
The positional repertoires of hominins: New insights from extant primates

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Abstract

With regard to the diversity of positional (posturo-locomotor) capacities of extant non-human primates, it is very likely that our ancestors and extinct non-human primates were also able of various posturo-locomotor modes. Furthermore, the most obvious variations between extant primates are mainly in size and shape (i.e. morphotypes) that are shown to be strongly related to locomotor performances. In this context, understanding the diversity of the positional repertoires in extant species in relation to size, morphotype and environment may help to model evolutionary transitions in extinct species' positional repertoires. For this aim, we conduct experiments 1) in the frame of the *Motion Analysis of Primates* platform at the CNRS Primatology Station (Rousset, France) where we have a long experience of integrative studies (biomechanics, morphology and positional repertoire) of longitudinal samples of the olive baboon, *Papio anubis*, and 2) in Zoological parks on the morphometrics of different gibbon species, *Nomascus gabriellae* and *N. siki*, in the zoos of Besançon and Mulhouse and on bonobos, *Pan paniscus*, in the zoo of Planckendael. By collecting radiographs, making external measurements (segment lengths and diameters) and quantifying posturo-locomotor behaviours, we increase our understanding of the relationships between bones, body mass distribution and positional behaviours. By using a developmental perspective, our results suggest strong relationships between limb mass proximal migration and the variations in the proportion of climbing behaviours. We also found a marker, in the skeletal proportions of the foot, for the proportion of grasping behaviours in baboons. Based on these results and on the functional relationships between body mass distribution and posturo-locomotor repertoires found in the literature, we propose a meta-analysis of the changes in morphotypes in Catarrhini species. This multivariate analysis allows us to predict the emergence of new positional repertoires, including its diversity, in relation to morphotypes and bone size during the evolution of primates, including hominins.

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