Postcranial morphology of taeniodonts (Mammalia: Taeniodonta) indicating fossorial adaptations in the Palaeogene

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Mammals originated during the Mesozoic and survived the Cretaceous-Palaeogene (K-Pg) mass extinction. Their evolution from small, opportunistic animals to more specialised animals with diverse locomotor behaviours following the extinction is still unclear. An ideal group to address this question is the Taeniodonta which are among the few eutherians that purportedly crossed the K-Pg boundary and diversified in the early Palaeogene. They are known thus far from the Palaeogene of North America and are characterised by their unique dentition adapted for an abrasive diet and their robust skeleton. There are 10 genera of taeniodonts classified into two families. The Conoryctidae are smaller with more generalised body plan, whereas the Stylinodontidae reached large body size (up to 100kg) and evolved crown hypsodonty. We focused our study on the postcranial functional morphology of the two taeniodont subgroups. We conducted linear discriminant analysis using 9 linear measurements of the humerus, comparing *Onychodectes* (a conoryctid) and *Stylinodon, Ectoganus, Psittacotherium* (stylinodonts) with extant mammals of known locomotion. We also used 29 linear tarsal measurements to evaluate the locomotor behaviour of *Onychodectes* and *Conoryctes* (conoryctids) and *Ectoganus* alongside a sample of extant mammals and other Palaeogene taxa. Our results show that *Onychodectes,* which is one of the most basal taeniodonts, might have been terrestrial/semi-fossorial, similar to the numbat. Postcranial features of *Onychodectes* show it possessed digging adaptations i.e. a long olecranon process of the ulna, enlarged manual unguals and a well-developed deltopectoral crest and broad distal end of the humerus. We find stylinodontid taeniodonts to be distinctly more fossorial, comparable to the striped skunk, gopher and the aardvark. Our study suggests that digging is an ancestral behaviour for taeniodonts implying the importance of burrowing for surviving the K-Pg extinction.

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