Excursion guide

EuroMam 2006

Spain

Workshop 4-8 July 2006

European Quaternary Mammal Research Association

Pinilla del Valle
Atapuerca
Altamira
El Castillo
El Mirón
Ambrona
Torralba

FUNDACIÓN DUQUES DE SORIA

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EuroMam
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MUSEO ARQUEOLÓGICO REGIONAL

European Quaternary Mammal Research Association

EuroMam Workshop Spain 2006

Excursion guide and selected bibliography of the fossil sites

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With the collaboration of:

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And the former EuroMam organizer Danielle Schreve

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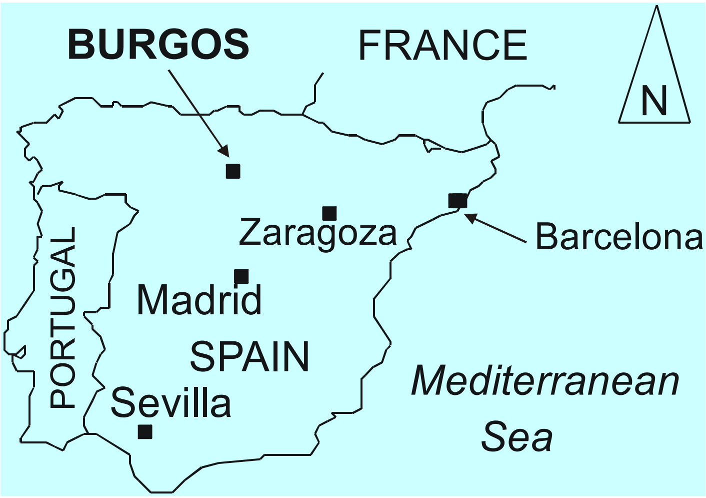
Program

The next EuroMam Excursion will take place in the North of Spain from Tuesday July 4th to Saturday July 8th 2006.



The itinerary is as follows:

1. Morning of Tuesday, July 4th 2006, at 9:30 h. Departure from **Madrid**, Atocha Train Station. Middle and late Pleistocene localities of **Pinilla del Valle and Torralba-Ambrona**

2. Wednesday, July 5th 2006. Early to Middle Pleistocene localities of **Atapuerca. Burgos**

3. Thursday, July 6th 2006. Late Pleistocene localities of **El Castillo and El Mirón. Cantabria.**

4. Friday, July 7th 2006. **Altamira**. **Cantabria**
Visit The New Cave and the galleries dedicated to the "Times of Altamira" at the Altamira Museum.

5. Saturday, July 8th 2006. Return to Madrid after breakfast at the residence in Burgos.

A brief introduction to the sites

Pinilla del Valle

The sites of Pinilla del Valle, are located at around 40 km NW of Madrid, near the Lozoya River. The sites are roughly dated between 140 to 100 ky. The main interest of the sites lays on its archaeological finds and two human teeth, unearthed by the team of Alferez in the 70th and 80th; being probably the first neandertals of the Iberian Peninsula. More than 20 years later, Baquedano, Bermúdez de Castro, Pérez González and Arsuaga re-open this research and found new exciting localities called Navalmaíllo, La Cueva de la Buena Pinta, Calvero de la Higuera, and continue excavating Camino. The Camino site was excavated in the 70th and the rest are new localities discovered after 2002 (Baquedano *et al.*, 2004).

The Pinilla del Valle fossil mammals

Homo neanderthalensis, Ursus sp., *Equus caballus* cf. *germanicus*, *Equus (Asinus)* sp., *Sus scrofa*, *Cervus elaphus*, *Dama* cf. *clactoniana* (last apparition datum), *Crocuta crocuta intermedia, Vulpes* sp., *Meles meles atavus, Mustela (Putorius) eversmanni* (Molero *et al.*, 1985, Alferez Delgado *et al.*, 1982), and the small mammals *Clethrionomys glareolus, Microtus agrestis, M. arvalis, Iberomys brecciensis* (Molero *et al.*, 1982). The bank vole, *Clethrionomys glareolus* is the most meridional cite of the species in the Iberian Peninsula, being present in some late Pleistocene localities of the Cantabrian Range as Covalejos (levels B, J y K); Erralla II and Laminak II, III (Sesé 2005).

Pinilla del Valle References (not available in PDF format)

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Ambrona

The 1993–1999 excavations at Ambrona (Spain), has been directed by Santonja and Pérez-González (Soto *et al.,* 2001, Villa *et al.*, 2005).

The site of Ambrona is situated in the province of Soria, in the north side of the Castillan branch of Cordillera Iberica (Iberian Range), in the Masegar (also called Arroyo de la Mentirosa) river valley. The Masegar is a left side tributary of the Jalón river.

Elephant remains come from the lower levels ("Lower Member Complex") of Ambrona where the levels AS1, AS1/2, AS2, AS3, AS4, AS5 y AS6 were defined from bottom to top.

The name of Ambrona, like the site of Torralba in the nearby, is associated to an archaeological settlement with plenty of elephant remains interpreted classically as a kill and butchering site since the beginning of the XX century. Ambrona is a complex mix of natural and human components, the remnant of a natural landscape regularly visited by hominids, which transported some artefacts from non local raw material sources and had an organized approach to meat acquisition. However, strong evidence of elephant hunting is provided only by sites younger than Ambrona.

The Ambrona fossil mammals

The micromammalian fauna of the Ambrona "Lower Member Complex" is *Crocidura* sp., *Microtus brecciensis* (Giebel 1847), *Arvicola* aff. *sapidus* (Miller 1908), *Apodemus* aff. *Sylvaticus* (Linnaeus 1758) *Oryctolagus* sp. (Sesé 1986) The age defined by this fauna is of a typical or advanced Middle Pleistocene in the sense of Sesé & Sevilla (1996).

The identified macromammals from the recent excavations held by the authors from 1993 to 2000 are: *Canis lupus* Linnaeus 1758, *Panthera* sp., *Elephas (Palaeoloxodon) antiquus* Falconer & Cautley 1847, *Equus caballus torralbae* Prat 1977, *Stephanorhinus hemitoechus* (Falconer 1868), *Capreolus* sp., *Cervus elaphus* (Linnaeus 1758), *Dama* cf. *dama* (Linnaeus 1758) and *Bos primigenius* Bojanus, 1827. The association of *Elephas (Palaeoloxodon) antiquus, Stephanorhinus hemitoechus*, *Equus caballus torralbae* and *Bos primigenius*), confirms the Middle Pleistocene age for Ambrona.

Atapuerca

The sites of Atapuerca (Burgos, Spain) are well known for their hominin bearing, karstic localities of Early to Middle Pleistocene age. The Sierra de Atapuerca is a small hill composed of Late Cretaceous limestone, where a complex karst system developed during the Late Miocene (Vallesian). The caves and galleries contain sediments dating from at least 1.5 Ma to c. 200 ka. The Sierra is an isolated hill, 1080 m high, located 14 km East of the city of Burgos, and dominates the Arlanzón valley near the village of Ibeas de Juarros.

From southeast to northwest, a now abandoned railway cutting through the southwestern flank of the Sierra exposes a number of sediment-filled cavities in the limestone. The Sierra de Atapuerca karst has two main cave systems which are both surface filled: the internal Cueva Mayor system and caves now dissected by the railway cutting Trinchera del Ferrocarril.

The first comprises the Sima de los Huesos (SH), Galería del Sílex, Galería Baja, Galería del Silo, Galería de las Estatuas and Portalón sites. The second has three main sites along the Trinchera del Ferrocarril: Trinchera Dolina (TD), Trinchera Galeria (Tres Simas Complex and Cueva de los Zarpazos) and Trinchera Elefante (TE).

The first palaeontological study of the Sierra was undertaken by Torres in 1976, during his research on fossil bears of the Iberian Peninsula. Aguirre began the Atapuerca Project in 1978 that continues today under the leadership of Arsuaga, Bermúdez de Castro and Carbonell.

The Trinchera Dolina represents one of the longest stratigraphic sequences at Atapuerca, comprising 18–19 m of surface filling, and divided into 11 stratigraphic levels. Nine of these levels (TD3–TD11, numbered from bottom to top) are rich in faunal remains and artefacts. Trinchera Dolina yields the oldest fossil hominin of Western Europe, the 800 kyr *Homo antecessor*; at the Trinchera Dolina level TD6, and at Sima de los Huesos site there is the best collection of the Middle Pleistocene hominin *Homo heidelbergensis.* However, small mammals (Rodentia, Insectivora, Chiroptera and Lagomorpha) represent the largest number of species and greatest fossil abundance in the deposits of the Atapuerca cave complex. The rodent and insectivores assemblage distribution at the Trinchera Dolina site reflects landscape and environmental changes during the past million years. Shifts between woodland, open land and moorland are indicated by the relative abundance of species based on diagnostic elements such as first lower molars. These data are combined with the distribution of large mammals, pollen, sediments and geological context of the Trinchera Dolina site. From this interdisciplinary approach we conclude that the first hominins from Western Europe, *Homo antecessor*, lived during a warm, wet and wooded interval, probably corresponding to Marine Isotope Stages 21 to 19. The transition from Early to Middle Pleistocene at Atapuerca is characterised by palaeoenvironmental changes recorded between levels TD5–6 and TD8–10, respectively. The general opening of the landscape at the beginning of the Middle Pleistocene could have favoured the dispersal of the species *Homo heidelbergensis* across Western Europe.

The Atapuerca fossil mammals

The most recent contribution to the Atapuerca Pleistocene mammals distribution is that of Cuenca-Bescós & García (2004 and in press) from which we extract here the large and small mammal distributions charts. The paper will be published in the special number of the Weimar 2004 Conference (CFS). The Atapuerca cave localities (Trinchera Dolina, Trinchera Galería, Trinchera Elefante, Sima de los Huesos) represent one of the best records for the history of the Pleistocene in Europe. The sites outcrop atlong and good stratigraphic sections ranging from the Early to the Middle Pleistocene with an impressive fossil contents as well as lithic industries that provide an insight into the first human evolution and early human activities in Western Europe (cannibalism, earliest burial, food processing). The stratigraphic distribution of the mammals at the Atapuerca sites reveals 6 different faunal units (ATA FU) with their lower and/or upper limits characterized by the first or last appearance data (FAD and LAD respectively) of mammalian taxa. Moreover, the Sierra de Atapuerca sites are well known for their hominid-bearing localities of Early to Middle Pleistocene age. Level 6 of Trinchera Dolina (TD) site has yielded the oldest fossil hominid from Western Europe, *Homo antecessor*, dated by biostratigraphy, paleomagnetism and radiometric analysis around 800 ka, the level TD6 characterize the ATA FU 4. The Sierra de Atapuerca also yields the best collection of fossil hominids ever unearthed from a Middle Pleistocene site, the *Homo heidelbergensis* fossil remains from Sima de los Huesos (SH) and Trinchera Galería (TG). The Sima de los Huesos site, has an age of 500 ka, and both sites are included in the Atapuerca Faunal Unit 6. Other vertebrate record of the Atapuerca sites is spectacular for its preservation and number of specimens. Large carnivores and herbivores, small mammals, as well as birds, lizards, fish, and frogs are found almost in every level of the cave-sections of Atapuerca. One hundred and one is the number of fossil mammalian taxa recorded at the Atapuerca cave localities up to date. The mammals are grouped in 9 orders, 27 families and 61 genus.

Atapuerca small mammal associations

Arvicolidae drawings from left to right: *Allophaiomys lavocati, Pliomys cf. P. Simplicior, Ungaromys sp., Arvicolidae nov. Sp., Allophaiomys chalinei, Stenocranius gregaloides, Pliomys, Mimomys savini, Arvicola aff. A. sapidus, Clethrionomys sp.*

			Insectivora											Rodentia																																		Quiroptera			Lagomorpha				
Atapuerca levels	Pleistocene Age	Ma	*Beremendia fissidens*	*Asoriculus gibberodon*	*Crocidura aff. C. kornfeldi*	*Erinaceus cf. E. europaeus*	*Talpa cf. T. europaea*	Desmaninae indet.	*Sorex* sp.	*Crocidura cf. C. russula*	aff. *Beremendia*	*Sorex minutus*	*Neomys* sp.	*Allophaiomys lavocati*	*Allophaiomys nutiensis*	*Allophaiomys burgondiae*	*Pliomys* cf. *P. Simplicior*	*Ungaromys* sp.	Arvicolidae nov.gen.nov.sp.	*Castillomys rivas*	*Sciurus* sp.	*Eliomys quercinus*	*Castor fiver*	*Allophaiomys chalinei*	*Stenocranius gregaloides*	*Terricola arvalidens*	*Microtus seseae*	*Pliomys episcopalis*	*Mimomys savini*	*Iberomys huescarensis*	*Apodemus* sp.	*Marmota* sp.	*Allocricetus bursae*	*Hystrix refossa*	*Micromys minutus*	*Microtus* sp.	*Microtus ratticepoides*	*Terricola atapuerquensis*	*Iberomys brecciensis*	*Allocricetus correzensis*	*Microtus arvalis*	*Microtus jansoni*	*Pliomys lenki*	*Arvicola aff. A. sapidus*	*Acanthion vinogradovi*	*Clethrionomys* sp.	*Microtus agrestis*	*Myotis* sp.	*Rhinolophus* sp.	*Miniopterus schreibersii*	*Oryctolagus* cf. *O. lacosti*	*Lepus* cf. *L. terraerubrae*	*Oryctolagus lunelensis*	Lagomorpha indet.	taxa n° (52 taxa in total)
TEURU	Middle					■			■													■									■					■			■		■			■		■	■		■	■				■	13
TD 10-11	Middle	0.3-0.4				■	■	■	■	■		■	■								■	■									■	■						■	■	■	■	■	■			■		■	■	■				■	22
TG III TZ	Middle	0.25				■	■		■												■	■									■	■						■	■	■	■	■	■	■	■			■						■	17
SH	Middle	0.4																				■									■					■				■			■					■	■	■				■	9
TG II	Middle					■	■		■	■												■									■	■						■	■	■	■	■	■	■	■			■	■					■	18
TD 8b	Middle									■												■									■							■	■	■										■			■		8
TD 8a	Middle	0.6				■	■	■	■	■																		■	■	■			■				■											■	■	■				■	14
TD 7	Early	0.78					■	■	■			■														■	■	■	■	■	■	■	■			■												■						■	15
TD 6b	Early	0.85				■	■	■		■	■	■											■		■	■	■	■	■	■	■	■	■	■														■		■				■	20
TD 6a	Early					■	■	■	■	■	■	■												■	■	■	■	■	■	■	■	■	■	■	■													■	■	■				■	23
TD 5	Early					■	■		■	■	■	■										■		■	■	■	■	■	■	■	■	■	■		■													■							19
TD 3-4	Early					■	■		■	■	■	■										■		■	■	■	■	■	■	■	■	■	■	■														■	■	■	■	■			23
TELRU	Early	1.4	■	■	■	■	■	■	■	■				■	■			■	■	■	■	■	■																															■	14

Atapuerca large mammal associations

			Primates			Carnivora																													Ungulates and Proboscidea																	
Atapuerca levels	Pleistocene Age	Ma	*Macaca*	*Homo antecessor*	*Homo heidelbergensis*	*Vulpes* cf. *V. alopecoides*	*Canis* sp. (*C. arnensis/mosbachensis*)	*Lynx* cf. *issiodorensis*	*Pannonictis* sp.	*Baranogale* cf. *B. antiqua*	*Ursus dolinensis*	*Lynx* sp.	*Mustela palerminea*	*Panthera gombaszoegensis*	*Panthera* sp. (jaguar/ leopard size)	Canidae indet.	*Crocuta crocuta*	*Vulpes praeglacialis*	*Canis mosbachensis*	*Felis* sp.	*Homotherium latidens*	*Meles meles*	*Lynx pardinus spelaeus*	*Ursus* sp.	*Vulpes vulpes*	*Panthera leo*	*Canis lupus*	*Cuon alpinus europaeus*	*Martes* cf. *M. foina/martes*	*Mustela nivalis*	*Mustela putorius*	*Ursus deningeri*	*Ursus* sp. (*U. deningeri/spelaeus*)	*Felis silvestris*	Cervidae indet.	*Hippopotamus* sp.	*Dama "nestii" vallonnetensis*	*Stephanorhinus etruscus*	*Equus stenonis - E. altidens*	*Eucladoceros giulii*	*Bison* cf. *B. voigstedtensis*	*Cervus elaphus* cf. *acoronatus*	*Sus scrofa*	*Mammuthus* sp.	*Praeovibos priscus*	*Equus caballus*	*Stephanorhinus hemitoechus*	*Cervus elaphus priscus*	*Bison* sp. (small)	*Hemitragus bonali*	*Dama dama* aff. *D. d. clactoniana*	taxa n° T=49
TE URU 19	Middle															■	■								■							cf														cf	cf				■	7
TG III TZ	Middle	0.25			■											■							■		■	■		■		■			■	■												■	■	■	■	■	■	14
TD 10-11	Middle	0.3-0.4																			cf	■		■	■	■	■			■													cf			■	cf	■		■	■	13
SH	Middle	0.35-0.4			■										■							■	■		■	■	■		■	■		■																				9
TG II	Middle																					■	■		■	■	■	■		■	■															■	cf	■	■	■		13
TD 8b	Middle																																																			0
TD 8a	Middle	0.5-0.65												■			■		■					■												■	■	■	■	■	■	■			cf							12
TD 7	Early	0.78																																																		0
TD 6b	Early	0.85		■								■	■				■	■	■					■													■	■	■	■	■	■	■									13
TD 6a	Early												■				■	■	■					■													■	■	■	■	■	■		■								12
TD 5	Early										cf	■	■	■			■	■	■		cf	sp															■			■			cf									12
TD 3-4	Early	~0.9									■	■		■			■	■	■	■																	■	■	■	■	■	■										13
TE LRU	Early	~1.4	■			■	■	■	■	aff.	cf	■	cf	■	■	■																			■	■	■	cf	cf													15

The cantabrian localities of El Castillo, El Mirón **and Altamira**

Map with the location of the main Cantabrian rock art (in César. González Sainz & Roberto Cacho Toca. Historical Science, University of Cantabria, http://www.muse.or.jp/spain/eng/cantabria/cantabria_top.html) Covalanas is located on top of the El Mirón cave cliff.

El Castillo

El Castillo cave is located some 30 km from Cantabria's coastal capital of Santander on a steep hillside above the Pas river, one of many relatively short north–south rivers running from the Cordillera Cantabrica through the narrow stretch of coastal plain to the Bay of Biscay. This cave takes its name from the hill where it is situated, El Castillo (The Castle), overlooking the town of Puente Viesgo. In 1903, an important archaeological deposit was located in the entrance vestibule of the cave, and numerous paintings and engravings were discovered in its interior. Hermilio Alcalde del Río, a local teacher, was the discoverer, and he also undertook the first studies in the site. Later, at different times during the century, other caves were found in the same hill, whose entrances had been blocked and hidden by collapses. These are the caves, each with an archaeological deposit and cave art, of La Pasiega, Las Chimeneas and Las Monedas; as well as La Flecha, which only had an archaeological deposit in its entrance. In the Upper Paleolithic, the large outer rock-shelter at El Castillo, 190m above sea level and facing east-northeast, was occupied much more often than the other caves which were then open. It was thus the main habitat in the hill and in all the immediate geographical area. These other smaller caves, despite being in the same intensely karstified limestone hill, seem to be mere satellites of the great habitat and decorative complex centred on El Castillo. They were occupied more occasionally as camps, for meetings and diverse activities, some of which would have involved the production of cave art.

After the first studies in the cave, the vestibule of Castillo was excavated by the Institut de Paleontologie Humaine at Paris, directed by H. Obermaier and H. Breuil, between 1910 and 1914. Obermaier excavated an archaeologically rich 18 m deep section at the center of the large entrance chamber of the cave, leaving a relatively large intact section near the entrance itself (Obermaier, 1924). In 1980, Cabrera Valdés began excavating an approximately 8 by 6 m area of the intact section (referred to here as the recent excavations) and those excavations continue today. El Castillo's long stratigraphic sequence (26 levels of cultural remains) span the Acheulean'', Mousterian, Aurignacian, Périgordian (Gravettian), Solutrean, Magdalenian, Mesolithic (Azilian), and Bronze Age has been studied from a range of perspectives. Sedimentological analyses show that the site's deep Mousterian and Upper Paleolithic sequence falls within the last glaciation, i.e., within Oxygen Isotope Stages 4, 3, and 2.

The cave art was studied at the same time, with the collaboration of Alcalde del Río and several foreign archaeologists. This work played a vital role in the definition of the Paleolithic cultural sequence in the Cantabrian region, due both to the good state of conservation of the archaeological the Castillo hill. It is located in the centre of the Cantabrian region, in the middle of the regional relief, and right in the area of contact between the open coastal zone and the interior valleys. The hill forms the eastern end of the Sierra del Dobra, a mountainous West-East ridge between the rivers Besaya and Pas. It dominates the route into the Toranzo valley up the River Pas, and also the nearby Pisueña valley, and it therefore controls the way to the high summer pastures, which must have been important for the herds of wild ungulates. On its other flank, the hill also controls the route to the Besaya valley, going round the Sierra del Dobra to the north.

The characteristic conical shape of the hill and its central position in the regional landscape, between these two main types of territory: the coastal plains and the inland valleys, indicate that the large vestibule of Cueva del Castillo must have been an essential camping place for the Paleolithic hunters of this central area of the Cantabrian region, on their movements between the coast and the valleys. Marine shells are frequent in the Upper Paleolithic deposit as far as the layers of the Magdalenian period. Furthermore, from the hill itself, different biotopes can quickly be reached, each with its own resources. Lithic raw material for the manufacture of tools is relatively abundant in the area, in the form of conglomerates on the hillside, and cobbles from the bed of the River Pas. The area also had good hunting and fishing, as the archaeological deposit so clearly shows; this was available both on the flatter ground in the valley and on the quite steep hillsides, which would have had partially different vegetation and resources, depending on their orientation.

The interior of the cave has a complex series of passages. The parietal art tends to be distributed throughout practically the whole cave, with very unequal densities of figures. The complexity of the cave as well as the great variety in the techniques, styles and formats, the superimposition of figures in several panels, as well as the habitual occupations in the vestibule, show that the cave must have been visited and modified on numerous occasions.

The discoveries of the latest years, made by Victoria Cabrera and Federico Bernaldo de Quirós in the cave El Castillo show the weakness of the Classical Model of the Aurignacian introduction by –essentially - modern humans coming from elsewhere, out of Europe. The recent dating of Istallösko (see Cabrera *et al.*, 2005), set the Aurignacian of the Balkans younger than previously assumed, and complicates the simple idea of an East to West invasion.

With debate escalating in regard to the prolonged contemporaneity of neandertal and modern human groups in the Franco-Cantabrian region on the one hand, and the late persistence of neandertals (until ca. 28–30,000 B.P.) and Mousterian industries in southern Iberia on the other; sites with Mousterian–Upper Paleolithic sequences from northern Spain play a pivotal role in the ongoing investigation of the Middle–Upper Paleolithic transition in western Europe. An important line of inquiry into the *Nature* of social and economic change from the Middle to Upper Paleolithic is the monitoring of shifts in land use and resource procurement patterns. The recognition of short-term, seasonal patterning in settlement and resource provisioning may provide insights into changes in mobility, territoriality, and social organization that might otherwise be missed. The results of a seasonality study of fauna from archaeological levels spanning the Middle–Upper Paleolithic transition from the sites of El Castillo, El Pendo, and Cueva Morín in Cantabrian Spain; along with other artifactual and faunal evidence suggest that: (1) economic strategies and technologies pervasive in the Upper Paleolithic are rooted in the Cantabrian Middle Paleolithic; and, (2) the apparent increase in deposits from the Middle through Upper Paleolithic may be the signature of a gradual increase in logistical economic strategies including the heightened level of social organization required for their implementation. Data concerning season of death and age at death of prey animals are derived from dental growth mark (increment, annuli) analysis (in Pike-Tay *et al.*, 1999).

The El Castillo large mammals of levels 18 and 20 from 1910–15 excavations

Taxon in probable order of abundance (descriptions of Vaufrey, Newton & Fischer, 1910–15)	Aurignacian Delta (level 18)	Mousterian A (level 20)
Cervus elaphus, red deer	Numerous, 216 individuals	Very abundant, 184 individuals
Bos sp. [and/or *Bison sp.*], large bovines	Numerous, 29 individuals	133 individuals
Equus caballus, horse	Numerous	Very abundant
Rhinoceros mercki [=*Dicerorhinus kirchbergensis*], Merck's rhino, or more likely *D. hemitoechus*	Fairly numerous	Present
Capreolus capreolus, roe deer	Fairly rare	Very rare
Rupicapra rupicapra, chamois	Fairly rare	Rare
*Capra ibex (*or *C. pyrenaica)* ibex	Very rare	One molar
Elephus antiquus, straight-tusked elephant	Fragments	
Sus scrofa, wild boar	Very rare	One molar
		(Pike-Tay *et al.*, 1999)

El Mirón

El Mirón cave on the northern edge of the Cantabrian Cordillera is one of the first montane sites in this area to be the object of modern interdisciplinary research. It was scientifically discovered by H. Alcalde del Río and L. Sierra in 1903, at the same time that these two early prehistorians also discovered the adjacent cave art sites of Covalanas and La Haza. It was never subjected to systematic archeological or paleontological investigation, despite the presence of abundant artifactual and faunal materials scattered on the surface. The area forms part of a highly karstic Lower Cretaceous limestone along the northern face of the Cantabrian Cordillera. Located at only about 260 m above present sea level on a steep mountain side, El Mirón is surrounded by peaks and ridges at or above 1.000 m and opens out onto an impressive cirque-like cliff face. Total accessible length of the cave is about 130 m; but it is the vestibule, with its gaping mouth (of about 20x18 m) that is most impressive. Sediments in the vestibule include sediment redeposited from an ancient colluvial fill in the inner cave, limestone rock fragments, biogenic $CaCO_3$ generated by cryptogamic and vegetation growth on the cave ceiling, eolian silts, bird droppings, and anthropogenic lithic and faunal remains. Sedimentological analyses of the cave fill reported here document the transition from a sandy silt facies with rounded cobbles in the inner vestibule to a carbonate-rich silt facies with angular limestone clasts near the cave mouth. There is no clear regional paleoclimatic signal in the bulk sediment analyses because of the heavy influence of local input and human disturbance. Micromorphology reveals subtle evidence for some short-term variations that can be correlated with regional paleoclimates, such as the Younger Dryas event (Straus *et al.*, 2001).

In 1996, Lawrence Straus of the University of New Mexico, and Manuel González Morales of the University of Cantabria, Santander, Spain, began to excavate El Mirón in the Cantabrian Mountains. Straus had first seen the cave in 1973 and knew that many archeologists dismissed it, believing the rubble and silt-filled outer chamber had been too disturbed by looters and herders to offer much that was intact. However, Straus and González Morales thought the cave might hold something worthwhile and decided to excavate. Their careful inspection of the vestibule suggested the existence of an old, stable ceiling and areas that might have been protected from at least recent digging: a stone cabin foundation near the south front of the vestibule and a corral at the south rear. In both the "Corral" and the "Cabin" below 10-20 cm of dung and recent debris, they immediately encountered intact deposits. Excavations since 1996 in the large El Mirón Cave have revealed a cultural sequence of late Mousterian, early Upper Palaeolithic, Solutrean, Magdalenian, Azilian, Mesolithic, Neolithic, Chalcolithic, Bronze Age, and Medieval occupations. They began to document a story of Neanderthals and Cro-Magnons who hunted in the mountains and spent time in this cave between 41,000 and 10,000 years ago during the late Paleolithic period. These components have been dated by 51 generally coherent radiocarbon determinations, all run by the Geochron labs, in association with the Lawrence Livermore labs for AMS. This series is one of the largest for a single prehistoric site in Iberia or even Europe. The series is consistent with the record from Cantabrian Spain and provides new detail on the age of the Middle–Upper Palaeolithic transition, on the various phases of the Magdalenian culture, on the appearance of the Neolithic in the Atlantic zone of Spain, and on the origins of the socioeconomic complexity in the metal ages. The stratigraphic relationship of 14C-dated levels to a roof-fall block and adjacent cave walls (both with engravings) provides rare terminus post and ante quem ages for execution of the rupestral art in El Mirón during the early to mid Magdalenian. The 14C record has also been instrumental in revealing the existence of depositional hiati during the early Holocene.

In addition to this research, Straus and González Morales have been able to prove that the Mesolithic foragers of the Cantabrian coast didn't begin to farm, domesticate animals, or use pottery until 5,700 years ago—about 800 years after other nearby groups just over the mountains in the Mediterranean-draining Ebro River Valley. As it is, El Mirón has yielded the oldest evidence for agriculture in northern Atlantic Spain. Because of this, Straus and fellow researchers have wondered why it took the mobile foragers so long to adapt to an agrarian lifestyle. Straus thinks the thick forests that separated the mountains from the coast 10,000 years ago could have been a major barrier between the two groups, but the large time gap still puzzles him.

This and other questions posed by excavation at the El Mirón cave are complex, and for Straus and González Morales and the rest of the research team, the hunt for the answers continues.

The El Mirón fossil mammals

The post-Pleistocene faunal remains

The faunal assemblages from Holocene-age deposits were excavated in the outer part of the vestibule only. Because the sediments from the initial test excavations in 1996 were only water-screened on-site in c. 3 mm mesh, but not floated, there are discrepancies in the representation of microfaunal remains vis à vis the materials from all the subsequent campaigns, when all intact sediments were transported down to a field laboratory in Ramales for systematic sample-based flotation, as well as total wet and dry screening through a series of meshes. Even so, hyper-fine screen mesh (e.g., 0.5 mm) has not been employed in the treatment of sediments from El Mirón, so the very smallest microfaunal elements are probably somewhat underrepresented in the samples. All small, but obviously identifiable macrofaunal remains (e.g., teeth, bones with articular surfaces [epiphyses], foramina, tori, sulci, etc.) and all remains (such as long bone shaft [diaphysis] fragments) >5 cm in length that were recognized in situ during excavation, were three-dimensionally piece-plotted. The post-Pleistocene faunal remains were recovered from the main, 10m2 excavation area in the outer part of the vestibule (the "Cabin) and from the contiguous western end of the trench that connects the outer ("Cabin") and vestibule rear excavation areas (Altuna et al., 2004).

The Holocene macromammal assemblages of El Mirón

Neolithic domesticated (D) and wild (W) mammals: D, *Bos Taurus, Capra/Ovis, Ovis aries, Capra hircus, Sus domesticus, Canis familiaris;* W, *Sus scrofa, Cervus elaphus, Bos primigenius, Rupicapra rupicapra, Martes* sp., *Felis silvestris.*

Chalcolithic domesticated and wild mammals: D, *Bos Taurus, Capra/Ovis, Ovis aries, Capra hircus, Sus domesticus, Canis familiaris*; W, *Equus ferus, Sus scrofa, Cervus elaphus, Bos primigenius, Rupicapra rupicapra, Capra pyrenaica, Vulpes vulpes, Ursus arctos*.

Bronze age domesticated and wild mammals: D, *Bos taurus, Capra/Ovis, Ovis aries, Capra hircus, Sus domesticus;* W, *Sus scrofa, Cervus elaphus, Rupicapra rupicapra, Capra pyrenaica.*

The Holocene micromammal assemblages of El Mirón

Early Neolithic levels 10 and 10.1: Level 10.1 yielded remains of *Arvicola terrestris* (mole rat), *A. sapidus* (water vole), *Microtus agrestis* (short-tailed vole), *Chionomys (Microtus) nivalis* (snow vole), *Clethrionomys glareolus* (bank vole), *Terricola (Pitymys) lusitanicus* (Portuguese pine vole), *Apodemus sylvaticus-flavicollis* (wood mouse or yellow-necked field mouse), *Glis glis* (grey dormouse), *Eliomys quercinus* (garden dormouse), *Talpa* sp. (mole), *Sorex coronatus-araneus* (common shrew) and *Mustela* sp. (small mustelid–probably weasel). The environmental conditions under which this fauna existed (albeit with depositional hiati and thus significant temporal gaps within the Preboreal and early Boreal periods) included temperate, humid climate and wooded vegetation with some open rocky slopes.

Level 10 produced teeth and bones of *Arvicola terrestris, Microtus agrestis, M. arvalis* (common vole), *Chionomys nivalis, Clethrionomys glareolus, Terricola lusitanicus, Apodemus sylvaticus-flavicollis, Glis glis, Eliomys quercinus, Talpa* sp., *Sorex coronatus-araneus*, a robust species of *Sorex*, *Mustela* sp. and the Chiroptera *Myotys* and *Miniopterus* (both cave bats).

Level 9 (+associated lenses) produced exactly all the same taxa, except *Mustela sp.* And the Chiroptera.

Levels 8+8.1 also have the same taxa, but with the loss of *Eliomys* and the addition of *Sorex minutus* (pygmy shrew), *Neomys sp.* (probably a water shrew) and some Chiroptera. There are hints of the beginnings of deforestation in the late Neolithic. Level 7 (+associated lenses and pit fills) has a somewhat less rich micromammalian fauna: *Microtus agrestis, Chionomys nivalis, Apodemus sylvaticus-flavicollis, Glis glis, Eliomys quercinus, Talpa sp., Sorex coronatus-araneus* and *Crocidura russula* (white-tailed shrew). Deforestation continued, with the presence of wet meadows in the environs of the cave. Level 6 yielded *Arvicola terrestris, Microtus agrestis, Chionomys nivalis, Clethrionomys glareolus, Apodemus sylvaticus-flavicollis, Glis glis, Eliomys quercinus, Talpa sp., Sorex coronatus-ananeus* and *Neomys sp.*

Level 5 (+ associated lenses), rich is micromammalian remains and taxa, yielded *Arvicola terrestris, Microtus agrestis, M. oeconomus* (nordic vole), *Chionomys nivalis, Clethrionomys glareolus, Terricola lusitanicus, Apodemus sylvaticus-flavicollis, Glis glis, Talpa sp., Sorex coronatus-araneus* and *Mustela sp.* The presence of *M. oeconomus* is a novelty, as this is today a species typical of the tundra and northern taiga biomes of the Holarctic, although it can be found in northwestern Europe as far south as Holland. It prefers cool or cold, wet habitats, such as bogs, marshes, wet meadows and grasslands, tundra, but also cold wooded steppe. Nonetheless its surprisingly recent (i.e., post-glacial) presence in the Chalcolithic (and Bronze Age) of El Mirón is not completely unique, having been identified in Roman-age levels in Amalda Cave in Guipúzcoa. The indices for deforestation in late Chalcolithic times are fairly clear.

There are fewer micromammalian remains and lessened taxonomic diversity in Level 4, notable for its intense bonfires and perhaps more intensive human occupation. The finds include *Arvicola terrestris, Microtus aravalis, Clethrionomys glareolus, Apodemus sylvaticus-flavicollis, Glis glis, Talpa sp., Sorex coronatus-araneus* and *Mustela sp.*

deposit and to its great thickness. Layers corresponding to nearly all the periods of the Paleolithic were dug, reaching over 20m in depth. Furthermore, the documentation of the cave art inside the cave, where there are many complex panels with superimpositions of figures in different techniques and styles, was also important for the model of the chronology of cave art elaborated by Henri Breuil. This model, based on a succession of technical procedures and stylistic changes throughout the Upper Paleolithic, was the main one used in chronological studies until 1965, when Leroi-Gourhan published his major work. Nowadays, the panels of figures in El Castillo are still proof of the distribution of many assemblages of cave art through millennia of decoration, despite the interpretations of some structuralist prehistorians, who tend to consider that all these complex panels are synchronic, or that the superimpositions are a form of composition.

The excavation of the stratigraphy at El Castillo was restarted in the 1980s by V. Cabrera, who had previously studied the results obtained by the first digs, which had hardly been analyzed and were not well published. In summary, in the twenty meters of depth in the vestibule, nearly thirty archaeological layers could be differentiated. These go from the late Acheulian, about 150,000 years ago, to the end of the Upper Paleolithic, and even the Epipaleolithic and more recent prehistoric periods. This long sequence, as it is being dug and studied at present, is providing valuable information about the transition, or replacement, between the Neanderthal populations of the Mousterian period and the *Homo sapiens sapiens* of the Aurignacian and later Upper Paleolithic periods. The multiple occupations found in the long stratigraphic sequence are probably a result of the good habitation conditions of the vestibule, and the excellent strategic position of

The early Bronze Age Level 3 (+ associated lenses) contains *Arvicola terrestris, Microtus agrestis, M. arvalis, M. oeconomus, Chionomys nivalis, Clethrionomys glareolus, Terricola lusitanicus, Apodemus sylvaticus-flavicollis, Glis glis, Talpa sp.* and *Mustela sp.*

The uppermost levels (1+2) –probably partly or wholly Bronze Age– produced only *Arvicola terrestris* and *Talpa.* The landscape was now completely humanized, with significant loss of woodlands because of agriculture and pastoralism. Micromammalian species diversity declined drastically as a result.

Human occupation does not seem to have been continuous in the El Mirón vestibule during the Holocene, since, had this been the case, the commensal micromammalian species would have proliferated in all the levels–something which is not the case. In support of this observation is the high species diversity in all the levels except the topmost ones, a fact which shows that the cave was often occupied by medium-size raptorial birds (owls), which are incompatible with humans. In short, there were periods other either ephemeral or intense human occupation throughout the Holocene, but these were interrupted by times of abandonment when the vestibule was used as a roosting locus for owls which sampled the micromammalian faunas of the cave surroundings.

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