**Supplemental material 9: Templeton test results**

Results of Templeton tests comparing unconstrained most parsimonious trees with most parsimonious trees constrained to recover specific topologies. For a given significance level, the test statistic (sum of negative ranks) needs to be smaller than the critical value, which is dependent on the number of non-zero scores (characters of different length on the constrained and unconstrained trees).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Constrained length | Sum of negative ranks | Number of non-zero scores | Critical value (p=0.05) |
| Carnivoramorpha monophyletic | 570 | 1068.0 | 60 | 692 |
| Creodonta monophyletic | 572 | 1118.5 | 61 | 716 |
| Hyaenodontidae monophyletic | 564 | 320.5 | 33 | 187 |
| Machaeroidinae-Limnocyoninae | 578 | 782.5 | 47 | 407 |