Supplementary Material

A new assemblage of Late Neanderthal remains from Cova Simanya (NE Iberia)

**Morales, J.I.\*, Cebrià, A., Soto, M., Rodríguez-Hidalgo, A., Hernando, R., Moreno-Ribas, E., Lombao, D., Rabuñal, J.R., Martín-Perea, D.M., García-Tabernero, A., Allué, E., García-Basanta, A., Lizano, E., Marquès-Bonet, T., Talamo, S., Tassoni, L., Lalueza-Fox, C., Fullola, J.M., Rosas, A.\***

**\* Correspondence:**

Juan I. Morales: [jmorales@iphes.cat](mailto:jmorales@iphes.cat) /**Antonio Rosas:** [arosas@mncn.csic.es](mailto:arosas@mncn.csic.es)



**Supplementary Figure S1.** 1.-Panoramic view of the Montcau caves. The galleries known to belong to the Cova Simanya system are highlighted in red (Photo: E. Moreno); 2.- Planimetry of the different Cova Simanya galleries and the other Montcau caves.

**Supplementary Table S1.** Inventory of the materials from the Pleistocene layers O300-PO400 and P300 recorded during the 2020 - 2022 excavations at Simanya Gran.

|  |  |  |  |
| --- | --- | --- | --- |
| Material | Category | Layer | |
|  |  | **O300 - PO400** | **P300** |
| Bone | Fauna | 528 | 45 |
| Tooth | Fauna | 116 | 4 |
| *Homo* | 1 |  |
| Chert | Flake | 8 |  |
| Tool | 1 |  |
| Cobble | 6 |  |
| Quartz | Cobble | 2 |  |
| Charcoal |  | 15 |  |
| Total |  | 677 | 49 |



**Supplementary Figure S2.** Spatial distribution of the total station coordinates from the materials excavated at Simanya Gran during 2020-2022. 1.- YZ cross-section presenting the materials recorded in the Main Gallery and the Inner Main Gallery, spanning from meter 30 to 88 along the X-axis and varying depths (in meters) along the Y-axis; 2.- XY plan view depicting the distribution of materials from layer O300-PO400 in the Inner Main Gallery; 3.- YZ cross-section illustrating the materials from layer O300-PO400 in the Inner Main Gallery.

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**Supplementary Figure S3.** Macrovertebrate remains from the Pleistocene layer O300-PO400 (Unit SG1) at Cova Simanya. 1.- Neck and glenoid cavity of the scapula of *Sus scrofa* with cut marks (detail photographed at 35 magnification), in anterior, lateral, and posterior view from left to right; 2.- *Capra pyrenaica* proximal femur in medial and posterior view; 3.- Distal humerus of *Capra* *pyrenaica*; 4.- M3 of *Capra pyrenaica* in lateral, occlusal and medial views; 5.- P4 of *Ursus* cf. *arctos*; 6.- M1 from *Ursus* cf. *arctos*; 7.- M2 of *Ursus* cf. *arctos*; 8.- P4 of *Ursus* cf. *arctos*; 9.- M1 from *Ursus* cf. *arctos*; 10.- M2 of *Ursus* cf. arctos; 11.- M3 of *Ursus* cf. *arctos*; 12.- M3 of *Capra pyrenaica* in lateral, occlusal and medial views; 13.- M1/2 of *Capra pyrenaica* in lateral, occlusal and medial views; 14.- I3 of *Ursus* cf. *spelaeus*; 15.- I3 of *Ursus* cf. *arctos*; 16.- I3 of *Ursus* cf. *arctos*; 17.- M2 of *Cervus elaphus* in medial, occlusal and lateral views; M3 of *Cervus elaphus* in medial, occlusal and lateral views. 20mm scale.

**Supplementary Table S2.** Inventory of human remains from Simanya Gran including the specimens from the “Museum Collection” and the 2020 – 2022 excavations.

| # Inventory | Anatomical identification | Individual | Other association | State of preservation |
| --- | --- | --- | --- | --- |
| SI-40 | Left ramus mandible | — | Mandible 1 | Fragment |
| SI-57 | Left mandibular condyle | — | Mandible 1 | Fragment |
| SI-47 | Right 1st hand phalanx, finger 1 | 1 | Hand 1 | Complete |
| SI-20 | Right 2nd hand phalanx, finger 2 | 1 | Hand 1 | Incomplete |
| SI-32 | Right 1st hand phalanx, finger 3 | 1 | Hand 1 | Incomplete |
| SI-10 | Right 2nd hand phalanx, finger 3 | 1 | Hand 1 | Complete |
| SI-18 | Right 3rd hand phalanx, finger 3 | 1 | Hand 1 | Complete |
| SI-14 | Right 1st hand phalanx, finger 4 | 1 | Hand 1 | Complete |
| SI-16 | Right 2nd hand phalanx, finger 4 | 1 | Hand 1 | Complete |
| SI-17 | Right 1st hand phalanx, finger 5 | 1 | Hand 1 | Incomplete |
| SI-33 | Right 1st metacarpal | 1 | Hand 1 | Incomplete |
| SI-43 | Right 2nd metacarpal | 1 | Hand 1 | Incomplete |
| SI-44 | Right 3rd metacarpal | 1 | Hand 1 | Complete |
| SI-24 | Right 4th metacarpal | 1 | Hand 1 | Complete |
| SI-21 | Left 1st hand phalanx, finger 1 | 1 | Hand 2 | Complete |
| SI-19 | Left 3rd hand phalanx, finger 1 | 1 | Hand 2 | Incomplete |
| SI-15 | Left 1st hand phalanx, finger 2 | 1 | Hand 2 | Complete |
| SI-22 | Left 1st hand phalanx, finger 3 | 1 | Hand 2 | Fragment |
| SI-11 | Left 2nd hand phalanx, finger 3 | 1 | Hand 2 | Complete |
| SI-9 | Left 3rd hand phalanx, finger 3 | 1 | Hand 2 | Complete |
| SI-13 | Left 1st hand phalanx, finger 4 | 1 | Hand 2 | Incomplete |
| SI-12 | Left 2nd hand phalanx, finger 4 | 1 | Hand 2 | Complete |
| SI-46 | Left 2nd metacarpal | 1 | Hand 2 | Incomplete |
| SI-56 | Left 4th metacarpal | 1 | Hand 2 | Complete |
| SI-28 | Right 4th metatarsal | 1 | Foot 1 | Fragment |
| SI-38 | Right lateral cuneiform | 1 | Foot 1 | Complete |
| SI-23 | Left 3rd hand phalanx, finger 1 | 1 | Foot 2 | Complete |
| SI-34 | Left 1st metatarsal | 1 | Foot 2 | Complete |
| SI-25 | Left 2nd metatarsal | 1 | Foot 2 | Fragment |
| SI-27 | Left 2nd metatarsal | 1 | Foot 2 | Incomplete |
| SI-39 | Left astragalus | 1 | Foot 2 | Incomplete |
| SI-1 | Left humerus | 1 |  | Complete |
| SI-2 | Right humerus | 1 |  | Fragment |
| SI-7 | Upper left P3 | 2 |  | Complete |
| SI-58 | Fibula, diaphysis | 2 |  | Fragment |
| SI-60 | Upper left M3 | 2 |  | Complete |
| SI-29 | Left 1st hand phalanx, finger 5 | 3 |  | Complete |
| SI-51 | Radius, diaphysis | 3 |  | Fragment |
| SI-52 | Radius, diaphysis | 3 |  | Fragment |
| SI-37 | Atlas, articular facet | 3 |  | Fragment |
| SI-36 | 3rd cervical vertebra, articular facet | 3 |  | Fragment |
| SI-61 | 4th cervical vertebra, articular facet | 3 |  | Fragment |
| SI-62 | 3rd cervical vertebra, articular facet | 3 |  | Fragment |
| SI-45 | Upper right I1 | — |  | Complete |
| SI-49 | Upper left I1 | — |  | Incomplete |
| SI-4 | Upper right I2 | — |  | Complete |
| SI-31 | Upper left I2 | — |  | Incomplete |
| SI-6 | Upper right P3 | — |  | Complete |
| SI-3 | Lower left I1 | — |  | Complete |
| SI-5 | Lower right P3 | — |  | Complete |
| SI-8 | Lower right M3 | — |  | Complete |
| SI-26 | Metacarpal | — |  | Fragment |
| SI-48 | Axis | — |  | Incomplete |
| SI-41 | Cervical vertebra, body | — |  | Fragment |



**Supplementary Figure S4.** Neandertal dental remains from Simanya cave. These specimens have not been attributed to any specific individual.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Label | Element | Position | Side | Mesiodistal crown diameter | Labiolingual crown diameter |
| SI - 45 | I1 | Upper | Right | 9,3 | 8,3 |
| SI - 49 | I1 | Upper | Left |  |  |
| SI - 4 | I2 | Upper | Right | 8,5 | 8,7 |
| SI - 31 | I2 | Upper | Left | 8,5 | 8,7 |
| SI - 6 | P3 | Upper | Right | 7,9 | 10,8 |
| SI - 7 | P3 | Upper | Left | 7,5 | 10,3 |
| SI - 3 | I1 | Lower | Left | 5,7 | 7,1 |
| SI - 5 | P3 | Lower | Right | 7,1 | 9,7 |
| SI - 8 | M3 | Lower | Right | 11,1 | 10,7 |
| SI- 60 | M3 | Upper | Left | 9,9 | 11,7 |

**Supplementary Table S3.** Inventory of dental remains from Simanya Gran (Sant Llorenç Savall, Barcelona, Spain) and measurements of the mesiodistal (MD) and buccolingual (BL) crown dimensions (in mm).

**Geometric morphometrics analyses of the humerus**.

3D geometric morphometric techniques based on landmark configurations we employed to assess the location of the Simanya Gran specimen in the morphospace. To this aim, we follow Rosas et al (2015)’s procedures and comparative samples. Distal epiphysis of the humerus was used for the analyses as it has been proved to be taxonomically informative in hominin evolution (Rosas et al. 2015).

The comparative samples were composed as follows: *H. sapiens* is represented by 88 right humeri (45 males and 43 females). The Neandertal sample comprises four original specimens from El Sidrón, and high-quality casts of the Feldhofer, La Ferrassie 1, and Lezetxiki specimens as well as virtual reconstructions of the Regourdou 1, Spy, and Krapina remains. In addition, casts of KNP-KP 271 (*Australopithecus anamensis*), A.L. 288-1s (*Au. afarensis*), STW 431 (*Au. africanus*), KNM-ER 739 (*Paranthropus boisei* or *H. habilis*), and KNM-WT 15000 (*H. ergaster*) were added to the sample.

We collected 18 homologous landmarks (Supplementary Table 4) with a MicroScribe 3D digitizer, and Amira software (Stalling et al., 2005) was used to collect the landmarks for virtual specimens. For comparative analysis, a partial Procrustes superimposition was performed, allowing rotation, scaling, and translation of the landmark coordinates (Mitteroecker and Gunz, 2009). Principal component analysis (PCA) was conducted with the Morphologika2 v2.5 software program (O'Higgins and Jones, 2006) to explore the within and between variability and distribution of the samples in the morphospace.

**Supplementary Table S4**. Humeral landmarks list, categorization, and description.

|  |  |
| --- | --- |
| Landmark | Definition |
| 1 | Most projecting point of the lateral epicondyle |
| 2 | Proximal junction point between lateral epicondyle and capitulum |
| 3 | Distal junction point between lateral epicondyle and capitulum |
| 4 | Middle curvature point of the lateral trochlea |
| 5 | Middle curvature point of the trochlear groove |
| 6 | Middle curvature point of the medial trochlea |
| 7 | Proximal junction point between medial trochlea and medial epicondyle |
| 8 | Most projecting point of the medial epicondyle |
| 9 | Proximal anterior point of the lateral trochlea |
| 10 | Proximal anterior point of the medial trochlea |
| 11 | Proximal posterior point of the lateral trochlea |
| 12 | Proximal posterior point of the medial trochlea |
| 13 | Proximal point of the olecranon fossa |
| 14 | Distal point of the olecranon fossa |
| 15 | Lateral point of the olecranon fossa |
| 16 | Medial point of the olecranon fossa |
| 17 | Maximum curvature between medial epicondyle and shaft |
| 18 | Most prominent point of the lateral supracondylar ridge |

**References:**

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