

Figure S3, Related to Figure 3, Mushegyan et al 2015

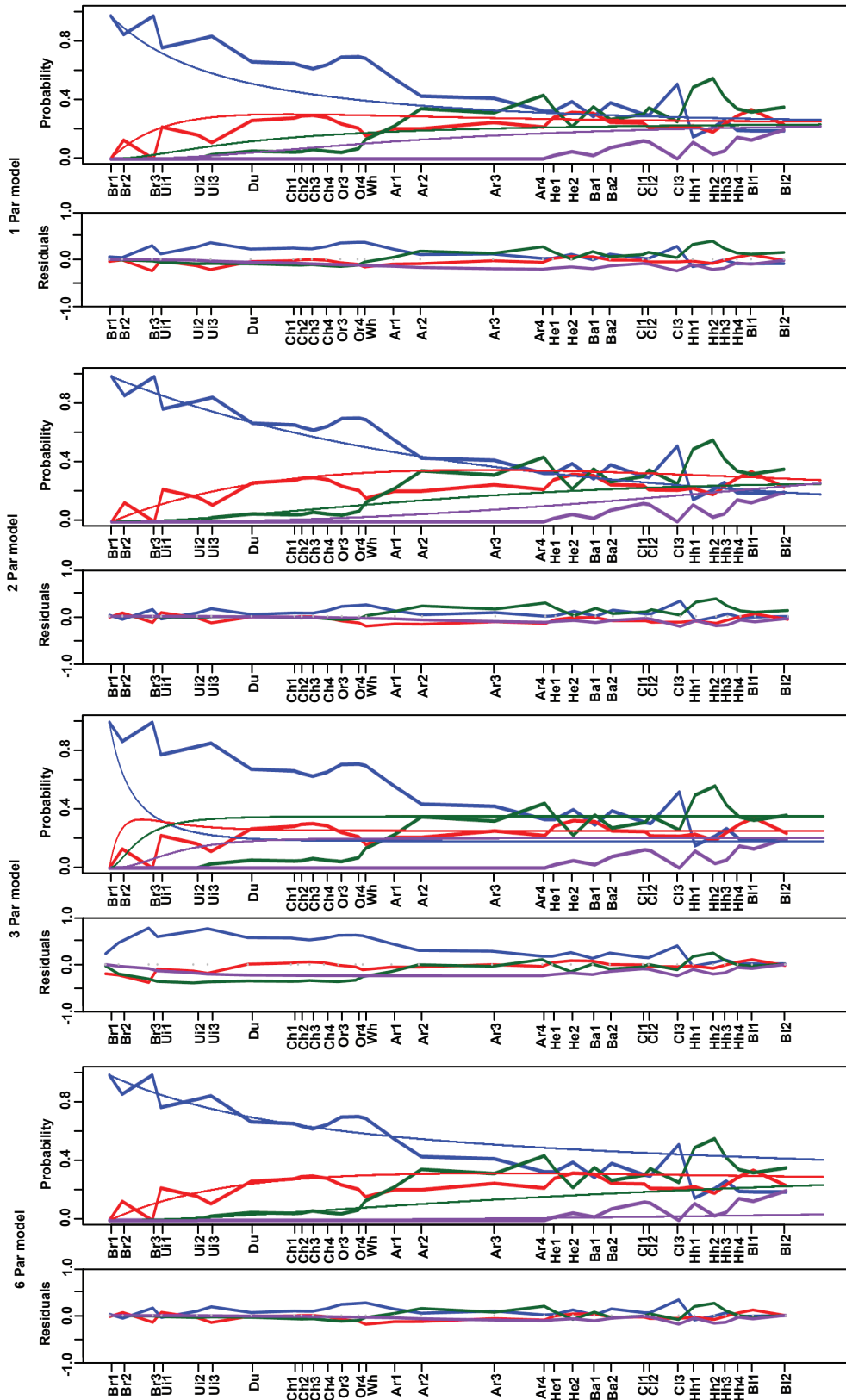


Table S2, Related to Figure 2, Mushegyan et al 2015

Bin (mya)	Genera	Bra	Mes	Hyp	Hys
50	10	100.00	0.00	0.00	0.00
49	10	100.00	0.00	0.00	0.00
48	20	85.00	15.00	0.00	0.00
47	20	83.19	16.81	0.00	0.00
46	19	79.58	20.42	0.00	0.00
45	18	77.78	22.22	0.00	0.00
44	18	80.99	19.01	0.00	0.00
43	19	84.21	15.79	0.00	0.00
42	26	85.86	12.58	1.56	0.00
41	32	87.50	9.38	3.13	0.00
40	37	82.13	14.03	3.84	0.00
39	46	71.38	23.34	5.28	0.00
38	50	66.00	28.00	6.00	0.00
37	20	70.00	25.00	5.00	0.00
36	20	65.00	30.00	5.00	0.00
35	27	55.56	38.89	5.56	0.00
34	34	66.67	25.93	7.41	0.00
33	56	71.43	23.21	5.36	0.00
32	47	70.85	19.72	9.44	0.00
31	37	70.27	16.22	13.51	0.00
30	44	62.14	18.11	19.76	0.00
29	50	54.00	20.00	26.00	0.00
28	49	51.96	21.25	26.79	0.00
27	49	47.88	23.75	28.38	0.00
26	48	45.83	25.00	29.17	0.00
25	49	45.25	24.57	30.18	0.00
24	48	44.09	23.71	32.20	0.00
23	48	42.92	22.86	34.22	0.00
22	50	41.76	22.00	36.24	0.00
21	51	41.18	21.57	37.25	0.00
20	35	37.25	21.90	40.85	0.00
19	18	33.33	22.22	44.44	0.00
18	46	32.61	30.43	34.78	2.17
17	40	40.00	32.50	22.50	5.00
16	43	34.44	32.92	29.03	3.61
15	45	28.89	33.33	35.56	2.22
14	50	38.00	28.00	26.00	8.00
13	33	34.63	26.50	28.63	10.25
12	16	31.25	25.00	31.25	12.50
11	30	30.00	23.33	36.67	10.00
10	30	30.00	26.67	30.00	13.33
9	24	50.00	25.00	25.00	0.00
8	26	15.38	23.08	50.00	11.54
7	34	20.59	20.59	55.88	2.94
6	37	27.03	24.32	43.24	5.41
5	40	20.00	25.00	37.50	17.50
4	59	14.75	16.39	37.70	31.15
3	55	13.26	16.04	37.48	33.22
2	51	11.76	15.69	37.25	35.29

<b>Model</b>	<b>RSS</b>	<b>k</b>	<b>AICc</b>
One-parameter	1.905419	1	-84.46784
Two-parameter	1.136294	2	-98.3498
Three-parameter	0.8040617	6	-98.71406

Table S4, Related to Figure 4, Mushegyan et al 2015

<b>NALMA</b>	<b>Age Range (mya)</b>
Bridgerian (Br)	50.3-46.2
Uintan (Ui)	46.2-42
Duchesnean (Du)	42-38
Chadronian (Ch)	38-33.9
Orellan (Or)	33.9-33.3
Whitneyan (Wh)	33.3-30.8
Arikareean (Ar)	30.8-20.6
Hemingfordian (He)	20.6-16.3
Barstovian (Ba)	16.3-13.6
Clarendonian (Cl)	13.6-10.3
Hemphillian (Hh)	10.3-4.9
Blancan (Bl)	4.9-1.8

**Figure and Table Legend:**

**Figure S1. Fossil record dynamic of molar phenotype changes at inter-Family levels.** Fossil record revealed that the trends towards a taller crown were preserved within each examined family. Clades did not evolve hypselodonty until the Pliocene.

**Figure S2. Markov model probability.** The probability of being in state brachydont, mesodont, hypsodont, and hypselodont is  $P_{\text{Brach}}$ ,  $P_{\text{Meso}}$ ,  $P_{\text{Hypso}}$ , and  $P_{\text{Hypsel}}$ , respectively. The probability of transition from a lower molar crown height state to a higher molar crown height state is represented by  $i$  and the probability of transition from a higher molar crown height state to a lower molar crown height state is represented by  $d$ .

**Figure S3. The observed (fossil record; broken lines) and expected (model; smooth lines) probabilities of the one, two, three, and six parameter changes through time.** The x-axis shows the time bins based on NALMA. The blue represents the brachydont state, the red represents the hypsodont state, the green represents the hypsodont state and the purple represents the hypselodont state.

**Table S1. Comprehensive list of examined rodent fossils (related to Figure 2).** Hypsodonty (hyp) score was assigned as follows: 1-brachydont, 2-mesodont, 3-hypsodont, 4-hypselodont. I.P. — initial presence; L.P. — last presence.

**Table S2. Total number of genera and tooth morphology phenotype prevalence per million year bin.**

**Table S3. Model comparison for the AICc determined by the residual sum of squares (RSS) and the number of parameters (k).**

**Table S4. NALMA and corresponding age ranges.**