

The mandible of carnivorous mammals: the impact of climate on morphological disparity through time

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Highly specialized forms of predators emerged several times during mammalian evolutionary history. In this study, we aimed to investigate the morphological disparity of these multiple lineages of carnivorous mammals and their association with climatic fluctuations over time. Using eleven homologous landmarks, we applied geometric morphometrics to quantify mandibular size and shape for 289 large extant and fossil species belonging to the Metatheria (Dasyuromorphia and Sparassodonta) and Eutheria clades (“Condylarthra”, “Creodonta” and Carnivora) using comparative analyses. Patterns of phylogenetically corrected disparity through time were explored in relation to paleoclimate (i.e. Zachos isotopic curves for oxygen and carbon). We found evidence for a climatic impact on both size and shape disparity of eutherians and metatherians. Size disparity scores of metatherians are always lower than eutherians, as in previous studies, but on shape these clades present comparable values. This essentially means that large metatherians achieved similar maximum disparities as eutherians did at different times. We argue that our results show that evolutionary constraint may not be an issue for diversification in large carnivorous marsupials. Multiple factors have affected the evolutionary mammalian disparities like simultaneous effects of climate and evolutionary time itself, which tends to produce increased diversity.