6th Annual Meeting of the

# European Society for the study of Human Evolution

14-17 September 2016
**MADRID** / SPAIN

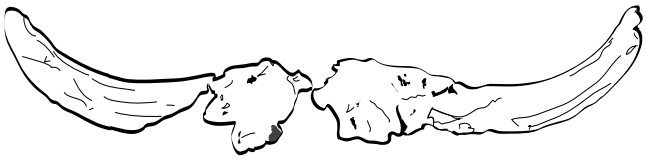
ESHE

**European Society for the study of Human Evolution**

ESHE

6th Annual Meeting

Madrid, Spain 14 -17 September, 2016



Proceedings of the European Society for the study of Human Evolution 5

Cover image: Bison Horns courtesy of the Museo Arqueológico Regional
Proceedings of the European Society for the study of Human Evolution Vol. 5
Citation: PESHE 5, 2016


PESHE 5 compiled and designed by Mikaela Lui

ISSN 2195-0776 (Print)
ISSN 2195-0784 (Online)

Poster Presentation Number 4, We (17:00-19:00)

## Investigating locomotion from cranial base morphology and foramen magnum position in primates and hominins

**Federica Landi[1], Antonio Profico[1], Alessio Veneziano[2], Isabelle De Groote[2], Giorgio Manzi[1]**

1 - Sapienza University of Rome · 2 - Liverpool John Moores University

Primates exhibit high variability in their locomotion. The main pattern adopted by each species is strictly connected to the surroundings in which it moves and is part of its ecological niche. The way a primate moves influences its morphological evolution, with limb proportions and long bone morphology often used as proxies for locomotion. Nonetheless, other skeletal structures may have been involved in important locomotory adaptations during primate evolution. The skull base provides a substrate for the growth of the brain and interlaces the neurocranium and the face. Also, it is directly connected to the vertebral column, which is pivotal for locomotion. This cranial district, as well as the relative position of the foramen magnum along the cranial base, are often found in literature as crucial elements for the comprehension of locomotion in fossil hominins [1,2,3]. In this study we adopted a Geometric Morphometric approach to investigate the capability of the cranial base morphology in discriminating between different locomotory patterns in a broad sample of living primates, modern humans and fossil hominins. The dataset consists of 308 adult specimens (males and females), for a total of 74 species. The sample is made of 3D surfaces obtained by computerized tomography. The 3D landmark configuration used for the analysis consists of 17 landmarks which synthesize the morphology of the whole cranial base. Three additional landmarks were acquired (prostion, left orbital and opistocranion) in order to capture the position of the foramen magnum along the Frankfurt plane. We tested for the multivariate correlation between cranial base shape/size, foramen magnum position and locomotor categories . The observed correlations were corrected for the effect of phylogenetic relatedness. The results showed that the shape of the cranial base and the position of the foramen magnum are not suitable for distinguishing between different types of locomotion in primates, while the cranial base size exhibited a clear discriminating power, likely due to the ecological importance of body size in primates. When modern humans and fossil hominins were included in the sample, the same correlations did not appear clear, probably due to the small sample of bipedal species. Further studies including other fossil hominins will help to clarify the results. This study suggests that cranial base morphology may have evolved as a non-specialised structure in primates and is probably the result of the multiple connections it has in the skeleton. In addition, the occipital bone and the position of the foramen magnum may not be as informative as previously thought for the interpretation of locomotion in fossil hominins.

**References:**[1] Ahern, J.C.M., 2005. Foramen magnum position variation in Pan troglodytes, Plio-Pleistocene Hominids, and recent Homo sapiens: implications for recognizing the earliest Hominids, American Journal of Physical Anthropology 127, 267-276.[2] Dean, M.C., Wood, B.A., 1984. Phylogeny, neoteny and growth of the cranial base in Hominoids, Folia Primatologica 43, 157-180.[3] Luboga, G.G., Wood, B.A., 1990. Position and Orientation of the Foramen Magnum in Higher Primates, american journal of physical anthropology 81, 67-76.[4] Fleagle, J. G., 2013. Primate Adaptation and Evolution: 3rd Edn. Academic Press.