

Table S6. Tree lengths for alternative topological hypotheses, number of steps longer than the less constrained topology, and *P* values from non-parametric Templeton tests, with all characters unordered and equally weighted. Constrained topologies: 1) Molecular scaffold alone; 3) Anthracobunidae constrained to join Paenungulata; and 5) *Eritherium* and *Phosphatherium* constrained to be stem proboscideans (cf. Gheerbrant 2012). (See Fig. S7 for topologies)

Constraint	Length	Length difference	<i>P</i>	Anthracobunid sister taxon	Position of Desmostylia
1	3660	-	-	Tapiromorpha*	Stem Sirenia
3	3662	2	0.7237	<i>Cambaytherium</i> / <i>Radinskya</i>	Stem Sirenia
5	3669	9	0.3704	Tapiromorpha*	Stem Sirenia