**S1 Appendix from Fernández-Crespo and Schulting, “Living different lives: early social differentiation identified through linking mortuary and isotopic variability in Late Neolithic/ Early Chalcolithic north-central Spain”**

**The Rioja Alavesa region and the Late Neolithic/Early Chalcolithic**

Rioja Alavesa is a confined region located in the mid-upper Ebro Valley (north-central Spain), belonging to Álava province (Basque Country). It is delimited by the steep Cretaceous limestone range of the Sierra de Cantabria-Toloño (900-1450 masl) to the north and by the middle course of the Ebro river to the south (Fig 1). The landscape is predominantly one of gentle south-facing slopes, mainly composed of Tertiary sandstone deposits, occasionally covered with thin Quaternary deposits [1]. The region is characterized by a Continental Mediterranean climate, the range itself acting as a barrier against Atlantic influences from the northern part of Álava and thus making the existence of different ecosystems possible both latitudinally and altitudinally [2].

The period spanning the mid-4th to early-3rd millennia cal. BC – culturally coincident with the LN/EC – experienced a temperate, relatively arid climate, dominated by meso-thermophilic mixed forests, principally composed by hazel, birch, alder, lime, ash and willow [3]. Also present are oak forests, together with pine, yew, bush, shrubs like heather and juniper and arid grasses (Artemisia, Centaurea). A decrease in the percentage of tree pollen and the appearance of ruderal and nitrophilic species (Chenopodiaceae, *Plantago* sp., *Urticadioica*) have been interpreted as a progressive anthropogenic depletion of forests and the expansion of arable fields and pastures [4-5]. Moreover, domestic cereal pollen appears in the local botanical record (although in low percentages) and there is micromorphological evidence of ovicaprid stalling in some rockshelters of the range [6-7].

Perhaps promoted by favorable climatic conditions, the period being considered here sees both a proliferation of open-air settlements, especially in the lowlands where the terrain is more suitable for agriculture [8], and a diversification of burial sites [9]. Thus, while passage tombs built in the Middle Neolithic continue to be in use and *ex-novo* monuments continue to be constructed in the valley, caves and rockshelters on both sides of the Sierra Cantabria-Toloño also start being used as funerary spaces [10]. The occupation and/or more extensive use of peripheral montane areas where the caves are located could suggest population growth spilling out of the main river valley. A pastoral economy would present an appropriate use of this landscape [11]. However, presuming an exclusive link between pastoral specialization and people using caves as burial places just on the basis of their chronological coincidence is rather speculative [12].

There is accumulating evidence that the LN/EC witnessed an increase in social unrest that may relate to demographic pressure and/or to incipient social complexity [13]. Evidence of interpersonal violence takes the form of arrowhead injuries in human skeletal remains and, less frequently, parry fractures and depressed cranial fractures [14-17]. Moreover, the first appearance of metal objects and some prestige items (votive polished stone axes, carved bone idol-palettes, bone and stone beads, etc.) in funerary contexts could be linked to the development of hierarchical societies and the appearance of social inequality in the region [18]. Thus, it is possible that all these social changes are associated with greater heterogeneity in access to subsistence resources.

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