

Body mass estimation in Triassic cynodonts from Argentina based on limb variables

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Body mass estimations for extinct taxa are fundamental in palaeobiological reconstructions, but little work has been done on this topic for non-mammaliaform cynodonts (NMC), the diverse and abundant Permo-Cretaceous forerunners of mammals. Here, we estimated the body mass of five species of NMC cynognathians by linear measurements and circumferences of postcranial elements (humeri and femora) from 14 specimens from Triassic units of the Ischigualasto-Villa Union Basin located between San Juan and La Rioja provinces, and the Cuyo and San Rafael basins, both in Mendoza province, Argentina. For this purpose, we used predictive formulas available in the literature based on variables on appendicular skeleton of different extant groups of mammals and reptiles. Geometric similarity using skull length was applied to provide an estimation of adult masses for species with only samples of juvenile and subadult limb bones. A broad body mass range was recorded. Small traversodontids such as *Andescynodon mendozensis* and *Pascualgnathus polanskii* were between 1 to 3.5 kg. Medium-sized traversodontids include adult *Massetognathus pascuali* with masses from 20 to 40 kg, and the adult forms of large-sized cynognathians like *Cynognathus crateronotus* and *Exaeretodon argentinus* reached or surpassed 100 kg. The morphological variations in the skull and the different body sizes observed between traversodontids are interpreted as reflecting different types of diets where small-sized traversodontids had a generalist diet, and the medium/large-sized traversodontids were herbivorous. Finally, palaeoecological working hypotheses regarding cranial and dental morphology, body mass, and their possible relation with diet in non-mammaliaform cynodonts of South America are offered.

Key words: Cynodontia, Gomphodontia, Traversodontidae, allometric equations, femur, humerus, paleobiology, Triassic, Argentina.

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