpadult vs scale(log(Number))	1.54 (0.65, 2.46)	0.002
GermTimeSimpearly vs scale(log(Number))	1.86 (1.04, 2.94)	0.000

Model 4, prior set p1

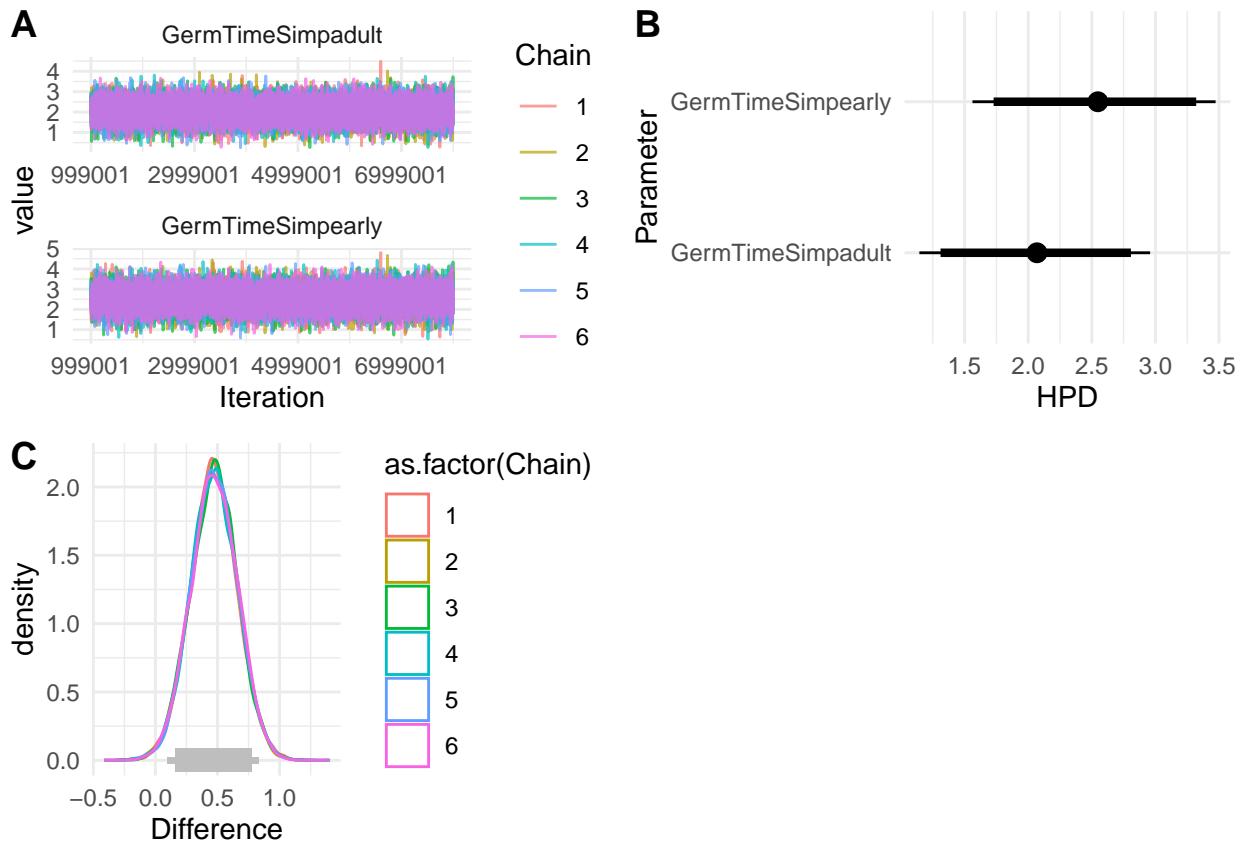


Table 111: Estimates of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.11 (1.24, 2.87)	0
GermTimeSimpearly	2.48 (1.65, 3.44)	0
scale(log(Number))	0.56 (0.44, 0.69)	0

Table 112: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.55 (-0.89, -0.1)	0.018
GermTimeSimpadult vs scale(log(Number))	1.57 (0.71, 2.37)	0.001
GermTimeSimpearly vs scale(log(Number))	1.97 (1.07, 2.87)	0.000

Model 4, prior set p2

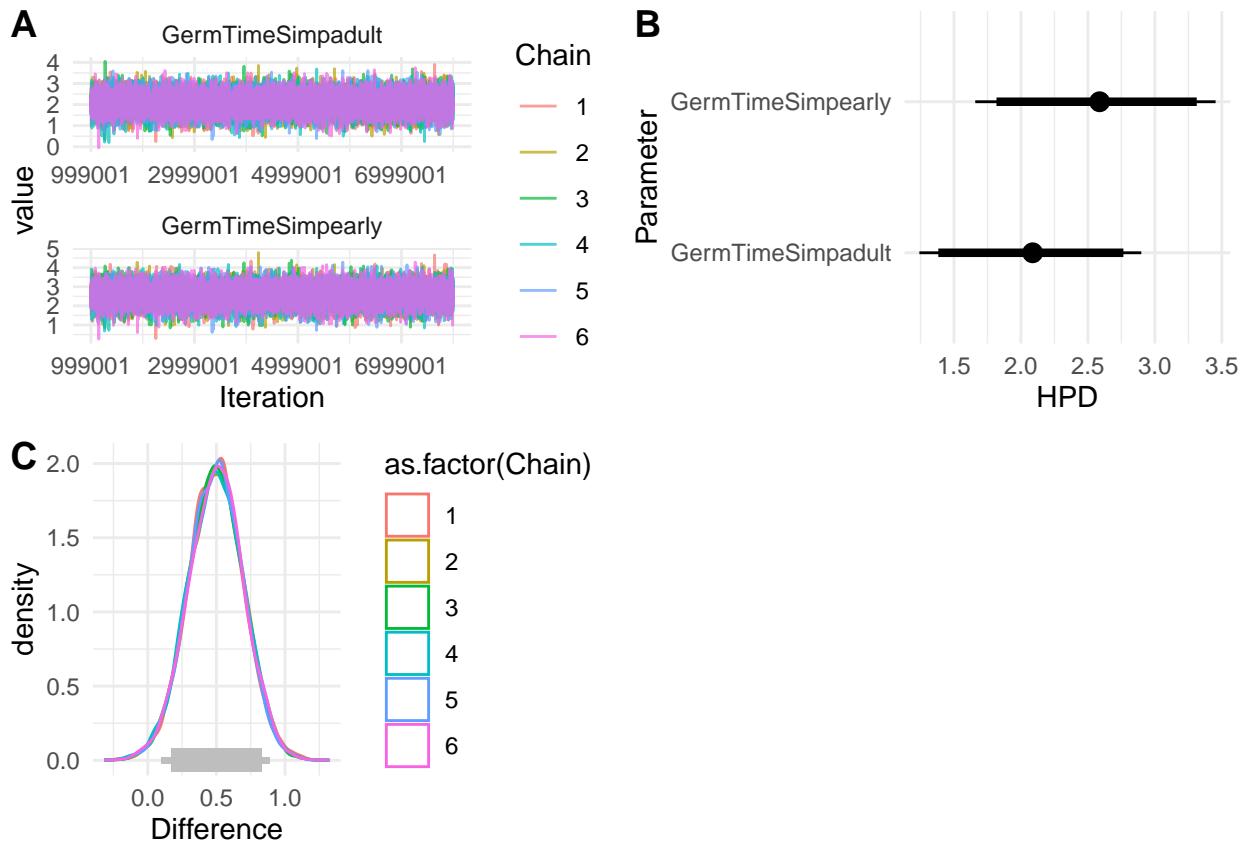


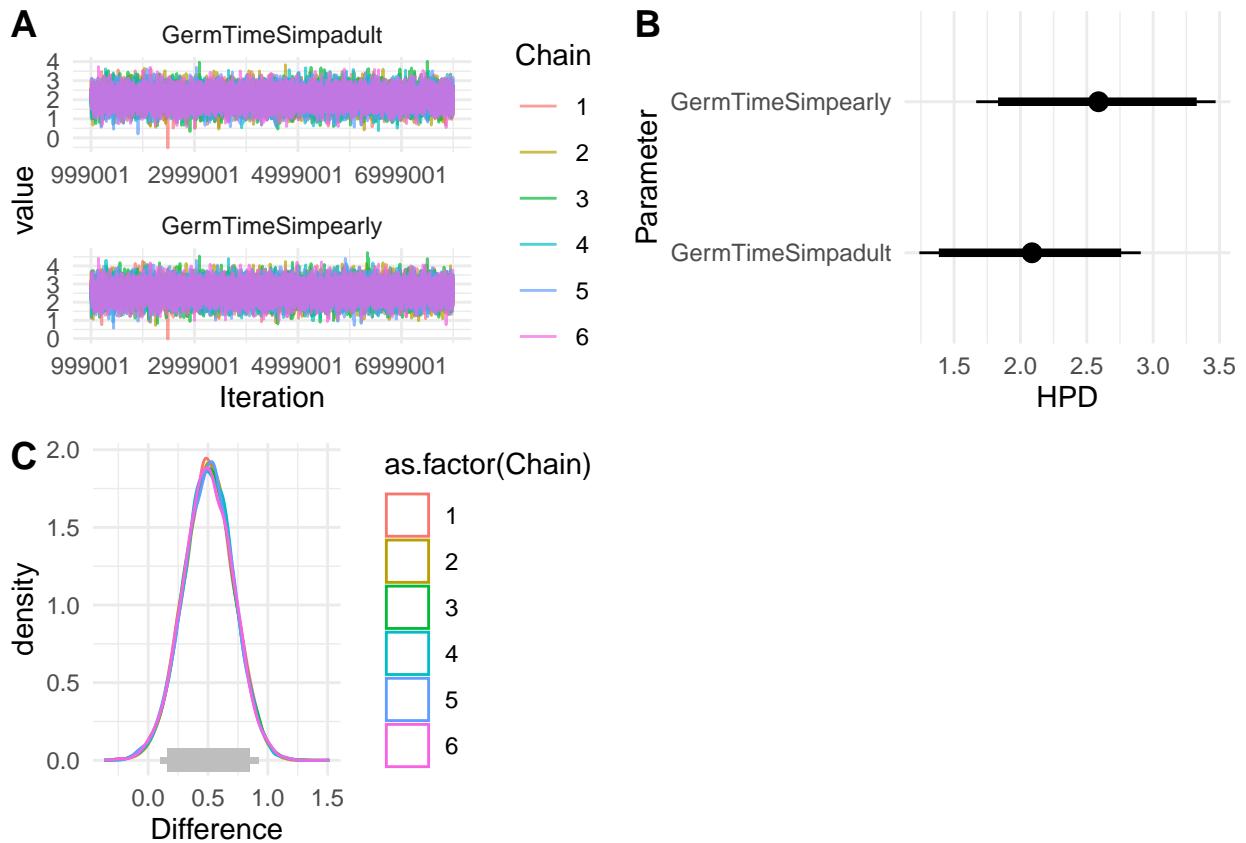
Table 113: Estimates of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.1 (1.26, 2.91)	0
GermTimeSimpearly	2.66 (1.63, 3.46)	0
scale(log(Number))	0.57 (0.44, 0.7)	0

Table 114: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.44 (-0.91, -0.1)	0.019
GermTimeSimpadult vs scale(log(Number))	1.54 (0.65, 2.32)	0.001
GermTimeSimpearly vs scale(log(Number))	1.89 (1.05, 2.89)	0.000

Model 4, prior set p3



*Model 5: Number of Cell Types ~ Timing of Germline Segregation*

Table 115: Estimates of Fixed Effects for Model \*5\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.09 (0.38, 3.24)	0.014
GermTimeSimpearly	2.5 (0.65, 3.66)	0.006

Table 116: Comparisons of Fixed Effects for Model \*5\* with prior set \*p1\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.36 (-0.94, 0.09)	0.127

Model 4WithoutCellNumber, prior set p1

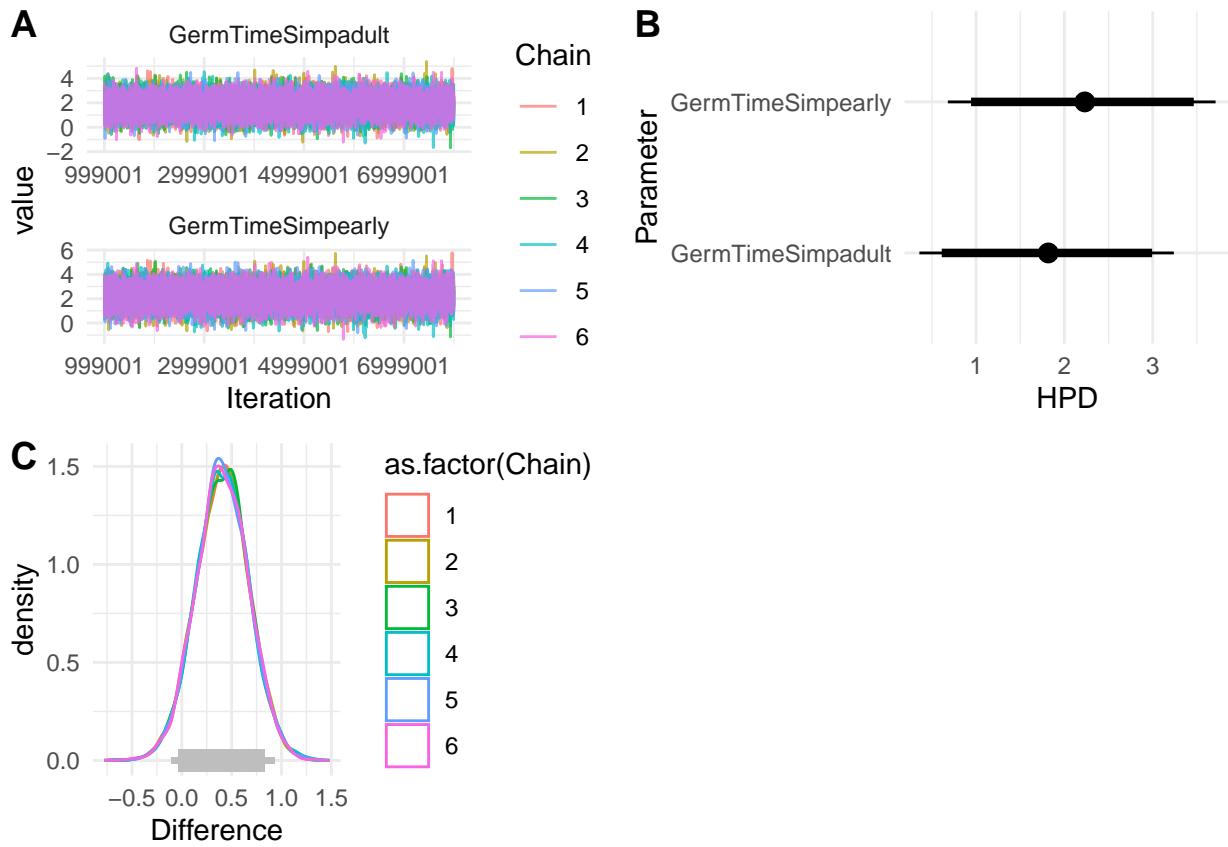


Table 117: Estimates of Fixed Effects for Model \*5\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.76 (0.52, 3.07)	0.008
GermTimeSimpearly	2.42 (0.91, 3.63)	0.002

Table 118: Comparisons of Fixed Effects for Model \*5\* with prior set \*p2\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.45 (-0.95, 0.07)	0.082

Model 4WithoutCellNumber, prior set p2

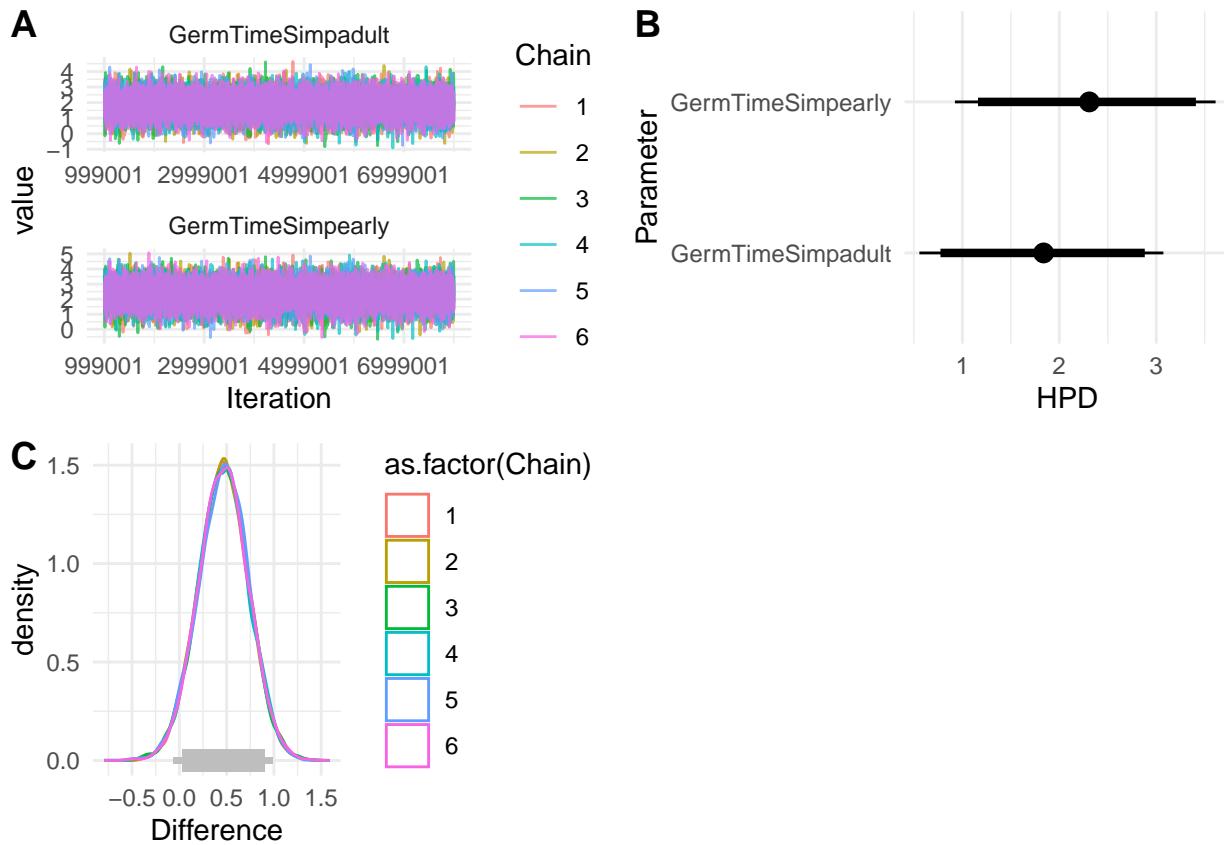


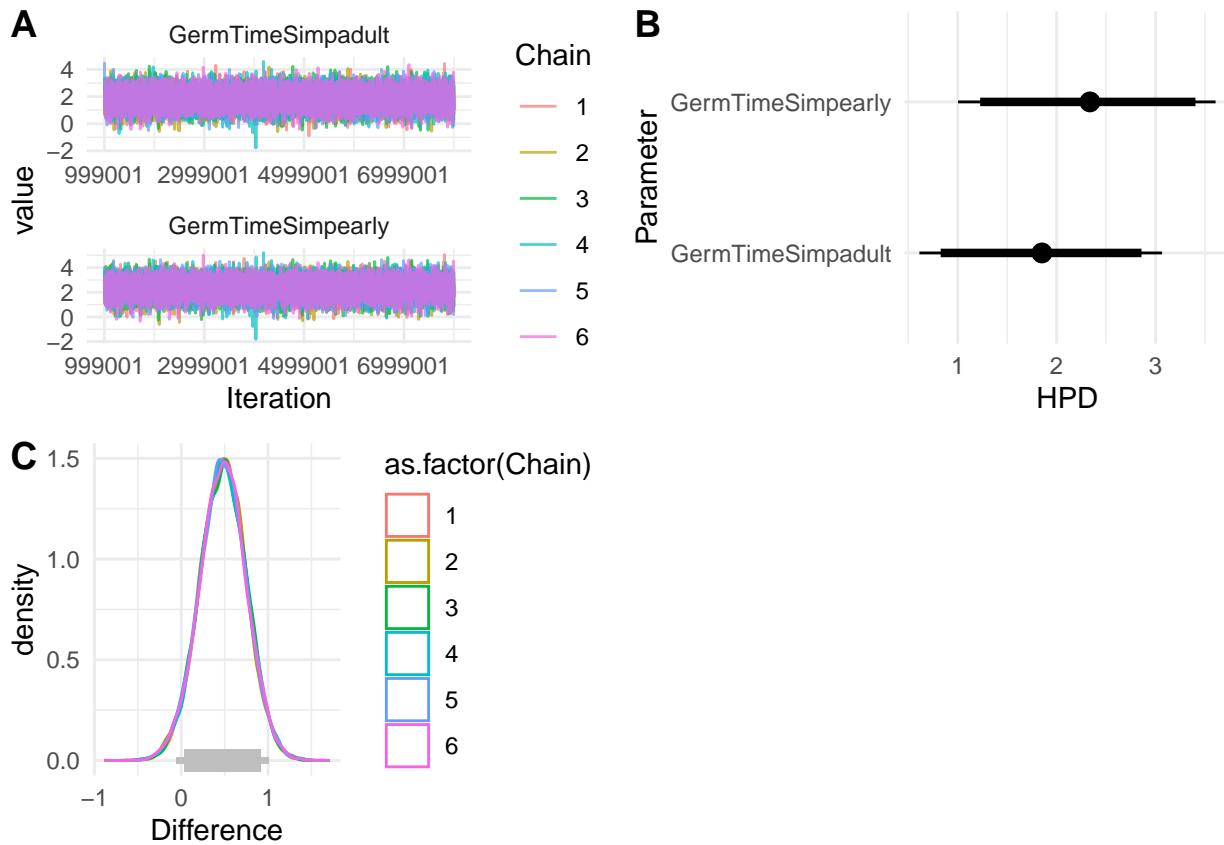
Table 119: Estimates of Fixed Effects for Model \*5\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.78 (0.59, 3)	0.004
GermTimeSimpearly	2.46 (1.1, 3.68)	0.001

Table 120: Comparisons of Fixed Effects for Model \*5\* with prior set \*p3\* for \*All\* taxa, at the \*Species\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.56 (-0.99, 0.05)	0.075

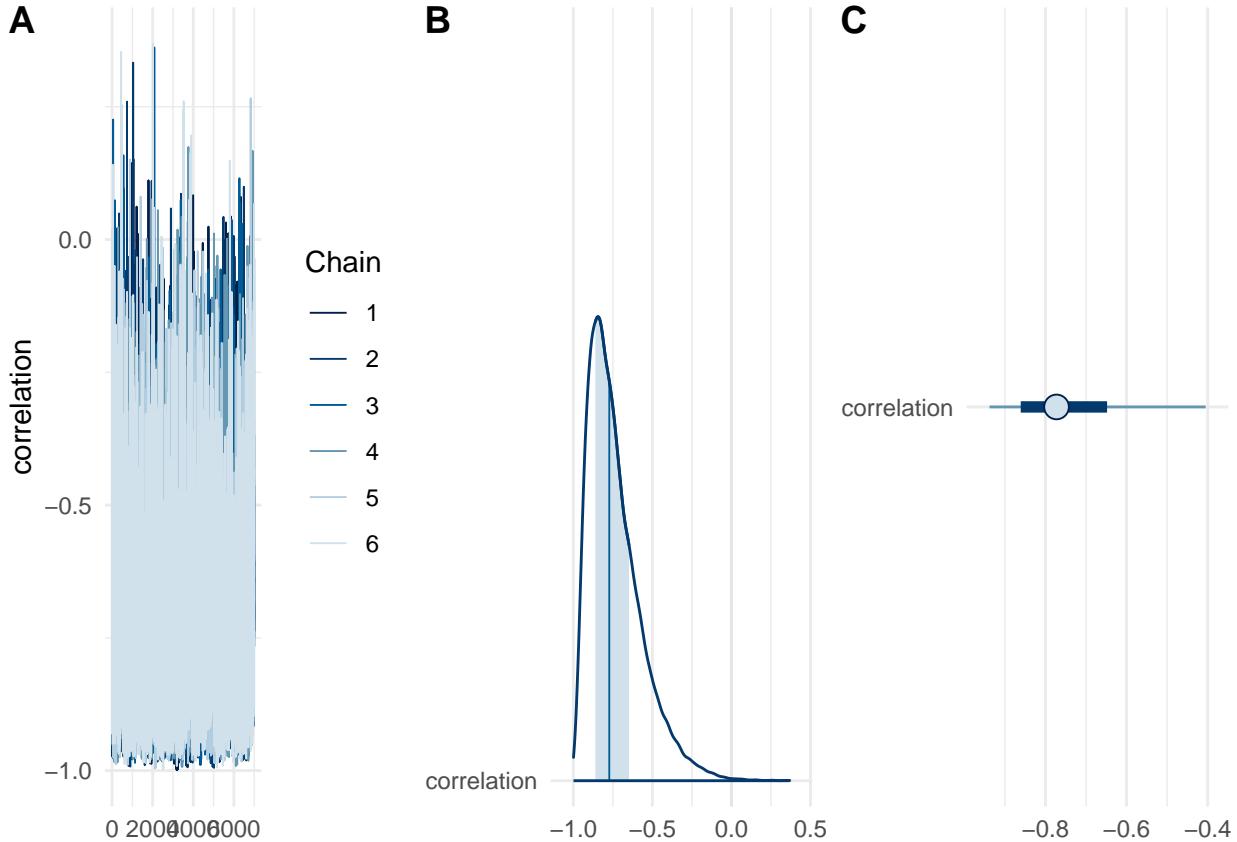
Model 4WithoutCellNumber, prior set p3



## Correlation between germline and fission

This analysis was run to test for a phylogenetic association between early germline segregation and a strict bottleneck separating each generation. Prior set 4 above was used.

Figure: A shows the convergence of all chains, B and C both show the posterior estimates and confidence intervals for the correlation between the *absence* of a strict bottleneck, and the *presence* of early germline segregation. This is shown only for 1 chain.

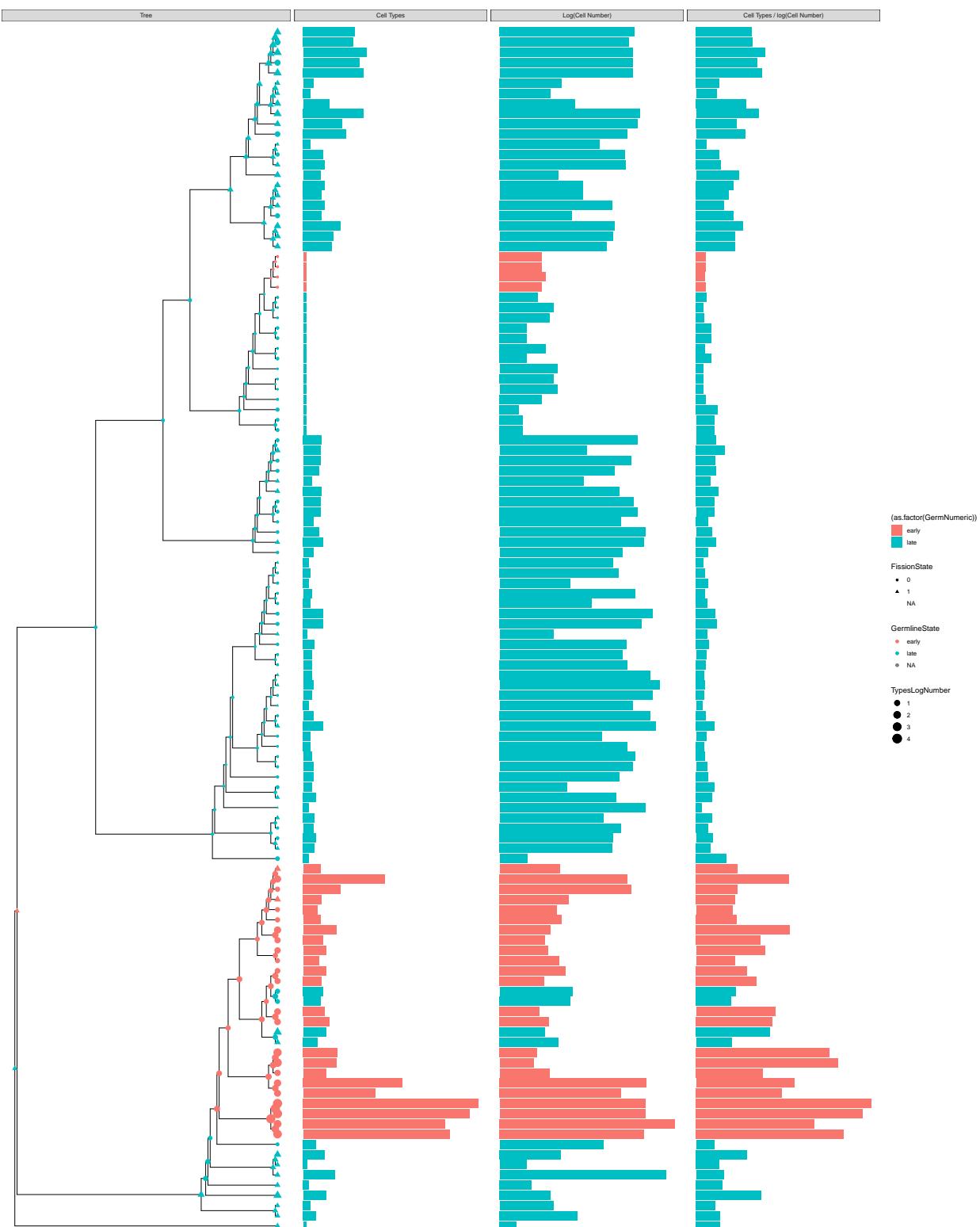


For each chain, the posterior CI were as follows

```
## [[1]]
##           lower      upper
## correlation -0.9799366 -0.3664453
## attr(),"Probability"
## [1] 0.95
##
## [[2]]
##           lower      upper
## correlation -0.9889717 -0.4395061
## attr(),"Probability"
## [1] 0.95
##
## [[3]]
##           lower      upper
## correlation -0.9732036 -0.3893509
## attr(),"Probability")
```

```
## [1] 0.95
##
## [[4]]
##           lower      upper
## correlation -0.9801254 -0.3949935
## attr(,"Probability")
## [1] 0.95
##
## [[5]]
##           lower      upper
## correlation -0.9868029 -0.4075743
## attr(,"Probability")
## [1] 0.95
##
## [[6]]
##           lower      upper
## correlation -0.9801142 -0.4086602
## attr(,"Probability")
## [1] 0.95
```

## Ancestral state reconstruction



Analyses with data points from only the animals

Model 1: *Number of Cells ~ Presence of Strict Bottleneck*

Table 121: Estimates of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	14.94 (4.95, 26.95)	0.009
Fission1	11.77 (0.6, 21.95)	0.041

Table 122: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	4.02 (-1.58, 10.26)	0.124

Model 1, prior set p1

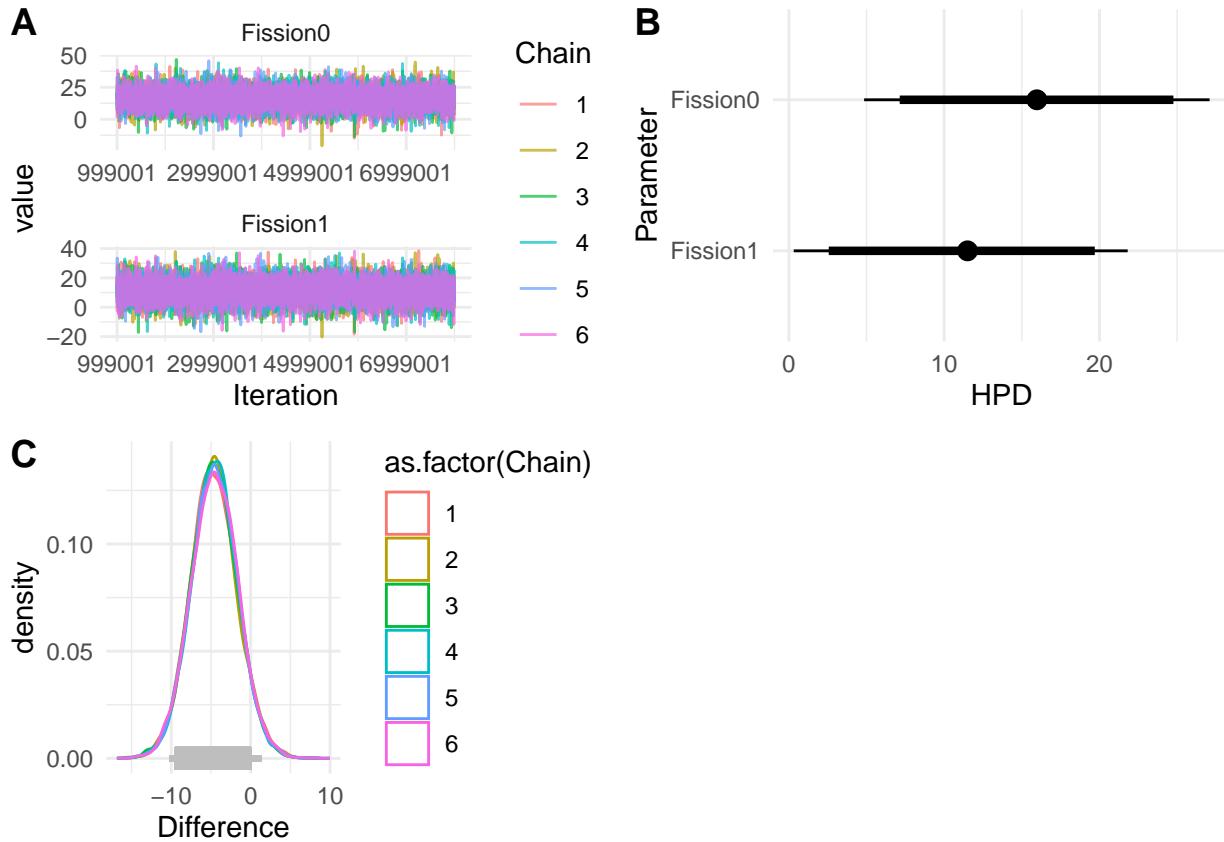


Table 123: Estimates of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	15.65 (5.88, 25.94)	0.004
Fission1	12.08 (1.95, 21.08)	0.027

Table 124: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	4.89 (-1.26, 10.16)	0.127

Model 1, prior set p2

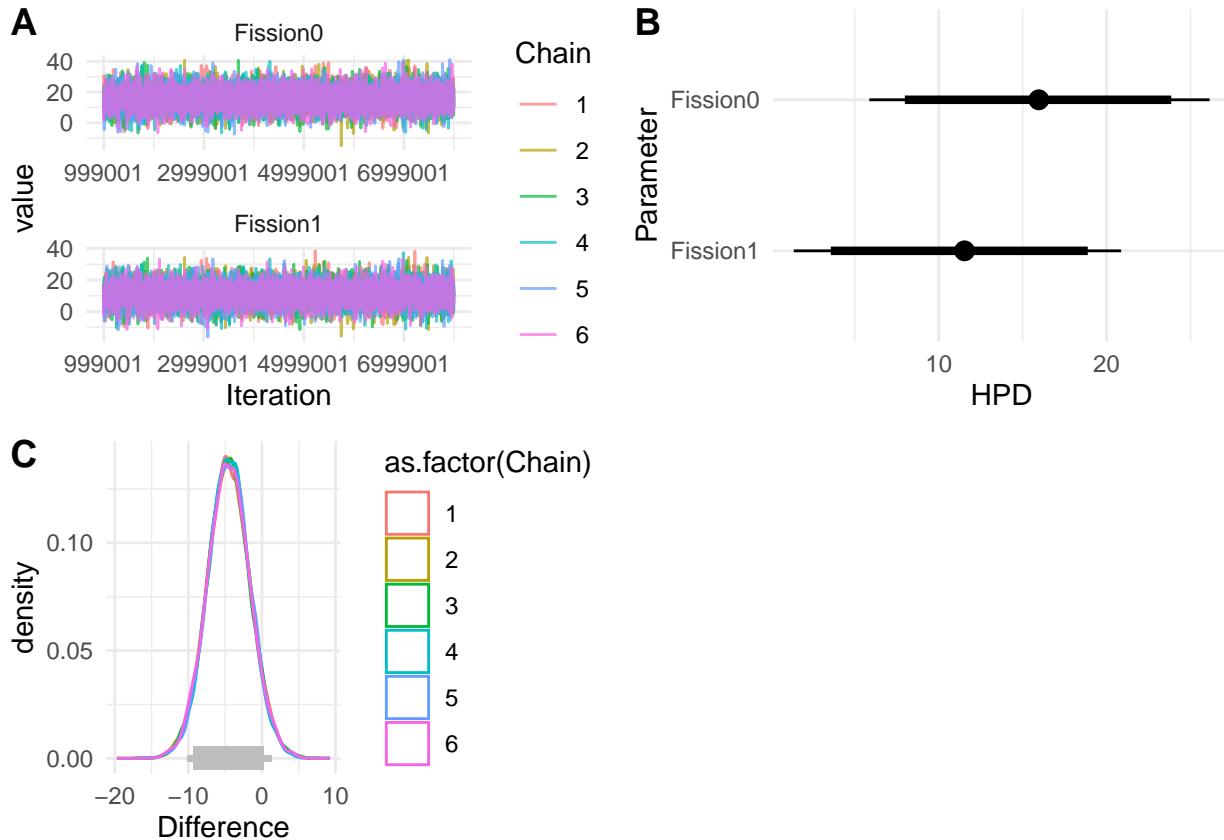


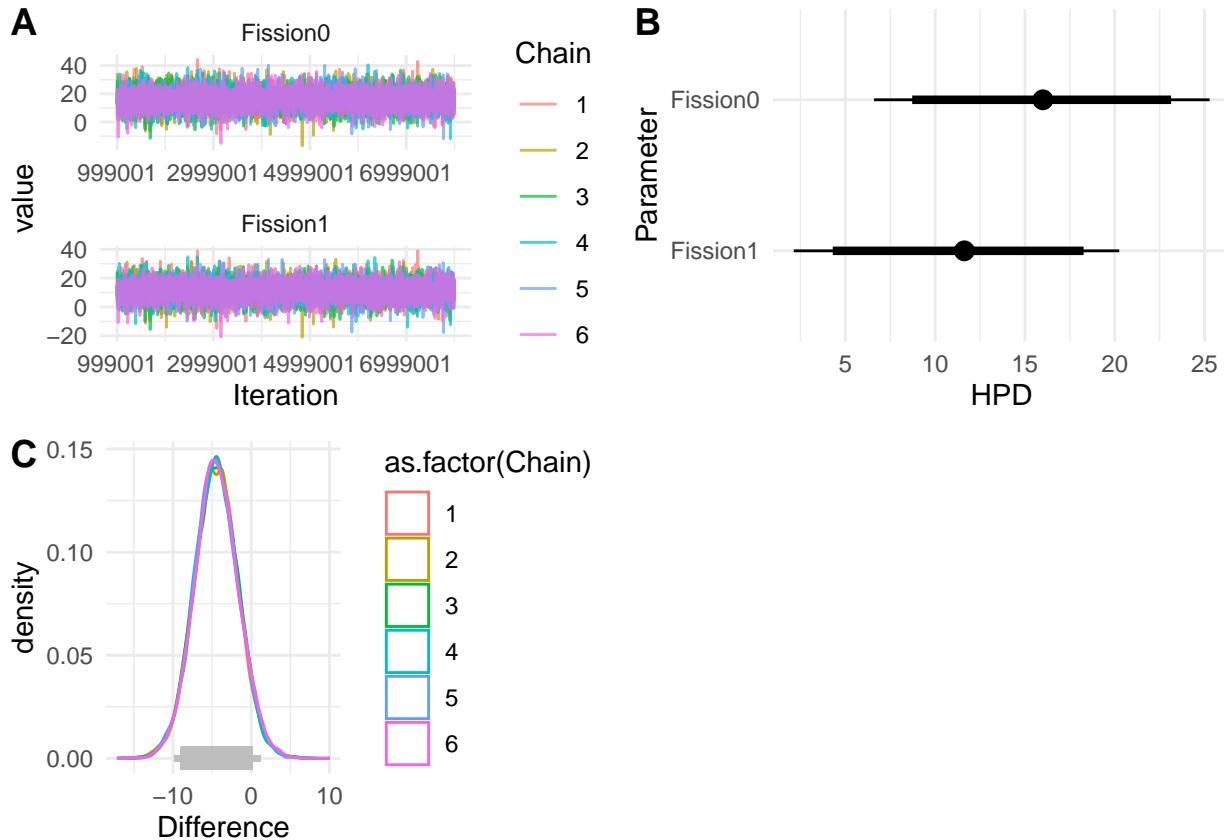
Table 125: Estimates of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	15.77 (6.4, 24.67)	0.004
Fission1	10.83 (2.73, 20.51)	0.021

Table 126: Comparisons of Fixed Effects for \*Model 1\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	4.4 (-1.19, 9.92)	0.108

Model 1, prior set p3



Model 2: *Number of Cell Types*  $\sim$  *Presence of Strict Bottleneck* +  $\log(\text{Number of Cells})$

Table 127: Estimates of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.96 (2.28, 3.49)	0
Fission1	2.74 (2.19, 3.33)	0
scale(log(Number))	0.45 (0.3, 0.67)	0

Table 128: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.12 (-0.25, 0.57)	0.447
Fission0 vs scale(log(Number))	2.53 (1.78, 3.07)	0.000
Fission1 vs scale(log(Number))	2.26 (1.69, 2.85)	0.000

Model 2, prior set p1

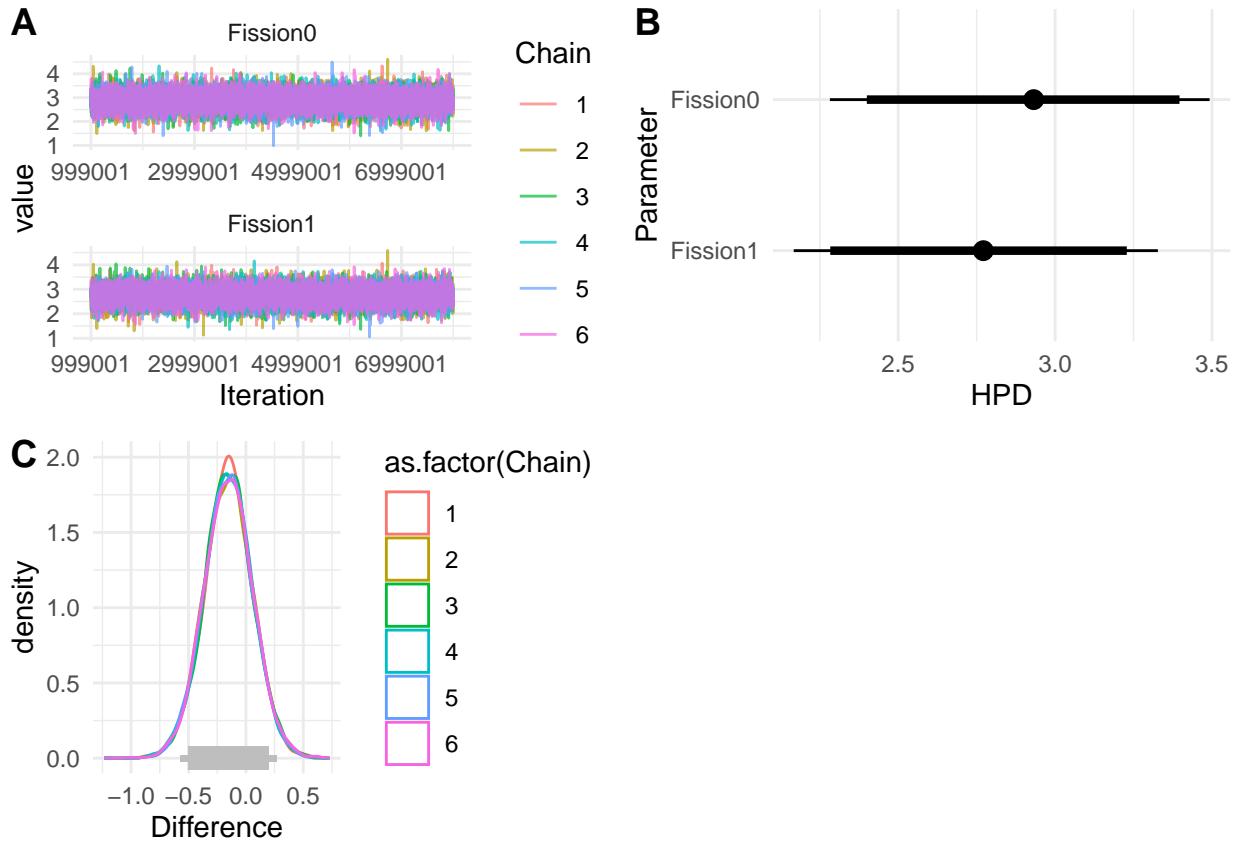


Table 129: Estimates of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.85 (2.25, 3.54)	0
Fission1	2.9 (2.15, 3.38)	0
scale(log(Number))	0.54 (0.27, 0.74)	0

Table 130: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.17 (-0.35, 0.68)	0.585
Fission0 vs scale(log(Number))	2.33 (1.7, 3.11)	0.000
Fission1 vs scale(log(Number))	2.2 (1.63, 2.89)	0.000

Model 2, prior set p2

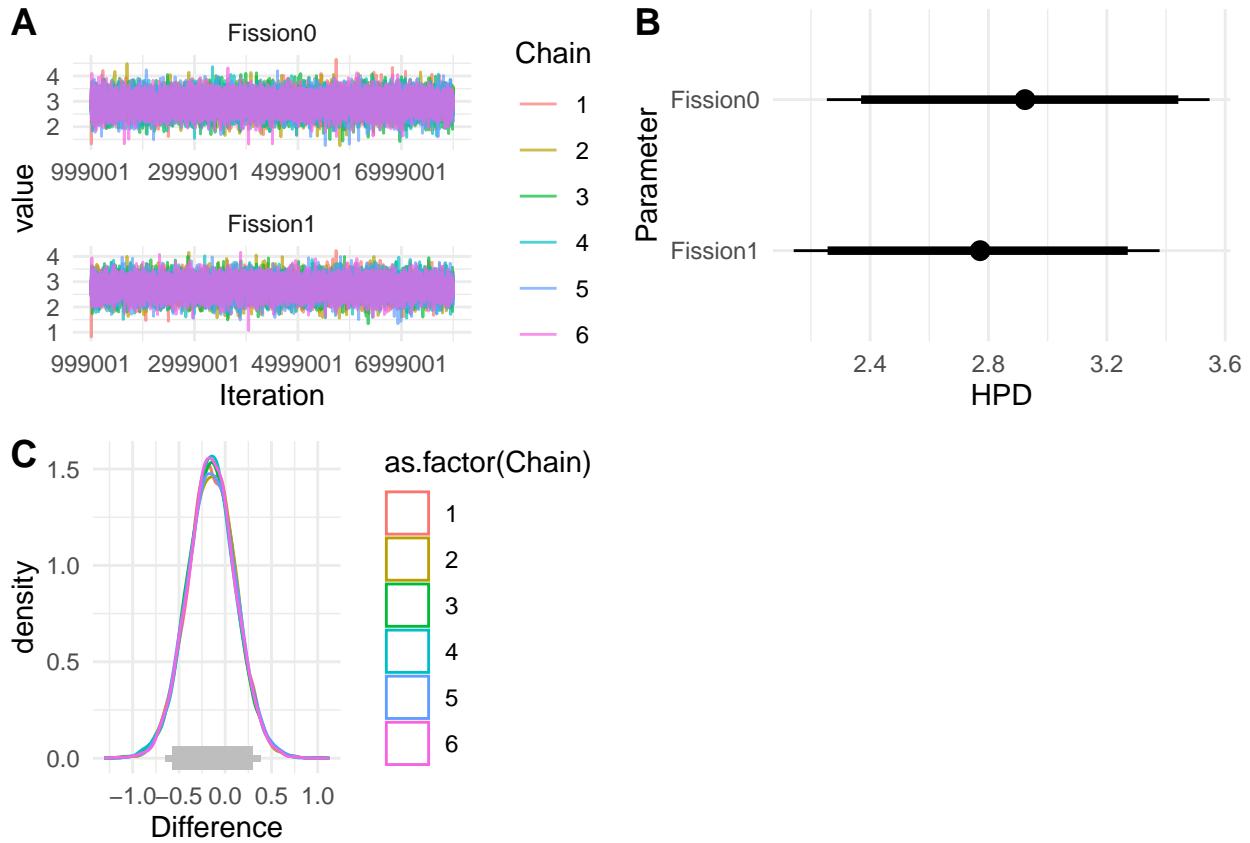


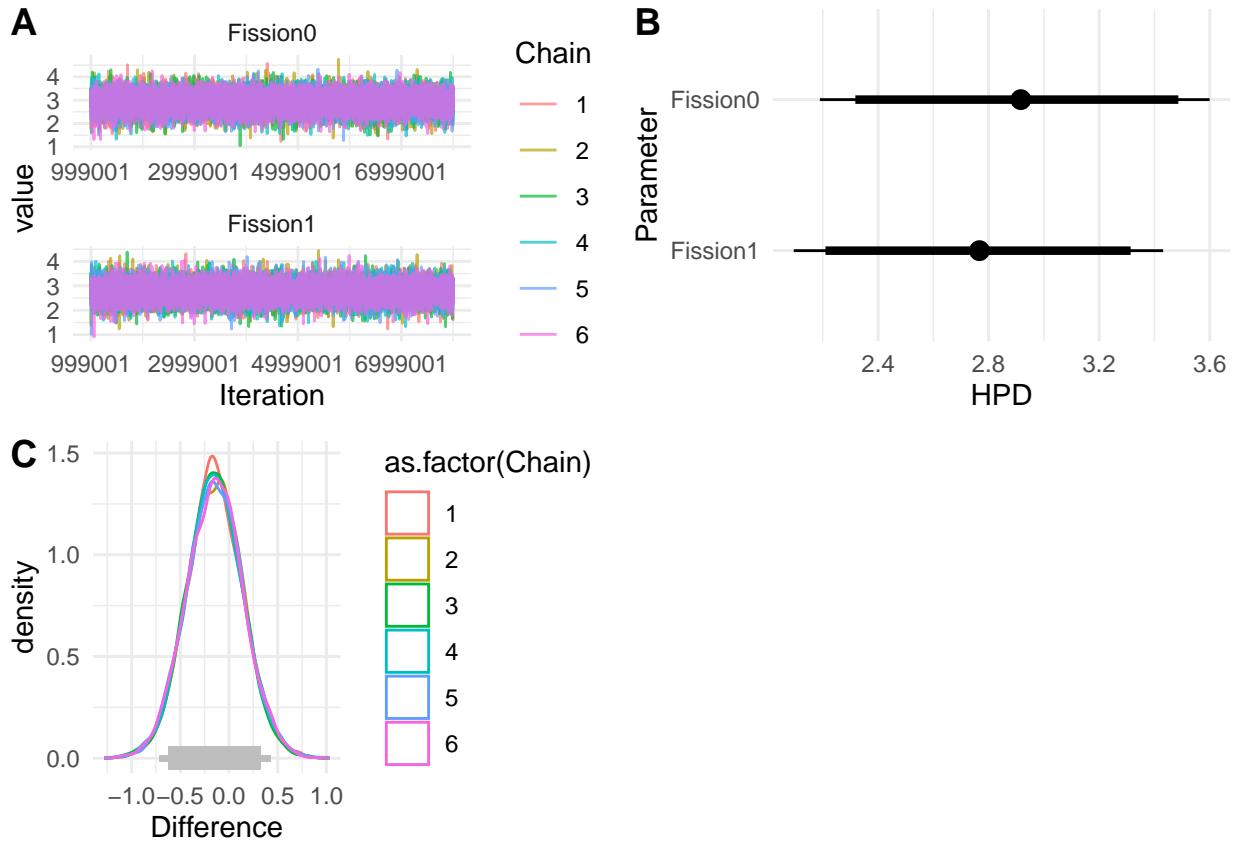
Table 131: Estimates of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2.92 (2.2, 3.61)	0
Fission1	2.82 (2.09, 3.42)	0
scale(log(Number))	0.5 (0.27, 0.77)	0

Table 132: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.19 (-0.43, 0.7)	0.587
Fission0 vs scale(log(Number))	2.44 (1.64, 3.18)	0.000
Fission1 vs scale(log(Number))	2.3 (1.59, 2.97)	0.000

Model 2, prior set p3



**Model 3:** *Number of Cells*  $\sim$  *Timing of Germline Segregation*

Table 133: Estimates of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	13.86 (2.13, 23.8)	0.026
GermTimeSimpearly	12.94 (-0.11, 24.43)	0.049

Table 134: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-1.65 (-8.74, 8.8)	0.926

Model 3, prior set p1

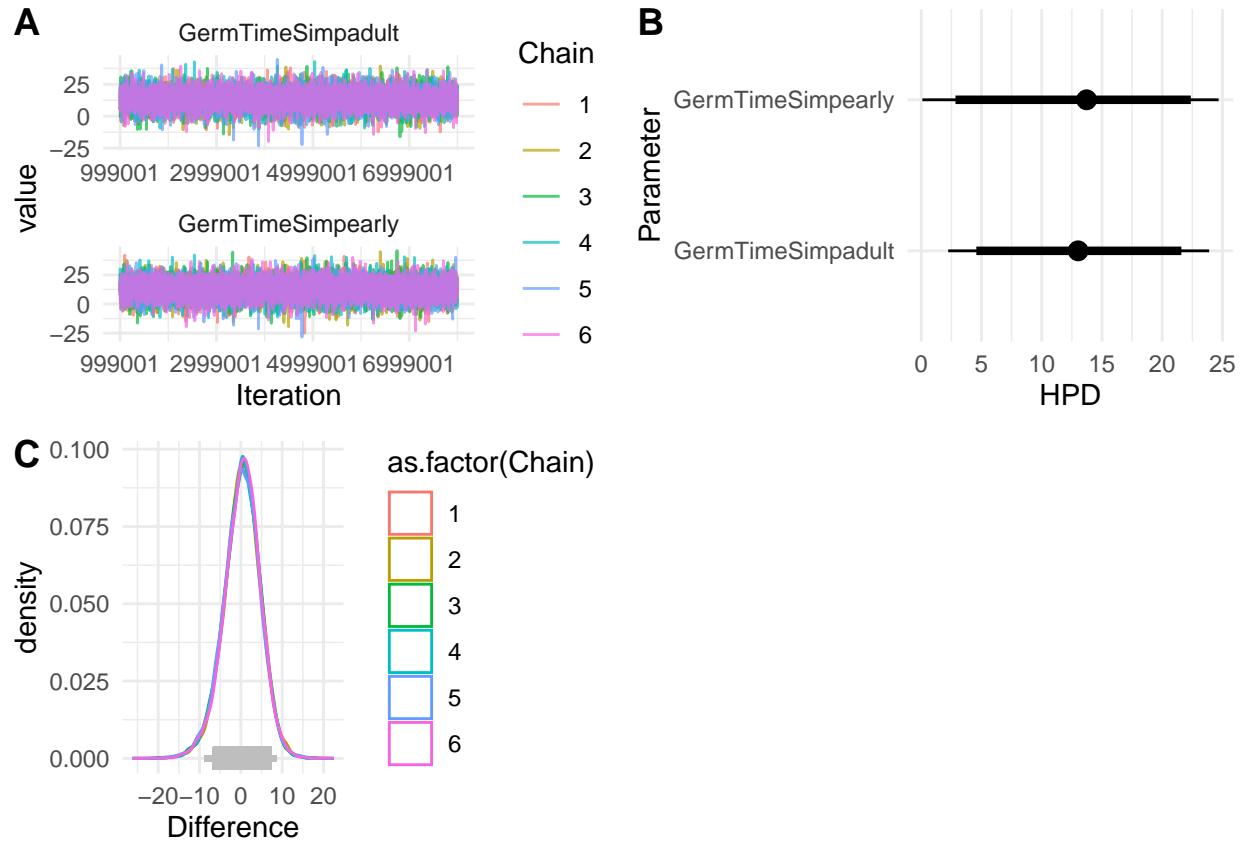


Table 135: Estimates of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	12.93 (3.38, 22.93)	0.019
GermTimeSimpearly	14.63 (1.58, 23.63)	0.033

Table 136: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0 (-8.14, 8.25)	0.834

Model 3, prior set p2

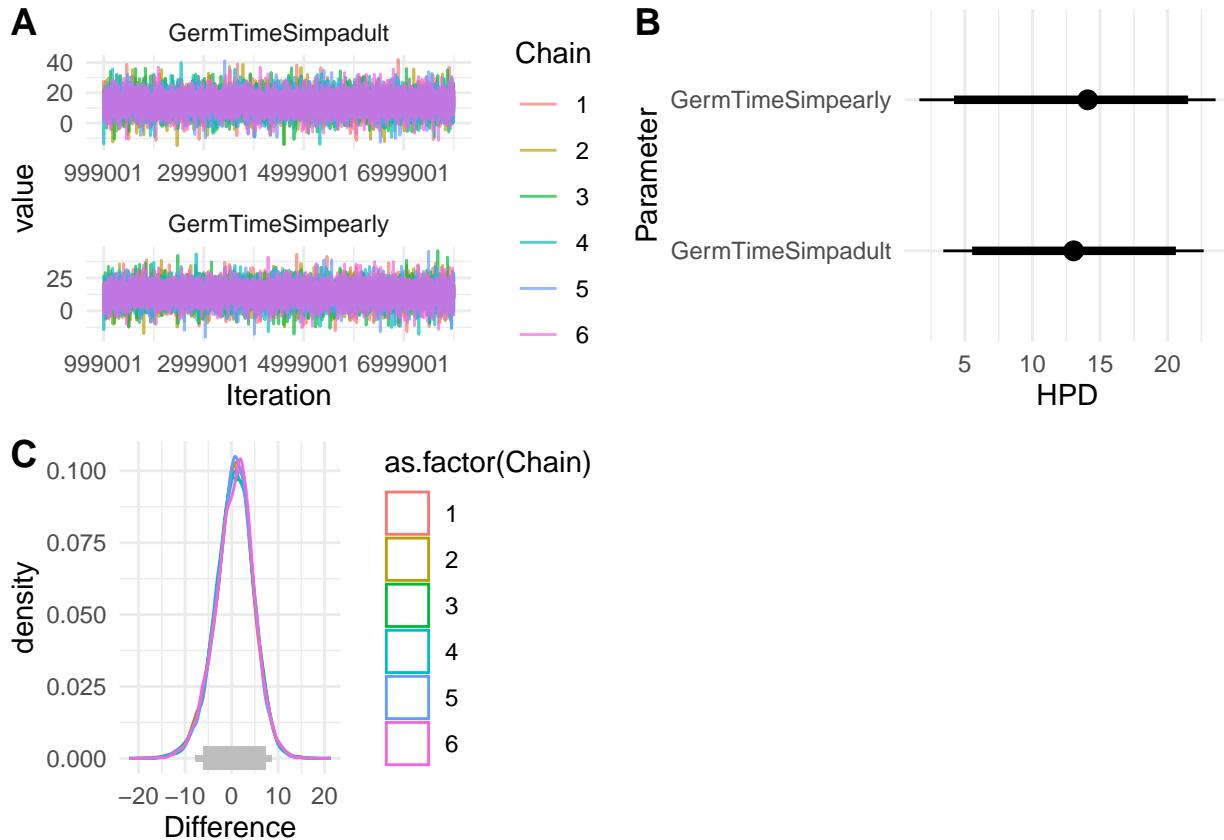


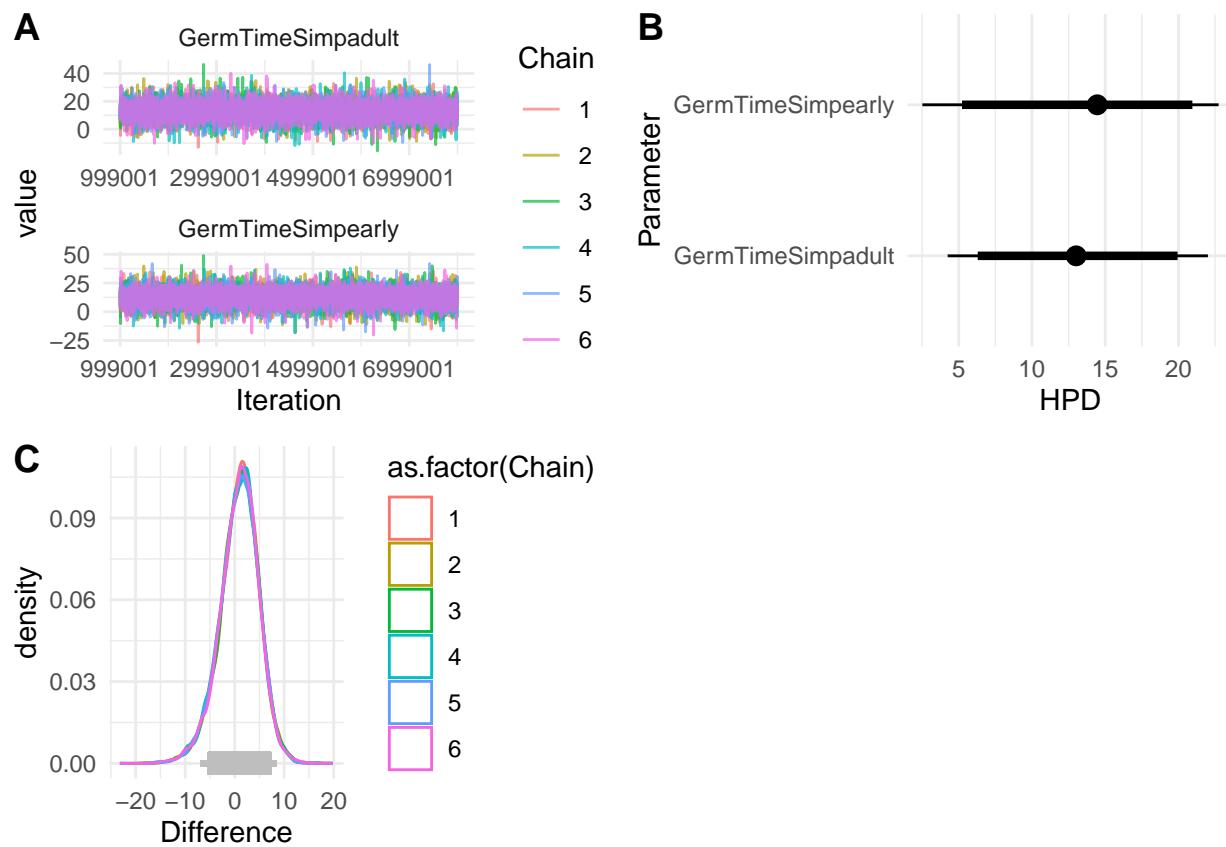
Table 137: Estimates of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	12.67 (3.82, 21.43)	0.011
GermTimeSimpearly	15.15 (3.68, 23.37)	0.021

Table 138: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-1.56 (-8.25, 6.87)	0.756

Model 3, prior set p3



**Model 4:** *Number of Cell Types*  $\sim$  *Timing of Germline Segregation* +  $\log(\text{Number of Cells})$

Table 139: Estimates of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.68 (2.15, 3.07)	0
GermTimeSimpearly	3.29 (2.67, 3.7)	0
scale(log(Number))	0.53 (0.35, 0.69)	0

Table 140: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.55 (-1.03, -0.13)	0.018
GermTimeSimpadult vs scale(log(Number))	2.09 (1.67, 2.65)	0.000
GermTimeSimpearly vs scale(log(Number))	2.74 (2.17, 3.23)	0.000

Model 4, prior set p1

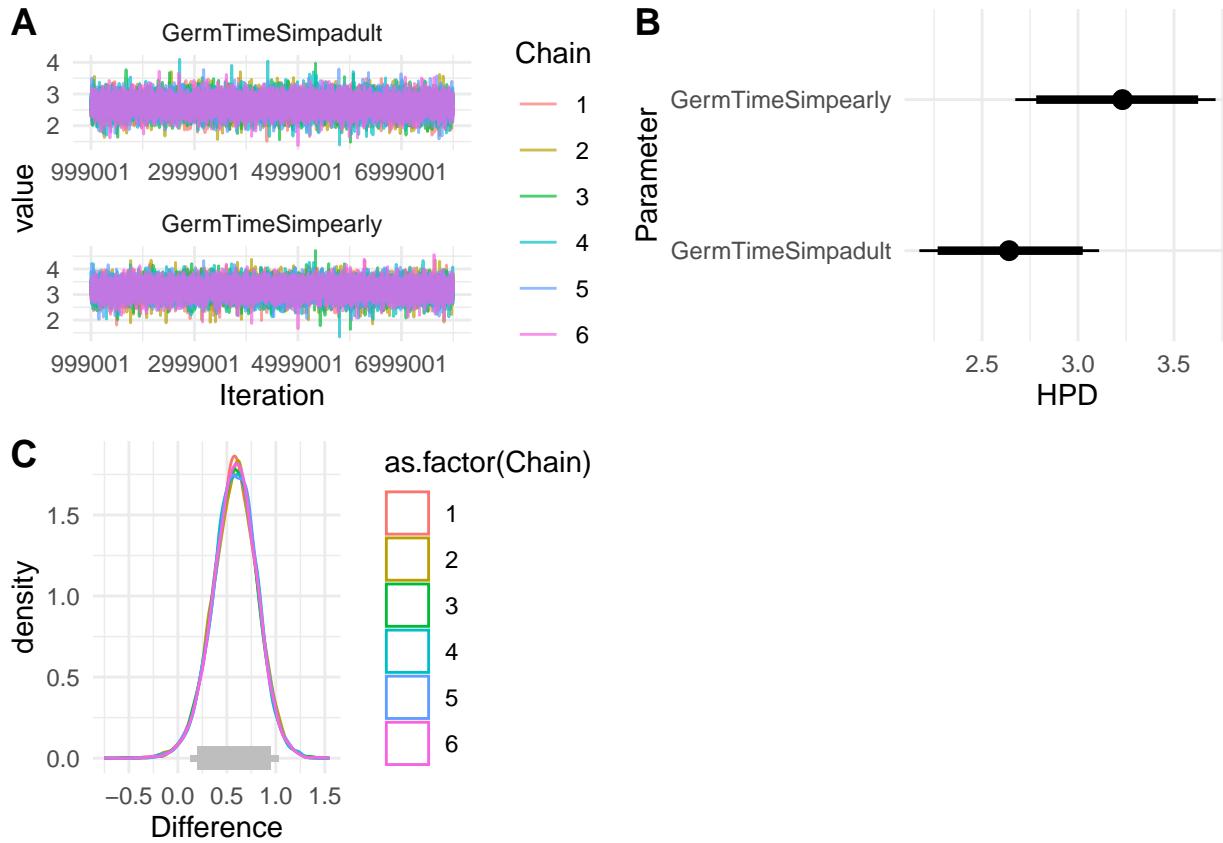


Table 141: Estimates of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.62 (2.06, 3.18)	0
GermTimeSimpearly	3.17 (2.59, 3.84)	0
scale(log(Number))	0.53 (0.32, 0.73)	0

Table 142: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.55 (-1.12, 0.02)	0.046
GermTimeSimpadult vs scale(log(Number))	2.13 (1.51, 2.68)	0.000
GermTimeSimpearly vs scale(log(Number))	2.7 (1.99, 3.33)	0.000

Model 4, prior set p2

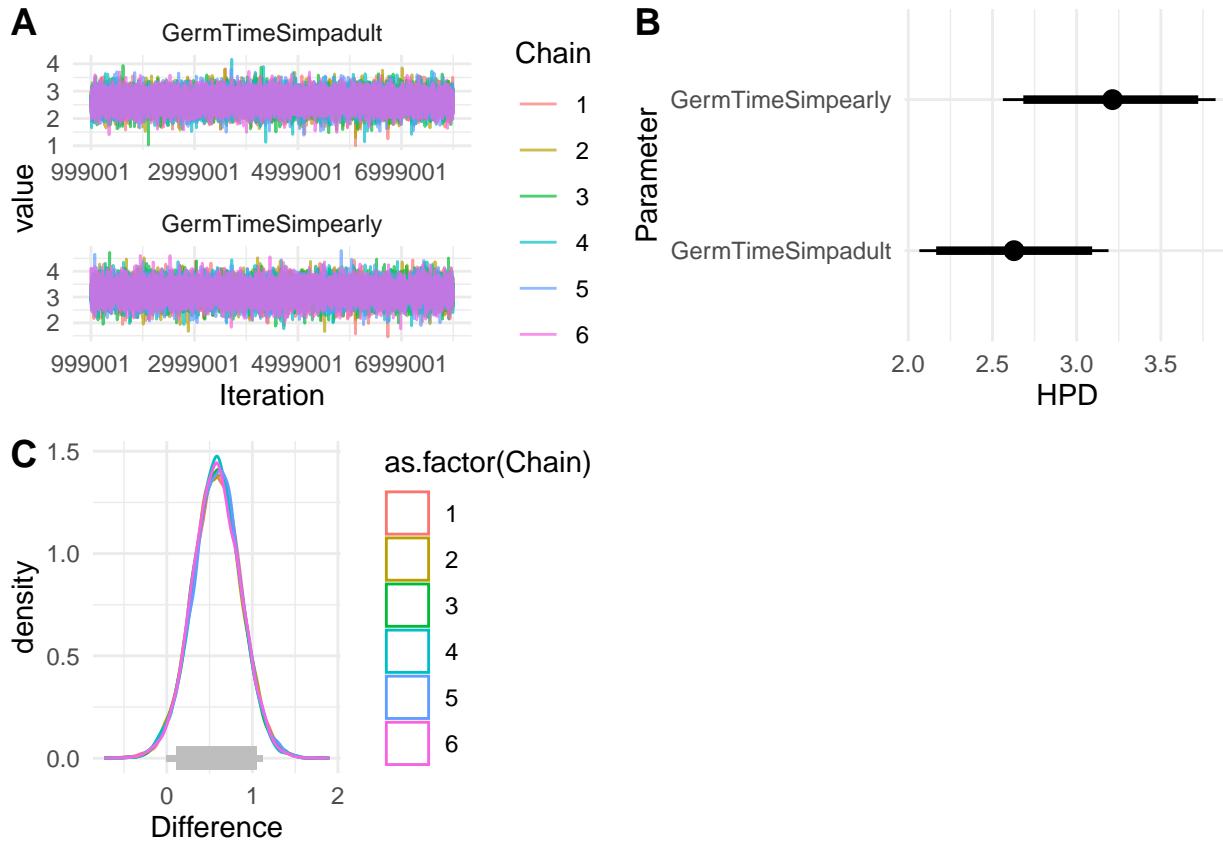


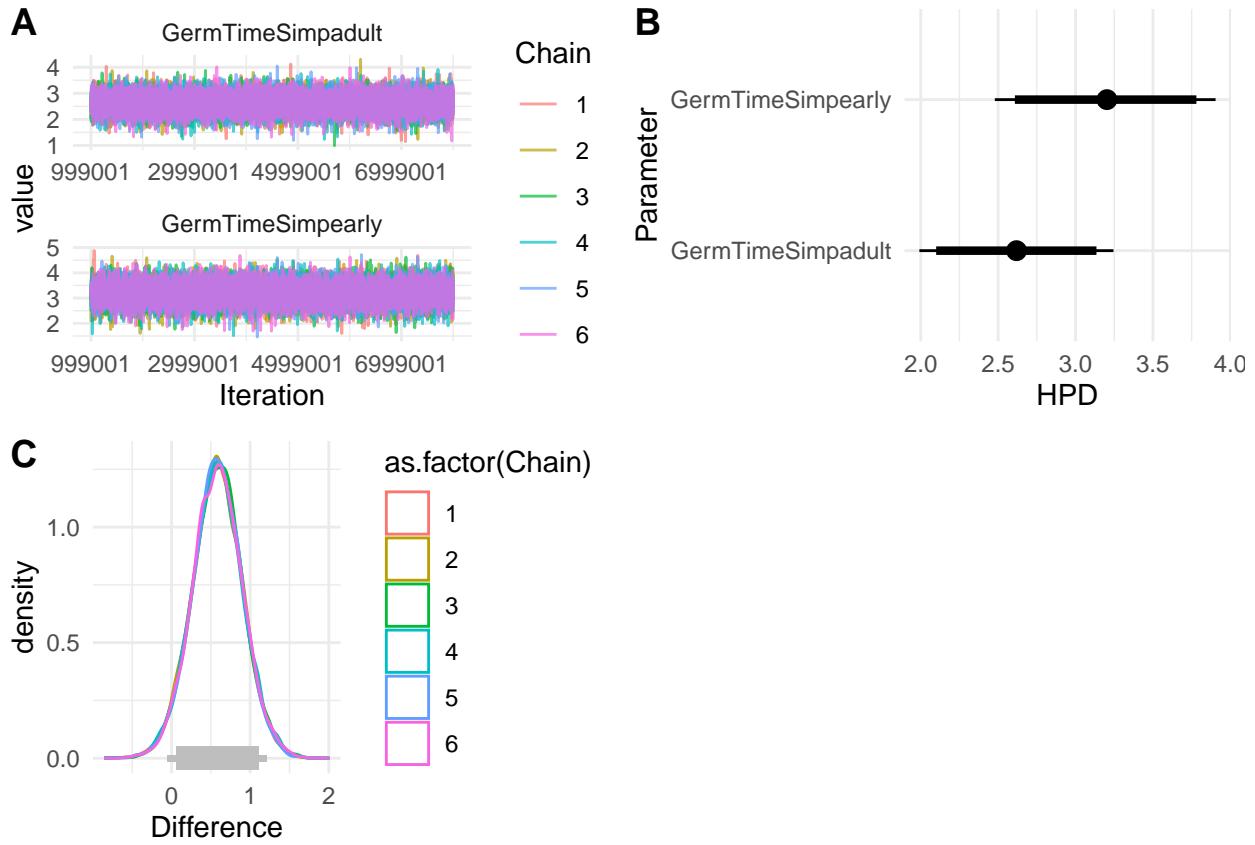
Table 143: Estimates of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.66 (2.02, 3.26)	0
GermTimeSimpearly	3.16 (2.47, 3.88)	0
scale(log(Number))	0.55 (0.3, 0.77)	0

Table 144: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.59 (-1.22, 0.04)	0.075
GermTimeSimpadult vs scale(log(Number))	2.17 (1.42, 2.73)	0.000
GermTimeSimpearly vs scale(log(Number))	2.75 (1.89, 3.39)	0.000

Model 4, prior set p3



*Model 5: Number of Cell Types ~ Timing of Germline Segregation*

Table 145: Estimates of Fixed Effects for Model \*5\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.5 (1.65, 3.44)	0
GermTimeSimpearly	3.14 (2.04, 4.11)	0

Table 146: Comparisons of Fixed Effects for Model \*5\* with prior set \*p1\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.67 (-1.26, 0.31)	0.182

Model 4WithoutCellNumber, prior set p1

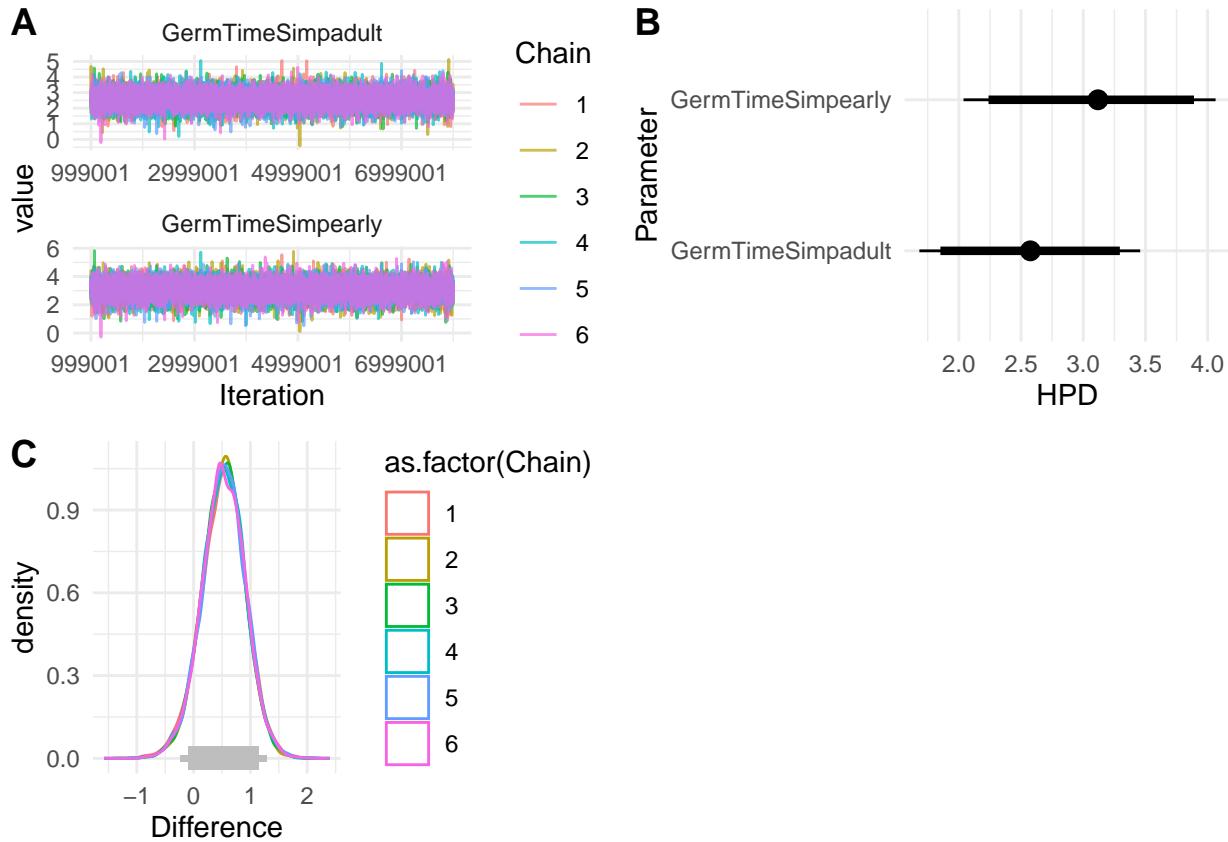


Table 147: Estimates of Fixed Effects for Model \*5\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.52 (1.79, 3.38)	0
GermTimeSimpearly	3.16 (2.29, 4.1)	0

Table 148: Comparisons of Fixed Effects for Model \*5\* with prior set \*p2\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.62 (-1.43, 0.12)	0.124

Model 4WithoutCellNumber, prior set p2

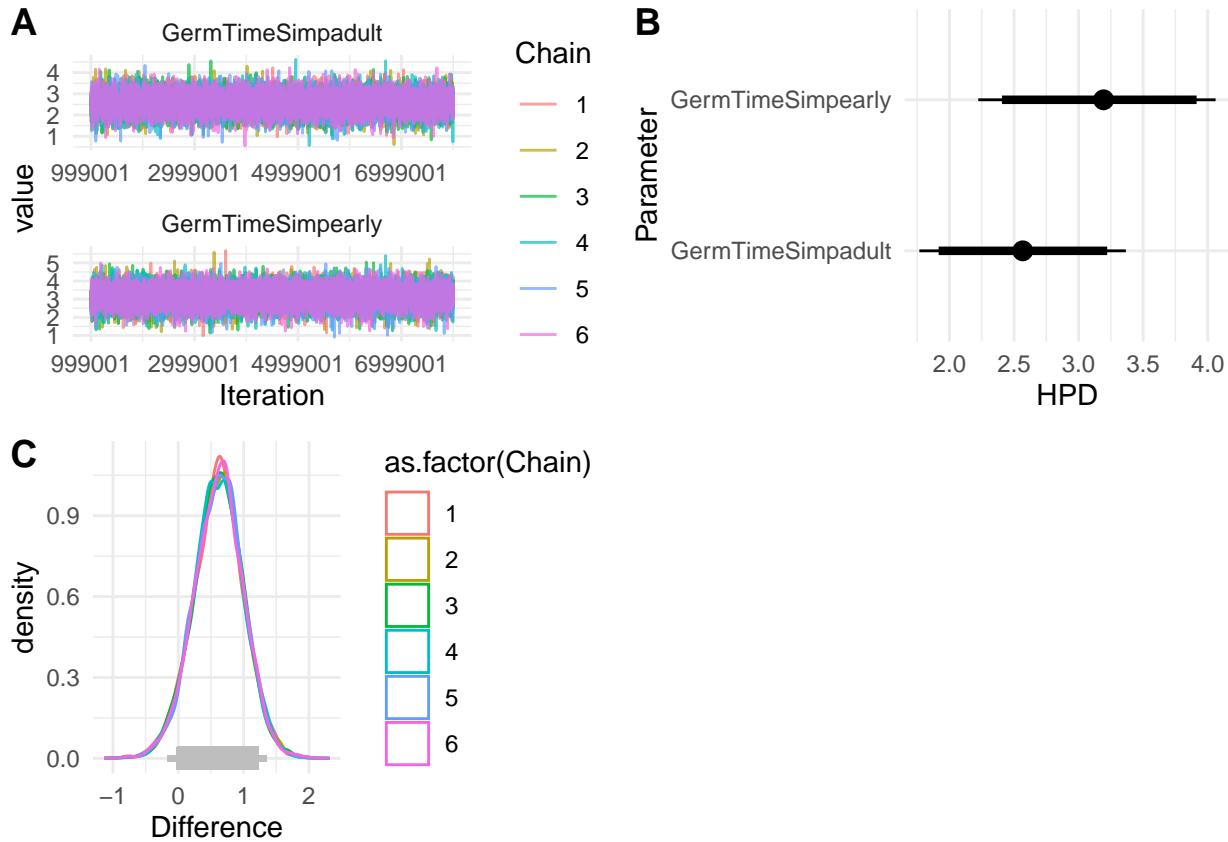


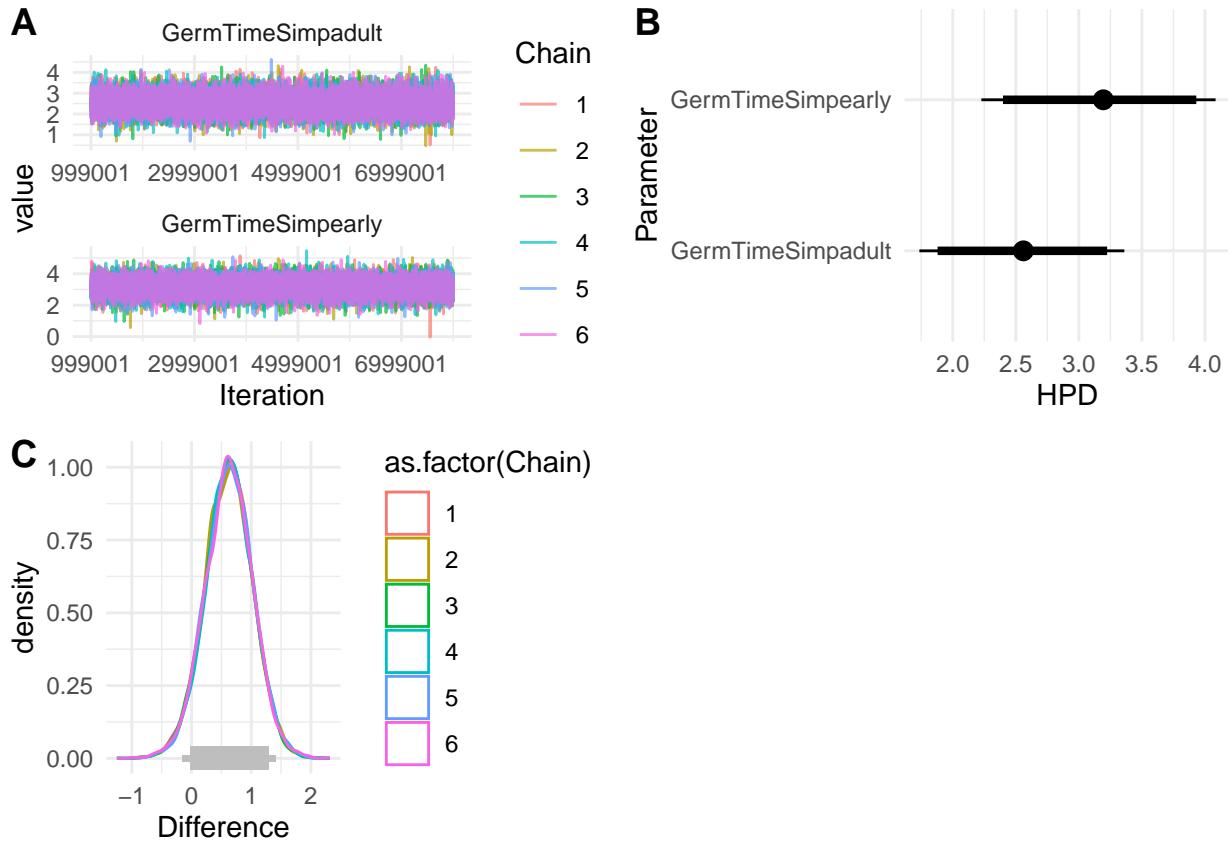
Table 149: Estimates of Fixed Effects for Model \*5\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.49 (1.75, 3.36)	0
GermTimeSimpearly	3.37 (2.23, 4.1)	0

Table 150: Comparisons of Fixed Effects for Model \*5\* with prior set \*p3\* for \*OnlyAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.67 (-1.42, 0.15)	0.119

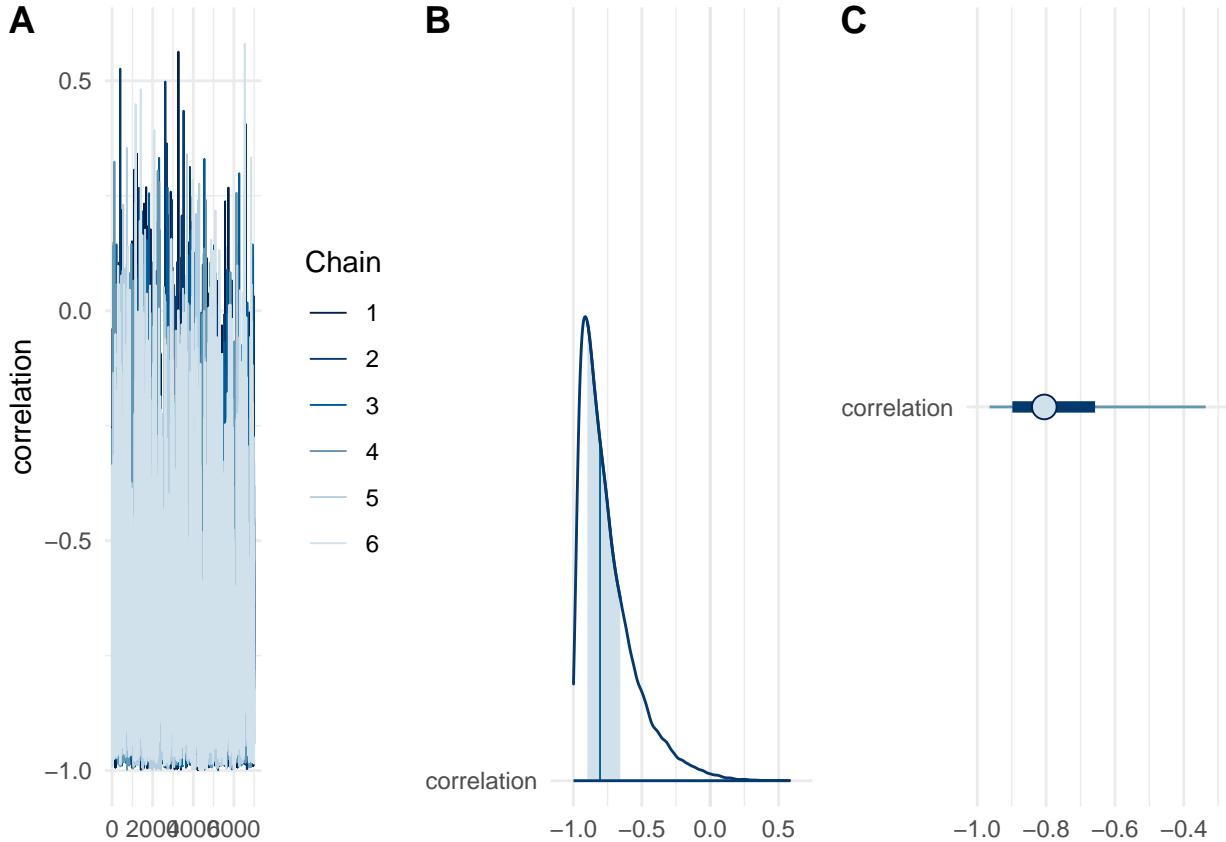
Model 4WithoutCellNumber, prior set p3



## Correlation between germline and fission

This analysis was run to test for a phylogenetic association between early germline segregation and a strict bottleneck separating each generation. Prior set 4 above was used.

Figure: A shows the convergence of all chains, B and C both show the posterior estimates and confidence intervals for the correlation between the *absence* of a strict bottleneck, and the *presence* of early germline segregation. This is shown only for 1 chain.

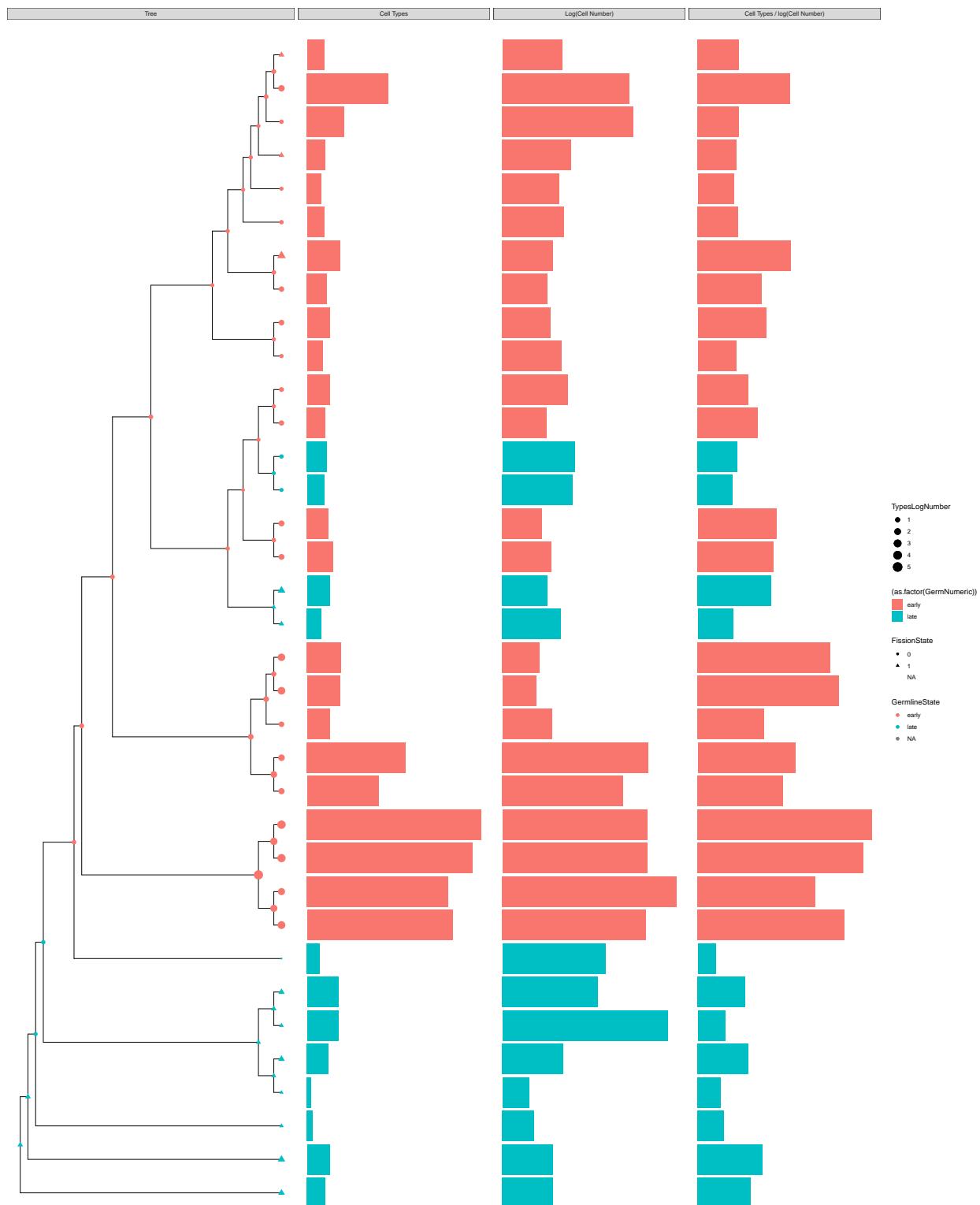


For each chain, the posterior CI were as follows

```
## [[1]]
##           lower      upper
## correlation -0.9989494 -0.2952171
## attr(),"Probability"
## [1] 0.95
##
## [[2]]
##           lower      upper
## correlation -0.9957889 -0.3631324
## attr(),"Probability"
## [1] 0.95
##
## [[3]]
##           lower      upper
## correlation -0.9946639 -0.3071185
## attr(),"Probability")
```

```
## [1] 0.95
##
## [[4]]
##           lower      upper
## correlation -0.9958155 -0.3744329
## attr(,"Probability")
## [1] 0.95
##
## [[5]]
##           lower      upper
## correlation -0.9986916 -0.4045988
## attr(,"Probability")
## [1] 0.95
##
## [[6]]
##           lower      upper
## correlation -0.9979254 -0.3031731
## attr(,"Probability")
## [1] 0.95
```

## Ancestral state reconstruction



Analyses with data points excluding the animals

Model 1: *Number of Cells ~ Presence of Strict Bottleneck*

Table 151: Estimates of Fixed Effects for Model \*5\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	15.24 (4.36, 24.69)	0.015
Fission1	12.24 (3.11, 23.22)	0.019

Table 152: Comparisons of Fixed Effects for Model \*5\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	0.9 (-0.79, 3.38)	0.256

Model 1, prior set p1

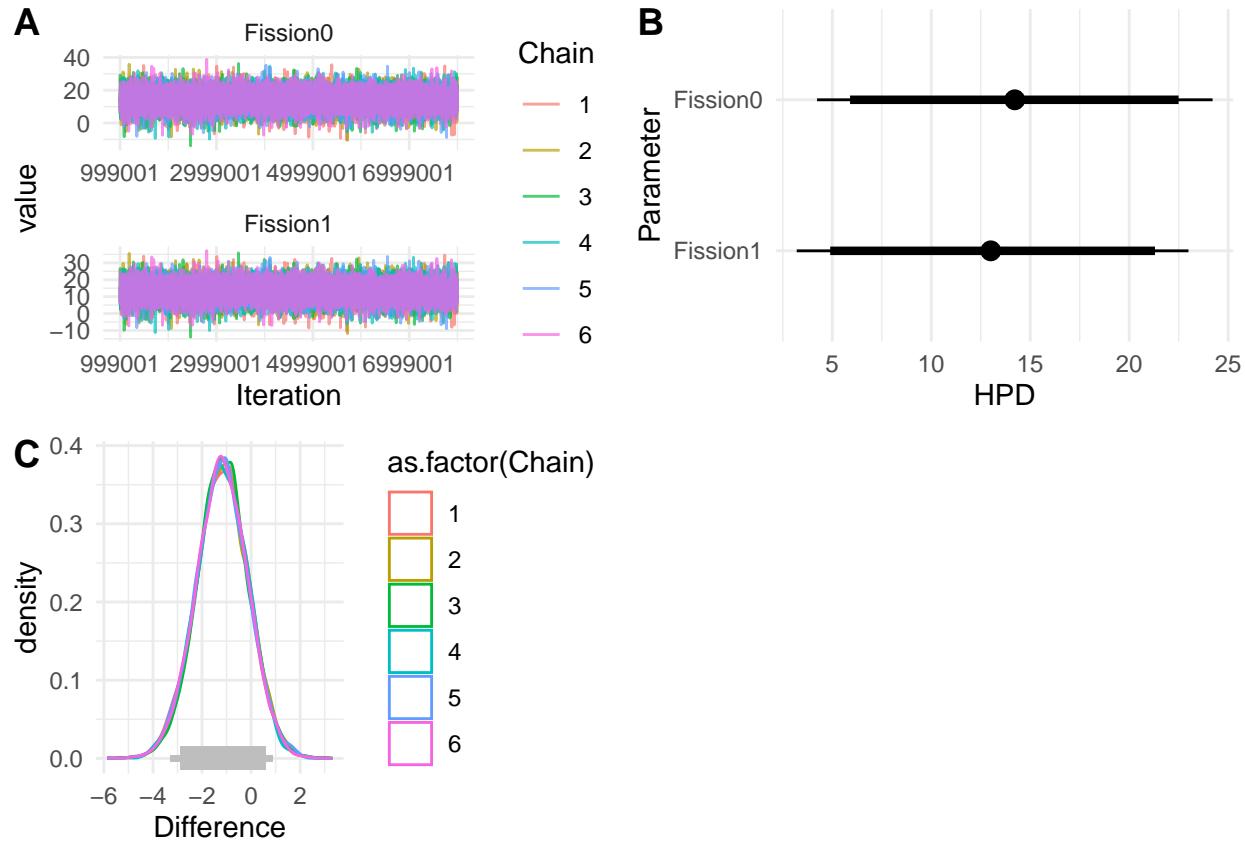


Table 153: Estimates of Fixed Effects for Model \*5\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	14.79 (4.73, 24.82)	0.009
Fission1	12.73 (2.56, 22.44)	0.013

Table 154: Comparisons of Fixed Effects for Model \*5\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	1.2 (-0.77, 3.2)	0.253

Model 1, prior set p2

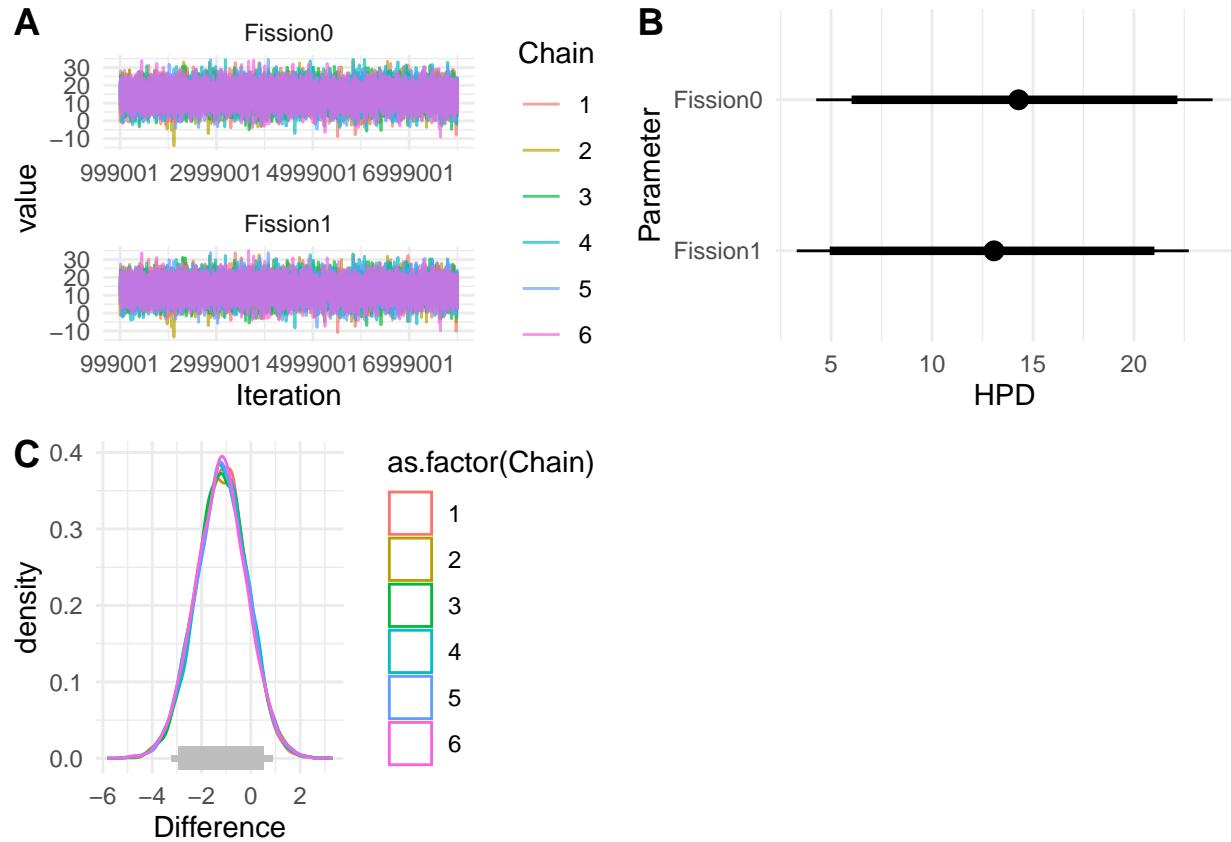


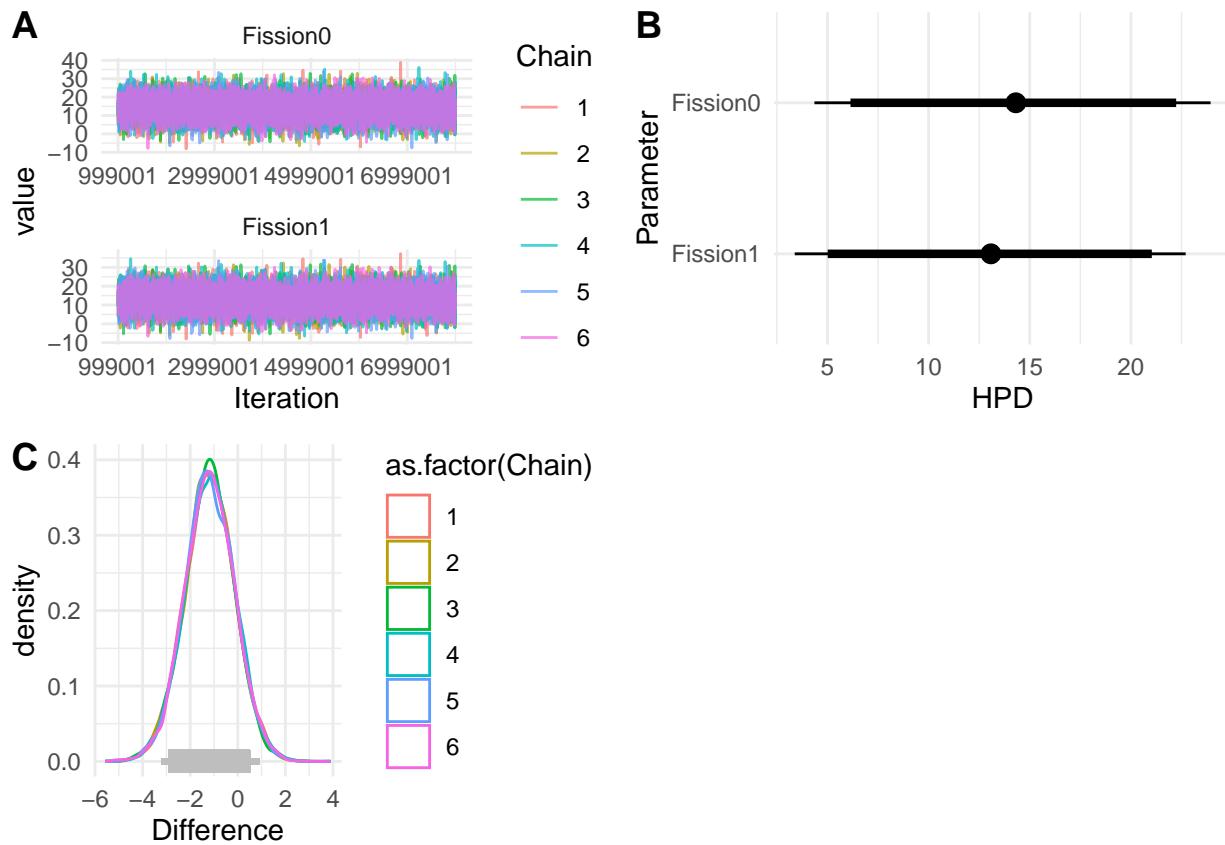
Table 155: Estimates of Fixed Effects for Model \*5\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	15.04 (4.21, 23.65)	0.008
Fission1	13.48 (3.48, 22.76)	0.012

Table 156: Comparisons of Fixed Effects for Model \*5\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	1.05 (-0.93, 3.2)	0.25

Model 1, prior set p3



Model 2: *Number of Cell Types*  $\sim$  *Presence of Strict Bottleneck* +  $\log(\text{Number of Cells})$

Table 157: Estimates of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	1.85 (1.26, 2.55)	0
Fission1	2.16 (1.35, 2.62)	0
scale(log(Number))	0.59 (0.43, 0.74)	0

Table 158: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	-0.15 (-0.36, 0.07)	0.214
Fission0 vs scale(log(Number))	1.35 (0.64, 1.95)	0.000
Fission1 vs scale(log(Number))	1.45 (0.77, 2.09)	0.000

Model 2, prior set p1

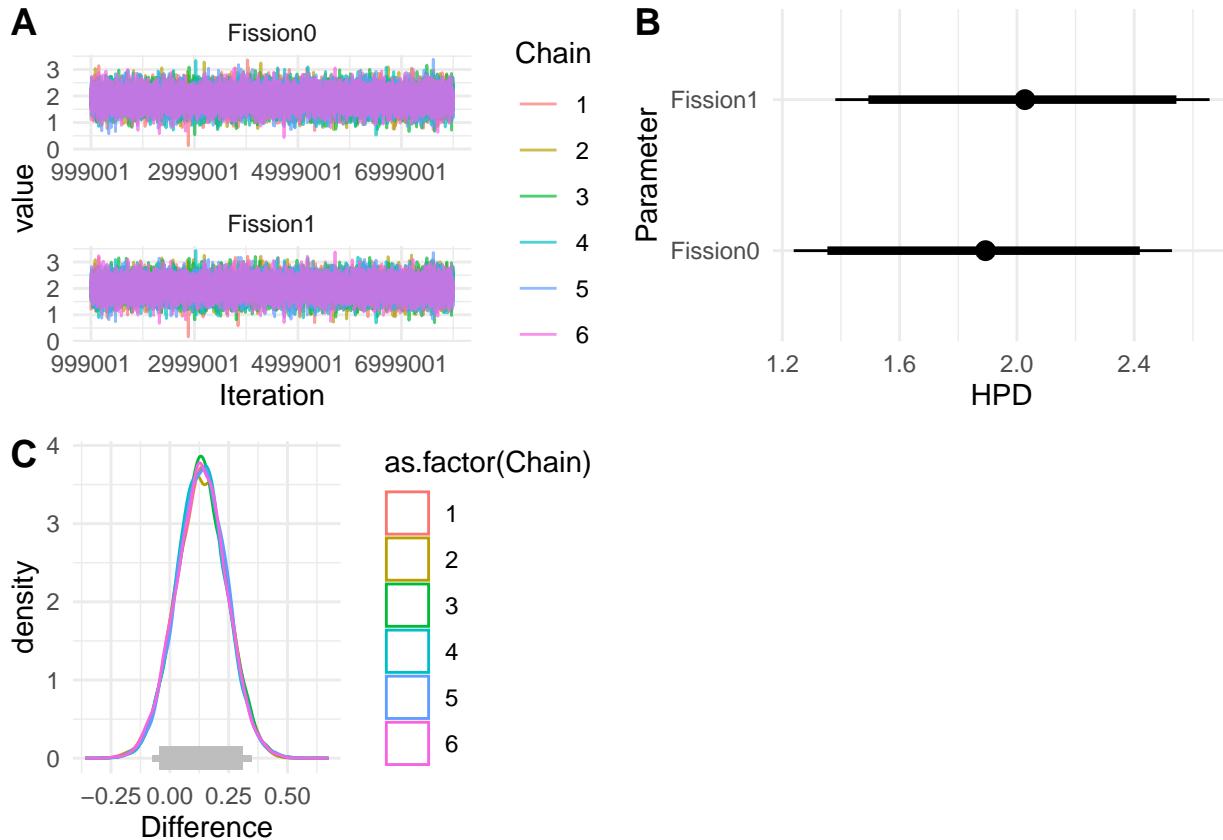


Table 159: Estimates of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	2 (1.25, 2.52)	0
Fission1	2.05 (1.4, 2.66)	0
scale(log(Number))	0.58 (0.39, 0.76)	0

Table 160: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	-0.14 (-0.41, 0.12)	0.289
Fission0 vs scale(log(Number))	1.27 (0.63, 1.95)	0.001
Fission1 vs scale(log(Number))	1.39 (0.8, 2.09)	0.000

Model 2, prior set p2

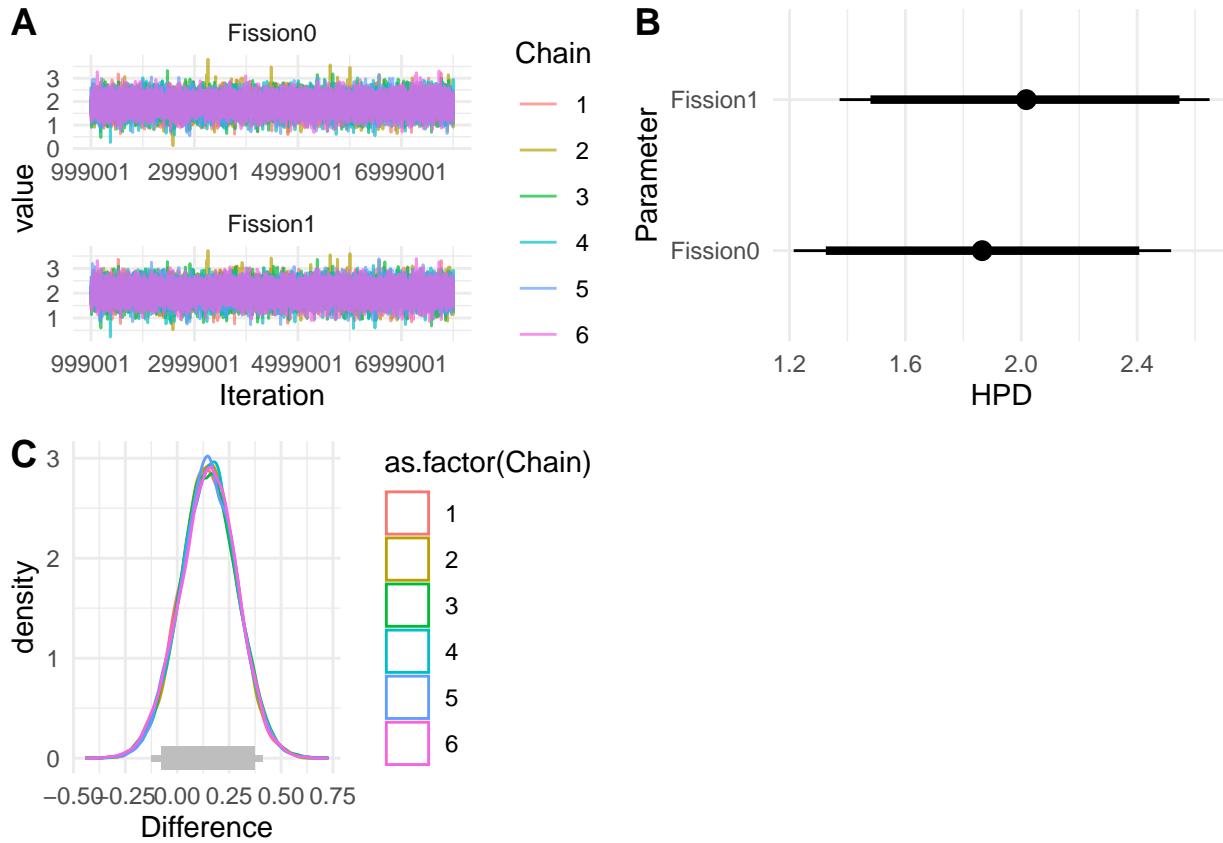


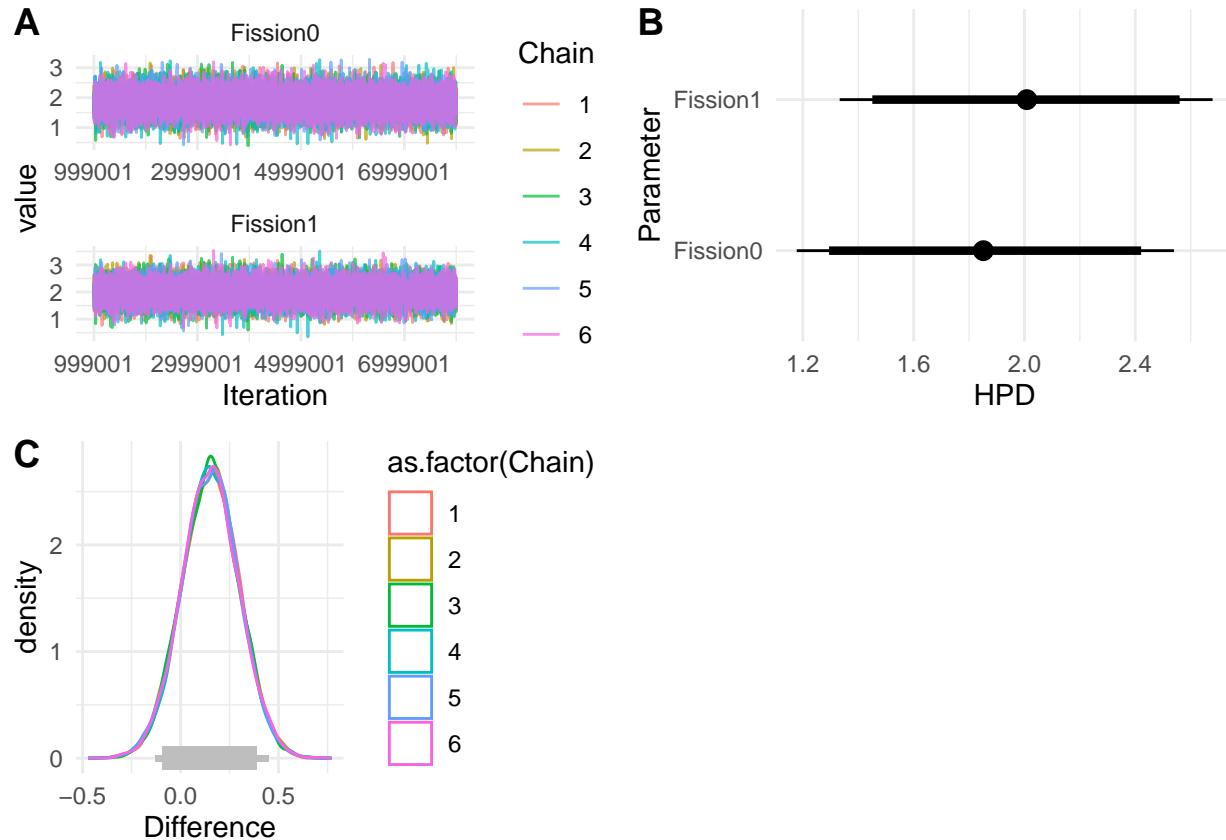
Table 161: Estimates of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
Fission0	1.87 (1.18, 2.55)	0
Fission1	2.07 (1.36, 2.71)	0
scale(log(Number))	0.57 (0.39, 0.77)	0

Table 162: Comparisons of Fixed Effects for \*Model 2\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
Fission0 vs Fission1	-0.11 (-0.44, 0.13)	0.297
Fission0 vs scale(log(Number))	1.33 (0.56, 1.97)	0.000
Fission1 vs scale(log(Number))	1.39 (0.76, 2.13)	0.000

Model 2, prior set p3



**Model 3:** *Number of Cells*  $\sim$  *Timing of Germline Segregation*

Table 163: Estimates of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	13.19 (3.04, 24.56)	0.018
GermTimeSimpearly	14.3 (0.38, 26.2)	0.039

Table 164: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-1.1 (-7.44, 6.98)	0.943

Model 3, prior set p1

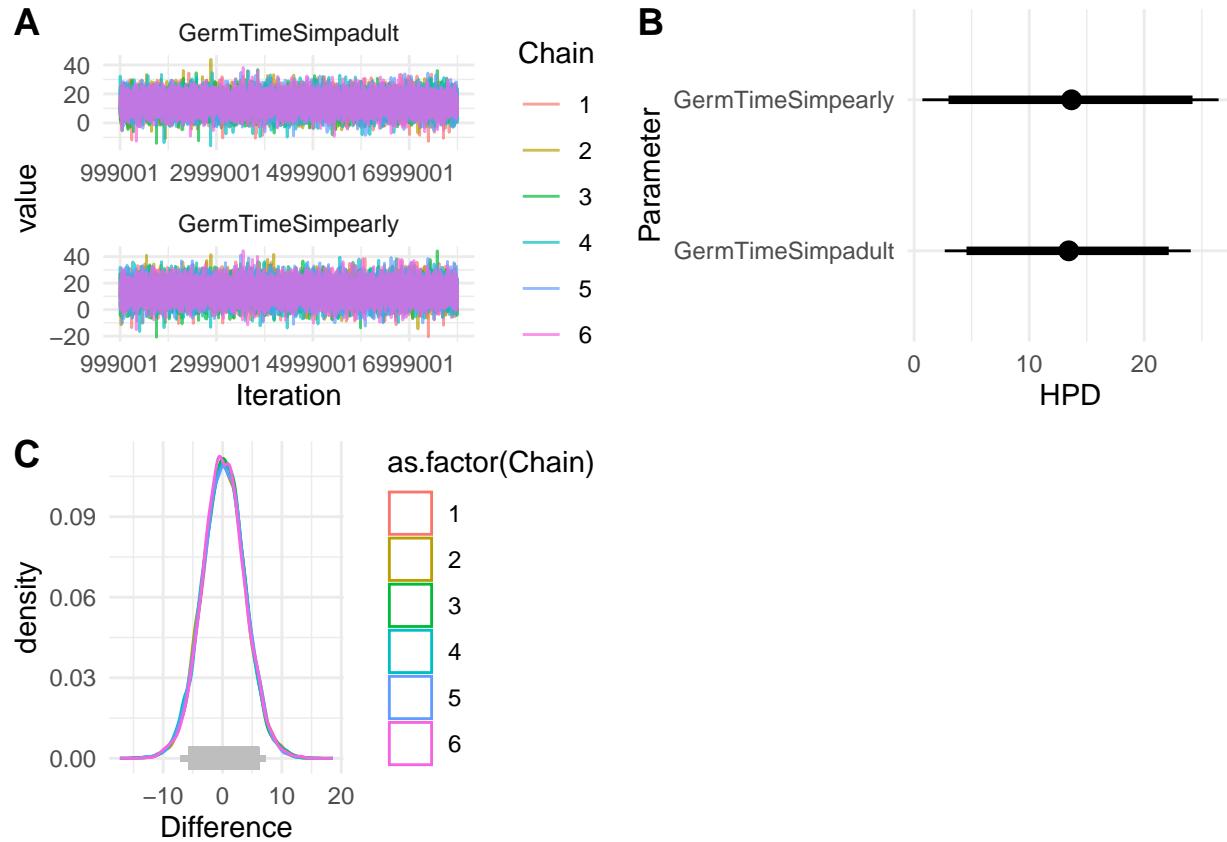


Table 165: Estimates of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	11.23 (3.61, 23.77)	0.014
GermTimeSimpearly	14.08 (1.07, 25.98)	0.034

Table 166: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.48 (-7.18, 6.59)	0.943

Model 3, prior set p2

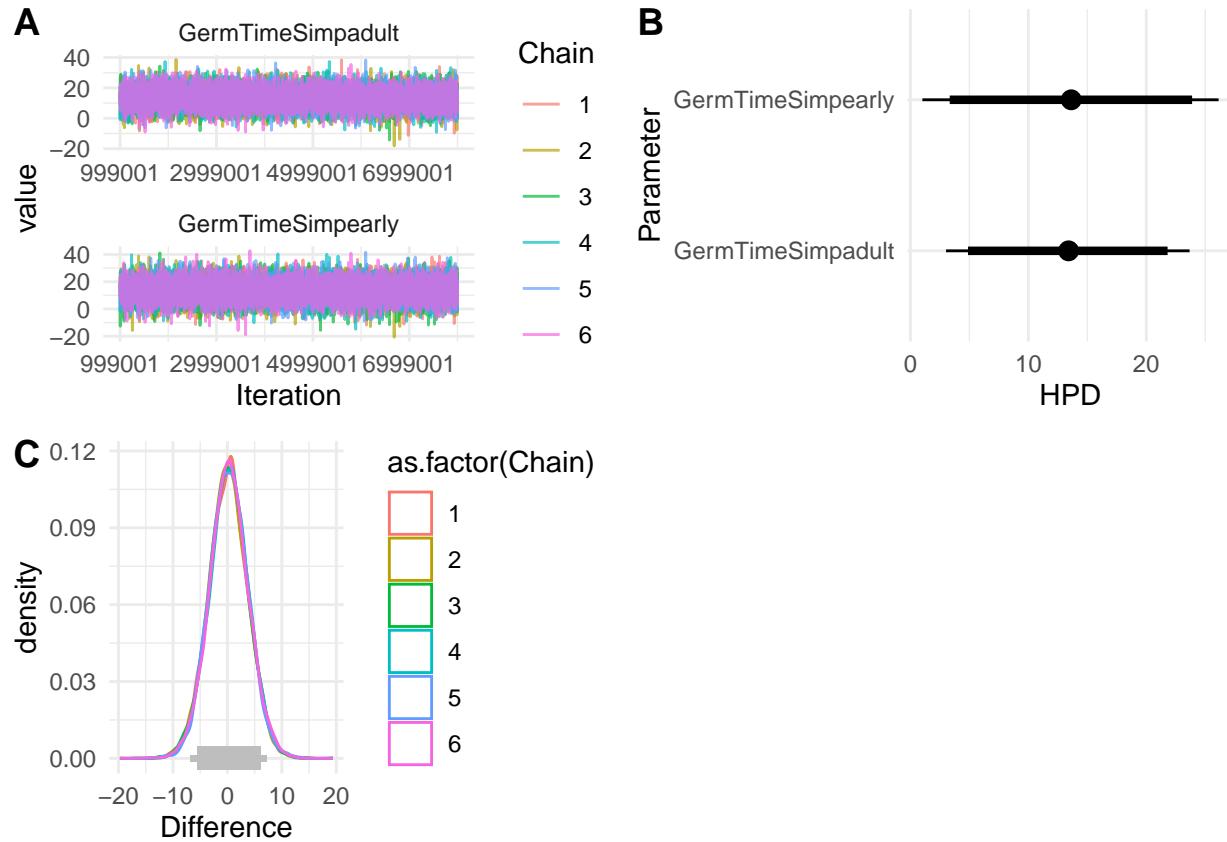


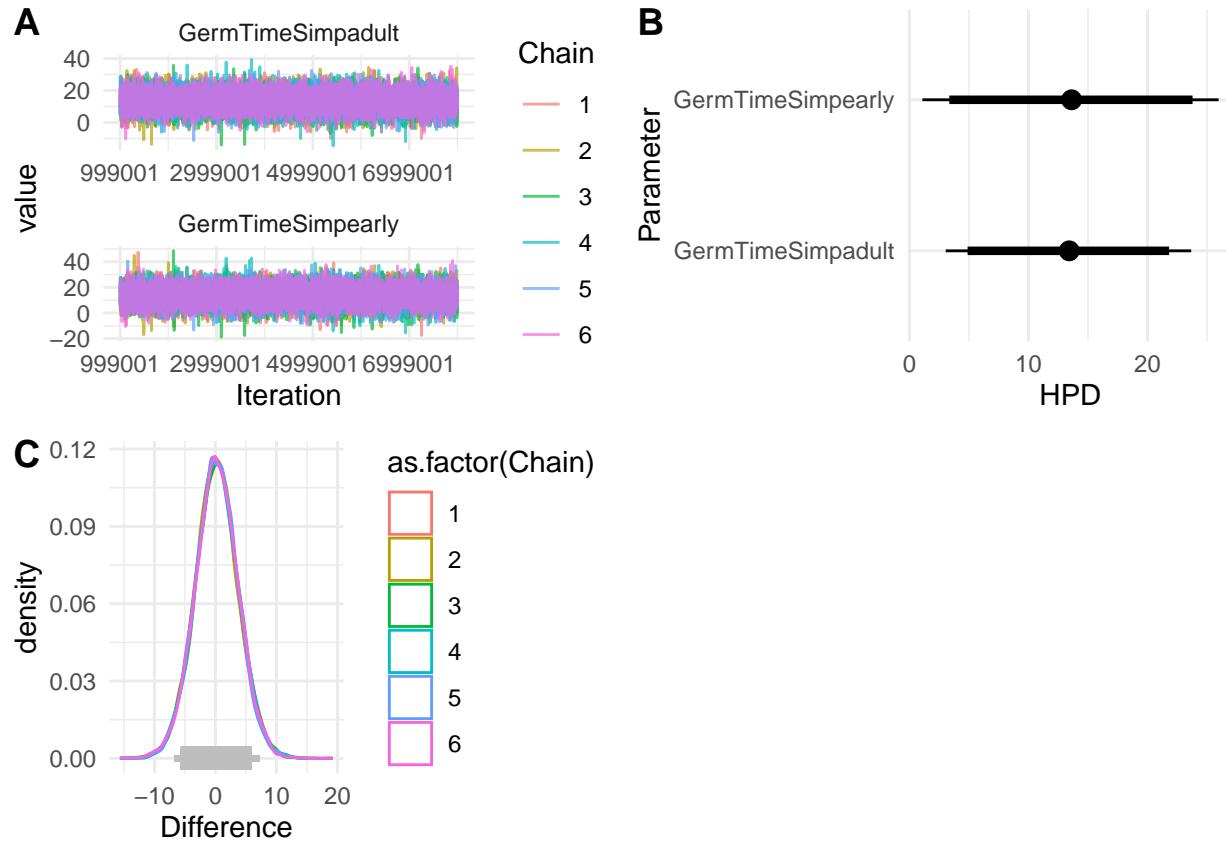
Table 167: Estimates of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	15.42 (3.43, 23.44)	0.017
GermTimeSimpearly	14.52 (1.35, 25.78)	0.032

Table 168: Comparisons of Fixed Effects for \*Model 3\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	-0.69 (-7.32, 6.73)	0.965

Model 3, prior set p3



**Model 4:**  $\text{Number of Cell Types} \sim \text{Timing of Germline Segregation} + \log(\text{Number of Cells})$

Table 169: Estimates of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	2.01 (1.36, 2.63)	0.000
GermTimeSimpearly	1.8 (0.68, 2.84)	0.002
scale(log(Number))	0.55 (0.42, 0.73)	0.000

Table 170: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.22 (-0.66, 1.1)	0.669
GermTimeSimpadult vs scale(log(Number))	1.26 (0.75, 2.04)	0.000
GermTimeSimpearly vs scale(log(Number))	1.38 (0.07, 2.23)	0.032

Model 4, prior set p1

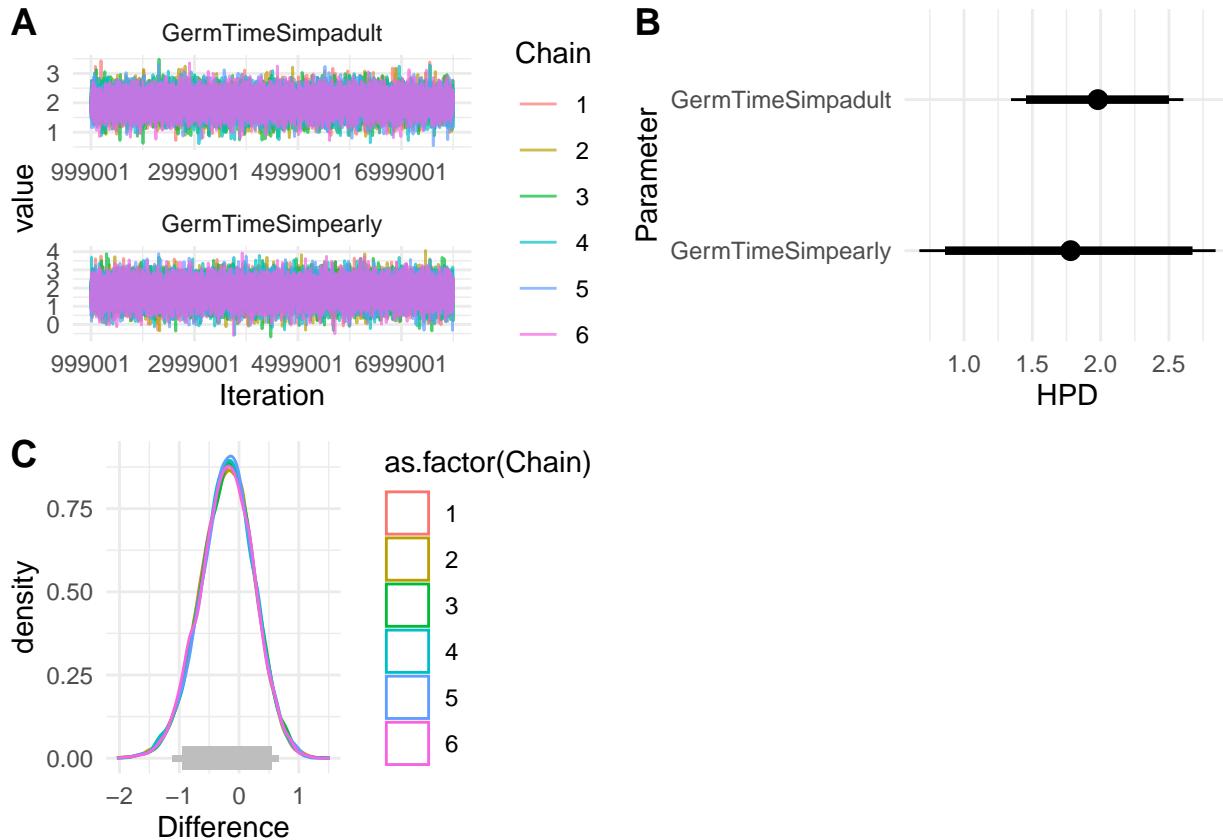


Table 171: Estimates of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.86 (1.33, 2.62)	0.000
GermTimeSimpearly	1.86 (0.58, 2.78)	0.003
scale(log(Number))	0.57 (0.38, 0.75)	0.000

Table 172: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.24 (-0.68, 1.18)	0.643
GermTimeSimpadult vs scale(log(Number))	1.38 (0.73, 2.04)	0.000
GermTimeSimpearly vs scale(log(Number))	1.19 (0.04, 2.24)	0.045

Model 4, prior set p2

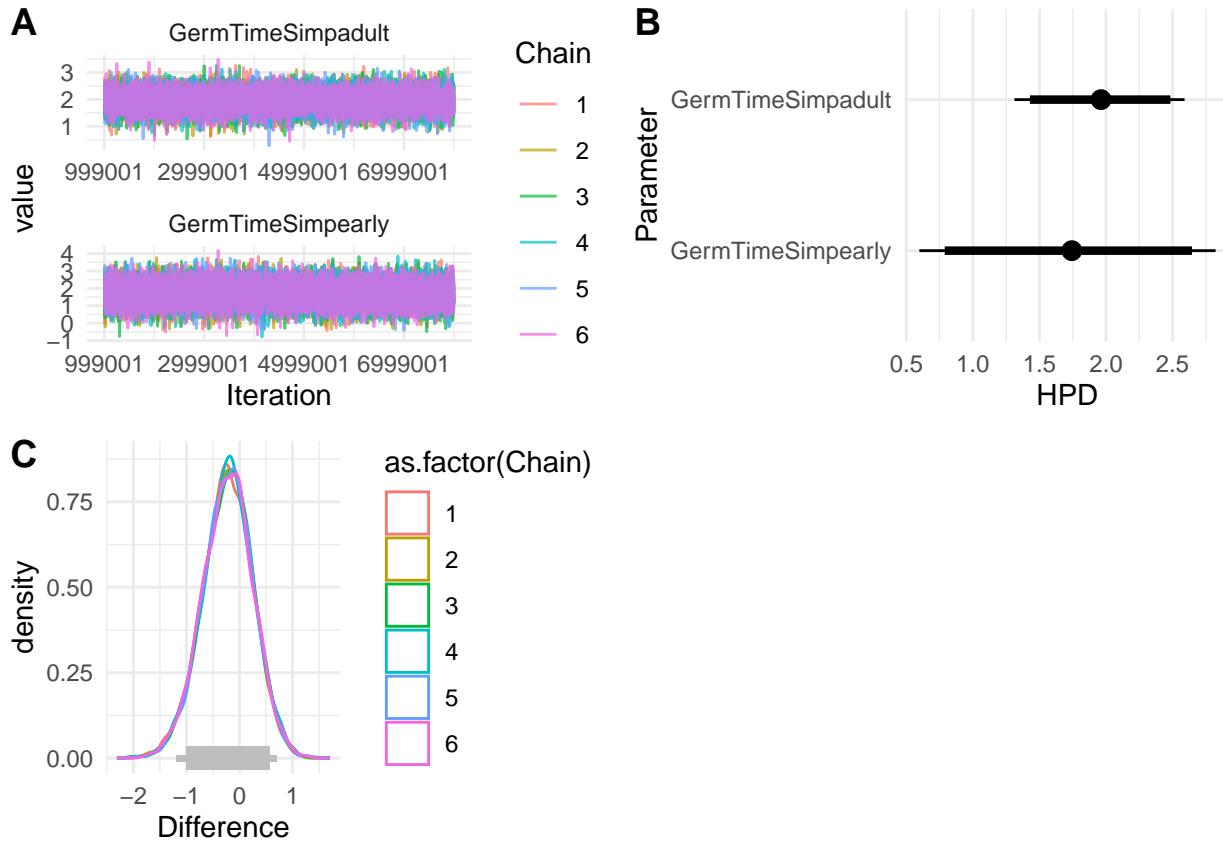


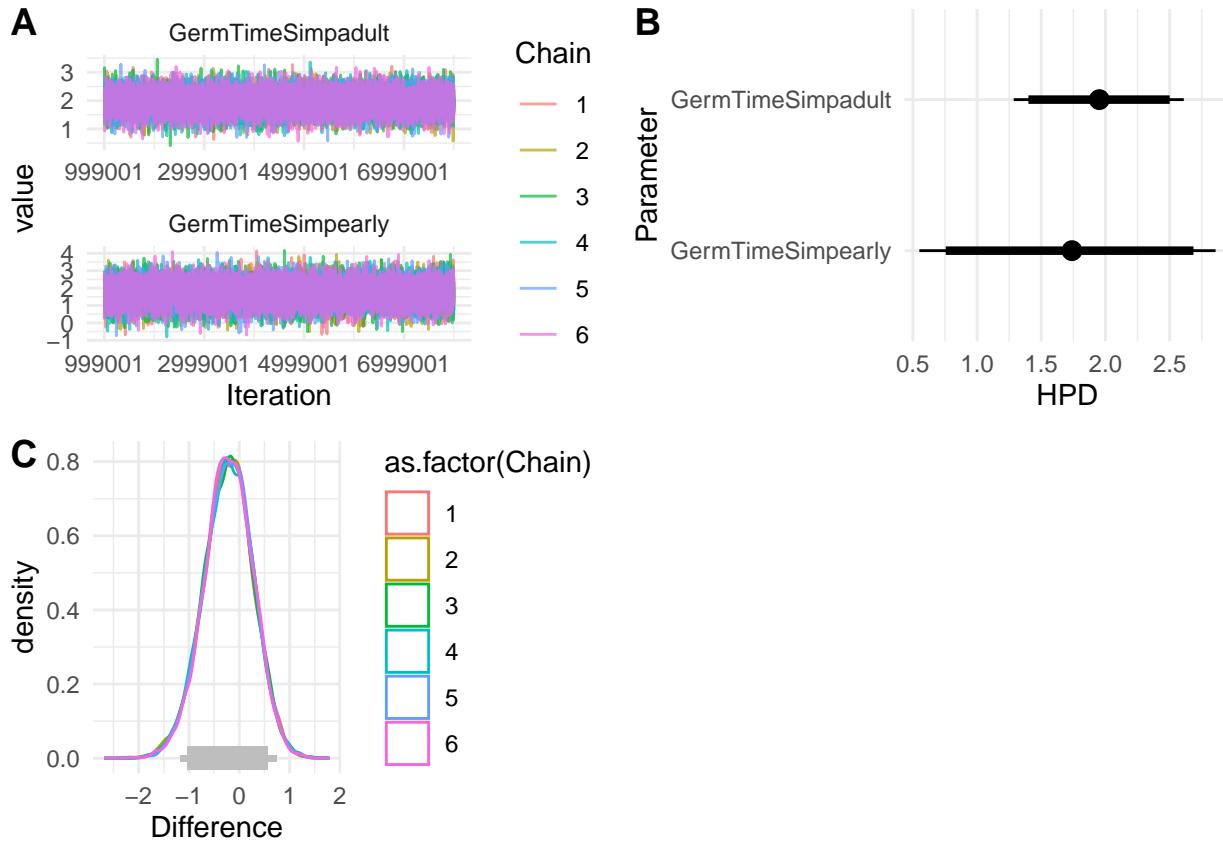
Table 173: Estimates of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.99 (1.26, 2.58)	0.000
GermTimeSimpearly	1.66 (0.61, 2.92)	0.005
scale(log(Number))	0.58 (0.38, 0.77)	0.000

Table 174: Comparisons of Fixed Effects for \*Model 4\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.08 (-0.8, 1.13)	0.664
GermTimeSimpadult vs scale(log(Number))	1.43 (0.71, 2.06)	0.000
GermTimeSimpearly vs scale(log(Number))	1.43 (0.01, 2.32)	0.054

Model 4, prior set p3



*Model 5: Number of Cell Types ~ Timing of Germline Segregation*

Table 175: Estimates of Fixed Effects for Model \*5\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.62 (0.72, 2.67)	0.001
GermTimeSimpearly	1.51 (0.2, 3)	0.033

Table 176: Comparisons of Fixed Effects for Model \*5\* with prior set \*p1\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.2 (-0.87, 1.17)	0.806

Model 4WithoutCellNumber, prior set p1

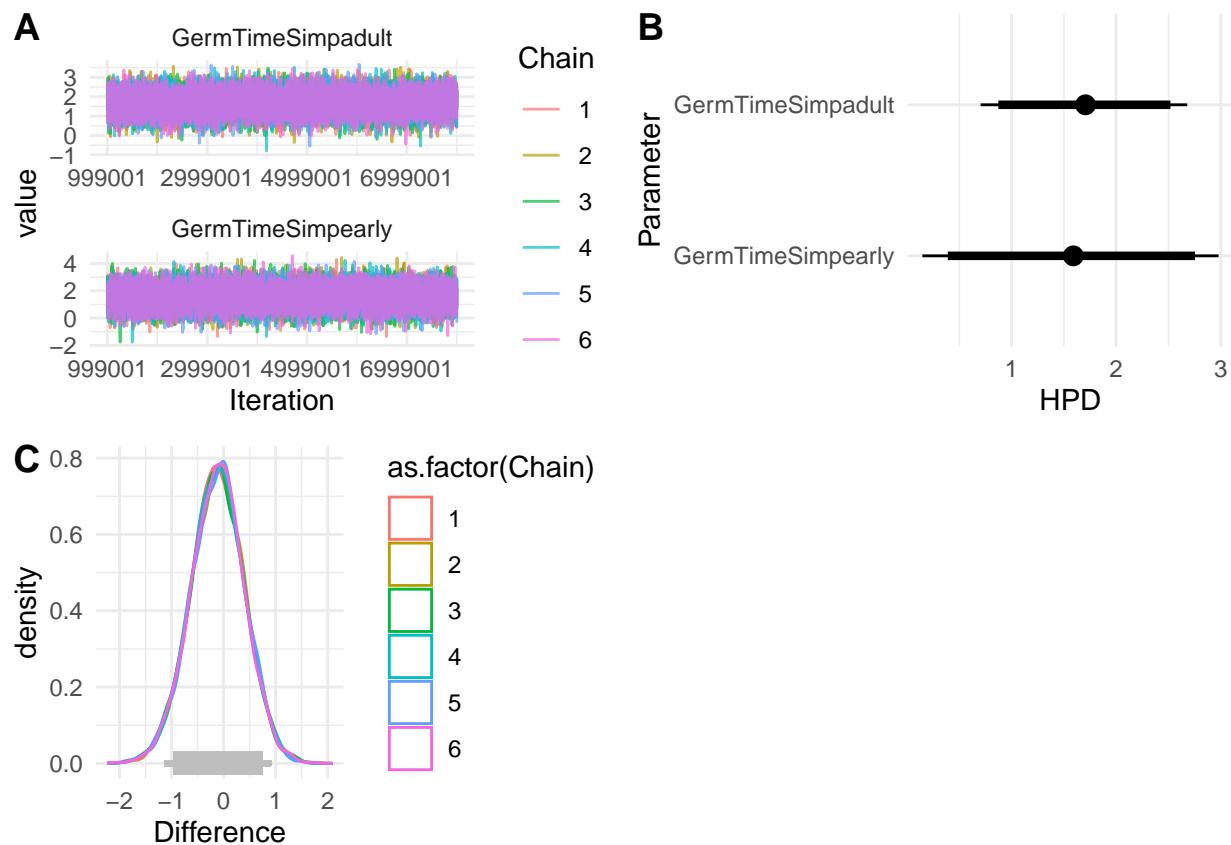


Table 177: Estimates of Fixed Effects for Model \*5\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.71 (0.89, 2.64)	0.000
GermTimeSimpearly	1.35 (0.22, 2.85)	0.025

Table 178: Comparisons of Fixed Effects for Model \*5\* with prior set \*p2\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.28 (-0.82, 1.22)	0.729

Model 4WithoutCellNumber, prior set p2

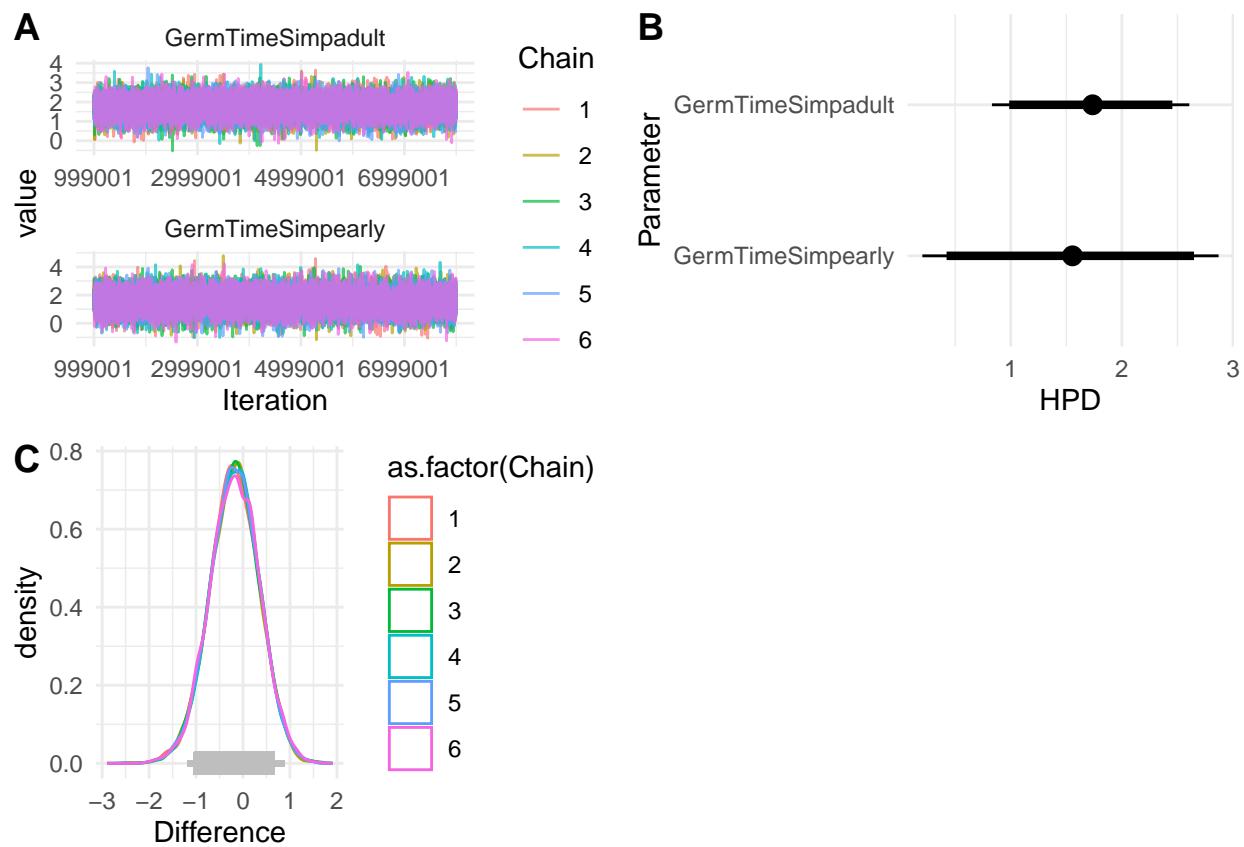


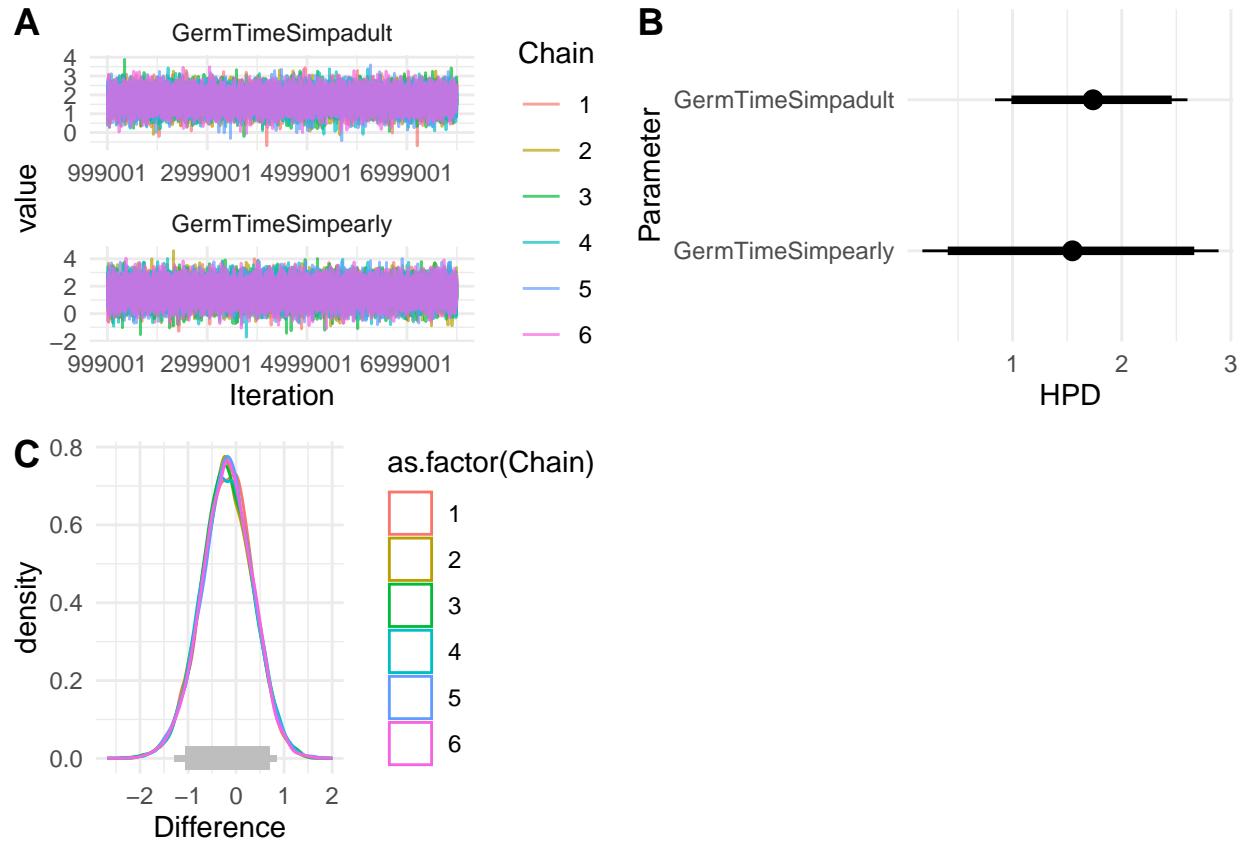
Table 179: Estimates of Fixed Effects for Model \*5\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects	Posterior Mode (CI)	pMCMC
GermTimeSimpadult	1.69 (0.82, 2.56)	0.001
GermTimeSimpearly	1.53 (0.19, 2.85)	0.026

Table 180: Comparisons of Fixed Effects for Model \*5\* with prior set \*p3\* for \*NoAnimals\* taxa, at the \*Genus\* level

Fixed Effects Comparisons	Posterior Mode (CI)	pMCMC
GermTimeSimpadult vs GermTimeSimpearly	0.02 (-0.82, 1.24)	0.742

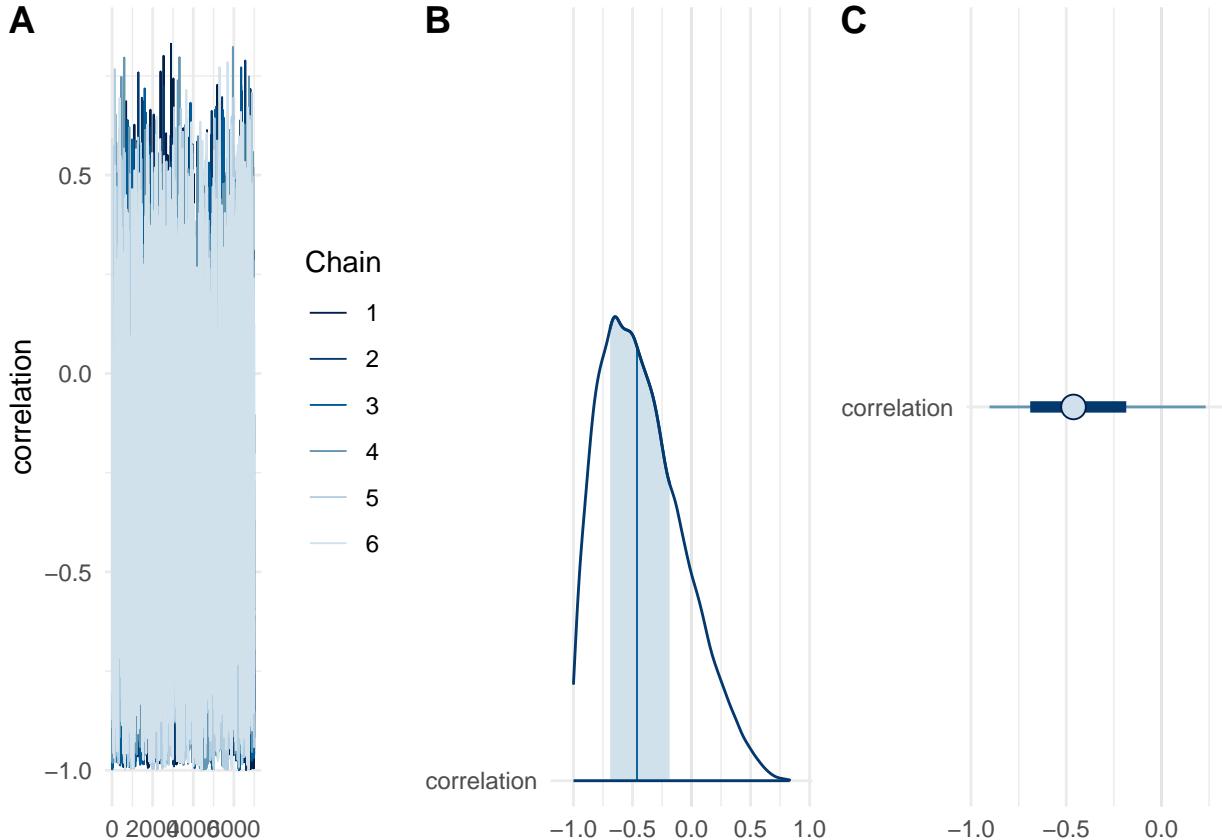
Model 4WithoutCellNumber, prior set p3



## Correlation between germline and fission

This analysis was run to test for a phylogenetic association between early germline segregation and a strict bottleneck separating each generation. Prior set 4 above was used.

Figure: A shows the convergence of all chains, B and C both show the posterior estimates and confidence intervals for the correlation between the *absence* of a strict bottleneck, and the *presence* of early germline segregation. This is shown only for 1 chain.



For each chain, the posterior CI were as follows

```
## [[1]]
##           lower      upper
## correlation -0.9883657 0.2615741
## attr(),"Probability"
## [1] 0.95
##
## [[2]]
##           lower      upper
## correlation -0.9768183 0.2319067
## attr(),"Probability"
## [1] 0.95
##
## [[3]]
##           lower      upper
## correlation -0.9988132 0.2562996
## attr(),"Probability")
```

```
## [1] 0.95
##
## [[4]]
##           lower      upper
## correlation -0.9969584 0.2182141
## attr(,"Probability")
## [1] 0.95
##
## [[5]]
##           lower      upper
## correlation -0.9970201 0.2141558
## attr(,"Probability")
## [1] 0.95
##
## [[6]]
##           lower      upper
## correlation -0.9981998 0.2430388
## attr(,"Probability")
## [1] 0.95
```

## Ancestral state reconstruction

