

Dating the earliest evidence of human presence in western Europe: New results from Pirro Nord (Italy)

Mathieu Duval^{1*}, Lee J. Arnold², Jean-Jacques Bahain³, Josep M. Parés¹, Martina Demuro², Christophe Falguères³, Qingfeng Shao⁴, Pierre Voinchet³, Julie Arnaud⁵, Claudio Berto⁵, Gabriel Luigi Francesco Berruti⁵, Sara Daffara⁵, Marta Arzarello⁵

¹ Geochronology and Geology research program, National Research Centre on Human Evolution (CENIEH), Paseo Sierra de Atapuerca, 3, 09002, Burgos, Spain

² School of Physics, Chemistry and Earth Sciences, University of Adelaide, North Terrace Campus, Adelaide, SA 5005, Australia.

³ HNHP UMR 7194 (MNHN-CNRS-UPVD), Département Homme et environnement du Muséum National d'Histoire Naturelle, 1, rue René Panhard, Paris 75013, France

⁴ School of Geography, Nanjing Normal University, No. 1 Wenyuan Road, Nanjing, 210023, China

⁵ Sezione di Scienze Preistoriche e Antropologiche, Dipartimento Studi Umanistici, Università di Ferrara, Ferrara, Italy

*Corresponding author: [mathieu.duval@cenieh.es]

Our understanding of early human dispersals in Europe is based on a handful of archaeological sites spread across the southern margin of the continent. Among them, Pirro Nord-13 (Italy) is usually considered to document the oldest evidence of human presence in Western Europe, although the site itself has never been numerically dated. Instead, the age of the Mode 1 (=Oldowan) lithic assemblage and associated fossils found in this karst fissure has been inferred from biochronology and estimated to be 1.3-1.6 Ma [1]; making it older than the Spanish Mode 1 pre-Jaramillo localities of Atapuerca Sima del Elefante, Barranco León and Fuente Nueva-3, which have been dated by a combination of numerical methods and palaeomagnetism.

We provide here the results from the first dating study of the site involving a wide range of methods: Electron Spin Resonance (ESR) and single grain thermally-transferred optically stimulated luminescence (SG TT-OSL) dating of quartz grains, combined U-series/ESR dating of fossil teeth and palaeomagnetic analyses of sediment. Such a multi-technique dating approach offers the possibility to obtain chronological constraints for both the fossil assemblage and the host sediment.

The (semi-)independent methods consistently yield an Early Pleistocene age for the site, although the resulting estimates are much younger than initially inferred from biochronology. We discuss potential reliability considerations with the new numerical ages and existing biochronological inference. Nevertheless, these results suggest either a complex taphonomic history in which fossil remains, lithic artifact and host sediment might not be coeval, or at least the sediment was most recently exposed to sunlight during the latest part of the Early Pleistocene.

Keywords: ESR dating, TT-OSL dating, combined U-series/ESR dating, Quartz grains, Tooth enamel

References

1. López-García, J.M., Luzzi, E., Berto, C., Peretto, C. and Arzarello, M., 2015. Chronological context of the first hominin occurrence in southern Europe: the *Allophaiomys ruffoi* (Arvicolinae, Rodentia, Mammalia) from Pirro 13 (Pirro Nord, Apulia, southwestern Italy). *Quaternary Science Reviews* 107: 260-266.