

TESTING THE PHYLOGENY OF PERIPTYCHIDAE AND “ARCHAIC” PALEOCENE MAMMALS UNDER DIFFERENT OPTIMALITY CRITERIA

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It is now well established that the end-Cretaceous mass extinction had enormous repercussions for mammalian evolution. Following the extinction, during the Paleocene, mammals started to radiate, occupying new and diverse ecological niches. However, the phylogenetic relationships between the so-called “archaic” mammals of this time, and their position within Placentalia, remain contentious. The Peripitychidae are a clade of distinctive “archaic” ungulates, composed of ~17 genera of small to large bodied, highly bunodont, terrestrial herbivores that were among the first placental mammals to appear after the end-Cretaceous mass extinction. Although the Peripitychidae has been historically considered a distinctive “condylarth” subgroup, their higherlevel relationships have been rarely tested. Here, we present an inclusive cladistic analysis to determine and test the phylogenetic affinities of Peripitychidae and other key Paleocene groups within Placentalia under different cladistic optimality criteria. We scored 140 taxa for 503 dental, cranial and postcranial characters, incorporating new morphological and taxonomic data. The data were then subject to parsimony and Bayesian tree of morphological evolution, running 5000000 generations with samples every 200 generations and discarding 25% of the samples as burn-in. Stationarity was achieved and a 50 percent majority rule consensus tree from the sampled trees was obtained. The parsimony analysis recovered 48 most parsimonious trees. The two consensus trees derived from the different analyses are largely congruent and recover a monophyletic Peripitychidae, although the parsimony consensus tree is better resolved. These results are consistent with simulation studies showing that parsimony tends to be more precise (more nodes reconstructed) than Bayesian analyses, although less accurate. The main topological differences between the results relate to the position of poorly known Puercan (earliest Paleocene) species. Our results affirm the monophyly of Peripitychidae and its nesting within a group of “condylarths” positioned at the base of Laurasiatheria and closely related to Artiodactyla. Within Peripitychidae we found support for the three major subfamilial divisions in both analyses. These results highlight the importance of using different optimality criteria when resolving a phylogeny and provide a new insight into how placental mammals were evolving after the end-Cretaceous extinction.

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