

## NEWS FROM ATAPUERCA IN ENGLISH



## NEANDERTHALS GREW FASTER THAN US

Nature publishes study by José María Bermúdez de Castro and Fernando V. Ramírez Rozi

An article published recently in Nature by Atapuerca Research Group co-director José María Bermúdez de Castro, and C.N.R.S. scientist Fernando V. Ramírez Rozi analyses the dental growth of various hominids.

Bermúdez de Castro and Ramírez suggest that Neanderthals developed and grew faster than Homo sapiens. This important discovery once again confirms the evolutionary distance between these two species, which cohabited the Iberian Peninsula for 15,000 years.

Young Neanderthals reached maturity earlier than our species. They developed faster and reached adulthood at the age of 15, while our dental growth is not completed until we turn 18. The Neanderthal growth rate was also faster than the rest of the hominid species including like H. antecessor and H. heidelbergensis, which were similar to the growth biology of Homo sapiens. Thus, from the basis of the common link between the two species (a line), Neanderthals adapted to faster growth while we moved towards slow development.

Bermúdez de Castro and Ramírez-Rozzi's article is based on the analysis of growth patterns in eight H. antecessor teeth, 106 from H. heidelbergensis, 146 Neanderthals and 100 from Homo sapiens. This new evidence does not refute the idea of a common descendency between Neanderthals and Cro-Magnons, but it does make it harder to defend. Previously we knew that there were considerable anatomical and genetic differences between the two species, and this study adds information about dental growth, an important biological clock.

"Dental growth is closely linked to the individual's overall development", explains Bermúdez de Castro, so on the basis of tooth growth we can time the arrival at adulthood. This study required meticulous analysis of the tooth enamel in all the specimens, which contains growth lines with a periodicity of nine days. These lines can be counted on the tooth surface and reveal the development of each species. In Homo sapiens, these striations (known as Retzius lines) are concentrated near the bottom of each tooth, while in the Neanderthals they are even more tightly packed at the base. This difference is due to the fact that the Neanderthal tooth crown formed 15% faster than ours. Bermúdez de Castro and Ramírez-Rozzi, who were able to use the magnificent collection of bones from Atapuerca for their work, found that our growth is unique amongst the hominids. Some Neanderthal brains reached 1,650 cc, however, if growth, body development and brain complexity are indeed linked to tooth development, this speed in maturity may well have caused an evolutionary disadvantage and extinction.

Neanderthals populated Europe during the last glaciation. The climate was extremely harsh tough and there was a shortage of plant-based food, forcing their dependency on meat. These tough living conditions caused a high mortality rate amongst adults, which probably led to their adaptation to faster growth.

## A selection of highlights from the previous issue

Until the 1970's, body, dental and cerebral growth were thought to have followed similar patterns in all hominid species. However, recent research has found that Australopithecus, Paranthropus and the oldest representatives our genus followed a similar growth pattern to gorillas and chimpanzees. On the basis of this discovery, scientists have focused their research on the time and the way that our species' growth and development appeared. Until now, the answer seemed to be the point when the Homo passed the 1,000 cc level of cranial capacity, however we might be a unique species in our development and growth.

The results from Bermúdez de Castro and Ramírez-Rozzi's study have reconfirmed the differences between Neanderthals and our species, and have also reopened the debate about the extinction of the Neanderthals.

BEARS IN SIERRA DE LA DEMANDA  
JUAN LUIS ARSUAGA  
Co-director of Atapuerca Excavations. Complutense University. ISCIII

Estrabon purportedly claimed that a squirrel could cross the Iberian Peninsula without leaving a tree. But was that true? Well, it all depends on the route the squirrel took. From the moment that crops began to be grown and livestock grazed in Iberia, our landscape started to change and the forests gradually cleared, especially on the plains.

The Palaeolithic ended during the last glaciation about 10,000 years ago. The climate was so harsh, cold and dry in the Ice Age that the only forests were in the warmest pockets near the coast, on sunny mountainsides and in the deepest, sheltered valleys. The rest was steppe and wide open scrub. Later the climate improved and the forests regained some of their lost ground.

Neolithic peoples arrived in Mediterranean Iberia about 7,000 years ago. In spite of the impact of agriculture and animal husbandry on our ecosystems, some of the large Palaeolithic fauna species survived for some time. The uro is the bull's wild forebear, known to Julius Caesar in the Galias. We know almost nothing about the last bison, while lions, leopards and hyenas became extinct at the end of the Ice Age or shortly afterwards. Fortunately we have been left with three large predators: the lynx, the wolf and the bear. The fate of the Iberian lynx is hanging by a thread, and it could become extinct in a few years. The wolf is by no means scarce north of the Douro River and has recently spread to the Central Range, with an additional pocket in Sierra Morena. The brown bear has almost disappeared from the Pyrenees but there are still populations in the Cantabrian Range, especially in Asturias. And it is precisely the bear that can tell us about the size of the forests in the late Middle Ages.

It just so happened that a King of Castile, Alfonso XI, wrote (or perhaps it would be more correct to say supervised) a book on hunting called El Libro de la Montería, shortly before the middle of the 14th century. It contains a complete description of all the lands where



re wild boar and bear were hunted in beatings. In each case the book describes the place for the beaters or watchers and the "armada", i.e., the huntsmen, who at the time were archers and especially crossbowmen.

Geologist and prehistorian Eduardo Hernández Pacheco located the hunting grounds described in El Libro de la Montería on a map and noted that the distribution of the forests at the time was more or less the same as at present. There were no forests on the plains of the two tablelands, as at present, nor in the Guadalquivir Valley, and wild boar and bear hunts therefore did not take place there. Nevertheless, as Estrabon said (or purportedly said), a squirrel could have skirted the great plains from the Pyrenees to Cádiz. It could also do it today, or almost.

If we read the Libro de la Montería to see which hunters could be found in the Atapuerca area in the 15th century, we find that the Atapuerca Hills are not mentioned by name, in spite of the continued abundance of wild boar and roe deer, even today. However, it does report that, "La Mata de Sant Illan, near Sant Johan de Ortega, is a good area for pigs in winter, and also

July when there were over a hundred people digging in the Atapuerca Hills. The first task consisted of removing rubble from the base of the Elephant Pit, the precise drawing of the stratigraphic cross-sections using laser stations, consolidation of Gran Dolina, initial brush removal in Huididero and profiling the cuts in the Lookout. Geology and dating work was also planned for the Arlanzón and Vena River terraces, and sieving of the sediment that could not be processed last year will be concluded to recover Neolithic plant remains from the lower levels of the Lookout Cave on the banks of the Arlanzón River.

This year, our expectations are largely confined to three fronts: the possibility of concluding excavation in the Neolithic levels of the Lookout Cave, which will enable us to tackle the Mesolithic period, a time when human groups began to change in regard to the land and animals as mere food sources to their consideration as the primary focus of an economy managed and controlled by means of domestication.

The results from excavations at the Huididero or Subsidence site and the dating and analysis of the

University, Rovira i Virgili University, Complutense University, National Scientific Research Centre, Zaragoza University, Institut de Paléontologie Humaine (Francia), US Geological Survey (USA), Univesità degli Studi di Roma.

- 24 Research fields: Anthracology, Archaeology, Molecular archaeology, Carpology, Ceramology, Spatial distribution, Geochronology, Geology, Computing, Microsedimentology, Palaeoanthropology, Palaeobotany, Palaeoclimatology, Palaeoecology, Carnivore palaeontology, Bird palaeontology, Human palaeontology, Palynology, Restoration, (morphotechnology, functionality, raw materials) and Zooarchaeology.
- 30 Ph.D.'s worked on the sites during the 2004 season.
- 46 people came to dig in June.
- 128 were digging in July.
- 4,000 kilos of earth processed in the washing boards installed on the banks of the Arlanzón River.
- 157,000 Euros requested to cover excavation expenses.
- 32,760 person-hours spent on the excavation sites.

creasingly exhaustive body of scientific knowledge about the Atapuerca Hills. Benito not only analysed the Hills and their sites but also contextualised them with respect to the surrounding physical landscape. Essentially, Benito's work analysed the geomorphological origin and evolution of the north-eastern sector of the Douro River basin and its surrounding alpine ranges, the Atapuerca Hills and the middle reaches of the Arlanzón River. He also produced a reconstruction of the relief in each of the periods when the sites were occupied. This body of work is all reflected in the actual text of the thesis, as well as in the annexed geological and geomorphological maps and the digital elevation models.

## MODERN LANDSCAPE NOT REPRESENTATIVE OF PREHISTORIC ASPECT, SAYS JESÚS RODRÍGUEZ

Atapuerca Research Group member Jesús Rodríguez has just published a paper in Global Ecology and Biogeography which analyses the body size of Plio-Pleistocene mammals in the Mediterranean area. One important use of this study has been to determine the potential of parallels between prehistoric and current fauna and ecosystems. Are any landscapes comparable with the prehistoric scene?

To do this, Rodríguez studied the patterns of change in mammal body structure in relation to climate changes, and made a connection between body weight and the various regions that he analysed. The article suggests that it is

impossible to reconstruct prehistoric landscapes through their present counterparts because these ancient ecosystems have totally disappeared, and even the majority of their animal and plant species have become extinct.

Rodríguez concludes that although the Mediterranean climate has existed for more than a million years, this is no reason for considering that the current Mediterranean fauna is similar or comparable to what existed in distant prehistory. The modern Mediterranean landscape is not representative of the past in this region.

## NEW PH.D. ALFONSO BENITO ANALYSES GEOLOGICAL EVOLUTION IN ATAPUERCA

Last March, Alfonso Benito defended his Ph.D. thesis at the Geodynamics Department of the Complutense University's Geology Faculty. His research, entitled Geomorphological analysis and quaternary paleolandscapes in the Atapuerca Hills and the middle reaches of the Arlanzón River, supervised by Professor Alfredo Pérez-González, was given the University's highest rating. As in every thesis, the dissertation was the climax of many years of research that gave birth to a mature study of Atapuerca, and like every other study, it has made a great contribution to the in-

## WORK BEGINS ON MUSEUM OF HUMAN EVOLUTION, TO BE FINISHED IN 2007

The official inauguration ceremony for works on the future MHE took place on 24 May on the old Cavalry Site with the symbolic laying of the first stone. The inauguration was presided by the Castilla and León Regional Culture Minister, Silvia Clemente, who declared afterwards that the Museum will be ready by 2007, something that Burgos citizens are somewhat sceptical about after being given constantly changing dates ever since the MHE appeared for the first time in the Socialist Party electoral programme in 1999.

**WHAT NOBODY QUESTIONS** is that this complex, a world reference for everything concerning Human Evolution, is going to be the definitive consolidation of tourism for Burgos, and some experts even predict that it will ensure that tourists stay in the town for an average of 2 nights, the highest level in Europe alongside cities like Florence and Venice. Another agreement reached was the establishment of an experts' committee to define the museum contents, which will raise the complex to the same status as the great museums of Europe.

## NEWS OF THE ATAPUERCA PROJECT SPREADS ACROSS FOUR CONTINENTS

Since last March, members of the Atapuerca Research Group and the Atapuerca Foundation have been travelling on lecture tours to Rio de Janeiro, Cairo, Amman, Tunis, Damascus, Albuquerque, Chicago, Athens, Moscow, Algiers, Bordeaux and Dublin. The aim of the tours is not only to spread word of the Atapuerca discoveries, but also to establish close collaboration networks amongst researchers around the world. For this reason, ERG and Foundation members are giving their lectures together with a local expert, which has ensured intense debate and scientific exchange in every case.

On 26 March, María Martínón-Torres spoke in Rio de Janeiro (Brazil) about "Origins of Humanity and the Atapuerca sites". This dentition specialist explained that the formation of tooth enamel and microstriations allow us to detect the diet, growth rates and also ailments of past hominids, as well as the metabolic stress caused primarily by food shortage. She was accompanied by the Brazilian scientist María Cristina Tenório, who spoke about Cave art in Minas Gerais and the first populations in Brasil.

On 17 April, Eudald Carbonell gave a lecture at the Egyptian Museum of Cairo as part of the same project, in this case on "Biological and cultural evolution".

On 25 April, Juan Luis Arsuaga went to Ammán (Jordan), to deliver a lecture on Atapuerca's humans bones. The local expert was Dr. Fawwaz Khreishah (Director General of the Jordanian Department of Antiquities) and the introduction was given by His Excellency Sr. Antonio López, Spain's Ambassador to Jordan.



in the time of bread". To find bears at the time of Alfonso XI, one had to go up to the headwaters of the Arlanzón River, "La Haedo [beech forest] above Pineda", or into the lands of the upper section of the mine railway that crosses the Atapuerca Hills, "Rio Cabado", "La Garganta Polvorosa de sobre Barbadiel de Herrerros", "Rio Puercos de Monte Rubio". So a large part of the Sierra de la Demanda was covered in forests, as it is today. Nowadays, only the bears are missing.

## 2004 &gt; 27th excavation season WORK FOCUSES ON DATING AND DIGGING AT THE OPEN AIR SITES

In June 2004 work recommenced at the Gran Dolina, Lookout and Huididero or Subsidence sites, leaving the Elephant Pit, Bear Claw Cavity, Bones Pit and Porch sites for

open air sites using core and other sampling methods will help us see the differences in the tools used by H. antecessor and H. heidelbergensis. Finally we expect to profile an area that corresponds to the Aurora stratum at Level TD6 in Gran Dolina. Nobody has any doubts about the likelihood of finding new H. antecessor bones to add to last year's discoveries, which will help to complete the evidence unearthed in 1994 and thus further our understanding of the biological features of the firsts hominids that populated the continent we now call Europe.

## BASIC STATISTICS:

- 7 Sites: Gran Dolina, Cavity, Elephant Pit, Porch, Bones Pit, Lookout and Huididero.
- 9 Academic Institutions: Burgos