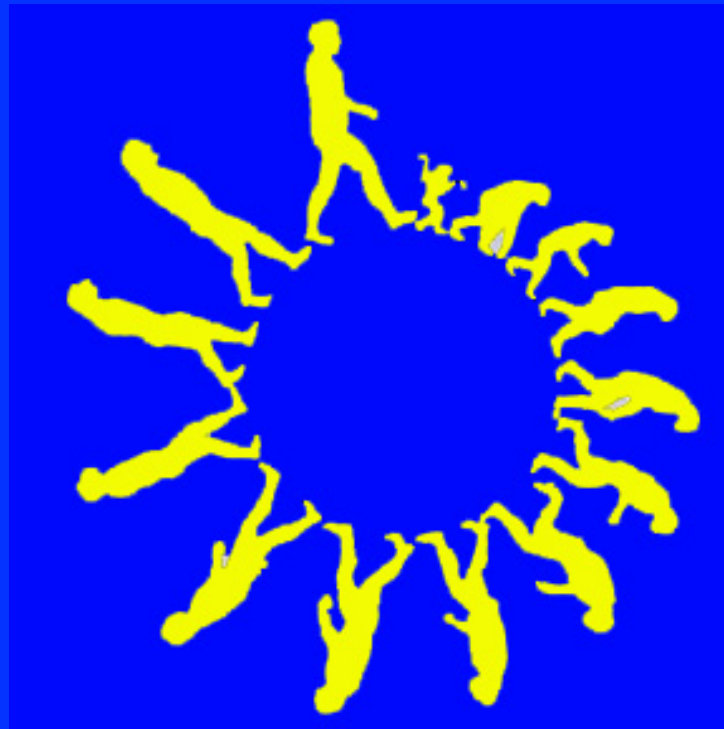


RESEARCH INFRASTRUCTURES AND HUMAN EVOLUTION

DR. MARÍA MARTINÓN TORRES



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María Martinón-Torres
Position: Research Group Leader: Dental Anthropology
Entity: CENIEH
Research program: Paleobiology of Hominins
Research team: Dental Anthropology
Office: 4202
Contact: +34 947040800 (ext. 4202) , maria.martinon@cenieh.es







**Hominin
Paleobiology**

**Spatial
archaeology**

Geochronology

**Prehistoric
Technology**

Geology

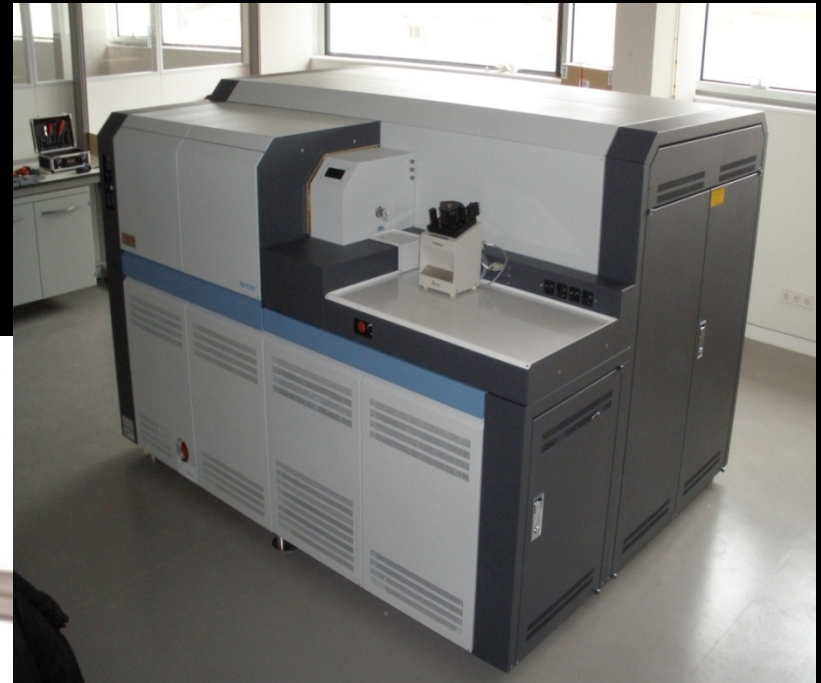
Laboratories

**Restoration
Conservation
Area**

Luminescence Dating



Neptune Multicollector inductively coupled plasma-mass spectrometer U-series



Long core, SQUID Rock, Magnetometer



Laser Ablation

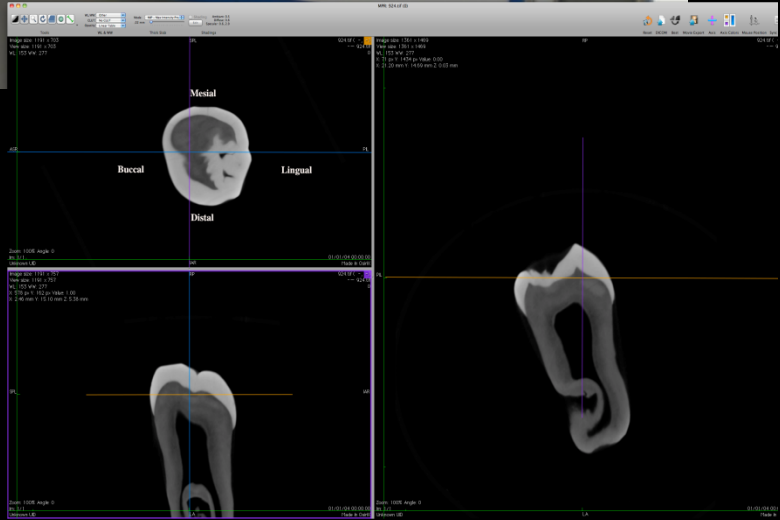


Optima, elemental analysis

Microtomography



Scanning electronic microscope



Confocal microscope





ATAPUERCA SITES

BURGOS



Madrid



Sistema Atapuerca, Cultura de la Evolución

CENIEH
8.850 m²

Human Evolution Museum
15.375 m²

Auditorium and Congress Hall
35.320 m²



Research on human evolution is essentially multi-disciplinary and multi-institutional as it is a holistic approach to human nature (anatomy, development, diet, disease) and it also addresses the context of the findings (archaeology, chronology and palaeoclimate).



INFRASTRUCTURE FOR THE TRANSFER AND SOCIALIZATION OF KNOWLEDGE:



Multi-institutional refers here not only to the different centers, universities and institutions that contribute to the development of the specific research topic but also to all the services and departments that articulate and complete the whole



CHAIN OF KNOWLEDGE:

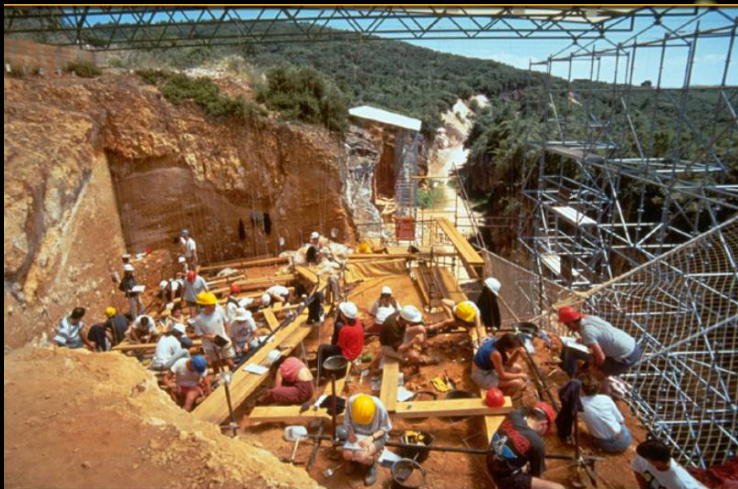
EDUCATION
TRAINING
DISSEMINATION
OUTREACH



RESEARCH

results

SOCIETY





SISTEMA ATAPUERCA benefits for Community of Castilla y León (data from 2012):

-54 million euros benefit

-new 1000 job positions

-500.000 tourists

MUSEO DE LA EVOLUCIÓN HUMANA

Programs of expert exchanges, research stays in host institutions and co-directions of PhDs: diversification and dynamic interaction of new scientists and ideas



Out of Asia: The initial colonisation of Europe in the Early and Middle Pleistocene

R.W. Dennell^{a,*}, M. Martínón-Torres^b, J.M. Bermúdez de Castro^b



PNAS

PNAS | August 14, 2007 | vol. 104 | no. 33 | 13279–13282

Dental evidence on the hominin dispersals during the Pleistocene

M. Martínón-Torres^{*†}, J. M. Bermúdez de Castro^{*}, A. Gómez-Robles^{*}, J. L. Arsuaga^{†‡}, E. Carbonell[§], D. Lordkipanidze[¶], G. Manzi^{||}, and A. Margvelashvili^{*¶}



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A new model for the evolution of the human Pleistocene populations of Europe

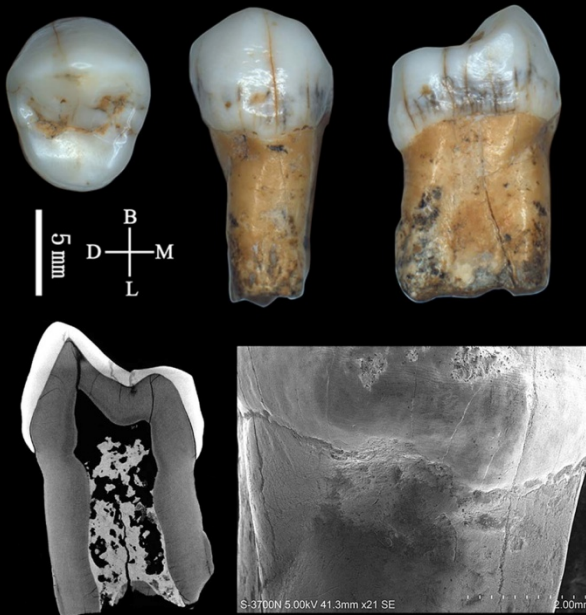
José María Bermúdez de Castro^{*}, María Martínón-Torres

National Research Center for Human Evolution (CENIEH), Paseo Sierra de Atapuerca s/n, 09002 Burgos, Spain



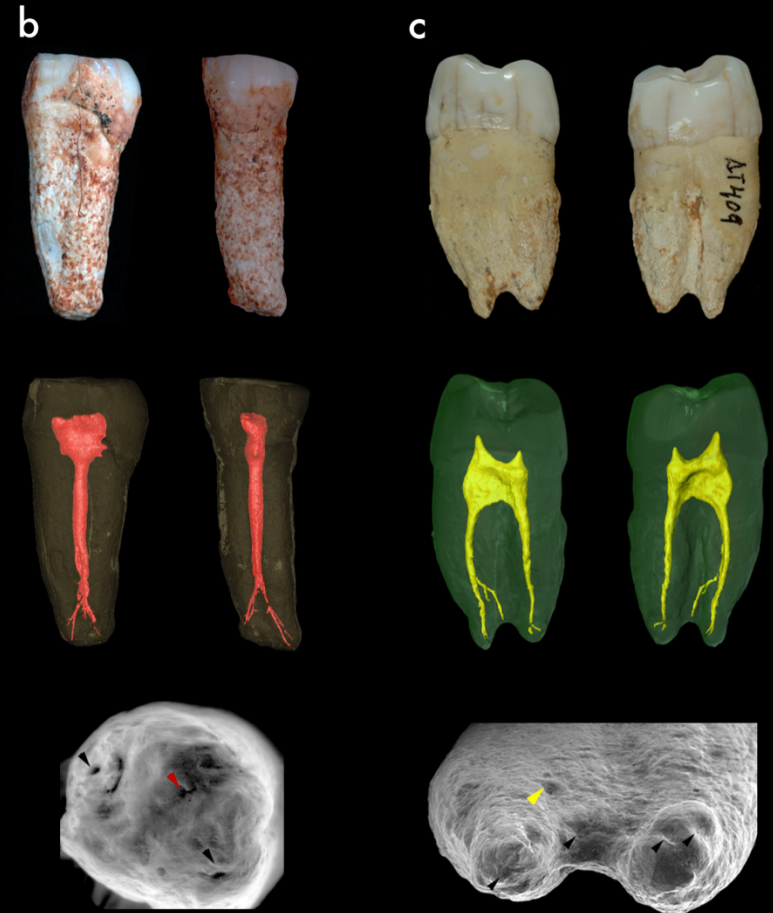
The comparisons of hominin fossils between China and Spain, and human origin and evolution in Eurasia (Grant n°GJHZ201314). *Funding source:* Cooperation Program of Bureau of International Cooperation (BIC), Chinese Academy of Science.

Memorandum of agreement between CENIEH (Dental Anthropology Group) and Institute of Vertebrate Paleontology and Palaeoanthropology of Beijing





Technology has been key to maximize the palaeobiological information that can be extracted from the fragile and rare fossil record. New generation of non-invasive imaging tools has helped to address the conflicting requirements of safeguard versus exploitation of the fossil record and allows a virtual sharing and handling of fossils, ensuring its integrity.



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Oldest human DNA found in Spain

By **Elizabeth Landau**, CNN
December 10, 2013 -- Updated 1430 GMT (2230 HKT)

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A drawing shows what the species of *Homo heidelbergensis* might have looked like 400,000 years ago.

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Gran Dolina TD6

Biochronology

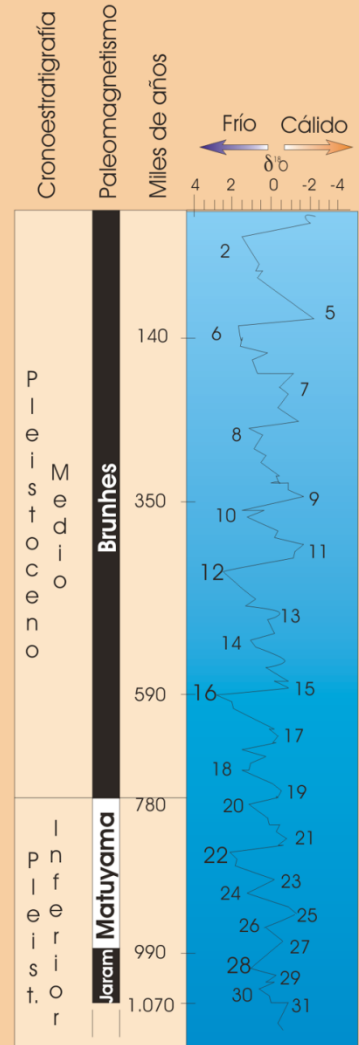
Cosmogenics

Thermoluminescence

Geochronology:
ESR
U-series



**Early Pleistocene
900.000 years,**



Paleomagnetism

A Hominid from the Lower Pleistocene of Atapuerca, Spain: Possible Ancestor to Neandertals and Modern Humans

J. M. Bermúdez de Castro, *et al.*

Science **276**, 1392 (1997);

DOI: 10.1126/science.276.5317.1392

Science

AAAS

Homo antecessor



nature

A hand is shown holding a fossilized jawbone, likely a hominid, against a blurred background of a cave wall. The jawbone is light brown and shows several teeth. The hand is positioned on the right side of the frame, with the thumb and index finger holding the bone. The background is a dark, textured surface, possibly a cave wall, with some light reflecting off it.

THE FIRST EUROPEANS

The jaw that puts humans in
Spain a million-plus years ago

CARBON NANOTUBES

Electron spin-orbit coupling

OBESITY

The genetic network of a disease

VISION

Retina cells are looking up

NATUREJOBS
Vaccine centre

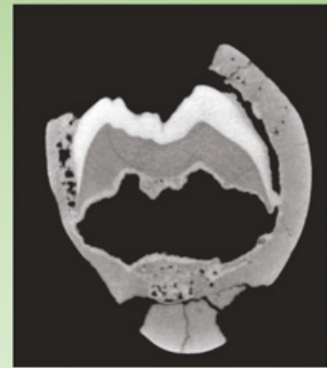
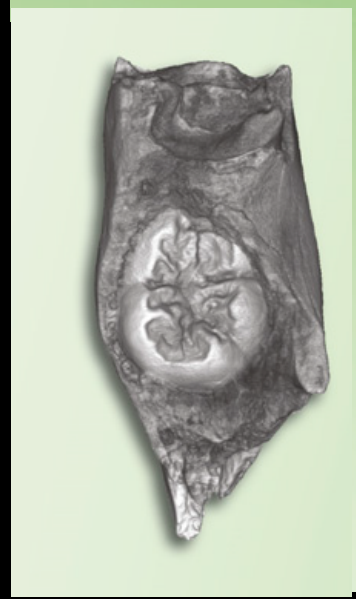




PNAS

New immature hominin fossil from European Lower Pleistocene shows the earliest evidence of a modern human dental development pattern

José María Bermúdez de Castro^{a,1}, María Martínón-Torres^a, Leyre Prado^a, Aida Gómez-Robles^a, Jordi Rosell^b,

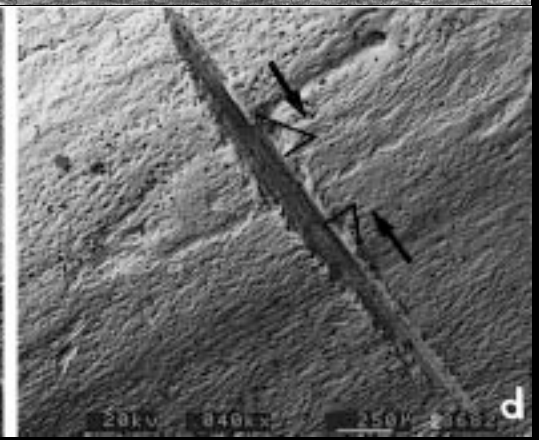
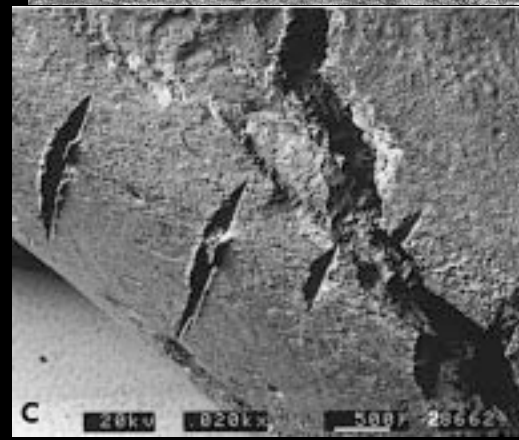
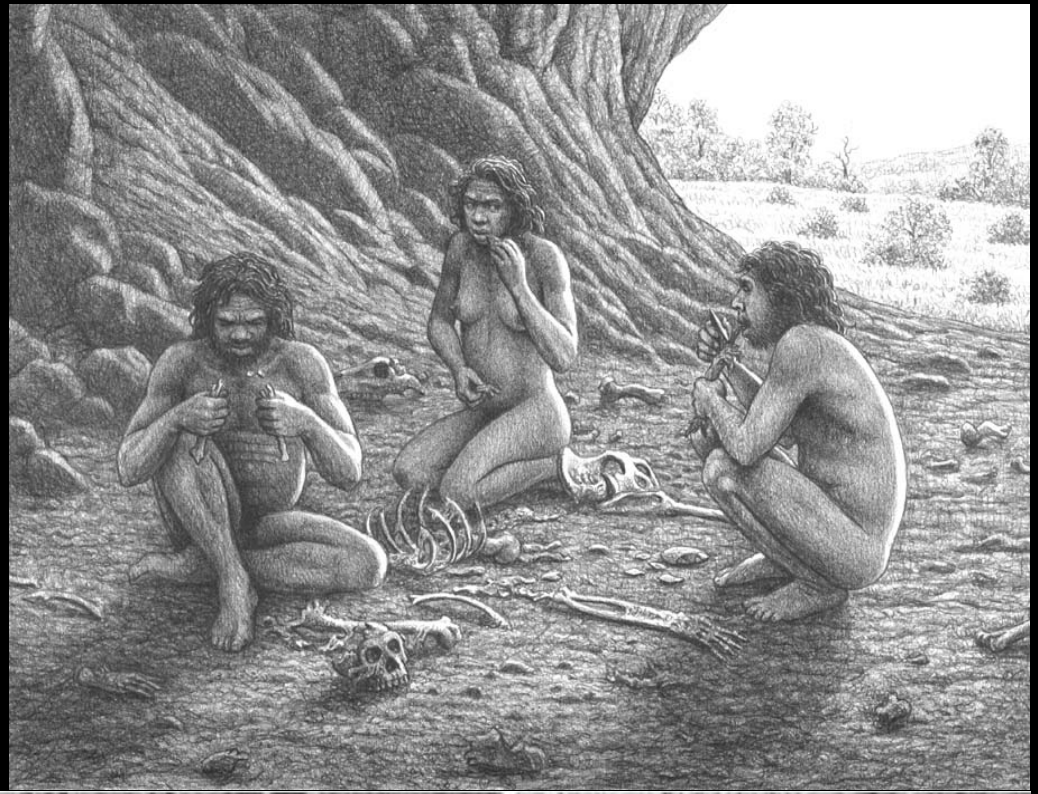




CANNIBALISM in the EARLY PLEISTOCENE of ATAPUERCA



1 cm



Facial Morphogenesis of the Earliest Europeans

Rodrigo S. Lacruz^{1*}, José María Bermúdez de Castro², María Martínón-Torres², Paul O'Higgins³, Michael L. Paine¹, Eudald Carbonell⁴, Juan Luis Arsuaga⁵, Timothy G. Bromage⁶



KNM-WT 15.000
Homo ergaster
Cerebro: 850 cc



ATD6-69
Homo antecessor
Cerebro: más de 1000 cc

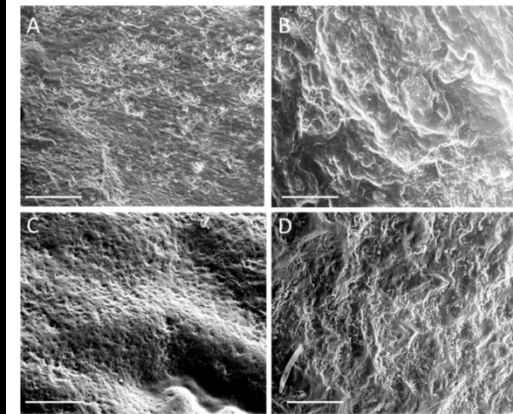
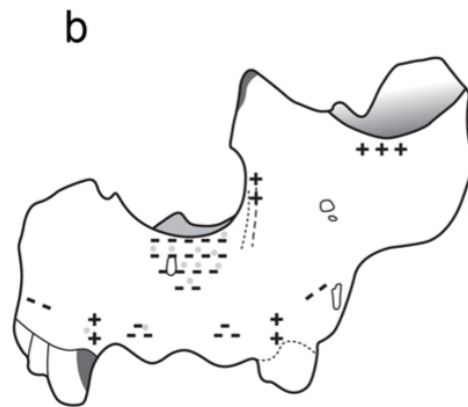
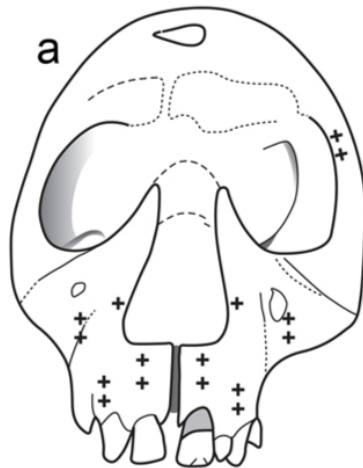
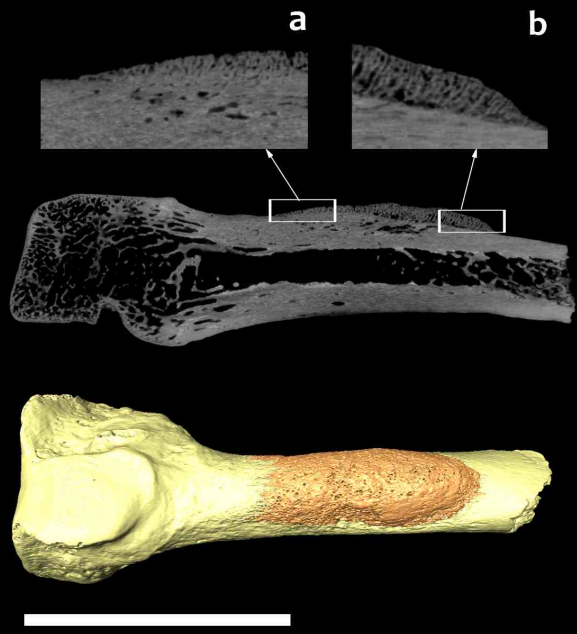
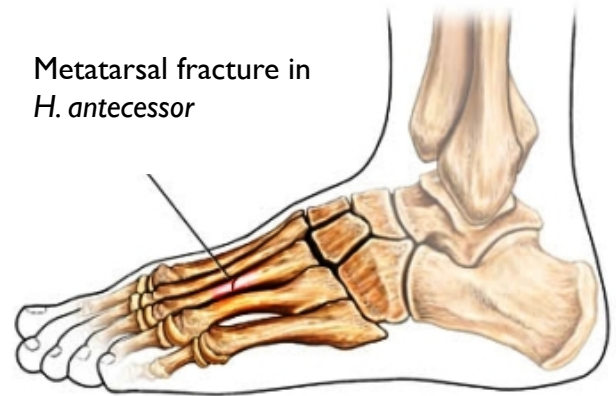


Figure 3. Scanning Electron Micrographs of facial growth remodeling in KNM-WT 15000 and ATD6-69. Images "A" and "B" are representative of growth remodeling fields in KNM-WT 15000 (*H. erectus*). Image "A" shows depository fields in the clivus area of this specimen. For comparison, "B" shows resorptive fields in the anterior aspect of the mandibular ramus of this specimen. Scale bars (A, B) = 50 μ m. Images "C" and "D" represent growth remodeling fields of the specimen ATD6-69 (*H. antecessor*). Image "C" shows depository fields near the zygomatic region whereas "D" is a representative resorptive field in the clivus of ATD6-69. Scale bars (C,D) = 100 μ m. All images shown here are taken from high resolution replicas examined in the scanning electron microscope.
doi:10.1371/journal.pone.0065199.g003

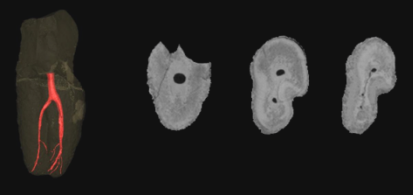
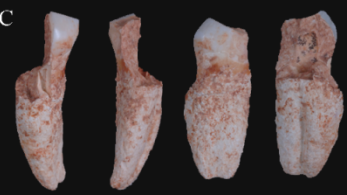




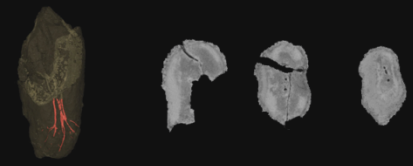
Metatarsal fracture in
H. antecessor



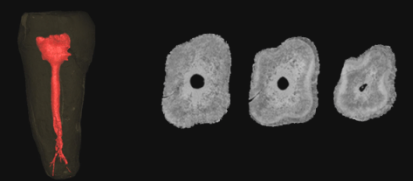
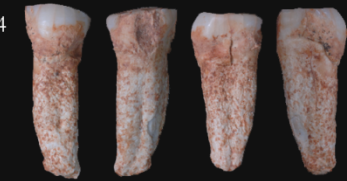
LC



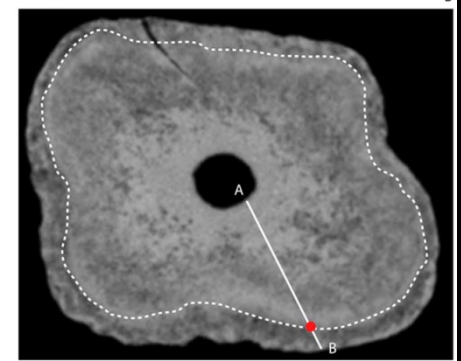
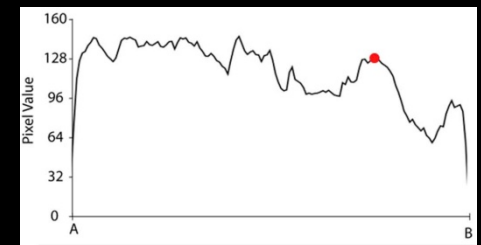
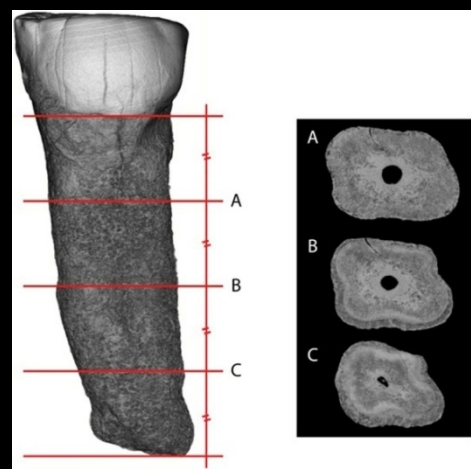
LP3



LP4



Hypercementosis





Craniosynostosis in the Middle Pleistocene human Cranium 14 from the Sima de los Huesos, Atapuerca, Spain

Ana Gracia^{a,1}, Juan Luis Arsuaga^{a,b,1}, Ignacio Martínez^{a,c}, Carlos Lorenzo^d, José Miguel Carretero^e, José María Bermúdez de Castro^f, and Eudald Carbonell^d

^aCentro Mixto UCM-ISCIII de Evolución y Comportamiento Humanos, ^cSinesio Delgado 4, Pabellón 14, 28029 Madrid, Spain; ^bDepartamento de Paleontología, Facultad de Ciencias Geológicas, Universidad Complutense de Madrid, 28040 Madrid, Spain; ^dÁrea de Paleontología, Departamento de Geología, Universidad de Alcalá de Henares, 28871 Alcalá de Henares, Spain; ^eInstitut de Paleoeccologia Humana i Evolució Social-Àrea de Prehistòria, Facultat de Lletres, Universitat Rovira i Virgili, Plaça Imperial Tàrraco 1, 43005 Tarragona, Spain; ^fDepartamento de Ciencias Históricas y Geografía, Facultad de Humanidades y Educación, Universidad de Burgos, 09001 Burgos, Spain; and ¹Centro Nacional de Investigación sobre la Evolución Humana, Avenida de la Paz 28, 09004 Burgos, Spain

Contributed by Juan Luis Arsuaga, February 12, 2009 (sent for review October 7, 2008)

We report here a previously undescribed human Middle Pleistocene immature specimen, Cranium 14, recovered at the Sima de los Huesos (SH) site (Atapuerca, Spain), that constitutes the oldest evidence in human evolution of a very rare pathology in our own species, lambdoid single suture craniosynostosis (SSC). Both the ecto- and endo-cranial deformities observed in this specimen are severe. All of the evidence points out that this severity implies that the SSC occurred before birth, and that facial asymmetries, as well as motor/cognitive disorders, were likely to be associated with this condition. The analysis of the present etiological data of this specimen lead us to consider that Cranium 14 is a case of isolated SSC, probably of traumatic origin. The existence of this pathological individual among the SH sample represents also a fact to take into account when referring to sociobiological behavior in Middle Pleistocene humans.

human evolution | paleopathology | sociobiology | congenital skull deformation

Paleopathology is the study of past diseases. In paleoanthropology, this is generally restricted to lesions of the bones and teeth. However, paleopathology can also inform about past human behavior in healthy individuals (ref. 1 and references therein), being cautious with the interpretation of health status of individuals and population based on any paleontological data (2, 3). Some pathological lesions produced by or related to human activities, including dietary aspects, can be treated, and social support can be provided by relatives or other members of

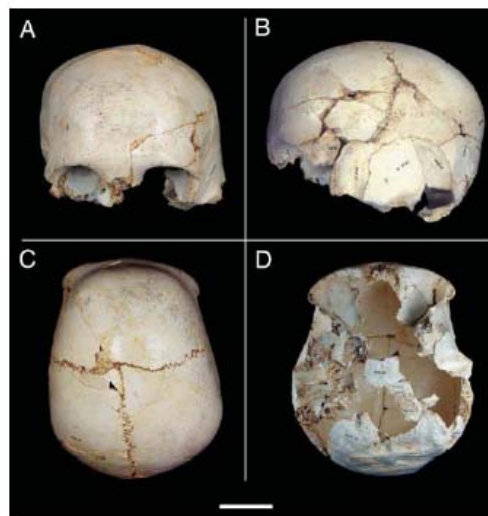
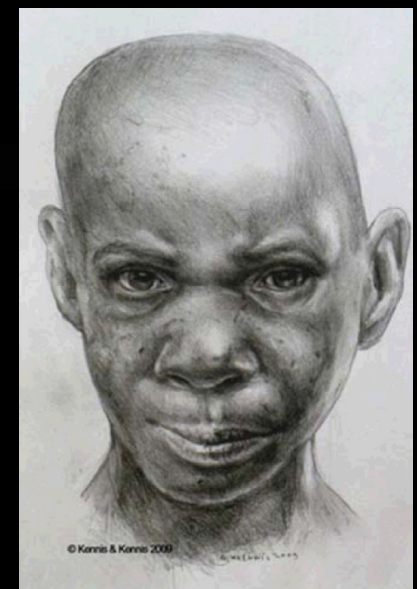
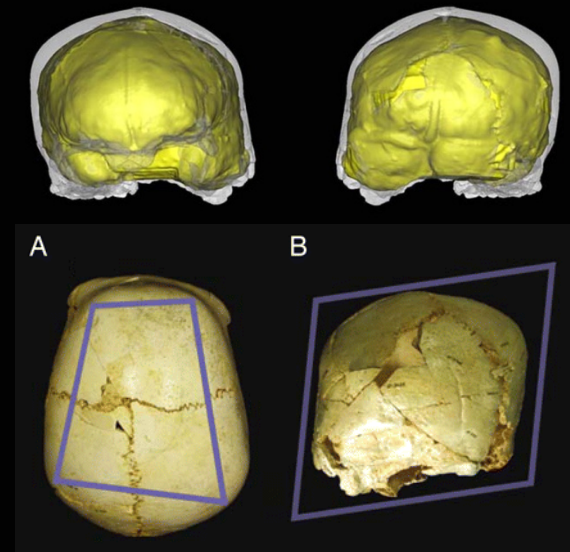


Fig. 1. Cranium 14 from SH site. (A) Frontal view, showing the left glenoid and mastoid regions well below those of the right side. (B) Left lateral view. Note the rounded profile, and the vertical forehead. (C) Superior view. The

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ANTHROPOLOGY



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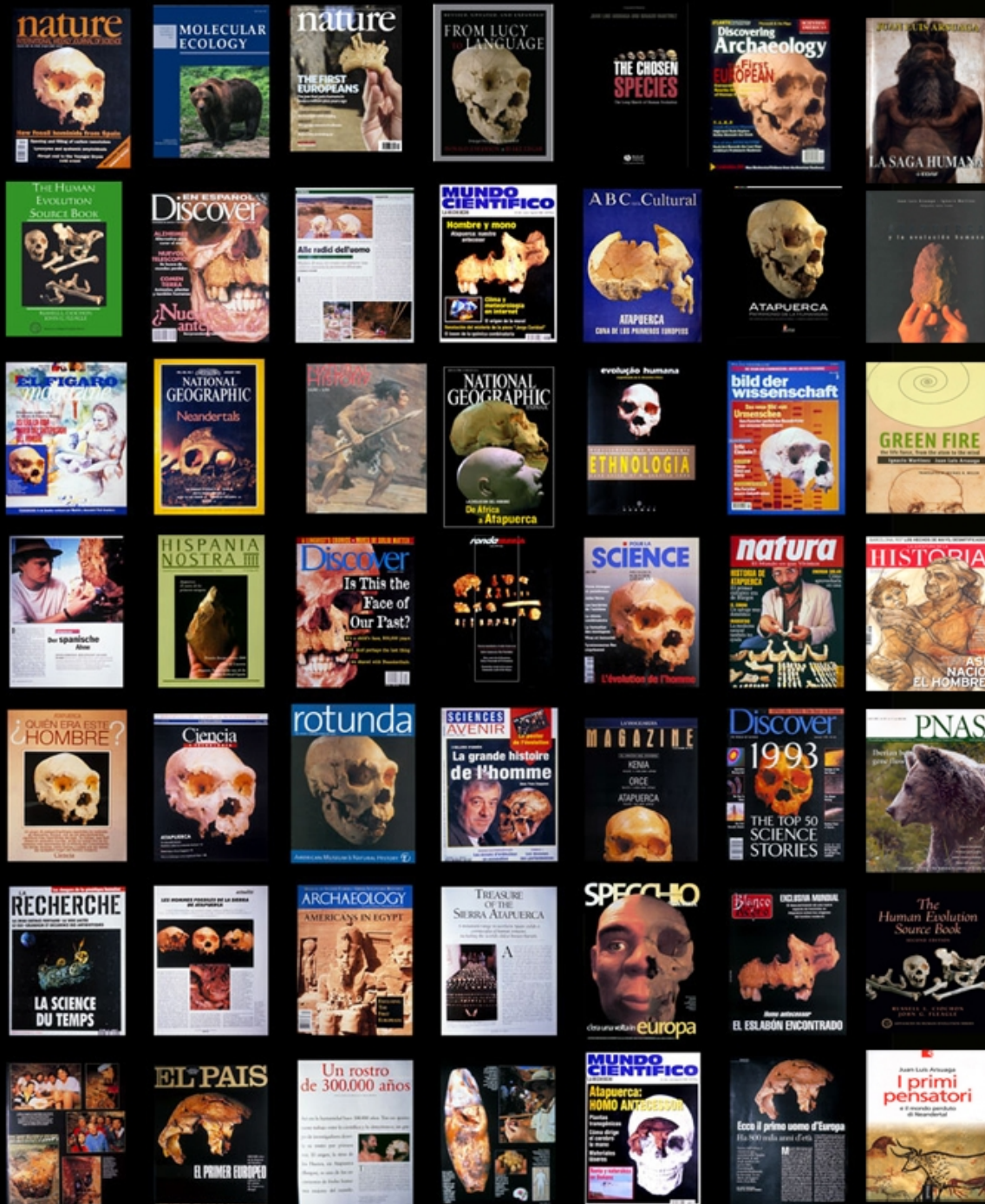
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SCIENTIST INTERVIEW: DECEMBER 2011

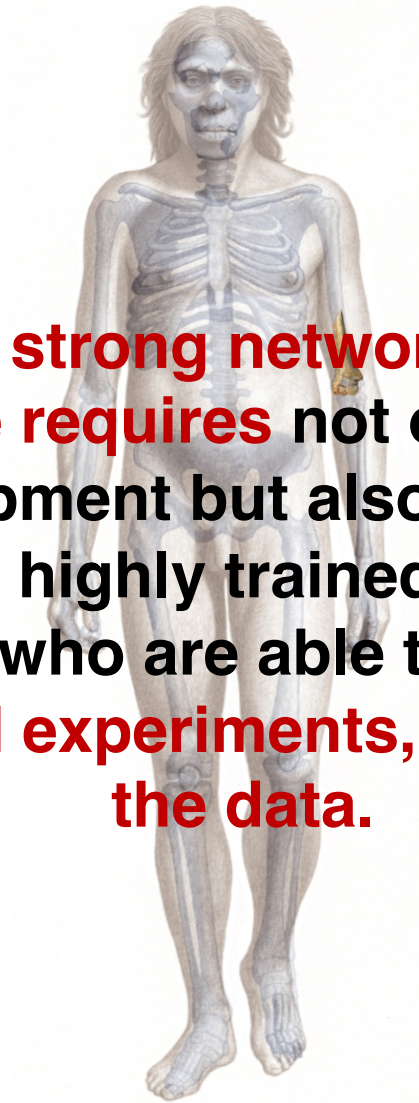


PHOTO: M. J. SIER.

A recent analysis of *Essential Science Indicators*SM data from Thomson Reuters showed that the work of Dr. María Martínón-Torres has entered the top 1% in the field of Social Sciences. In addition, one of the papers she co-authored earlier this year, "Hominin variability, climatic instability and population demography in Middle Pleistocene Europe" (*Quaternary Sci. Rev.* 30[11-12]: 1511-24, Sp. Iss. June 2011), has been named a Hot Paper in Geosciences.

Martínón-Torres is a Research Leader in the Dental Anthropology Group of the Centro Nacional de Investigación sobre la Evolución Humana (CENIEH) in Burgos, Spain.

BELOW, SHE TALKS WITH [SCIENCEWATCH.COM](#) ABOUT HER HIGHLY CITED WORK.



A solid and strong network of research infrastructure requires not only state of the art equipment but also and most importantly, highly trained, experienced scientists who are able to design the protocols and experiments, and to interpret the data.

EVROPA PRIMA PARS TERRÆ IN FORMA VIRGINIS. SEPTENTRIO.



Est tibi, formosæ sub forma Europa puellæ
Vivida fecundos parit ut illa sin

MERIDIES.
Ridens Italiam dextra Cimbrosq; sinistra
Obtinet, Hispanum fronte genitq; solum.

Pectore habet Gallos, Germanos corpore gestat,
Ac pedibus Graios, Sauromatasq; fouet.