

3RD ANNUAL MEETING OF THE

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

19–21 SEPTEMBER 2013
VIENNA / AUSTRIA



Poster Presentation Number 30, Fr (18:00-20:00)

A preliminary assessment of the thoracic remains of the El Sidrón Neandertals (Asturias, Spain)

Markus Bastir¹, Daniel García Martínez¹, Almudena Estalrich¹, Antonio García Taberner¹, Rosa Huguet², Alon Barash^{3,4}, Wolfgang Recheis⁵, Marco de la Rasilla⁶, Antonio Rosas¹

1 - Paleoanthropology Group, Museo Nacional de Ciencias Naturales CSIC, Madrid, Spain · 2 - Institut Català de Paleoeologia Humana i Evolució Social, Tarragona, Spain · 3 - Faculty of Medicine Galilee, Bar Ilan University, Zefat, Israel · 4 - Department of Anatomy and Anthropology, Sackler Faculty of Medicine, Tel Aviv, Israel · 5 - Department of Radiology, Medizinische Universität Innsbruck, Austria · 6 - Department of History, University of Oviedo, Spain

The El Sidrón site (Asturias, Spain), dated to approximately 49 kyrs BP, has produced the most important collection of Iberian Neandertals. More than 2400 fossil cranial and postcranial remains have been recovered so far. These have been attributed to at least thirteen individuals including seven adults, three adolescents, two juveniles and one infant (Rosas et al. 2006; 2012). This paper presents first results on our research on the thoracic skeleton of the El Sidrón Neandertals, and in particular, the ribs. The skeletal thorax is important in human evolution in several respects: it participates as the kinematic part in the ventilatory function of the respiratory system, it connects morpho-functionally the cranium with the post-cranium, and the upper and lower parts of the thorax are central structures related to the ontogeny and evolution of body shape (Bastir 2008, Bastir et al., 2013). The current sample of the El Sidrón costal skeletal remains contains about 245 fossils. Their degree of preservation ranges from fully preserved and undistorted ribs to highly fragmented remains. Also, a lower thorax has been recovered, which is still in anatomical connection at the costo-vertebral articulations although with some taphonomic distortion. The aim of this paper is to present first results of our ongoing work on the remains of the thoracic skeleton and its bearing on the Neandertal ribcage morphology, its growth, and implications for body shape. We measured 20 3D-landmarks and sliding semilandmarks per rib on surface-scans of original El Sidrón fossils and performed geometric morphometrics to investigate size and shape variation. Data were compared with other Neandertal fossils as well as with an ontogenetic sample of twenty-eight recent modern humans ranging from newborn to adults of both sexes (Bastir et al. 2013). Shape data were analysed by principal components and partial least squares analyses to explore growth and adult allometric variation as well as patterns of morphological covariation. Our results suggest no size differences between Neandertals and modern humans among the 1st ribs of adults. However, in terms of shape the El Sidrón 1st ribs are a systematically more elongated in antero-posterior direction and less curved than those of modern humans. The morphology of the first rib is informative because partial least squares analysis in modern humans suggests a very tight correlation ($R=0.85$, $p<0.001$) between the shape of the first rib and the shape of the remaining rib-cage. Assuming similar relations in Neanderthals we hypothesise therefore that the upper thorax of the El Sidrón Neandertals is particularly extended in an antero-posterior direction. Differences in the rib geometry are likely also related to differences in the configuration of the costo-vertebral articulations. In this respect, our results fit with previous observations (Franciscus and Churchill 2002; Gómez-Olivencia et al. 2009). The divergent orientations of ontogenetic shape trajectories in a comparative growth analysis suggest that these morphological differences are expressed later during postnatal ontogeny.

Acknowledgements: We thank the El Sidrón Excavation team, Philippe Mennecier and Antoine Balzeau. Research is funded by CGL 2012-37279 and CGL 2012-36682 (Spanish Ministry of Economy and Competition), and The Leakey Foundation.

References: Bastir, M., 2008. A systems-model for the morphological analysis of integration and modularity in human craniofacial evolution. *J. Anthropol. Sci.* 86,37-58. Bastir, M, García-Martínez D., Recheis W., Barash A., Coquerelle M., Rios L., Peña A., and O'Higgins P., 2013. 3D analysis of human ribcage ontogeny. *Am. J. Phys. Anthropol.* S56,75. Franciscus, R.G., and Churchill, S.E., 2002. The costal skeleton of Shanidar 3 and a reappraisal of Neandertal thoracic morphology. *J. Hum. Evol.* 42,303-356. Gómez-Olivencia A., Eaves-Johnson K.L., Franciscus R.G., Carretero, J.M., and Arsuaga, J.L., 2009. Kebara 2: new insights regarding the most complete Neandertal thorax. *J. Hum. Evol.* 57,75-90. Rosas, A., Estalrich, A., García-Taberner, A., Bastir, M., García-Vargas, S., Sánchez-Meseguer, A., Huguet, R., Lalueza-Fox, C., Peña-Melián, Á., Kranioti, E.F., et al. . 2012. The Neandertals from El Sidrón (Asturias, Spain). Updating of a new sample, Les Néandertaliens d'El Sidrón (Asturies, Espagne). *Actualisation d'un nouvel échantillon. L'Anthropologie* 116(1):57-76. Rosas, A., Martinez-Maza, C., Bastir, M., Garcia-Taberner, A., Lalueza-Fox, C., Huguet, R., Ortiz, J.E., Julia, R., Soler, V., Torres, Td. et al. . 2006. Paleobiology and comparative morphology of a late Neandertal sample from El Sidrón, Asturias, Spain. *Proc. Nat. Acad. Sci. USA.* 103,19266-19271.