

BRIEFING YOU

about our

Field School for Quaternary Palaeoanthropology and Prehistory of Murcia, S.E. Spain

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Dates:

**July 2nd (Tues.) – July 23rd (Tues.) 2013 at Cueva Negra del Estrecho del
Río Quípar**

**July 23rd (Tues.) – August 13th (Tues.) 2013 at Sima de las Palomas del
Cabezo Gordo**

ABSTRACT

The main objective of the research project is to increase the finds of Pleistocene hominin fossils, along with stone tools and prehistoric animals, by excavation at two sites, **Cueva Negra** (*Black Cave*) del Estrecho del Río Quípar de La Encarnación and **Sima de las Palomas** (*Dove Hole*) del Cabezo Gordo de Dolores de Pacheco, in the Spanish province of Murcia. A secondary objective is to compare and contrast how Neanderthal folk and their *H. heidelbergensis* forebears used natural resources near to the sites, which are in very different local environments. The results will be of importance in developing research into fossil man of the ice age in Mediterranean Spain. Fieldwork since the early 1990's has very significantly increased the numbers of Pleistocene hominin remains from both sites, as well as the Middle Palaeolithic stone tools and Middle-early Late Pleistocene faunal remains. The results are greatly helping to extend our knowledge about *H. heidelbergensis* and *H. neanderthalensis*, their origins and their lifeways.

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Dear Field Helper,

I want to welcome you to take part in our Field School. I'm sure you'll have an interesting time, especially if you're interested in human evolution and our hominin ancestors.

You may very well be as lucky as some recent participants who have helped to excavate hominin bones and teeth during the course of their stay with us. The most recently found are Neanderthal bones, still in their original state of anatomical articulation of the chest, shoulder girdle and upper limb, and of the pelvic girdle, leg and foot, which belong to maybe three individuals, perhaps crushed by a rock-fall or perhaps intentionally arranged and covered with rocks, which we have been uncovering at *Sima de las Palomas* since 2005 and which date to between 55,000 and 40,000 years ago. Some of them our helpers it was the most exciting thing they had ever done. Several of them knew very little about human evolution or how we excavate at prehistoric sites when they arrived, and went away thrilled and having picked up a great deal of both knowledge, not to mention Neanderthal human remains! There is also great excitement at *Cueva Negra* which lately has been recognized as a very much older site than we had thought it was. In its sedimentary fill we have recovered numerous teeth of fossil rodent species known from several sites in Spain after 1,000,000 years ago that became completely extinct long before 500,000 years ago. We have also excavated an Acheulian hand-axe associated with flakes struck by the so-called Levallois technique and stone tools with abrupt Mousterian-like retouch. Palaeomagnetic research undertaken by the Berkeley Geochronology Center shows that the sedimentary fill is older than 780,000 years ago. Palaeontological and palaeopalynological research suggest an age of 800-900,000 years ago. This early date means that *Cueva Negra's* six early Neanderthal-size teeth are best seen as belonging to the Neanderthal precursor in Europe called *Homo heidelbergensis*. In 2011 we discovered calcined animal bones and burnt chert 4.5 metres down in the sediment, which are the oldest evidence for fire in Europe found to date (in Africa there is evidence from 1,700,000 years ago).

The **BRIEFING YOU** which follows tells you how the Project got started and where we're at right now. As you'll see, since the Project began in the early 1990's we have found a large number of remains of hominin and animal bones, and the stone tools of Pleistocene hominins. Read the draft of a soon-to-be-published chapter about our sites at the end of the **BRIEFING**. Go to our web site for plenty of colour pictures of our sites <<http://www.um.es/antropfisica>> .

The Project is carrying out excavations at two sites in Murcia province, S.E. Spain which date from between 900,000 and 40,000 years ago, and are called:

Cueva Negra (Black Cave) del Estrecho del Río Quípar de La Encarnación, and
Sima de las Palomas (Dove Hole) del Cabezo Gordo de Dolores de Pacheco.

The dates when we shall be at each site are as follows:

July 2nd (Tues.) – July 23rd (Tues.) 2013 at *Cueva Negra* del Estrecho del Río Quípar

July 23rd (Tues.) – August 13th (Tues.) 2013 at *Sima de las Palomas* del Cabezo Gordo.

We start and finish on Tuesdays because from London there are both *Ryanair* flights (from Luton and Stansted) and *Easyjet* (from Gatwick) on weekdays – as well as many other low budget flights by other airlines (see *FIELD LOGISTICS*), and also connecting *Iberia-Air Nostrum* flights from Madrid and Barcelona on weekdays - but not at weekends - for intercontinental travellers arriving in Spain (e.g. from U.S.A.).

I think the best thing you can do now is to read the **BRIEFING** very carefully, and then make up your mind. If you have any queries, please don't hesitate to write to me.

Very important! Please send me, as soon as you can, details about your route, place, date, and time of arrival so that we know you are definitely arriving so as to put you on our list of people to be picked up at Murcia-San Javier Airport (or at Calasparra railway station for Cueva Negra) – or else so that we know you are NOT to going to be picked up by us if you are coming under your own steam or on other days. This is very important for you and for me!

I look forward to seeing you in Spain in the Summer of 2013,

Yours truly

Michael J. Walker

EXCAVATING AT CUEVA NEGRA DEL ESTRECHO DEL RÍO QUÍPAR AND SIMA DE LAS PALOMAS DEL CABEZO GORDO
FIELD SCHOOL AND RESEARCH PROSPECTS FOR 2013

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Dear Helpers, Friends, Supporters, and Others,

Together with my co-directors of excavation María Haber and Mariano López, and our young graduate staff Antonio López, Jon Ortega, Azucena Avilés and Matías Campillo, I write thanking you for your help, interest and support, and to inform those who have never been here about what we are doing. Our helpers contribute to our success. Our web-site is being brought up to date and with luck will be ready for you soon. Meanwhile, I attach our 2013 poster advertisement and our 2013 BRIEFING YOU to keep you up to date on our work and prospects for 2013.

In June 2012 we registered here at Murcia the Murcian Association for the Study of Palaeoanthropology and the Quaternary or **MUPANTQUAT** (Asociación Murciana para el Estudio de la Paleoantropología y del Cuaternario) which will extend our work but it will also be responsible for organizing our Field School and excavations; email <mupantquat@gmail.com> web-site in preparation, soon to be <www.mupantquat.com>. MUPANTQUAT is also finalizing the English and Spanish editions of a semi-popular book about more than twenty years of excavation at Sima de las Palomas del Cabezo Gordo and Cueva Negra del Estrecho del Río Quípar. The English version is now with the U.K. publisher Oxbow that expressed an interest in it. We have proposed a self-explanatory title: "HOW THE EARLIEST CAVE-FOLK OF SOUTH-EAST SPAIN WERE DUG UP". Our association itself will be the publisher of our Spanish edition here at Murcia. A Murcia regional government foundation has made an animated film about, and called simply, "CUEVA NEGRA"; our association and the foundation are taking it around our region for showings in different towns and cities, and after the showing there is a scientific colloquium in which we take part by giving brief talks and answering questions from the audience. In fact, we have been so busy that it has delayed preparing the 2013 edition of BRIEFING YOU. We appeared in the PBS-NOVA television documentary "Decoding Neandertals" that was shown in January 2013 in the USA.

A lot is happening! Excavations at Cueva Negra and Sima de las Palomas have given us evermore startling finds in the past few years. At Sima de las Palomas we have uncovered articulated skeletal remains in anatomical connexion of two Neanderthal adults with a child, covered by rocks in the cave 55-45,000 years ago (the last articulated adult Neanderthal to be excavated was way back in 1976, at St.Césaire in France). Researching for his PhD, Jon Ortega is doing brilliant work in our lab, cleaning and identifying the bones in the cemented breccia masses we have excavated. In 2011 we acquired vibroscalpels (so-called "air-scribe" tools) powered by a small compressor to facilitate the cleaning. We now also use Murcia University Veterinary Hospital's new scanner to visualize human bone remains in the breccia masses and to record the digitalized images for analysis and virtual reconstruction. We are grateful to Professor Christoph Zollikofer and Dr. Marcia Ponce de León who came over from Zürich University to show us how they carry out such research there and who also most kindly invited Jon and me to visit their Zürich laboratories in 2011. In Autumn 2012 Jon spent several weeks at Zurich "boning up", so to speak, on their IT methodology. In September 2012 I presented a poster on behalf of us all about this research on the Sima de las Palomas Neanderthals at the 2nd Annual Meeting at Bordeaux of the recently formed European Society for the Study of Human Evolution, which attracted great interest.

To help us study the skeletons, in January 2011 the eminent Anthropology Professor Erik Trinkaus came over here from Washington University at St.Louis. Thanks to his invaluable collaboration we have now published a second paper on Sima de las Palomas Neanderthal remains in the *Proceedings of the National Academy of Sciences of the USA*, two papers (with another in press) in the *American Journal of Physical Anthropology*, and a third in *Journal of Dental Research*, and we also published a long paper in *Quaternary International* in 2012 about how we excavated the Neanderthal skeletons. Another in the same journal has also just been published on Cueva Negra and is available on-line in the early edition at the moment.

To house our spectacular Neanderthal skeletons a 5-storey museum has been built below Sima de las Palomas (in September 2010 the Chairman of our Regional Government in Murcia laid its foundation stone). I visited the finished building early in January 2013 with the architect, but it now needs fitting out as it is a concrete shell right now.

In April 2012 I presented a paper with our colleagues on our research at both sites in Toulouse at the 54th Annual Meeting of the Hugo Obermaier Society for Palaeolithic and Ice-Age Research. I was in England in June 2012, to spend time with our Oxford research colleagues Tom Higham and Jean-Luc Schwenninger who undertake, respectively, radiocarbon dating and optically stimulated luminescence dating at our sites.

At depth of 4.5 metres down in the sedimentary fill of the cave, the 2011 excavation at Cueva Negra discovered calcined bone and burnt chert. Dr. Francesco Berna at Boston University's Archaeology Department informs me that the bone had been heated at 500-800°C, according to Fourier-transform infra-red spectrometry, a technique developed there by the distinguished geoarchaeologist Professor Paul Goldberg and research is continuing. Near them, at Williams College, Dr. Anne Skinner is using electron spin resonance analysis to determine the temperature. In Germany, Dr. Daniel Richter of Bayreuth University's Geography Department is attempting to date the burnt chert using thermoluminescence, a technique in which he is a well-known expert. Micromorphological analysis of the Cueva Negra sediments is being carried out by geoarchaeologist Dr. Diego Angelucci of the Italian University of Trento, and granulometrical analysis is being

conducted by geomorphologist Dr. Yann Gunnell of the Geography Department at Lyons University-2 in France who returned in 2012 to take many samples during out excavation.

The astonishing antiquity of Cueva Negra has greatly excited Anthropology Professor Tom Wynn of the University of Colorado at Colorado Springs. He is a world authority on what Acheulian and Levallois knapping techniques can tell us about the evolution of cognition in hominins. Two of his students helped in our 2011 excavations and one of them in 2013 wants to present a thesis including her work. Until now nobody had ever imagined that the Levallois reduction technique in Europe could be as old as we are finding it to be at Cueva Negra, and to have both Acheulian and Levallois techniques at our site is intriguing. Tom is one of three editors of a 2009 Cambridge University Press book on the evolution of human cognition, *Cognitive Archaeology And Human Evolution* which has a chapter by me about the significance of the Cueva Negra lithic assemblage. Another editor is Tom's colleague Professor Fred Coolidge, whom it was a pleasure to meet again at the Bordeaux meeting in September. We have now published more about the significance of the Cueva Negra Palaeolithic artifacts in a new paper in *Quaternary International* that you can read in the early on-line edition (it will be in print during 2013).

We are now beginning to determine the natural chert sources exploited by the Cueva Negra hominins, thanks to collaboration at Arizona University, where its recent anthropology graduate Winston Zack, who spent three field seasons here, submitted many samples he took, from both the site itself and chert outcrops in its vicinity, to Dr. Alex Andronikov at AU's Lunar and Planetary Sciences Laboratory who has conducted spectroscopic analysis of rare-earth trace elements in the cherts. We hope to publish the findings in 2012. Winston has started on a doctoral programme at North Texas University. We are revising a paper on the work for publication in the journal *Quartär*.

Alas, I cannot enter into correspondence with everyone individually, even when you write to me with specific enquiries about the progress of our research. Hundreds of people have attended our Field School over the past two decades, and because I have no secretary I cannot answer scores of letters separately. So that is why I am sending you this round-robin letter. One size will just have to fit all, I am sorry to have to say. The snippets offered below will have to suffice, together with what will be put up on the website (especially in "Briefing You"), even if they only serve to whet your appetite for more! You will appreciate, I feel sure, that it is one thing for me to correspond about ongoing unpublished research with the handful of established scientists who collaborate with our project, but it would be an unethical and improper thing for me (or them) to do if we were to enter into correspondence about unpublished new business people who are not directly involved in the scientific development and elaboration of those particular research matters. Their eventual publication must be awaited with your patience - even though it may have to last for a few years.

All the same, I do try to go out of my way to answer enquiries from those graduate helpers who are now doctoral candidates at universities around the world, when from time to time they write to me enquiring about highly specific scientific matters concerning their own research which have occurred to them in relation to knowledge they acquired when working at our sites.

Also, when undergraduate students want to come as helpers, and enquire about how to use their experience to gain credit from their own colleges or universities, because we ourselves have no structure for giving them such credit, I do want you to know that if *your own college professors* are willing to give you college credit for a paper or report you present to them on your return, then I will collaborate with *your college professors who write directly to me* to ask about appropriate topics for papers or reports you might present to them, and I will offer *you advice during your stay here* (but not afterwards); you may use photographs you have taken and, indeed, we always encourage you to take photographs provided that you let us have copies for our use. You should inform your faculty that each one of our Field School's three-week sessions involves *180 hours of training*, divided into about ninety of supervised excavation and retrieval of finds both by your own manual excavation and by wet-sieving (wet-screening) of excavated Pleistocene sediment, about seventy hours of supervised preliminary sorting of finds in our field-lab, about ten of talks and seminars and another ten for a visit to places of archaeological relevance and historical interest.

For those universities who require *certificates of attendance* as requisites for completion of undergrad degrees (especially in Archaeology, in the UK and Commonwealth countries, and a few others), I will sign their forms *provided you bring them with you* (I won't guarantee to do so if you forget to bring them and try to send them to me *afterwards*) and I always issue our own *Field School certificates of attendance* to every helper - whereas some universities only accept their own completed forms (e.g. London), others find ours to be an acceptable substitute should you forget to bring their own forms (e.g. Oxford).

I'm often asked to write in support of helpers who apply for graduate study. It is time-consuming and because I am extremely busy with other paperwork every December and January, I will write such support only provided that I have received the forms I have to fill in for you *before October thirty-first*, thereby giving me November to fill them in and send them off; usually graduate-study applications have to be in by the following February. Moreover, I will only fill in *paper forms which can be returned by airmail* (whether to you or the institution you are applying to, depending on its requirements) - whether for graduate-study or any other applications or requests on your behalf. I can fill paper forms in by hand after my university office hours while watching television at home in the evening.

Alas, I do not guarantee to help where an institution gives me no other option than to fill out an "on-line" form. I avoid like the plague having to go "on-line" to institutions and fill in forms "on-line" by computer, for several reasons. First, it can be very slow and take up far too much time in my office hours at the university. Secondly, "on-line" forms are constraining and often do not let me say all those things I might want to say but which I can easily add or annex to a paper form. Thirdly, institutional administrative or secretarial assistants (I have none) ought to be capable of transcribing documents into "IT" documentary formats (though some nowadays seem almost unable to read or write, let alone spell or punctuate with accuracy), but they are not trained either to do anthropological research or to give university lectures to students - both of which comprise what I am paid to do according to my employment contract, whereas I am not contracted to do secretarial work (for which in any case I have never been trained) and I refuse to do it "on-line" so that *at the expense of my working time and labour* some institutions can cut costs by employing fewer administrative or secretarial assistants to work for them than they might otherwise do; there is a fundamental matter involved here involving principles of natural justice, employees' rights and duties, and fair-play by employers in the work-place.

We rarely get financial help from the public authorities here, alas. We did receive some in 2007 and 2009, but there was none in 2008, 2010, 2011, or 2012 and there will be none in 2013 owing to economy measures brought in because of Spain's dire financial crisis. Anyway, much of the money we did receive was earmarked for costly infrastructure (e.g. our 4x4 field vehicle, our "Topcon" total GPS station for surveying; heavy safes to guard our finds; etc.) or for dating and other analyses at international centres. We rely on our field helpers to keep the fieldwork going. Our charge is 50 euros per night (including bed, light breakfast, mid-morning sandwich, cooked lunch and cooked supper). The deposit is the UK sterling equivalent of two-hundred-and-fifty euros per each seven-day period or part thereof. So for three weeks you deposit seven-hundred-and-fifty euros, but for ten days you deposit is five-hundred. You pay us the out-standing balance in euros on your arrival (300 euros for 3 weeks, whereas for ten days you owe us nothing more). You might want to take out holiday insurance in case of last-minute inability to come, because the deposit is non-returnable. It is non-returnable because we are in a holiday-resort area with flights that are heavily booked well in advance of the July-August high summer season. So even if we have someone on a waiting-list when you drop out, that person might not be able to book a flight only a few weeks before the session. This means we might well have to use your deposited money in order to try to tempt one of our local undergrads to take your place instead of taking a well-paid vacation job in a bar or restaurant beside the packed beaches or at a golf resort, because, in order to have adequate help on site at all times so that we can carry out our excavations efficiently we need always to have on site a basic minimum number of people, below which we cannot work smoothly.

I am looking forward to seeing many of you again this year,
Your truly

Michael Walker

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Cueva Negra del Estrecho del Río Quípar, Caravaca de la Cruz

Sima de las Palomas del Cabezo Gordo, Torre Pacheco



Where our sites are in Murcia



Cueva Negra

Top: big arrow marks the cave, small arrow marks chert source

Bottom: far left, Dr Diego Angelucci sampling sediment; left, excavating; right, Drs Jean-Luc Schwenninger, Yanni Gunnell, Marc Calvet and Régis Braucher sampling in 2011 – foreground arrow shows burnt layer and upper arrow shows a small erosive feature; far right, Drs. Gary Scott and Lluís Gibert conducting palaeomagnetic research in 2008.



Cueva Negra: Tip of arrow shows burnt layer. Archaeologists Winstron Zack and Kellie Carlson at work.



Cueva Negra: Calcined bone and thermally-altered chert.



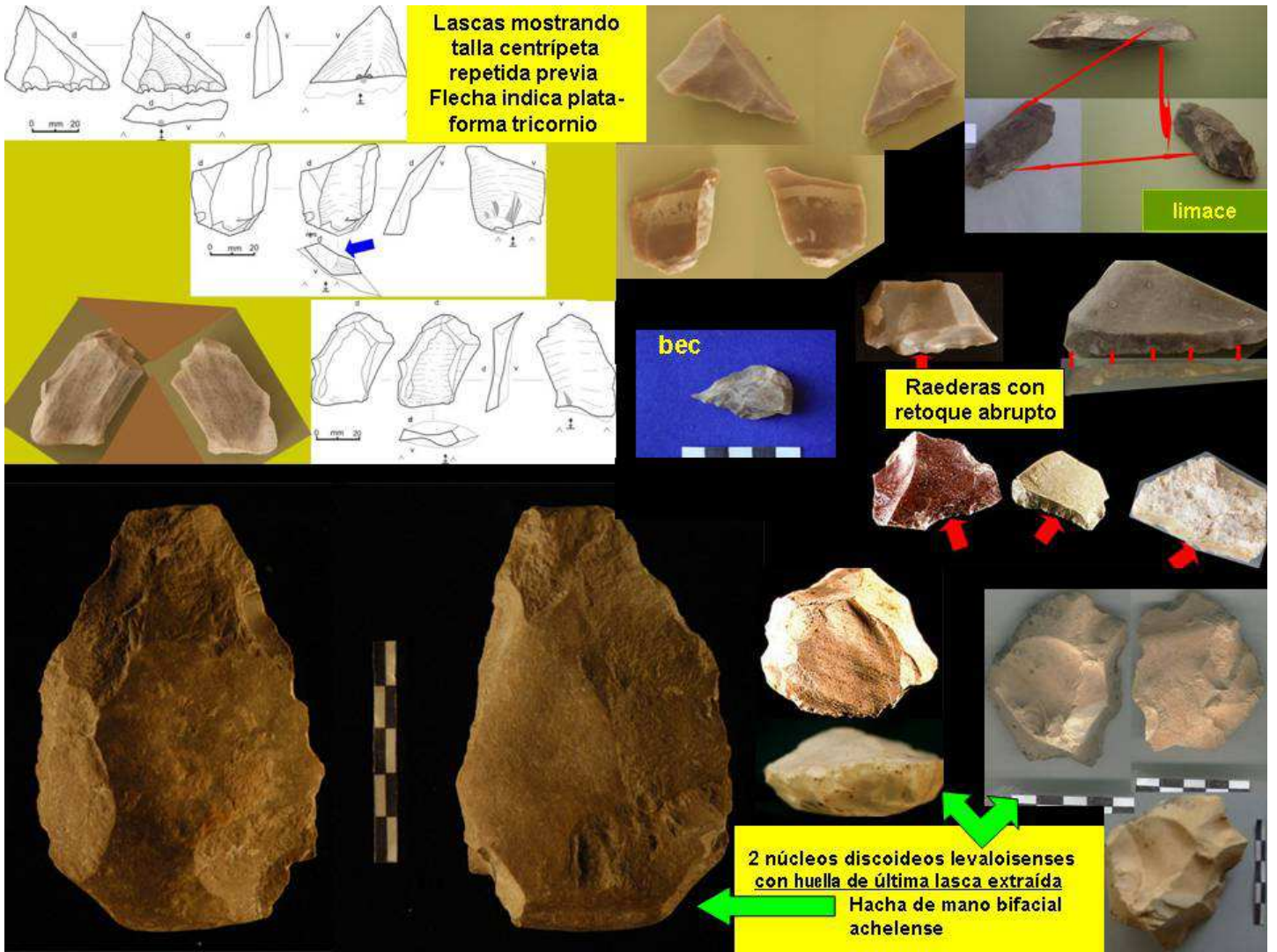
Mimomys savini



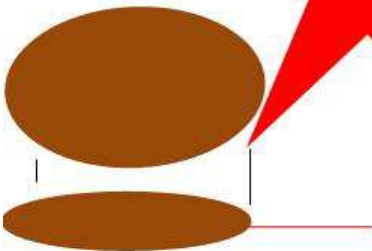
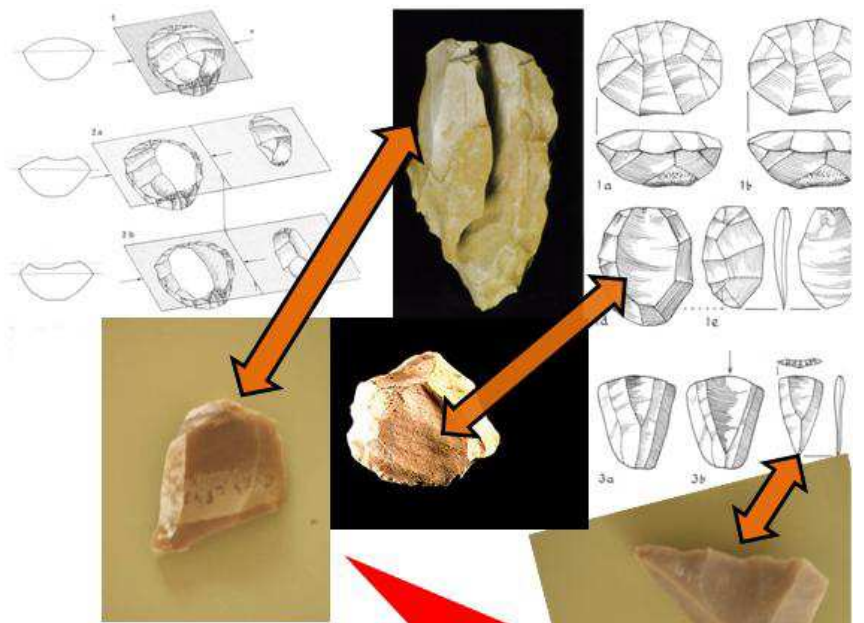
Microtus (Allophaiomys/Euphaiomys) cf chalinei



Cueva Negra: Hunting fossil rodents.



Cueva Negra: Palaeolithic artifacts, flake tools, disc cores, and hand-axe



“Acheulian” bifacial fashioning of a core into a “hand-axe” tool

At Cueva Negra 800,000 yrs ago *Homo heidelbergensis* exercised **CHOICE** between 2 alternative chains of behavioural activities

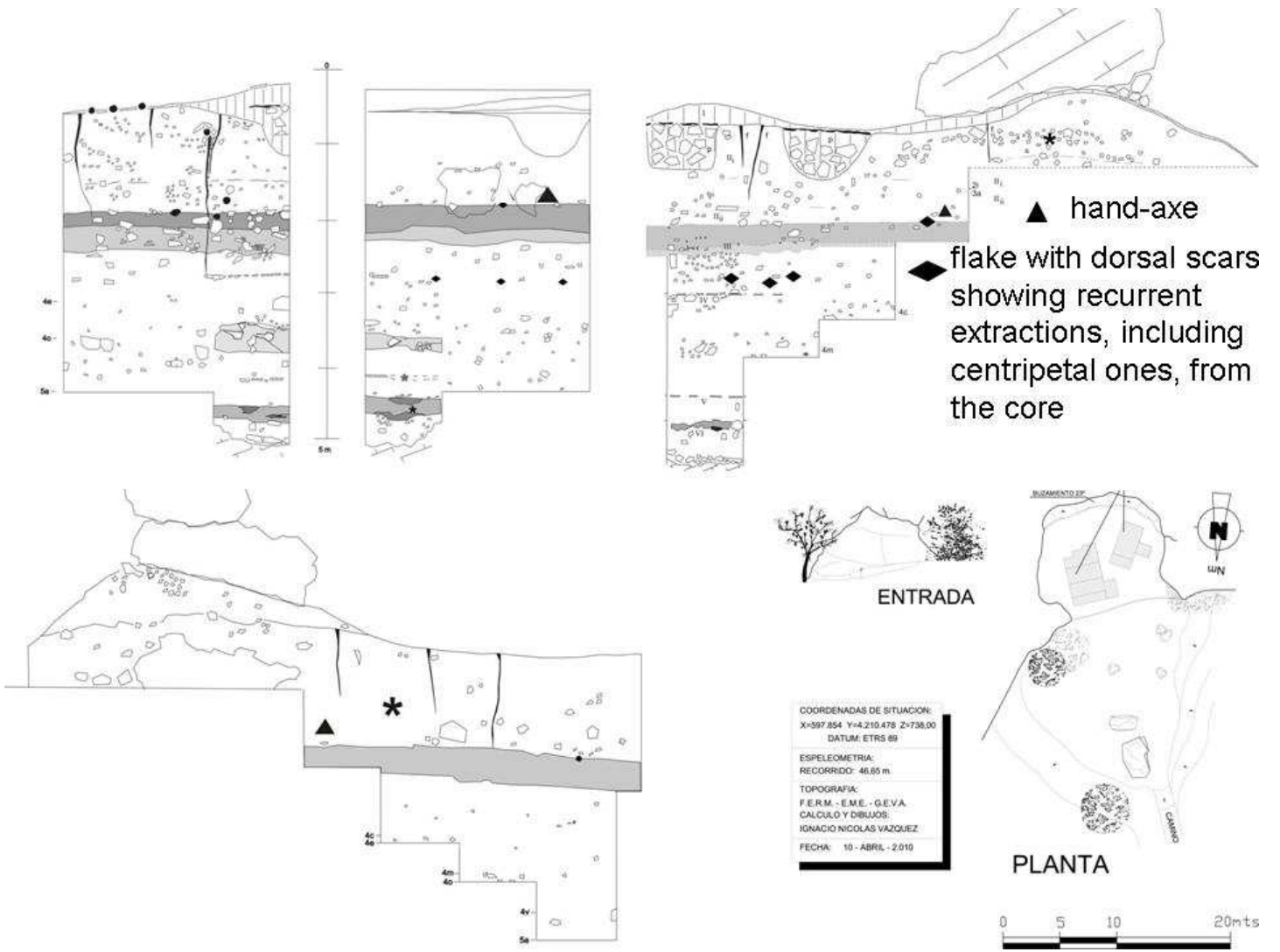


“Levalloisian” removal of prepared flakes of predetermined shape to use as, or retouch into tools

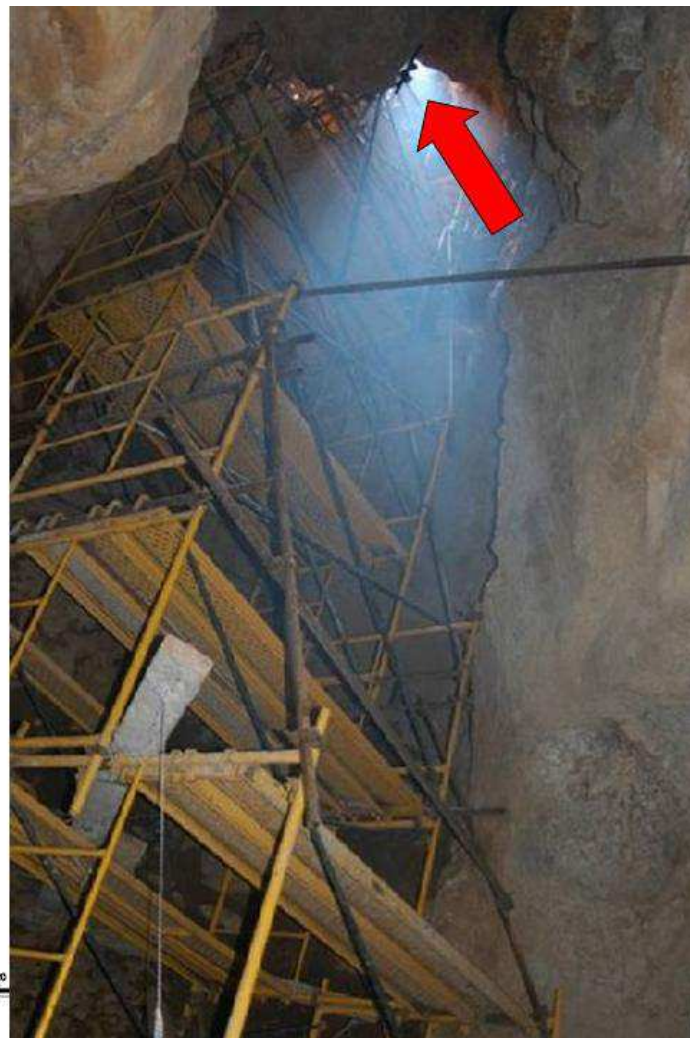
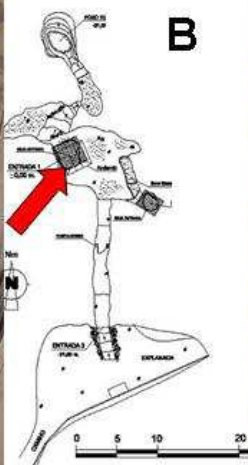
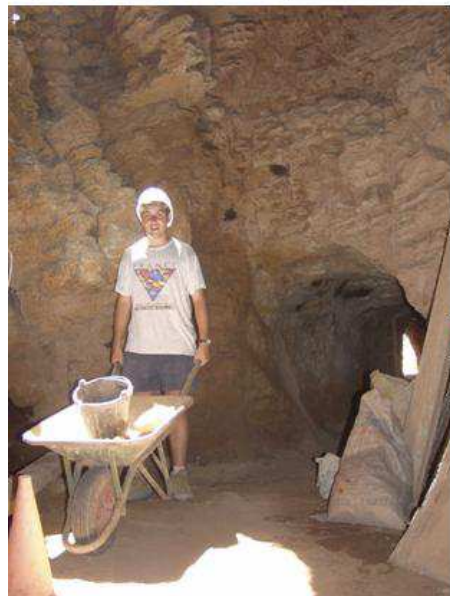
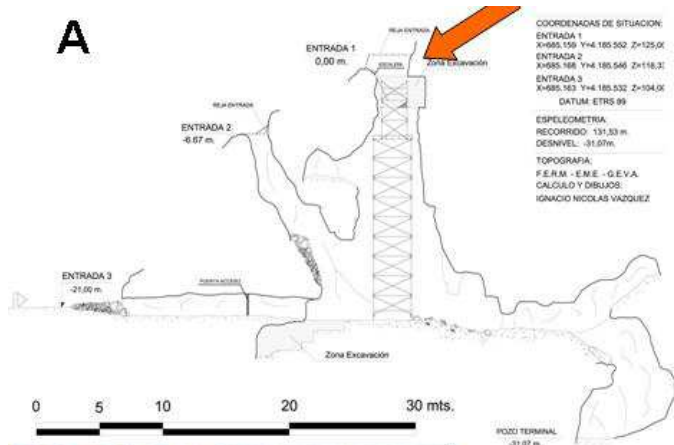
Cueva Negra and cognitive versatility as shown by different stone-knapping procedures



Cueva Negra: *Homo heidelbergensis* teeth



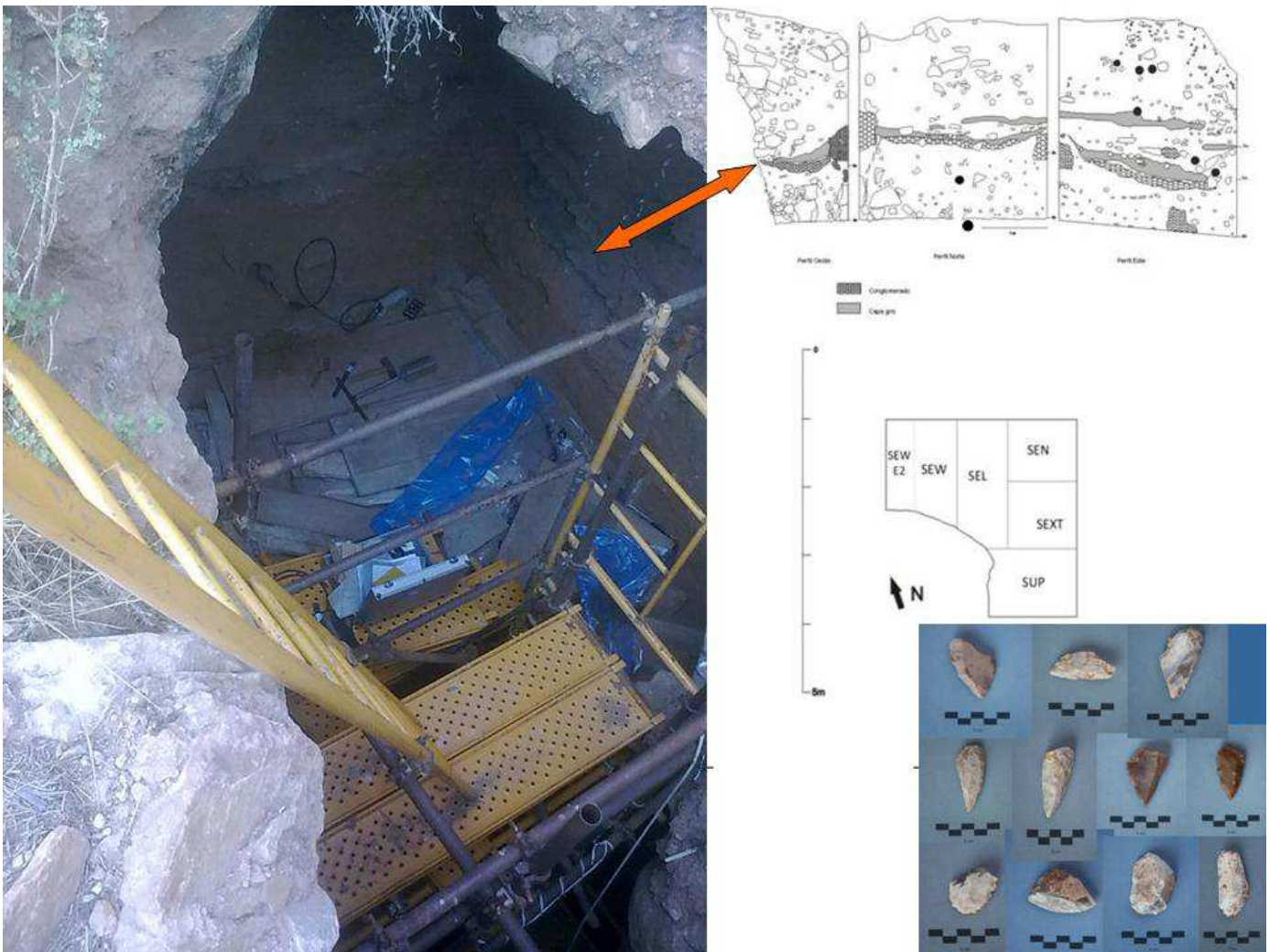
Cueva Negra: Sections and site-plan



Sima de las Palomas: A elevation, B plan, Arrow points to excavation area; left, mine tunnel entrance; right, main shaft

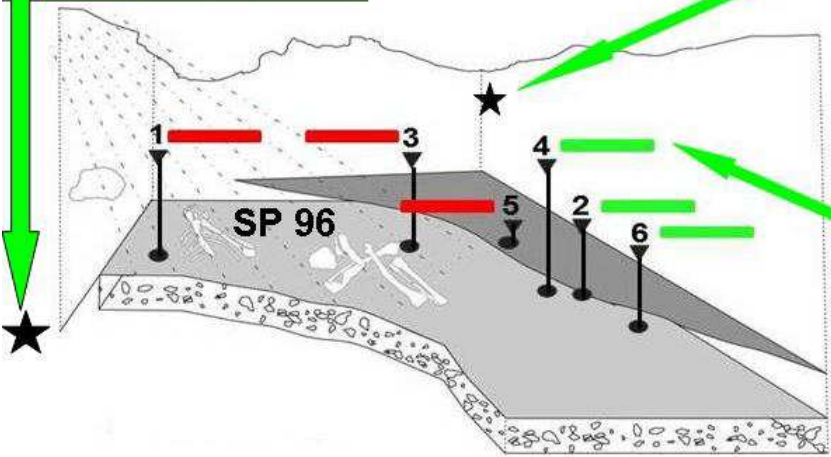


Sima de las Palomas: A, top of main shaft; B excavation area; C, excavation proceeding;D, conglomerate "B" cleaned



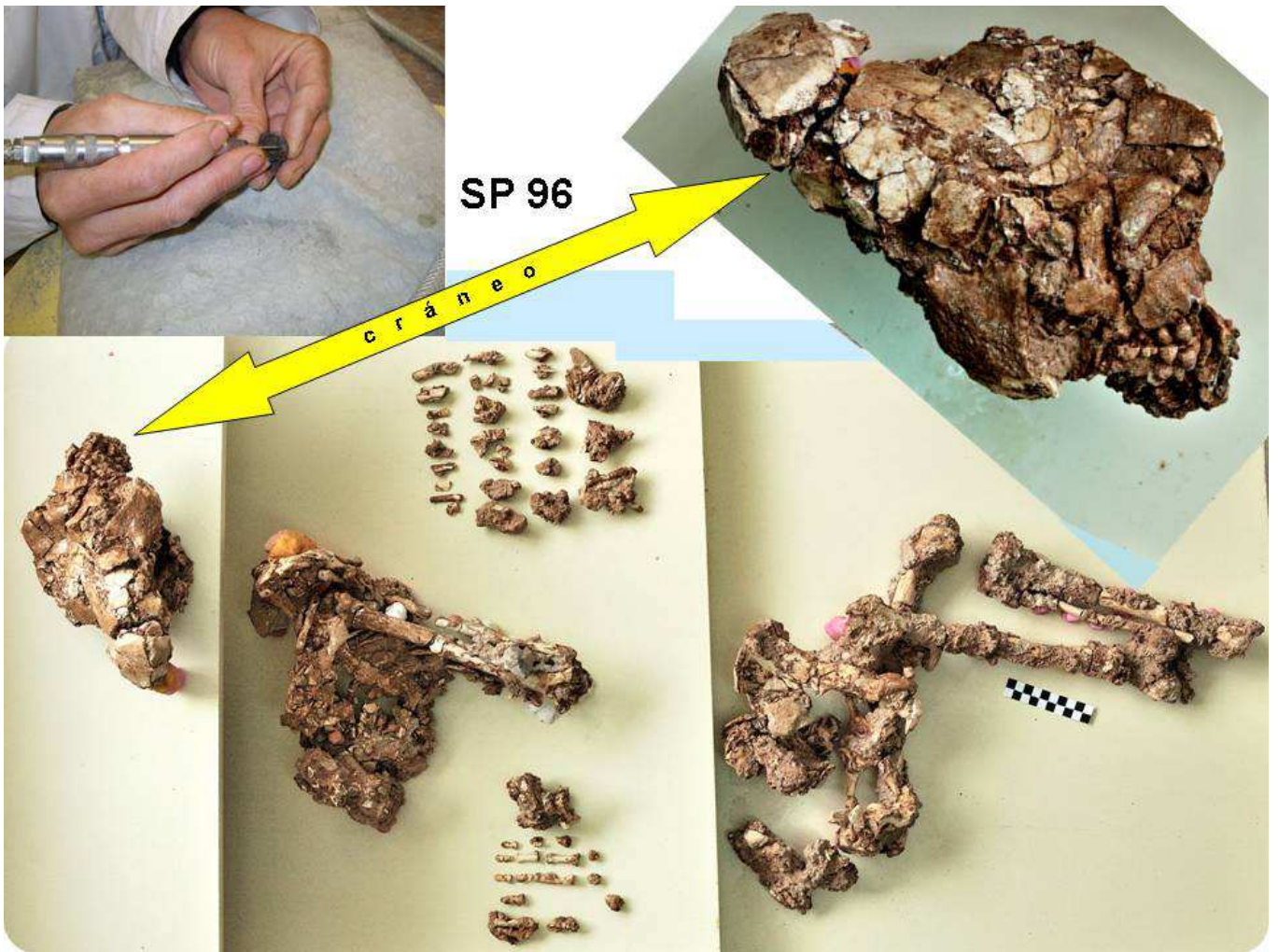
Sima de las Palomas; left, at end of 2011 season; right, sections, excavated area, Mousterian stone tools

Sima de las Palomas Neanderthals Chronology and stratigraphical relationships

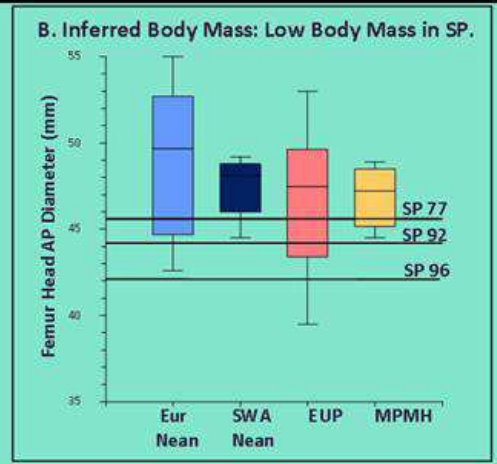
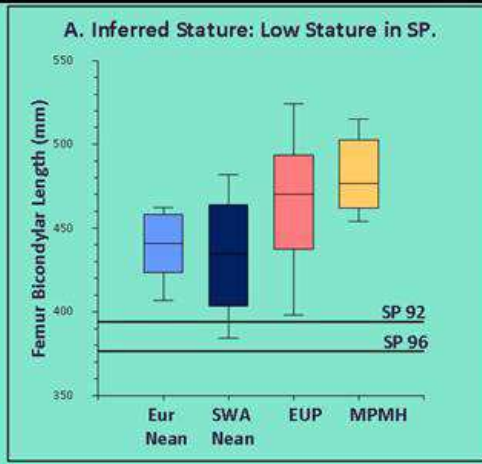


- 1. 54,100±7700 BP (from 3 U-ser estimates) Neanderthal metacarpal. █
- 2. 43,800±750 BP (U-ser) Unburnt bone. █
- 3. 51,000±2500 (U-ser) Unburnt bone. █
- 4. 34,450±600 BP (calib 40,950-37,622; C14) Burnt bone cemented to Neanderthal mandible. █
- 5. 54,700±4700 BP (OSL) Burnt sediment. █
- 6. 35,030±270 BP (calib 40,986-38,850; C14) Burnt rabbit bones. █

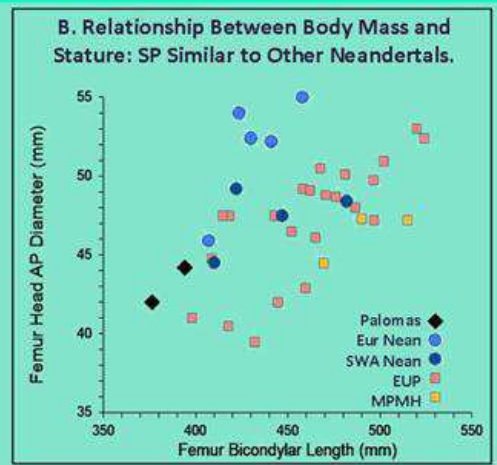
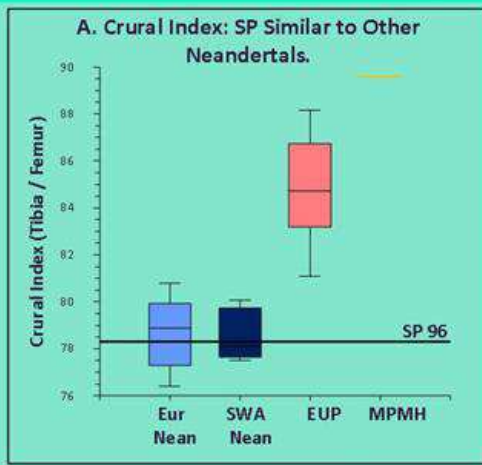
Sima de las Palomas: chronological relationships



Sima de las Palomas: cleaning "Paloma" SP-96 with vibrosscalpel ("air-scribe")



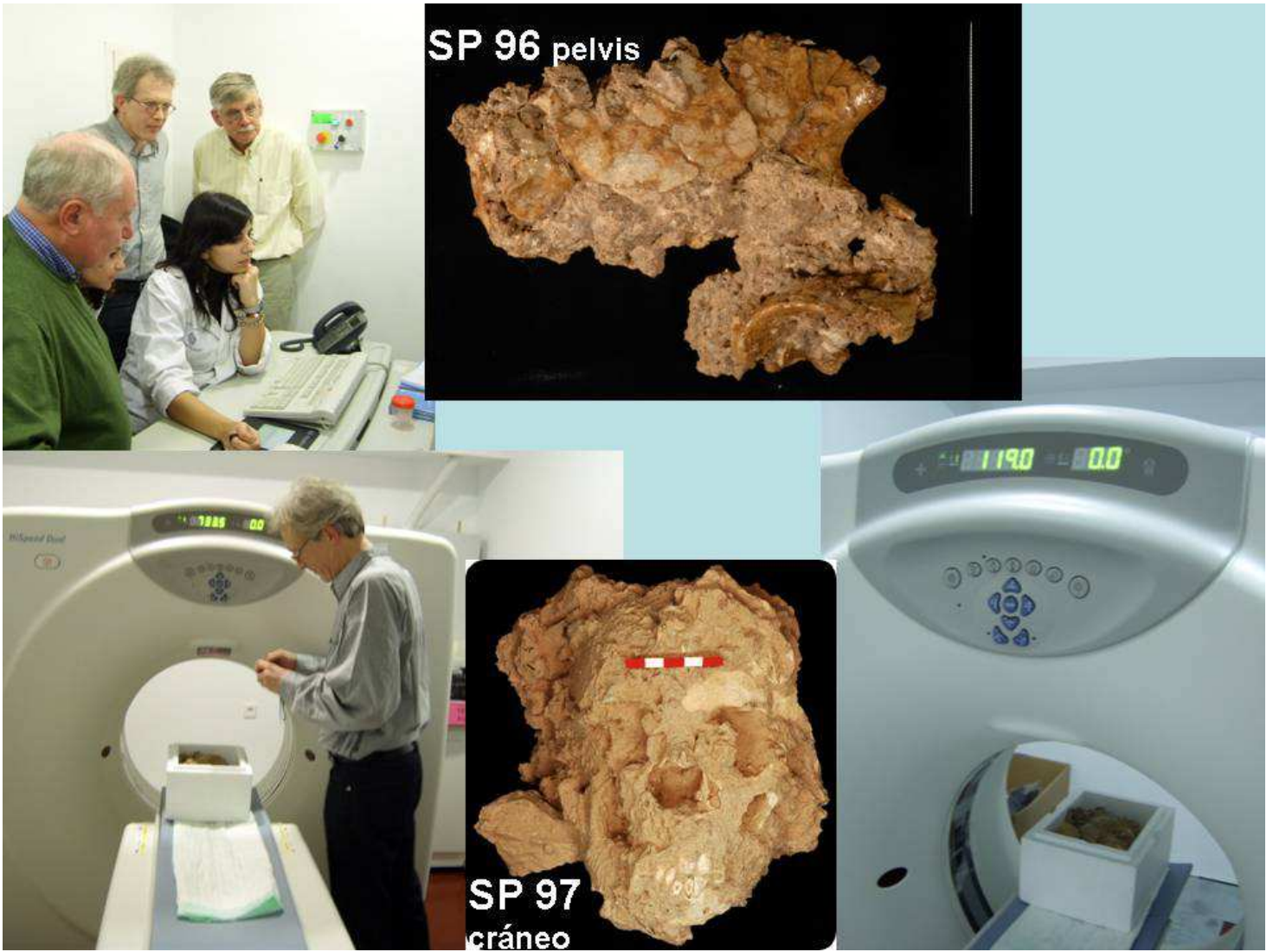
1



2

Boxes represent 25% quartiles. Eur Nean: European Neandertals, SWA Nean: South West Asian Neandertals, EUP: Early Upper Paleolithic Modern Humans, MPMH: Middle Paleolithic Modern Humans.

Sima de las Palomas: "Paloma" SP-96; graphs show comparison between Sima de las Palomas and other Neanderthals



Sima de las Palomas: Professors Michael Walker, Christoph Zollikofer and Erik Trinkaus studying the pelvis of SP-96 "Paloma" and child skull SP-97 with Murcia University Veterinary Hospital CAT scanner in 2011



Sima de las Palomas: Jon Ortega excavating SP-92 and its articulated foot in 2005; Jon Ortega with Drs. Christoph Zollikofer and Marcia Ponce de León studying Sima de las Palomas Neanderthals at Murcia University Veterinary Hospital's CAT scanner (bottom right) in 2011 and analyzing the digitalized scanned images at Zurich University's Anthropology Institute (top left).

BRIEFING YOU

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RESEARCH PLAN

THE PROJECT AND ITS RESEARCH GOALS

The Project aims at achieving careful recovery, by scientific excavation, of skeletal remains of *Neanderthal* folk and their *Middle Palaeolithic* stone tools and extinct animal remains, from between about 900,000 and 40,000 years ago, at the 2 southeastern Spanish sites in the province of Murcia of

CUEVA NEGRA ("Black Cave") in the River Quípar gorge at La Encarnación near Caravaca de la Cruz (0.9-0.8 m.yr), and

SIMA DE LAS PALOMAS ("Hole of the Doves") on *Cabezo Gordo* hill at Dolores de Pacheco near Torre Pacheco (60-40 k.yr.).

The Project is allowing full recovery of these materials to be used to draw comparisons and contrasts between findings at the site near the coast of *Sima de las Palomas* and those at the site in the inland hill-country of *Cueva Negra*. This throws much-needed light on the exploitation of natural resources by *Neanderthal* folk (*H. neanderthalensis*) and their even more archaic fore-runners (*H. heidelbergensis*) in two very different local environments 100 kilometres apart.

Sima de las Palomas overlooks the coastal plain behind a large coastal lagoon known as the *Mar Menor* ("Lesser Sea") from about 125 metres above sea level. It is therefore in a mild environment, where people could have lived throughout the year during the ice age. By contrast, *Cueva Negra* is at 740 metres above sea-level where the *River Quípar* emerges from a rocky gorge ("*Estrecho del Río Quípar*") overlooked by mountains rising to 1,500 metres above sea-level; it is only 30 kilometres from peaks which tower to over 2,000 metres. In ice-age times its environment was uninhabitable by man for much of the year.

BACKGROUND AND SIGNIFICANCE OF THE PROJECT

Michael Walker writes: I was keen to extend knowledge about *Neanderthal* presence in southeastern *Spain* following my appointment there as Professor of Physical Anthropology at *Murcia University* in 1988. I had come to it from *Sydney University* in Australia, from where I had already carried out research into the southeastern *Spanish Quaternary* (e.g. Cuenca & Walker 1986 and refs.; Cuenca, Pomery & Walker, 1986, and refs.) and *hominins* (Cuenca & Walker 1980; Habgood & Walker 1986), and supervised Phil Habgood's excellent Ph.D. thesis *A Morphometric Investigation into the Origin(s) of Anatomically Modern Humans* which has just been published in the *BAR (British Archaeological Reports International Series, Oxford)* in December 2003. (For other references, see *Reading Suggestiosns*.)

CUEVA NEGRA DEL ESTRECHO DEL RÍO QUÍPAR

I therefore lost no time in accepting an offer to visit *Cueva Negra* made by my friend Miguel San Nicolás, a Spanish prehistorian, who had dug a 2 metre-deep test pit there in 1981 and found possible "Mousterian" stone tools, and extinct animals such as *rhinoceros* (Martínez *et al.*, 1989). Apart from that test pit, no further work had as yet been done there.

No sooner did I see the test pit, than I at once recognized something that the young archaeologist had not, but which my previous research in southeastern *Spain* had taught me to recognize easily - namely, that it was dug through a sediment laid down by the nearby river when it reached the cave from time to time, sediment which also included minerals derived from the rock of the cave walls and roof, and even a small amount of very fine wind-blown soil (known as *loess*) which must have been blown onto long-vanished swamps in front of the cave, on the *River Quípar* flood-plain, by fierce winds which whipped up enormous amounts of dust from barren *tundra* which both surrounded the ice-age glaciers of the *Sierra Nevada* 200 kilometres to the south and sporadically may even have extended northwards at altitudes of over 1,000 metres above sea level near to the cave. The sedimentary fill of *Cueva Negra* (5 metres deep at the back of the cave, perhaps 8 at the front) was deposited when the *River Quípar* (a tributary of the *River Segura*) and swamps and lakes watered by it, sporadically reached the cave at a time when the *Quípar* flood-plain stood close to the level of the cave.

Earlier research, backed up by radiocarbon dating, had shown that the 3 river terraces of the *Segura* river basin may have been formed somewhat more recently than was once thought to be the case. The *lowest* terrace began accumulating only 30,000 years ago when the third major cold stage of the last ice-age began, and after the *middle* terrace had stopped accumulating by some 40,000 years ago at the end of the middle stage of the last ice-age. The early and middle cold stages of the last ice age were when *Neanderthal* folk and "Mousterian" stone tools were especially widespread in Europe. My new excavations at *Cueva Negra* held out great promise of confirming the typology of its stone tools.

As we shall see, things have now turned out to be very different indeed, and far more surprising –amazing!– than I had ever imagined, and certainly very exciting for our understanding of early Palaeolithic archaeology in Eurasia. We know now that the sediments in the cave were laid down long, long before the last ice age, and that its Palaeolithic "Levalloisian" chert flakes some of which have edges modified by "Mousterian" retouch are among the oldest of this kind not only in Europe but even in Africa, and are accompanied by an "Acheulian" hand-axe on a limestone cobble. In short, the sediment had been laid down in the cave long, long before nearby river terraces came into existence, and was protected for posterity by tectonic uplift of the hillside in which *Cueva Negra* lies. More of all that later on!

But let us start now at the beginning. My project got under way when I started to excavate *Cueva Negra* in 1990. Since then I have excavated there during three weeks every year. This field research has provided six adult teeth of *Neanderthal*-like (*Homo sapiens neanderthalensis* or *H. neanderthalensis*) or early (or pre-) *Neanderthal* folk (*Homo heidelbergensis*). The large *Neanderthal*-like teeth show severe attrition (wear); indeed, the crowns of both a canine and an incisor tooth were so worn down that the pulp cavity ("nerve") became exposed: such extreme wear is a well-known characteristic of *Neanderthal* adult teeth.

Here are some English-language publications you might care to look for at your nearest major university or city library (some more recent ones are available from us as pdf) and I include two to be published in the near future. Go to our web-site: <http://www.um.es/antropfisica>:

- 2012 M.J.Walker, M.V.López-Martínez, J.S.Carrión-García, T.Rodríguez-Estrella, M.San-Nicolás-del-Toro, J-L.Schwenninger, A.López-Jiménez, J.Ortega-Rodrigáñez, M.Haber-Uriarte, J-L.Polo-Camacho, J.García-Torres, M.Campillo-Boj, A.Avilés-Fernández, W. Zack: "Cueva Negra del Estrecho del Río Quípar (Murcia, Spain): A late Early Pleistocene hominin site with an "Acheulo-Levalloiso-Mousteroid" Palaeolithic assemblage" *Quaternary International* (early on-line version) doi:10.1016/j.quaint.2012.04.038, pp. 1-25 (ISSN 1040-6182).
- 2012 (forthcoming) M.J.Walker, M.V.López-Martínez, J.S.Carrión-García, T.Rodríguez-Estrella, M.San-Nicolás-del-Toro, J-L.Schwenninger, A.López-Jiménez, 2012 (in press) R. C. Power, M. J. Walker, Salazar García, D. C., Henry, A.: "Neandertal plant food consumption and environmental use at Sima de las Palomas, southeastern Spain." *PaleoAnthropology* (ISSN 1545-0031).
- 2011 M.J.Walker, J.Ortega, K.Parmová, M.V.López, E.Trinkaus: "Morphology, body proportions, and postcranial hypertrophy of a female Neandertal from the Sima de las Palomas, southeastern Spain" *Proceedings of the National Academy of Sciences USA* 108 (25) 10087-10091 (ISSN 1091-6490).
- 2011 (early edition published on-line April 5, 2011. D.O.I.: 10.1016/j.quaint.2011.03.034) M.J.Walker, M.V.López-Martínez, J.Ortega-Rodrigáñez, M.Haber-Uriarte, A.López-Jiménez, A.Avilés-Fernández, J.L.Polo Camacho, M.Campillo-Boj, J.García-Torres, J.S.Carrión-García, M.San Nicolas-del Toro, T.Rodríguez-Estrella: "The excavation of the buried articulated Neandertal skeletons at Sima de las Palomas (Murcia, SE Spain)." *Quaternary International* (ISSN: 1040-6182).
- 2011 M.J.Walker, J.Ortega Rodrigáñez, M. V. López Martínez, K. Parmová, E. Trinkaus: "Neandertal postcranial remains from the Sima de las Palomas del Cabezo Gordo, Murcia, southeastern Spain." *American Journal of Physical Anthropology* 144: 505-515 (ISSN 0002-9483).
- 2011 M.J.Walker, J.Zapata, A.V.Lombardi, E.Trinkaus, "New evidence of dental pathology in 40,000 year old Neandertals" *Journal of Dental Research* 90: 428-432 (ISSN 0022-0345).
- 2010 M.J.Walker, A.V.Lombardi, J.Zapata, E.Trinkaus: "Neandertal mandibles from the Sima de las Palomas del Cabezo Gordo, Murcia, southeastern Spain." *American Journal of Physical Anthropology* 142: 261-272 (ISSN 0002-9483).
- 2009 M.J.Walker: "Chapter 7. Long-term memory and Middle Pleistocene 'Mysterians'." Pp. 75-84 in S.A.de Beaune, F.L.Coolidge, T.Wynn (eds), *Cognitive Archaeology And Human Evolution*. New York, Cambridge University Press (ISBN 0521746116).
- 2009 G.R.Scott, L.Gibert: "The oldest hand-axes in Europe." *Nature* 461: 82-85 (ISSN 0028-0836).
- 2008 M.J.Walker, J.Gibert, M.V.López, A.V.Lombardi, A.Pérez-Pérez, J Zapata, J.Ortega, T.Higham, A.Pike, J-L.Schwenninger, J.Zilhão, E.Trinkaus: "Late Neandertals in Southeastern Iberia: Sima de las Palomas del Cabezo Gordo, Murcia, Spain." *Proceedings of the National Academy of Sciences USA* 105 (52): 20631-20636 (ISSN 1091-6490).
- 2006 M.J.Walker, T.Rodríguez-Estrella, J.S.Carrión García, M.A.Mancheño Jiménez, J-L.Schwenninger, M.López Martínez, A.López Jiménez, M.San Nicolás del Toro, M.D.Hills, T.Walking: "Cueva Negra del Estrecho del Río Quípar (Murcia, Southeast Spain): An Acheulian and Levalloiso-Mousteroid assemblage of Palaeolithic artifacts excavated in a Middle Pleistocene faunal context with hominin skeletal remains." *Eurasian Prehistory* 4 (1-2): 3-43 (Cambridge, Mass., Harvard University, Peabody Museum, American School of Prehistoric Research; ISBN 8391641597, ISSN 1730-8518).
- 2004 M.J.Walker, J.Gibert, A.Eastham, T.Rodríguez-Estrella, J.S.Carrión, E.I.Yli, A.J.Legaz, A. López, M.López, G.Romero: "Neandertals and their landscapes: Middle palaeolithic land use in the Segura drainage basin and adjacent areas of southeastern Spain". In *Settlement Dynamics of the Middle Palaeolithic and Middle Stone Age Vol. 2*, ed. by N.J. Conard. Chap. 14, pp. 461-511. Tübingen: Kerns Verlag, "Tübingen Publications in Prehistory 2".
- 2004 M.J.Walker, J.Gibert, T.Rodríguez, M.López, A.Legaz, A.López: "Two Neandertal Man sites in Murcia (SE Spain): Sima de las Palomas del Cabezo Gordo and Cueva Negra del Estrecho del Quípar". In M. Toussaint, C. Draily y J-M. Cords, eds., *Premiers hommes et paléolithique inférieur. Human origins and the lower palaeolithic. Sessions générales et posters. General sessions and posters. Actes du XIV^e Congrès UISPP (Union Internationale des Sciences Préhistoriques et Protohistoriques), Université de Liège, Belgique, 2-8 septembre 2001. Acts of the XIVth UISPP Congress, University of Liège, Belgium, 2-8 September 2001*, pp. 167-189. Oxford, Archaeopress, "BAR International series 1272".
- 2003 J.S.Carrión, E.I.Yli, M.J.Walker, A.J.Legaz, C.Chain, A.López: "Glacial refugia of temperate, Mediterranean and Ibero-North African flora in south-eastern Spain: new evidence from cave pollen at two Neandertal man sites." *Global Ecology and Biogeography* 12: 119-129.
- 2001 M.J.Walker: "Excavations at Cueva Negra del Estrecho del Río Quípar and Sima de las Palomas del Cabezo Gordo: two sites in Murcia (south-east Spain) with Neandertal skeletal remains, Mousterian palaeolithic assemblages and late Middle to early Upper Pleistocene fauna". In *A Very Remote Period Indeed. Papers on the Palaeolithic Presented to Derek Roe*, ed. by S. Milliken and J. Cook, pp. 153-159. Oxford: Oxbow Books.
- 1999 M.J.Walker, J.Gibert, F.Sánchez, A.V.Lombardi, I.Serrano, A.Gómez, A.Eastham, F.Ribot, A.Arribas, A.Cuenca, L.Gibert, S.Albaladejo, J.A.Andreu: "Excavations at new sites of early man in Murcia: Sima de las Palomas del Cabezo Gordo and Cueva Negra del Estrecho del Río Quípar de la Encarnación." *Human Evolution* 14: 99-123.
- 1998 M.J.Walker, J.Gibert, F.Sánchez, A.V.Lombardi, I.Serrano, A.Eastham, F.Ribot, A.Arribas, J-A.Sánchez-Cabezas, J.García-Orellana, L.Gibert, S.Albaladejo, S., J.A.Andreu: "Two SE Spanish middle palaeolithic sites with Neandertal remains: Sima de las Palomas del Cabezo Gordo and Cueva Negra del Estrecho del Río Quípar (Murcia province)." *Internet Archaeology* 5 (autumn/winter 1998) <http://intarch.ac.uk/journal/issue5/walker_index.html>. You might be able to get access to it for free provided you are an accredited reader at a major library that subscribes to it (most major universities and public libraries in the U.K. subscribe).

The prehistoric fauna at Cueva Negra includes remains of elephant (mammoth), rhinoceros, hyaena, bear, monkey (macaque), wild cattle, bison, wild horse, ibex, extinct giant deer, red deer, fallow deer, lynx, fox, rabbit, pika, tortoise, and over 60 different bird species. Several of these animals are, of course, no longer found in Western Europe nowadays. Of exceptional importance is presence of extinct rodents (some of which were well and truly extinct by 600,000 years ago) which are being studied by Murcia University biologist Antonio López Jiménez for his Ph.D. whom you will probably see a lot during the 2013 field season: especially, the fossil voles *Allophaiomys chalinei*, *Mimomys savini*, *Arvicola* cf. *deucalion*, *Pliomys episcopolis*, *Microtus brecciansis brecciansis* and *Terricola (Pitymys) huescarensis huescarensis*, and other extinct rodents include a fossil, *Allocrietus bursae*, and a wood mouse, *Apodemus flavicollis*, cf. *A. aff. mystacinus* (rock mouse), whilst lagomorphs include an early form of rabbit and also the pika, *Prolagus calpensis*, which also became extinct in Spain during the Middle Pleistocene. Pollen analysis points to temperate conditions rather than cold ones.

The fossil rodents imply that the sediment in the cave was laid down by the start of the Middle Pleistocene, mostly towards the close of the Early Pleistocene 900,000-800,000 years ago. This implies that *Cueva Negra's* Neandertal-like human remains are of the Neandertals' direct forebears, *H. heidelbergensis*, perhaps similar to those from *Sima de los Huesos* (Bone Shaft) inside *Atapuerca Cave* in northern Spain - both there and at *Cueva Negra* the occurrence of "Acheulian" hand-axes sits easily with such an age. In 2005 Oxford University's Dr Jean-Luc Schwenninger took sediment samples and measured background radiation with a portable gamma-ray spectrometer, and although we published his given preliminary dates of about 400-500,000 years ago for *Cueva Negra*, in 2007 and again in 2011 he came and took more samples, at Oxford University Physics Department's renowned Research Laboratory for Archaeology and the History of Art (RLAHA) where he heads its Optical Sediment Luminescence Laboratory. Whereas his initial optical sediment luminescence-dating was based on multiple-grain analysis, his new samples are being analyzed at the Oxford lab using now the laborious time-consuming analysis of single-grains in order to improve accuracy and avoid the likelihood of contamination by recent grains which is ever-present in multiple-grain estimates, and we await his findings eagerly. In 2007-2008 sediment samples at *Cueva Negra* were the subject of palaeomagnetic research by Drs Gary Scott and Lluís Gibert at the Berkeley Geochronology Center and their results demonstrate an age greater than 780,000 years ago though probably less than 990,000, most probably around 900,000-800,000

years ago when there was a warm interglacial period ("Marine Isotope Stage 25" or MIS-25) which would be appropriate for the palaeontological and fossil pollen findings which point to benign temperate conditions.

Among the large mammalian fauna, an Early Pleistocene horse is represented by a characteristic tooth that the Dutch palaeontologist Dr. Jan van der Made, who works at Madrid's Natural Science Museum, considers to belong to *Equus altidens*, as had been suggested by the Barcelona palaeontologist, the late Dr. Josep Gibert. An almost complete rhino skull and mandible belonging to a young rhinoceros (*Stephanorhinus etruscus*) were excavated in 1994, a larger rhino mandible in 1997, as well as a large fragment at a very great depth in our test-pit (square C2a) of a third in 2000, and a magnificent set of extinct giant deer (*Megaloceros* sp.) antlers was excavated in 1995; Dr. van der Made considers it likely that it represents a new species from which two Middle Pleistocene lineages evolved in Europe. A bison horn-core and part of a macaque (cf. *Macaca sylvanus*) upper jaw, as well as a bear tooth and part of a hyaena mandible, are among the large faunal remains. An elephantid mandible fragment, excavated in 1993 at *Cueva Negra*, can hardly belong to any other species than *Mammuthus meridionalis*, which was the only fossil species that lived in Spain and southern Europe 800,000 years ago. Altogether, from 1999-2012, *Cueva Negra* has provided us with some 16,000 items that represent skeletal fragments of mammals, around over 4,000 of birds, and over 2,000 of reptiles, especially tortoise (which is mainly the extinct *Eurotestudo hermanni*, according to palaeontologist Dr. Xabier Murélagua of the University of the Basque Country who has studied our collection). Of these totals, approximately 200, 200 and 50, respectively, correspond to the 2012 field season. This is a preliminary estimate as there is a large number of splinters and fragments, several of which may turn out to be classifiable on further study by specialists in particular areas of comparative vertebrate anatomy and palaeontology. These splinters and fragments amount to 18,000 items of which some 500 correspond to the 2012 fieldwork, though we are still studying these.

A few years ago my colleague in the Biology Faculty at Murcia University, the palaeopalynologist Dr. José Carrión (Botany Dept.) defined pollen in soil at our site of species which include both evergreen and deciduous oaks (such as *Quercus faginea*) and some other broad-leaved trees, pointing to greater availability of surface water and benign temperate conditions; see the article in *Global Ecology and Biogeography* vol. 12, cited above, and he and his team took more samples during 2009, 2010 and 2011. However, since publishing that article we all agree now that the sediment sampled is far older than we had ever imagined when we had sent the manuscript to that journal - in which the pollen was assigned to the Late Pleistocene, whereas now we know it is most probably late Early Pleistocene (Walker et al., 2012, *Quaternary International* early on-line edition). Previously, British avian palaeontologist Anne Eastham had defined over 60 bird species, including diving ducks, waders, and other waterfowl which point to former lakes in what today are rather dry river valleys in which rivers are little more than small streams. Other birds, such as Jays and Woodpigeons eat acorns, and hinted at presence of oaks even before their pollen was identified this year. Yet other birds such as larks and plovers show that there were also wide areas of open country near the site. In short, the site was located conveniently for exploiting resources present in different local environments quite close to hand, from wetlands with stands of broad-leaved trees, to parkland where open spaces were interspersed with stands of woodland, and open rough steppe with stands of pines and other conifers, and finally steep hillsides with crags and mountainsides.

The Palaeolithic assemblage is represented at *Cueva Negra* by over 1,000 classifiable pieces (of which more than half are struck flakes without retouch) and over 25,000 fragments and spalls, found by us over the period 1990-2012. Most of it is made from poor quality chert, quartzite, Jurassic limestone and marble, with relatively little good flint, all of which was taken to the cave by *H. heidelbergensis*. Since 2004 we have excavated some fine examples of the Levalloisian core-reduction technique of preparing flint flakes, in deep layers close to where we had excavated the Acheulian bifacially-flaked hand-axe, in 2003. These layers also have small stone tools with steep abrupt Mousterian retouch. It is very exciting that an Acheulo-Levalloiso-Mousterian industry was present ca. 900,000 years ago because it shows conclusively that all three kinds of Palaeolithic stone-tool preparation formed part of a single tradition from the end of the Early Pleistocene in Europe. The 2012 field season excavated very many small implements from deep levels – at least ten with retouch as well as ten struck flakes without retouch – and around two hundred spalls and fragments.

One very important source of raw materials for making stone artifacts was an outcrop of conglomerate 800 metres (half a mile) away from *Cueva Negra*. The outcrop represents a fossil shingle beach of the shore of the Miocene *Tethys* Sea, which, millions of years ago, in the Tertiary geological era, stretched from the Atlantic Ocean across what is now the Mediterranean Sea and eastwards to what is now the Persian Gulf. The pebbles and cobbles at the outcrop include flint, chert, Jurassic limestone and quartzite. None of these occur in the rock walls or roof of *Cueva Negra*, which are somewhat later Miocene biocalcarene rock. Our identification of the nearby local rock source was very greatly enhanced in 2011 thanks to collaboration at Arizona University, where recent anthropology graduate Winston Zack, who spent three field seasons here, submitted many samples he took, from both the site itself and chert outcrops in its vicinity, to Dr. Alex Andronikov at AU's Lunar and Planetary Sciences Laboratory who has conducted spectroscopic analysis of rare-earth trace elements in the cherts.

At the conglomerate outcrop, we have picked up a typical waste end-product (a small "*Levallois disc-core*") which is what was left over after early humans had removed from a pebble here several flint flakes for use as everyday cutting, scraping, or piercing tools. We have also picked up small retouched Palaeolithic implements including a small scraper similar to others excavated at *Cueva Negra*. Another small disc core, this time of limestone, was also found on the hillside near the cave itself. Upto now, small Levalloisian disc cores (even those with minimal peripheral prepared facetting) had not been found that date from before 300,000-400,000 years ago in Europe and the Near East. At *Cueva Negra* our excavations show that Levalloisian flakes are present in deep layers that are very much older and the two disc cores are likely to be no less ancient. Of special interest at *Cueva Negra* is are finds of 3 so-called "soft" hammers, or soft knapping billets which were used for knapping stone delicately and made from the butts and pedicles of the antlers of deer.

Since 2004 we have excavated some splendid flakes produced by the Levalloisian core-reduction technique, in layers close to where in 2003 we had excavated a bifacial core-tool which is an Acheulian hand-axe. It is extremely gratifying to be able to show presence of very different knapping techniques at such great depth. Our 2003 campaign at *Cueva Negra* had concentrated on an area adjoining that in which our 2001 excavation of a 3 x 1 metre area explored a consistent palaeolithic living surface with fragments of stone knapping, broken bone fragments, and other débris. It was at a position of intermediate depth with regard to the levels defined at the site, but was probably not encountered during earlier campaigns that went deeper because where those excavations took place there had been a massive slab of rock which fell from the roof during the Pleistocene and occupied most of the area behind where we identified this living surface in 2001. In 2003 we had begun to excavate a 3 x 1 metre area next to it. At the end of the campaign we were a few centimetres above where we expect to find it, which we did, when in the 2003 campaign. This very exciting phase of our work at the site culminated in the marvellous surprise that was the excavation here of an Acheulian hand-axe and confirmed the extent of an important activity area.

The hand-axe had lost its tip in antiquity, no doubt through (mis)use. A remarkable aspect of the artifact is that it was made by bifacial working of a flat cobble of local limestone, not chert, probably got from a nearby outcrop of conglomerate mentioned earlier. The spectacular find brought into perspective two matters that had concerned us previously: first, the widespread evidence for knapping of limestone at *Cueva Negra* (spalls and chips, flakes, retouched pieces, and perhaps the disc core mentioned earlier), and, secondly, a hitherto puzzling singular find of a flat limestone cobble with bifacial retouch in the shape of a chopping-tool of "pick"-like form, that may have been an unfinished hand-axe, excavated in the same level of an adjoining square in 2001.

The significance of the coexistence of Acheulian, Levalloisian and Mousterian techniques of stone artefact preparation is that it gives support to Southampton University's Professor Clive Gamble who has stressed the importance of the coexistence in Europe, from half-a-million years ago, both of assemblages comprising large numbers of bifacially-flaked core-tools, and assemblages of retouched flake tools, and has posed a crucial matter for archaeologists to consider from the viewpoint of alternative core-reduction sequences (the French call them *chaînes opératoires*) of palaeolithic knappers: "*With the chaîne opératoire we now have the methodological tools and a conceptual model for moving the debate onto the productive pastures of hominin involvement with their taskscapes. For example, were these taskscape skills merely those of tool assisted hominins ... or are we dealing with more sophisticated capabilities comparable in many respects to modern humans ...?*" (Gamble, C.S., 1999, *The Palaeolithic Societies of Europe*, Cambridge University Press, p. 138).

Put another way, did, in Europe, those Pleistocene Pre-Neanderthal (*H. heidelbergensis*) forerunners of Neanderthals behave in so very similar a fashion to Pleistocene *H. heidelbergensis* forerunners in Africa of anatomically-modern *H. sapiens*, such that (a) Neanderthals ought to be best regarded as *H. sapiens neanderthalensis*, and (b) both they and anatomically-modern *H. sapiens* ought to be regarded as evolutionary descendants of a common Afro-European *H. heidelbergensis* which was wholly comparable and commensurable throughout as regards not only skeletal anatomy, but also *behaviour* - in so far as this is demonstrated by the ease with which they were able to follow *alternative* reduction sequences in knapping stone obtained locally at *Cueva Negra*, namely, a bifacial reduction-sequence of cores into bifacially-flaked core tools such as Acheulian hand-axes, and preparation of small disc cores on which repetitive flaking reduced these further still, in order to remove flakes, of predetermined size and shape, for subsequent Mousterian edge-retouch into flake-tools such as scrapers or points?

I have attempted to get to grips with this aspect of cognitive evolution 900,000 years ago at *Cueva Negra* in my recent contribution published in 2009, "Chapter 7. Long-term memory and Middle Pleistocene 'Mysterians'," pp. 75-84 in S.A.de Beaune, F.L.Coolidge & T.Wynn (eds), *Cognitive Archaeology and Human Evolution* (Cambridge and New York, Cambridge University Press. ISBN 0521746116). The book includes papers presented at a colloquium on cognitive evolution during the XV Congress of the International Union of Prehistoric and Protohistoric Sciences at Lisbon in 2006. Tom Wynn is Professor of Anthropology at the University of Colorado at Colorado Springs where Fred Coolidge is Professor of Psychology, and they have written many articles about Palaeolithic technology and cognitive evolution as well as the book *The Rise of Homo Sapiens* published in 2009 by Wiley-Blackwell, and Sophie de Beaune is a prehistorian at the University of Lyons who also has published in the same area.

I have dealt with the matter also in a recent scientific article: M.J.Walker, M.V.López-Martínez, J.S.Carrión-García, T.Rodríguez-Estrella, M.San-Nicolás-del-Toro, J-L.Schwenninger, A.López-Jiménez, J.Ortega-Rodríguez, M.Haber-Uriarte, J-L.Polo-Camacho, J.García-Torres, M.Campillo-Boj, A.Avilés-Fernández, W. Zack: "Cueva Negra del Estrecho del Río Quípar (Murcia, Spain): A late Early Pleistocene hominin site with an "Acheulo-Levalloiso-Mousteroid" Palaeolithic assemblage" *Quaternary International* (early on-line version) doi:10.1016/j.quaint.2012.04.038, pp. 1-25 (ISSN 1040-6182).

Neither the complexity nor the antiquity of our *Cueva Negra* tool-kit need come as a complete surprise. In Africa, the Levalloisian core-reduction technique goes back to 1,400,000 years ago (I. de La Torre, R.Mora, M.Dominguez-Rodrigo, L. de Luque & L. Alcalá, 2003: "The Oldowan industry of Peninj and its bearing on the reconstruction of the technological skills of Lower Pleistocene hominids". *Journal of Human Evolution*, 44 (2), 2003, p. 203-224). In Africa, reduction of stone to fashion hand-axes goes back as far as 1,700,000 years ago. Both types of reduction imply cognition of imaginary secant planes that divide volumes, symmetrically in the case of bifacial hand-axe fashioning, but asymmetrically in the case of Levalloisian disc cores such that the major volume could be knapped in a way that in the end "released", so to speak, the flake of intended shape to be removed from within it (Tom Wynn has written that this is the most demanding and complex of all reduction-sequences ever developed). It tells us much about the evolutionary significance of early human cognitive awareness that probably lay behind the dispersal of *Homo* out of Africa and throughout Eurasia before 1,500,000 years ago.

Our 2011 season's astounding discovery of traces of ancient fire lying deeply within the cave sediments confirms the ability of humans to survive in higher latitudes than those of equatorial Africa where their ancestors originally had evolved between 4 and 2 million years ago. Fire allowed our ancestors to keep warm at night and wild animals at bay, but especially to cook food and thereby enhance rapid absorption of nutrients so necessary for physiological metabolic processes in the body and especially the brain. Ours is the oldest firm evidence for fire at a Palaeolithic site outside Africa (where it is found at sites going back to 1,700,000 years ago). The evidence includes both many fragments of white, calcined bone that Boston University's Archaeology Department tells us had been subjected to high temperatures of 500°-800° C (using the methodology developed there by Professor Paul Goldberg of Fourier-transform infra-red spectroscopy). Near them, at Williams College, Dr. Anne Skinner is using electron spin resonance analysis to determine the temperature. Several spalls of burnt chert and a spectacular lump that had exploded owing to thermal shock which was uncovered with the resulting razor-sharp splinters still in place like the petals of a rose (Dr. Daniel Richter of Bayreuth University in Germany is studying some of the burnt chert to try to obtain an exact thermoluminescence date for the combustion event). Geoarchaeologist Dr Diego Angelucci (Trento University, Italy) is an expert on sediment micromorphology, which he is studying at our site where he is considering our burnt evidence in its context of a sediment that seems to be derived from a kind of fossilized ash. The French geophysicist Dr. Régis Braucher has taken samples for cosmogenic nuclide analysis that has provided exact chronological dating at some other sites (Dr. R. Braucher, Laboratoire de Nucléides Cosmogéniques LN2C, CEREGE UMR 6635, CNRS, Aix-en-Provence). Dr. Yanni Gunnell of Lyons-2 University is investigating sedimentary granulometry at our site.

People sometimes ask for my views on hominin evolution in the Pleistocene. Were *Neanderthals* an evolutionary side-track with a dead end, or were they part of a seamless web of evolving humans? Well, to see what I think, try reading two of my articles "The quest for our human ancestors" in *The Review of Archaeology* vol. 24 (1): 20-38 (2003) and "Hominin Tar Babies, Palaeolithic Chewing Gum, Middle Pleistocene Gloop, and Dissipative Systems" in *The Review of Archaeology* vol. 26 (1):1-25 (2005).

SIMA DE LAS PALOMAS DEL CABEZO GORDO

Over 100 years ago, miners on the hill of Cabezo Gordo (which simply means Big Hill) were attracted by a vein of the iron ore magnetite which made a dark stain in the pale-grey marble rock of the hillside. The iron had welled up in molten form through the limestone when volcanic activity was fierce here during the early Mesozoic. The miners dug an artificial shaft down hoping to follow the vein which, however, petered out, and they found themselves digging hard breccia out of a natural cavern which went not only downwards, but also back up to the surface again in what we now call the *Sima de las Palomas* which is a vertical shaft 18 metres deep the mouth of which is at 125 metres above sea-level on the barren hill-side; the miners took out more than three-quarters of its natural fill. To speed up removal of this unwanted material, they blasted a horizontal tunnel through the hillside to the bottom of the main shaft. Disgusted, no doubt, by finding no iron after so much work, they did not bother to remove that part of the breccia which today still forms an intact column, rich in fossils and stone tools, from top to bottom against the rear wall of the natural shaft, and which we have been excavating scientifically since 1994.

Chance discovery by a spelaologist called Juan Carlos Blanco Gago in 1991 of a very important fossil, consisting of parts of the upper and lower jaws of a human face, which he noticed in the side of the natural shaft of *Sima de las Palomas* about three metres below the surface, drew our attention to the great research potential of the sediments in the shaft (Gibert, Walker, *et al.*, 1994). The spelaologist belonged to a local environmental conservation group, and he was descending the shaft on an abseil rope to find out what kinds of birds nested in the cave. He saw the fossil in the upper part of sediments banked against the rear wall of the shaft and pulled it out, without realizing what it was. Being a careful person, he saved it and showed it to us. On cleaning, it turned out to belong to the lower part of the face of a Neanderthal - parts of the upper and lower jaws, in fact. Neanderthals lived in Europe between 150,000-35,000 years ago, and are assigned to an extinct human subspecies, *Homo sapiens neanderthalensis* (or *H. neanderthalensis* for short).

Preliminary field-work by us at this site began in 1992 and continued in 1993, when, together with my palaeontologist friend, the late Dr. Josep Gibert of the "Dr.M.Crusafont" Palaeontological Institute and Museum at Sabadell (a satellite city of Barcelona), and our helpers, we sifted through rubble which iron-miners who entered the natural cave 100 years ago had piled up inside or thrown out onto the hillside. The miners had also driven a horizontal tunnel through the rock of the hillside to meet the bottom of the shaft. The tunnel became partly filled up with rubble which had fallen down the shaft, and has been removed and sieved to give us many important finds. The important task of sieving the mine rubble on the hillside and in the tunnel gave us 25 finds of Neanderthal bones or teeth. In 1997 a Neanderthal maxilla (upper jaw) bone was found this way. Other finds include parts of jawbones (mandibles) belonging to three adults and two children, various loose teeth, part of a child's maxillary bone of the face, parts of 2 adult cheekbones (zygomatic bones) and two fragments of the massive Neanderthal bony brow ridges over the eye socket, as well as several large fragments of bones of the skull vault - frontal, parietal, temporal and occipital bones. We have also found several vertebrae and fragments of arm bones (humerus, ulna), leg bones (femur, fibula), finger and toe bones, and part of a hip-bone. Some of the bones show traces of burning. Because all these finds are from the mine rubble we do not know where originally they had come from within the cave.

Tens of thousands of years before, the natural shaft slowly filled up with earth and stones which trickled down off the limestone hill-side, together with water rich in calcium carbonate dissolved out of the limestone and which percolated into the earth and rock, cementing them hard in a compact fossil conglomerate called *breccia*. In it, bones of extinct animals hint that sometimes it was visited by panthers who maybe climbed down into the top of the cave with an ease common to all cats, though it is perhaps even more likely that they were hunted and killed by Neanderthals. When the deep shaft was almost filled up, Neanderthal folk settled in, unaware that the earth floor they camped on was over 15 metres thick. Eventually, the skeletons of three of them (including that whose jaws had been found by Juan Carlos Blanco Gago) became covered by a downward-sloping heap of very large stones. Some may have been laid intentionally over the bodies; others may well have been washed into the mouth of the former shaft by heavy rainstorms - we once were caught unawares by one when working, and had to spend a couple of hours in our excavation cowering behind a short-lived albeit terrifying waterfall, unable to climb out through it. The two-metre deep, sloping pile of stones over three Neanderthals whose skeletons were well preserved beneath it, became partly cemented later on by calcium carbonate; we now call this mass of cemented stones "conglomerate A". Nevertheless, it was porous enough for finer sediment to pass through it afterwards and accumulate behind it.

This later, finer sediment contained 65 dispersed fragments of bones and teeth of Neanderthal adults and children, as well as Mousterian or Middle Palaeolithic implements made from flint flakes and animal bones. We excavated the mandible of a baby and another of a child. In 1998 we excavated a large adult mandibular fragment that had a small piece of burnt animal bone cemented to it. This piece of burnt animal bone gave an accelerator radiocarbon (AMS-¹⁴C) determination of 35,000-40,000 years ago at Oxford University's Research Laboratory for Archaeology and the History of Art (RLAHA) where the Director of the Radiocarbon Laboratory and Accelerator Unit, our colleague the archaeologist Dr. Tom Higham tells us that his determination of 34,450±600 BP (OxA-10666) corresponds to a real age of at least 40,000 years ago when calibration factors are applied; Tom subsequently obtained a second determination, of 35,030±270 BP (OxA-15423) on burnt lagomorph (rabbit) bones found nearby. After calibration the dates probably correspond to the period 43-38,000 BP, but because of the ever-present possibility of later contamination by minuscule amounts of ¹⁴C formed subsequently, the most that can be said is that the real age is *no later* than 40,000 years ago and could be very much older. A uranium-series date of 43,800±750 (APSLP4) obtained on bone by Dr. Alistair Pike at the University of Bristol's Archaeology Department hints at an age of about 45,000-43,000 years ago. Because contamination might here again have affected the estimate, it is better to regard it still as the *minimum* age of the uppermost two metres of the finer sediment that had built up behind the cemented stones of conglomerate A that contains three articulated Neanderthal skeletons (see next paragraph). Here Dr. Pike obtained two uranium-series dates, of 54,100±3850 (APSLP-1) and 51,000±1250 (APSLP-6) on fragments, respectively, of Neanderthal human bone and animal bone, using laser ablation multicollector mass spectrometry. They are comparable to an optically stimulated sediment luminescence date of 54,700±4700 date obtained (on sample X2509) by Dr. Jean-Luc Schwenninger, head of the Optical Sediment Luminescence Dating Unit Laboratory of Oxford's RLAHA. For more about the dating see our 2012 article: M.J.Walker, M.V.López-Martínez, J.Ortega-Rodríguez, M.Haber-Uriarte, A.López-Jiménez, A.Avilés-Fernández, J.L.Polo Camacho, M.Campillo-Boj, J.García-Torres, J.S.Carrión-García, M.San Nicolas-del Toro, T.Rodríguez-Estrella: "The excavation of the buried articulated Neanderthal skeletons at Sima de las Palomas (Murcia, SE Spain)." *Quaternary International* 259: 7-21, 2012 (ISSN: 1040-6182).

From about two metres below the top entrance that gives access to both our upper excavation cutting and the main shaft of Sima de las Palomas, we have excavated articulated Neanderthal skeletons with two new skulls and attached mandibles, in 2005, 2006, 2007,

2008 and 2009. The first find which was made back in 1991 by Juan Carlos Blanco Gago had come from that deep position, and as it was of a mandible in anatomical connexion with the maxillae, it is clear that in fact there has been three Neanderthal individuals here. The articulated skeletal remains of three Neanderthals (two adults and a juvenile) here include skulls, chest, upper limbs, back-bone, pelvis, lower limbs, and bones of the hands and feet. There is one remarkably well-preserved foot, and also an articulated elbow joint (lower part of humerus in articulation with upper part of ulna and radius). They are being cleaned, slowly and carefully, by Biology graduate and PhD candidate Jon Ortega Rodríguez in the Physical Anthropology research laboratory at Murcia University's Biology Faculty; the work has been greatly advanced by our acquisition in 2011 of a small compressor and vibroscalpels (sometimes called "air-scribe" tools). Just how many different bones there are must await cleaning because they are within cemented breccia.

The Neanderthal skeletal remains were excavated a few centimetres above where Juan Carlos had plucked out the Neanderthal skull fragment of the two maxillary bones and teeth cemented to the jawbone, when he descended on his abseil rope twenty years ago. Our skeleton SP-96 is 85% complete and belonged to a young woman whom we now call "Paloma". Below her was a child's skeleton (SP-97). Both have well-preserved skulls and mandibles. Underneath them was another adult (SP-92) close to which there were Paleolithic flints and some burnt animal bones, perhaps remains of food eaten near the time the Neanderthals died. None of the three skeletons showed signs of burning. Maybe they were covered up with large stones, perhaps to stop hyaenas and leopards from scavenging (bones of both carnivores occur at the site). Our Neanderthal skeletons are of worldwide importance because almost 40 years have passed since the last time a European Neanderthal was excavated with its skeleton articulated in anatomical connexion (at St-Césaire in France).

The articulated skeletons belong to a time about 50-60,000 years ago, according to the findings of both Dr. Jean-Luc Schwenninger (54,700±4700 BO, sample X2509), and Dr. Pike (51,000±1250 and 54,000±3850 BP, APSLP6, APSLP1). Their results are comparable to a date obtained a few years ago on an aragonite crystal from a nearby level by uranium-series dating of 56,000 (+13000/-10000) BP by Dr. Joan-Antoni Sánchez-Cabeza at the Physics Department of the Autonomous University of Barcelona. For more about the dating see our 2012 article: M.J.Walker, M.V.López-Martínez, J.Ortega-Rodríguez, M.Haber-Uriarte, A.López-Jiménez, A.Avilés-Fernández, J.L.Polo Camacho, M.Campillo-Boj, J.García-Torres, J.S.Carrión-García, M.San Nicolas-del Toro, T.Rodríguez-Estrella: "The excavation of the buried articulated Neanderthal skeletons at Sima de las Palomas (Murcia, SE Spain)." *Quaternary International* 259: 7-21, 2012 (ISSN: 1040-6182).

The female skeleton SP96 is the subject of an article published in June 2011 in the weekly *Proceedings of the National Academy of Sciences of the USA (PNAS)*. How close were the three skeletons in time to those other *Neanderthal* remains found dispersed in the finer sediment that accumulated later on behind conglomerate A? It is not wholly beyond the bounds of possibility, let alone outside the likely ranges of error of the dating methods at our disposal, that only a short period of time separated them or perhaps two or three thousand years separated them.

The total number of separate bone fragments and teeth from Sima de las Palomas identified to date is almost three hundred items. The number of mandibles (or fragments of them) that belong to different Neanderthal individuals is nine (three were found in mine rubble; three from the uppermost part of our excavation; two belong to excavated articulated skeletons SP-96 and SP-97 and it is very likely that the one removed from the side of the shaft in 1991 by Juan Carlos belongs to articulated skeleton SP-92).

Towards the end of 2006 I wrote asking about the possibility of hunting for Neanderthal DNA in our *Sima de las Palomas* bones to Professor Svante Paäbo, the internationally renowned geneticist who conducts research into both mitochondrial and nuclear DNA from Neanderthal bones, who is the Director of the ultra-modern, seven-storey-high, Max-Planck Institute for Evolutionary Anthropology at Leipzig in Germany, and whom I had first got to know at a meeting in Madrid back in 1993. He invited me to Leipzig where I gave a talk to his Institute in 2007 which was well received. Svante Paäbo made useful suggestions about how we might best excavate the *Sima de las Palomas* Neanderthal skeletal remains, wearing face-masks and surgical gloves, and putting the fossils into sterile containers. This we did in 2007 and in that autumn Svante's then Ph.D. student, Oxford University Biology graduate Dr. Adrian Briggs, came to Murcia and we helped him as he extracted samples from our newly-excavated Neanderthal bones in a sterile operating theatre in Murcia University's Veterinary Science Faculty. Dr. Paäbo reported back from Leipzig that our excavation technique had been so good that almost no modern human DNA contamination could be detected, though so far, alas, neither has any Neanderthal DNA been identified. In 2008 Dr. Paäbo sent over another of his Ph.D. students, Dr. Thomas Maričić, who took part in our *Sima de las Palomas* field season, sampling human remains during excavation. He took the samples back for analysis at Leipzig. Alas, Dr. Paäbo's team there still failed to detect either nuclear DNA or mitochondrial DNA; however because they could not detect contamination by modern DNA either, Dr. Paäbo thinks that the field methodology was adequate but that over many thousands of years high ambient summer temperatures at the site have destroyed Neanderthal DNA.

Another world-famous researcher into Neanderthal skeletal fossils is also collaborating closely with us: Professor Erik Trinkaus of the Washington University of St. Louis, Missouri (U.S.A.). Erik visited Murcia to study the *Sima de las Palomas* remains twice in 2007 and again for ten days in January 2011 for a morphological study of "Paloma" (SP-96) that was published in June 2011 in the *Proceedings of the National Academy of Sciences of the USA (PNAS)*. We are privileged to have Professor Trinkaus working on the collection. Another collaborator is Barcelona University anthropologist Professor Alejandro Martínez Pérez-Pérez who has taken casts of all of the teeth at *Sima de las Palomas* which help him to conduct research into attrition and wear on the crowns. His work complements research on our teeth that has been undertaken over the years both by the dental anthropologist and orthodontician Dr. Vince Lombardi from Pittsburgh, a long-standing collaborator who joined us in the field again in 2011, and in my Subdepartment of Anthropology at Murcia by Dr. Josefina Zapata, as well as microscopic research on the dental attrition (tooth wear) by Dr. Alejandro Pérez-Pérez at Barcelona University. In 2011 we were visited by physical anthropologist Dr. Patricia Bayle, at Bordeaux University who returned in March 2012 with Professor Kate Robson-Brown from Bristol University together with its microscanner which gave excellent resolution with the *Sima de las Palomas* loose teeth, on which detailed research is continuing. Two students of Professor Trinkaus are also assisting in our dental research, John Wilman who visited us in 2011 and Sarah Lacy who was present with Drs. Bayle and Robson-Brown in March. We were also visited by Dr. Amanda Henry from the Max Planck Institute for Evolutionary Anthropology at Leipzig where she and Dr. Robert Power study the plant component of Neanderthal diets by investigating phytoliths in dental calculi, and she now has detected their presence in calculi of *Sima de las Palomas* teeth.

In 2011 we began to carry out CAT scanning of the excavated Neanderthal skeletons using the new General Electric scanner installed at the end of 2010 in Murcia University's Veterinary Faculty Hospital, and to help us to orientate the study we were joined by the renowned Swiss expert in scanning Neanderthals and other hominids, Professor Christoph Zollikofer, Director of Zurich University Anthropology Institute, and his wife Dr. Marcia Ponce de León (they have published many important scientific papers using the technique).

Later in 2011 Jon Ortega Rodríguez and I visited their Zurich lab. Jon returned in Autumn 2012 for a few weeks to learn the IT techniques our Swiss colleagues use, and we published a poster with them that I presented in September 2012 in Bordeaux at the 2nd Annual Meeting of the recently formed European Society for the Study of Human Evolution. Jon is continuing the work with the scanner here at Murcia with the dual aim of both facilitating location of bone hidden in breccia cement and especially the creation of virtual reconstructions of Neanderthal skeletal parts using image-analysis computer programs. Klára Parmová from the Czech Republic came again this year from Brno, in fact twice, to help us once more in the field at Sima de las Palomas and then later on after Jon returned from Zurich to work with him in the lab, and her help is greatly valued by us, and so is that of our lab technician Ana Asensio and of our new graduate Ángel Buitrago who has spent several seasons with us in the field as well as helping to clean the skeletons in the lab, and we should also mention undergraduate David Buendía who is learning the technique.

Animal remains from *Sima de las Palomas* include teeth of hippopotamus and hyaena, and bones or teeth of leopard, aurochs, wild horse, ibex, red deer, lynx, fox, badger, hare and tortoise. Between 1992 and 2011 several hundred classifiable skeletal elements have been found and around thousands of bone splinters and fragments many of which still have adherent cemented breccia. Of particular interest are leopard remains. A complete leopard skull was found in a low position in the breccia column by the same speleologist who found the first hominin in 1991, and according to both the palaeontologist, the late Dr. Josep Gibert, and another palaeontologist who has also helped studying the fauna, Dr. Alfonso Arribas of the Museum at Madrid's Instituto Tecnológico y Geológico de España, it belongs without doubt to a late Middle Pleistocene type, known from southern France as *Panthera pardus cf. lunellensis*. In 2006 we excavated two phalangeal bones of leopard paws in our upper cutting, and it may be wondered whether the remains found in 1991 could have fallen from above due to mining operations in recent times. In 2011 porcupine jaws were excavated and Sara Rhodes presented a master's thesis at Toronto University on them which appear to belong to *Hystrix brachyura*. Sara is returning in 2012 when she will turn her attention to some aspects of Cueva Negra faunal remains. Laboratory work is still in progress cleaning and classifying the 2012 faunal finds, but preliminary estimates suggest that some 40 classifiable mammalian items, 50 bird items and well over 40 of tortoise (and perhaps other reptiles) have so far been separated although there are at least 200 splinters and fragments.

In 2003 my colleague in the Biology Faculty at Murcia University, the palaeopalynologist Dr. José Carrión, in the Botany Dept., defined pollen in soil at our site of species which include both evergreen and deciduous oaks (such as *Quercus faginea*) and some other broad-leaved trees, pointing to greater availability of surface water; see the article in *Global Ecology and Biogeography* vol. 12, already mentioned. He and his team returned and took more samples in 2009 and 2010 and we await their results.

Even before we were able to build a 20-metre high scaffolding tower and take aragonite crystals for uranium-thorium dating from the breccia column, we had a fair idea of its age because we had sent 3 fragments of fossil animal bone, cemented in breccia thrown out from the shaft by the miners which we had found on the hillside, to geochemist Dr. Peter Pomery of Australia's University of Queensland who obtained electron spin resonance dates of 83,000/42,000, 146,000/73,000 and 532,000/266,000 years ago. The estimates served to give a rough idea of the great antiquity of the remains though Dr. Sánchez-Cabeza's uranium-series dates gave us the age-range of the visible *breccia* column with better accuracy and precision as spanning the last interglacial period and continuing into the last glacial period.

The Mousterian industry from the site includes now 900 classified pieces, from retouched scrapers to simple struck flakes and cores (and there are around 3,200 unclassifiable fragments of flint and other stone materials that also must have been brought to the cave by the Neanderthals, because they do not occur in the limestone in which it lies). The 2012 campaign found a few retouched Mousterian implements and at least 40 fragments and spalls. Many pieces are on good quality flint (and even occasionally jasper), but there are also rock-crystal implements and others of marble, siliceous metamorphic dolomitic limestone, quartzite, and milky quartz. There are typically Mousterian stubby points or convergent scrapers, and flat triangular projectile points are common (of Levallois or "pseudo"-Levallois type).

At the foot of the breccia column, a test pit in the floor of the main chamber shows that it lies on a depth of at least a metre-and-a-half of rubble and soil disturbed by the miners who left behind a Winchester rifle cartridge in it! In 1997 we considerably extended the excavation here down into what seemed likely to be undisturbed sediments without, however, any palaeontological or palaeolithic remains so far. This work continued downwards and outwards in 1998, 1999, 2000, 2001 and 2002. We thought we had been rewarded when we discovered a layer extraordinarily rich in microfaunal remains that we meticulously excavated until in 2001 we found iron nails and hooks in it, indicating that it was no more than a heap of skeletons of rock doves, bats and small mammals, which the miners who entered the cave in the nineteenth century must have gathered together and burnt, before covering them with soil.

In 2002 we excavated down a further 1.5 metres in the deepest sediments in this cutting until calcrete flowstone covering cobbles and limestone rock blocked further excavation. We found three palaeolithic struck flint flakes, all heavily patinated, and infer from the nature of the sediment that reworking of it had taken place, perhaps during the last interglacial period when the sediment here was waterlogged because the water table was higher than today. The reworking, combined with mining operations, indicates that this part of the cave does not afford a sequence of undisturbed deep Pleistocene sediments and excavation here has been discontinued therefore. We now think that those sediments hint at a new interpretation of the sedimentary and geomorphological history of the cave. It is plausible that today's main chamber is the result of miners having broken through a rock wall from an open natural karstic rift, down which they had first entered the cave, into a nearby karstic rift that they found to be completely filled with Late Pleistocene breccia (most of which they threw outside). Only at a greater depth still, we now think, did these two hypothetical rifts communicate formerly via a horizontal phreatic karstic network of small passages in which mixing of waterlogged sediments took place whenever the water table rose high enough to inundate them; this network did not open on to the hillside and therefore could never have been entered by animals or humans during the Middle or early Late Pleistocene. Thus the lower cutting we had excavated beneath the open rift entered by miners is of no palaeoanthropological interest.

It is nevertheless possible that beneath our scaffolding tower, sediments deep to it, in what we now believe was once a parallel rift, could contain material that had fallen into it from above, including the three palaeolithic flakes that probably became displaced laterally, in the aforementioned hypothesized horizontal network, for us to discover deeply below the rift whereby the miners had entered the cave system. We also suspect the rift containing the breccia column may have been full of water during the last interglacial period, opening at the surface as a well of water where our upper cutting now is. Five metres above the floor of the main chamber, where the column of breccia juts forward below the vertical wall that it presents higher up, we conducted excavation of a trial cutting in the lower part of sedimentary column, but the results to date have not been particularly informative.

CONCLUDING REMARKS

For a palaeoanthropologist, having *two* hominin sites only 100 kilometres apart is a dream come true! Quite apart from the potential of exciting new discoveries, the presence of 2 sites of sites of archaic European humans in contrasting environments has opened up fascinating possibilities for comparing and contrasting the ways in which Neanderthal folk utilized the different environments and the natural resources they offered, namely the upland environment of *Cueva Negra* and the milder coastal one, even during the ice-age, of *Sima de las Palomas*.

RESEARCH GOALS AND HOW WE ACHIEVE THEM

Our 2013 field research will involve excavation at both *Sima de las Palomas* and *Cueva Negra*.

Our main objective at *Sima de las Palomas* is to continue to excavate, from above downwards, the hominin and stone-tool bearing sediment which forms a 20 metre-high column of breccia against the rear wall of the natural shaft. This is a technically complicated task. 100 years ago iron-miners entered the shaft and removed much of the sediment they found in it. They left behind a 20 metre-high column of breccia under a rocky overhang against the rear wall of the shaft.

In order to excavate the column of breccia scientifically, a 20-metre high scaffolding tower with platforms was built inside the shaft in 1994, and excavations in 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2009, 2010, 2011 and 2012 have already produced many important new hominin finds in early Late Pleistocene layers belonging to the early part of the last ice age.

Every morning we all walk up a steep, narrow footpath to the site. This takes about 15 minutes. Then, those helpers who excavate at the top of the column of breccia must also scramble up the hillside to the mouth of the shaft, which is covered by an iron grille. We open the grille and climb down a 3-metre ladder to the platform at the top of the tower. For safety, we wear stout boots because the hillside is steep and rocky and it is easy to sprain an ankle.

When we are excavating in our upper cutting here, we may wear safety harnesses which are belayed from the tower, and also hard hats. We trowel the fossil soil using small plasterers' trowels (with diamond-shaped blades) and sometimes we use surgical scalpels and fine dental probes. Any finds we make are placed on a plastic tray. Scientific excavation is a painstaking and delicate business, and cannot be hurried. When important finds are made, their position must be carefully measured before they can be removed.

The rest of the excavated soil is put in a bucket which we pass to helpers on the platform of the tower. They lower it down on an aerial ropeway. At the foot of the tower, other helpers empty the soil into wheelbarrows which they wheel out of the cave along the horizontal mine tunnel. The soil is then put in bags and carried on the backs of other helpers down to our 4-wheel-drive vehicle.

This is then driven 3 kilometres to the cutting sheds of the limestone quarrying company which owns the hill of *Cabezo Gordo*. Here, other helpers empty the soil over metal geological sieves which have a fine mesh, and then hose these with a jet of water so that the soil dissolves and leaves stones, flints, bones and other finds which we put into bags. Important finds have been made this way, such as the milk teeth of Neanderthal children.

After lunch, we wash all of the finds in bowls of clean water, leave them to dry, and later sort and them and put them into bags with appropriate labels. These will later be the object of future research in the lab, well after the expedition is over.

The first hypothesis we were testing (1994-2012) was that the upper part of the sediment does, indeed, contain remains of Neanderthal folk and associated Mousterian artifacts and food remains, from between 60 and 40,000 years ago.

Because it will be many years before our excavation, which is very slow, reaches the lowest part of the breccia column, in 2002 we began to excavate a small area about five metres above the floor of the main chamber, where the column of breccia juts forward below the vertical wall that it presents higher up, we conducted excavation of a trial cutting in the lower part of sedimentary column, but the results to date have not been particularly informative. For safety reasons, we only excavate this intermediate cutting after ceasing work in the upper cutting towards the end of each morning session. When we excavate here we use electric lamps run from car batteries which in turn are charged by a solar panel.

At *Cueva Negra* the immediate hypotheses we are testing are two-fold. First, we are exploring a widespread hypothesis (supported at other cave sites) that not only Neanderthals (*H. neanderthalensis*) but also their *pre-Neanderthal* forebears (*H. heidelbergensis*) carried out more day-to-day activities in areas that were well-lit by daylight, rather than in the darker innermost parts of caves, which receives support from our excavation of the important activity area from which the Acheulian hand-axe came. However, even more exciting is the 2011-2012 discovery of finds from a very deeply-lying deposit that demonstrate that fire was used at the site.

We walk up to the cave by a well-trodden footpath every morning. We carry out excavation at *Cueva Negra* by trowelling. Because the soil here is light in colour, unwanted foot-prints of boots and joggers show up in it all too prominently, so when we get to the cave in the morning we change out of such footwear and slip on very light slippers or plimsolls with absolutely flat soles and no tread at all. On the other hand, when we are wet-sieving the excavated sediment, we change footwear again, using gum-boots or rubber boots so that muddy sediment does not get on to our light slippers or plimsolls to be carried into the cave and onto the areas under excavation. Sometimes hand picks have to be used to break up the harder soil. Once again, we have the generator and power tools for use if needed.

The only way we can wash our soil here, in order to separate finds from the hard soil that encrusts them, is by pumping water up to the cave from the *River Quípar* which is 40 metres vertically below it. We do this using a petrol-driven pump, to pump water up through hose-piping to two large petrol drums; the hose-piping often springs leaks because of the high pressure of the water inside it. Helpers spend quite a lot of time scrambling up and down the steep hillside, in order to start up and stop the pump, re-prime it, or fix leaks in the hose-pipe!

Two very large oil drums are stood beside the cave mouth at a level slightly above that of our metal geological sieves onto which we put soil, so that other hose-pipes from their base let water run down by gravity to the sieves over which we play the water. We use four nests, each of which consists of 3 interlocking, stainless-steel, geological sieves of reducing mesh-size down to 2 mm mesh, one above the other, with the finest sieve being that at the bottom of the nest. We pick out the finds and save them. After lunch we wash them, and after they are dry we sort them and put them into labelled bags for future research.

APPLICATION OF RESULTS

WHO BENEFITS FROM OUR FINDINGS AND HOW?

Beneficiaries must include scientists and students concerned with *hominin evolution* and *palaeoanthropology* in the *later European Quaternary* because we are throwing new light on two matters: (a) the evolution of *Neanderthal Man*, and (b) the ways in which *Neanderthal Man* and his precursors, who are called *Homo heidelbergensis*, utilized natural resources in different ice-age environments. Our Cueva Negra and Sima de las Palomas researchers have therefore set up a new body:

NEW: MUPANTQUAT, MURCIAN ASSOCIATION FOR THE STUDY OF PALAEOANTHROPOLOGY AND THE QUATERNARY (Asociación Murciana para la Paleontología y del Cuaternario)

This association was established and registered officially in June 2012 following advice from Murcia's Director-General for Cultural Heritage, in order both to oversee the research at our two sites of Cueva Negra del Estrecho del Río Quípar and Sima de las Palomas del Cabezo Gordo, and to disseminate information to the general public about palaeoanthropology and the Quaternary. Its chairman is Michael Walker, and its vice-chair and secretary are his co-directors at the excavations, Dr María Haber Uriarte and Mariano López Martínez. Its treasurer is Jesús García Torres who has helped our excavations with liaison with the media in which he has wide experience. Other committee members are staunch supporters of our field and lab work, Dr Ignacio Martín Lerma (Palaeolithic use-wear analyst), Antonio López Jiménez (specialist in micromammalian fossils) and Jon Ortega Rodríguez (specialist in Neanderthal skeletal restoration and reconstruction). Our association has several university teachers and high-school teachers among its membership. The *mupantquat* web-site <www.mupantquat.com> should be up and running by February or March 2013 but we now do have an email address <mupantquat@gmail.com>

The first official meeting of the association was a reception that took place during the 2012 Cueva Negra excavation, on July 19th, in honour of visiting guest scientist Professor Bernard Wood of the George Washington University who was made our first honorary member, and the event was accompanied by a preview of the animated documentary "*Cueva Negra*" made by the Integra Foundation (see below).

OUR FINDINGS HELP TO FORMULATE PUBLIC POLICY WITH BENEFITS FOR THE TOURIST INDUSTRY AND LOCAL BUSINESS:

Our field research has led to development of regional public policy with the following outcome.

OPENING IN 2014: MURCIA MUSEUM FOR PALAEOONTOLOGY AND HUMAN EVOLUTION (MUPEH, Museo de Paleontología y Evolución Humana)

This imposing, new, purpose-built 5-storey museum has been erected by the Murcian Regional Government and Torre Pacheco township, below Sima de las Palomas, at the foot of Cabezo Gordo, but it still has to be fitted out. We accompanied our regional Minister for Culture together with its famous architect, Federico Soriano, who showed us around in January 2013. It has exhibition floors as well as workshops and laboratories, and even residential accommodation and a restaurant, as well as an auditorium. Our Sima de las Palomas Neanderthals will be the highlight of the display, naturally. The museum has been built thanks to our Sima de las Palomas finds which it will house, and we have been behind its establishment from the beginning. It has taken several years to come to fruition. The museum is very near the coastal resorts of the Mar Menor and therefore will be an important focus for cultural tourism. Because we are in a tourist area with hundreds of thousands of European Union summer visitors every year, our findings will reach a very wide international public indeed. Many local businesses have been involved in the construction and will be involved in its refurbishment and maintenance.

OUR PROJECT BENEFITS THE EDUCATIONAL COMMUNITY:

Our field and lab research has an educational impact that reaches out to schools and local institutions in the following ways:

2012-2013 EDUCATIONAL TALKS WITH SHOWING OF ANIMATED FILM "CUEVA NEGRA"

Our **MUPANTQUAT** association is cooperating actively with Murcia regional government's public "Integra Foundation" which has produced an animated 30-minute film with us about Cueva Negra, called simply "*Cueva Negra*". It is aimed at a teen-age audience, and seems to be going down well! Since its first showing in October 2012, **MUPANTQUAT** and the "Integra Foundation" are showing it in towns and cities in our region to the general public, with free entry. After each showing there is a public **MUPANTQUAT** Colloquium with a couple of brief talks by us about our findings, after which the public can ask questions which we do our best to answer. I think you can access the film on http://www.regmurcia.com/servlet/s.SI?sit=a,0,c,0,m,0&r=AgP-24607-DETALLE_EVENTO.

MUPANTQUAT is also arranging a series of 2013 field excursions to our sites, and also to other relevant sites in the region, for both high-school students and university undergraduates, as well as for its own membership, and it is organizing a programme of public lectures and talks on appropriate topics. **MUPANTQUAT** offers a reduced subscription to student members and we encourage undergraduate participation in the field and lab.

MUPANTQUAT has several university teachers and high-school teachers among its membership. The educational community is very much interested in the common humanity of our species and of its origins. Human evolution, over 100 years after Darwin, is only now ceasing to be the Cinderella of the sciences, thanks to 30 years of unceasing palaeoanthropological research around the globe.

An outstanding question -- which has been the topic of more than one very recent book -- concerns the relation between our modern world-wide species of *Homo sapiens* and some earlier forms that were present not so long ago during the last ice age, such as *Neanderthal Man*. How alike or unlike were they? How related or unrelated are they? When and where did their common ancestors begin to go their separate ways? Did they behave differently, particularly with regard to utilization of local resources? Did the ancestors of modern people become skillful hunters who used foresight, while *Neanderthals* died out because they could not use foresight and were usually scavengers whose "hunting" amounted to no more than unplanned skirmishes with large game? These are intriguing questions the project is beginning to throw light on: for instance, our very recent palaeolithic discoveries at *Cueva Negra* show that a million years ago even *pre-Neanderthals*, known to palaeoanthropologists as *Homo heidelbergensis*, could pick and choose, at will, between alternative core-reduction knapping sequences, depending on whether they wanted to make core-tools (such as hand-axes) or flake-tools (for subsequent edge-retouch) out of local stones.

PUBLICATION AND DISSEMINATION OF OUR FINDINGS:

Our *Cueva Negra* and *Sima de las Palomas* research team and **MUPANTQUAT** are involved in a several forms of dissemination of our work. Here are a some of them.

COMING SOON TO A BOOKSHOP NEAR YOU: "HOW THE EARLIEST CAVE-FOLK OF SOUTH-EAST SPAIN WERE DUG UP"

In January 2013 we are putting the finishing touches to the manuscript and illustrations of a semi-popular semi-scientific book about how we have excavated, investigated and researched into early humans in southeastern Spain. A preliminary version of the English text is with the editorial team of our U.K. publisher Oxbow Books at Oxford. We have proposed the title as "*How the Earliest Cave Folk of South-East Spain were Dug Up*". The Spanish edition of the book will go to press here at Murcia in 2013 and the publisher will be our new association **MUPANTQUAT**. The book is aimed at young people, and takes a "hands-on" approach, emphasizing, with plentiful illustrations, *how* we have carried out the work, what methods and techniques we have employed in the laboratory and in the field, instead of placing the emphasis on the significance of our findings in an academic context of human evolution in the Old World during the Pleistocene. We hope the book will be attractive to high-school students and their teachers, and perhaps useful to first-year university undergraduates and college students, as well as being accessible to general readers interested in exactly how we know what we know about the distant past. We do not want to present an erudite weighty tome, only of interest to a specialized readership of scholars and academics (such learned volumes go unread as often as they then soon become remaindered as discount "bargain" offers).

We both publish and present at meetings our scientific findings in both English and Spanish, and you will find a list of these below. Some are in scientific journals with high international impact; others are aimed at a wider readership, including undergraduates, including presentations at congresses of specialists or other meetings of particular interest-groups. Some of these are international or national, but others are local. We are also preparing enormous detailed monographs on each of our two sites.

However, we also present our findings to international and national media. This in January 2013 PBS-NOVA showed a TV documentary in English "*Decoding Neanderthals*" in which we took part in 2012 (try <http://video.pbs.org/video/2323758207>); and in 2011 ARTE-XENIUS showed a TV documentary "*Neandertale*" in German and French in which we took part in 2011. In 2010-11 we took part in the Spanish national television (TVE) documentary series ARQUEOMANÍA and a new series will be shown in which we have taken part in December 2012. Also an hour-long film in Spanish was made in 2004 which features *Sima de las Palomas del Cabezo Gordo*, called "*Piedra sobre piedra*" ("*Stone upon stone*"), directed and produced by a Murcian, Roque Madrid, for his Madrid-based production company CUARTOCRECIENTE, and sold to the international channel of Spanish national television (TVE) whose HISPASAT satellite beams to a wide audience in Latin America (the film was shown over 10 times). In June 2011 Spanish national television (TVE) put out an hour-long programme of interviews at Barcelona University with each of the six speakers, M.J. Walker included, in the special seminar on Neanderthals in the Iberian Peninsula held as part of the XVII Congress of the Spanish Society for Physical Anthropology. Our sites have been the object of visits by radio and TV crews, and every year since 1994 broadcasts by have made by both public and private radio and TV stations: *BBC*, *RTVE*, *Onda-Cero*, *Ser*. In 2005 our excavation of Neanderthal leg and foot bones at *Sima de las Palomas* was covered on prime-time TV news by Spanish national television which in 2003 gave similar coverage to both the discovery of the *Cueva Negra* hand-axe and the excavation of a child's mandible at *Sima de las Palomas*. In December 2003 the popular radio-presenter Nieves Herrero had M.J. Walker on her two-hour chat show on Spanish national radio *RNE*.

A gratifying event during our 2010 field season was a two-day visit by scientific journalist Rosa Tristán of Spain's second-largest circulation daily newspaper, *El Mundo*, which ran a full 3-page spread by her about both our sites in its Sunday science supplement, with the partly-cleaned juvenile Neanderthal skull and mandible we had excavated in 2008 at *Sima de las Palomas* occupying the whole cover page. It was the first time we have attracted so much public attention in the national press. In 2011 *El Mundo* featured our discovery of fire at *Cueva Negra*, and *La Verdad* gave a two-page coverage to a press conference in Murcia in honour of the visit here by Professor Erik Trinkaus.

Another national publication about current scientific research of all kinds in Spain and whose web-site is greatly visited by scientists and high-school teachers here also put out an article in Spanish by us in October 2010 about both our sites which has received A FEW thousand hits <http://www.aecientificos.es/escaparate/verpagina.cgi?idpagina=20630480&refcompra=>, or you can go to <http://www.aecientificos.es>, then click on Artículos de Interés Científico, the article on the web has several colour illustrations; the journal is called *Acta Científica y Tecnológica* and our article is now in print in two parts in its volumes 18 and 19 for 2011 (see our list of publications).

Ten years ago we successfully undertook a very different kind of public enterprise, which was the **TRAVELLING PUBLIC EXHIBITION** about our sites and research at them, called: "**Archaic Europeans and Neanderthals: Project HOMO, Hominins, Technology and Environment in the Middle and early Upper Pleistocene**" which was all about our work at *Cueva Negra* and *Sima de*

las Palomas, and travelled around the European Union, because it won funding from the **European Commission's** "Culture 2000" Programme (2000-0820CLTCA1A) so that the Commission paid for half (€150,000 euros) of its cost, the other half coming from the participating institutions that have agreed to display it, namely Murcia's Museo de la Ciencia y del Agua (Science and Water Resources Museum) where it was open to the public in 2002 for three months, the Austrian national Museum of Natural History at Vienna where the exhibition was unveiled for the first time in October 2001, the "Dr.M.Crusafont" Palaeontological Museum of Barcelona at Sabadell which displayed it during 2002, the Oxford University Museum of Natural History which showed it from September to Christmas 2002, and, near to our Sima de las Palomas site in Murcia, at the old Town Hall of Torre Pacheco where it was in Spring of 2003. After that it went to Logroño in northern Spain, and in October of 2003 it opened at the splendid Science Museum at San Sebastián in northern Spain's Basque Country for a six-month showing. Later in 2004 it was shown in the spacious foyer of Murcia University Library for three months, after which it visited a town in Murcia called Abarán. Currently it is displayed near to Sima de las Palomas in the town of Torre Pacheco. This exhibition has given research at our two sites great publicity around Europe – it received hundreds of visits from groups of high school students in all the centres where it was on display. I am not sure but perhaps you may be able still to open up a slot on the web about it at <http://www.contraplano.es/homo>

Various public lectures and exhibitions:

Over the years I have given several lectures about the twenty years of field research at Cueva Negra and Sima de las Palomas. In June 2011 I presented a paper about both our sites in a monographic seminar on *Neanderthals in the Iberian Peninsula* during the XVII Congress of the Spanish Physical Anthropological Society held at Barcelona University, and in November I presented a paper on each of our sites during a week-long series of lectures on regional archaeology at Murcia's Archaeological Museum. In September 2010 I gave a lecture about Cueva Negra during the Sixteenth Annual Meeting of the European Association of Archaeologists at the Hague in a Session on Palaeolithic Chronologies which I co-organized with Oxford's Dr Tom Higham. In September 2009 I gave a lecture about Sima de las Palomas during the Fifteenth Annual Meeting of the European Association of Archaeologists at Riva del Garda, Italy, in a Session on the Middle and Upper Palaeolithic. In 2009 I also gave lectures about both our sites at the Society of Antiquaries of London of which I am a Fellow, and also at meetings in Spain, namely, at a symposium organized at Murcia by a leading bank here in honour of Charles Darwin, as well as at the Universidad Miguel Hernández at Elche, at the Cieza Museum in Murcia, and a lecture about Human Evolution at Murcia's Science and Water Resources Museum. In 2008 I gave public lectures about the sites at the Murcian Archaeological Museum in a series of lectures organized in association with an exhibition of the region's palaeontology, and another at a symposium at Orce, Granada, in honour of the late Dr. Josep Gibert.

During the past decade I directed the scientific content of a travelling European Union public exhibition about our sites and research at them, called "**Archaic Europeans and Neanderthals: Project HOMO, Hominids, Technology and Environment in the Middle and early Upper Pleistocene**", which is all about our work at Cueva Negra and Sima de las Palomas, and is now travelling around the European Union, because it won financial support from the European Commission's "Culture 2000" Programme (2000-0820CLTCA1A) so that the Commission paid for half (€150,000 euros) of its cost, the other half coming from the participating institutions that have agreed to display it, namely Murcia's Museo de la Ciencia y del Agua (Science and Water Resources Museum), the Austrian national Museum of Natural History at Vienna (where the exhibition opened in October 2001), the Palaeontological Museum of Barcelona at Sabadell, the Oxford University Museum of Natural History (where it was on show between September 19th and Christmas, 2002), and the town council of Torre Pacheco in Murcia where it went on show on February 23rd 2003 and where it is now back on show in 2005. Later in 2003 it went to Logroño in northern Spain, coinciding unfortunately with the start of our *Cueva Negra* excavation in July. However, when in October it went for six months to the splendid Science Museum at San Sebastián in northern Spain's Basque Country, I gave a lecture to accompany the opening there. Later in 2004 it was shown in the spacious foyer of Murcia University Library for three months and in the Autumn of 2004 it visited a town in Murcia called Abarán at the invitation of the mayors of 6 towns who clubbed together to show it. In each case I have been present to introduce the opening to gatherings of the general public. This exhibition is giving research at our two sites great publicity around Europe – it receives hundreds of visits from groups of high school students in all the centres where it is on display. You may perhaps still be able to open up a slot on the web about it at <http://www.contraplano.es/homo>

In April 2007 I gave a talk about our research at Sima de las Palomas and Cueva Negra at the invitation of Professor Svante Paäbo, the internationally renowned geneticist who conducts research into both mitochondrial and nuclear DNA from Neanderthal bones, who is the Director of the ultra-modern, seven-storey-high, Max-Planck Institute for Evolutionary Anthropology at Leipzig in Germany, and whom I had first got to know at a meeting in Madrid back in 1993. The talk was well received and Svante Paäbo made useful suggestions about how we might best excavate the *Sima de las Palomas* Neanderthal skeletal remains, wearing face-masks and surgical gloves, and putting the fossils into sterile containers. This we did in Summer 2007 and in the Autumn Svante's Ph.D. student, Oxford University Biology graduate Adrian Briggs, came to Murcia and we helped him as he extracted samples from our newly-excavated Neanderthal bones in a sterile operating theatre in Murcia University's Veterinary Science Faculty. Later on, he reported back from Leipzig that our excavation technique had been so good that almost no modern human DNA contamination could be detected, though so far, alas, neither has any Neanderthal DNA been identified – possibly because too few samples were taken by him and they may have been too small anyway (less than 200 milligrams each) given the high ambient temperature at *Sima de las Palomas* which may predispose to break up of the nucleotide fragments of DNA.

In September 2006 I gave a presentation entitled "The Demise of the Mysterians" based on our Cueva Negra research, in Colloquium 13 ("The Earliest Inhabitants of Europe") at the XV Congress of the International Union of Prehistoric and Protohistoric Sciences at Lisbon. In November 2005 I gave a lecture about our work at Cueva Negra and Sima de las Palomas at Oxford University's Institute of Archaeology in its Quaternary Seminar Series. In February 2006 I gave lectures on that work at Barcelona University and at Castellón.

My European travels in 2004 (see above) in order to gain support for the projected regional Museum for Paleontology and Human Evolution took up much of my spare time and energy that year, to the exclusion of other activities such as delivering public lectures, other than to local meetings of archaeologists and anthropologists at Murcia. I gave an invited lecture about our research at Oxford University's Institute of Archaeology in November 2005. I gave a public lecture at the San Sebastián Science Museum in October 2003 and in February 2002 I gave one at Murcia's Science and Water Resources Museum. In 2001 I gave several public lectures at places which included Oxford University, the XIV International Congress of Prehistoric and Protohistoric Sciences which was held at Liège in Belgium, at the Austrian national Natural History Museum in Vienna. In November 2000, I gave a major lecture about human evolution during the Middle and earlier Upper Pleistocene, at an international scientific meeting in Valencia organized by the

Spanish governmental institution known as the Menéndez Pelayo International University. Other participants included Professor Bernard Wood of the Washington University and Professor Günter Bräuer of Hamburg University, as well as Mexican and Spanish scientists, including Emeritus Professor Emiliano Aguirre.

In 2000 national governmental recognition of our field research, by granting us R&D Project PB98-045, assisted us to acquire new international contacts and collaboration, as well as maintaining pre-existing ones, and most particularly favoured our obtaining the royal patronage of His Majesty King Juan Carlos I of Spain who graciously accepted Honorary Chairmanship for the (December 6-19, 2000) *International Colloquium and Workshop "The Iberian Peninsula and Human Evolution", A Symposium in Honour of Professor Phillip V. Tobias, F.R.S.*" which I organized at Murcia. Professor Tobias, who was 75 in 2000, flew to Murcia from South Africa to take part, where he is Emeritus Professor of the Witwatersrand University at Johannesburg and still directs its Palaeoanthropology Research Group. He is a frequent visitor to Spain. He gave a splendid address on "The role of water in the extra-African dispersal of humanity, with special reference to the peopling of the Iberian Peninsula." The programme included official visits to our sites of the Sima de las Palomas of Cabezo Gordo and Cueva Negra del Estrecho del Río Quípar, on which I also gave an address entitled "Neanderthal Man in Murcia: Cueva Negra del Estrecho del Río Quípar and Sima de las Palomas del Cabezo Gordo."

Other participants gave addresses as follows. Professor Geoffrey A. Clark of the University of Arizona State University gave an address on "Modern human origins research: putting Iberia in a global context." Professor Derek A. Roe of Oxford University gave an address on "The Iberian Peninsula in the Palaeolithic: an outsider's view." The orthodontal surgeon and dental anthropologist Dr. Vincent A. Lombardi, from Pittsburgh, gave an address on "Dental anthropology and Neanderthal Man." Drs. Joao Zilhao and Cidalia Duarte of the Portuguese government's Archaeological Institute gave an address on "The Lagar Velho child: burial anatomy and implications for modern human origins in Iberia." Professor Camilo José Cela Conde of the University of the Balearic Islands, a Fellow of the American Association for the Advancement of Science, gave an address on "Just how stupid was *Homo habilis*? Problems over a suitable taxonomy of Pliocene hominins." Dr. José Gibert Clols of the "Dr. M. Crusafont" Palaeontological Institute of Barcelona gave an address on "Cueva Victoria at Llano del Beal, Cartagena, Murcia". Professor Enrique García Olivares of Granada University gave an address on "Molecular palaeontology: The study of biomolecules in fossils." Professor Daniel Turbón of Barcelona University gave an address on "Ancient DNA in the Iberian Peninsula". Professor José Enrique Egocheaga of Oviedo University gave an address on "Preliminary results of palaeoanthropological research into the Cueva de El Sidrón Neanderthals." Professor Ignacio Martínez of Madrid's Complutensian University gave an address on "The evolution of mind" on behalf of himself and Professor Juan Luis Arsuaga (who at the last minute was unable to attend because of another pressing commitment).

In 1997 I gave invited lectures to the Spanish National Archaeological Congress, at Harvard's Peabody Museum, and at University College London's Institute of Archaeology, while in 1996 I gave a lectures at Oxford University's "Baden-Powell" Quaternary Research Centre, at the *International Symposium in Honour of Professor Phillip Tobias FRS* held at the University of the Balearic Islands at Palma de Mallorca, and at the Cartagena Cultural Centre at Cartagena, as well as during a week-long Murcia University Summer School to 40 international students on *Human Evolution and Palaeoanthropology* in September at which other leading Spanish scientists took part (Professors Emiliano Aguirre, Daniel Turbón, José Gibert and José Camilo Cela Conde) as well as other junior researchers (Drs. Francesc Ribot and Miguel Martínez Andreu, Ms. Florentina Sánchez, and Mr. José Isaac Serrano). In 1995 I gave two public lectures at the invitation of the municipal authorities of Torre Pacheco and another lecture and an exhibition at the invitation of those of Caravaca. I also gave invited scientific lectures at the Murcian Regional Archaeological Week (two lectures and an exhibition), at the Autonomous University of Barcelona (a lecture), at Barcelona University (a lecture), and at the *International Conference on Human Palaeontology* at Orce (two lectures and an exhibition, and I also guided an excursion to *Sima de las Palomas*). I also organized an exhibition at Murcia University's "Biology Week" and a guided excursion to *Sima de las Palomas* for Murcia University's Summer School on "Archaeology of Death". In 1994 I gave several lectures on the two sites in England during my period as Oxford University Visiting Senior Research Fellow in Archaeology (3 in Oxford, one at the Natural History Museum in London, another at London University and yet another at Liverpool University. In most years since 1991, I have addressed the Murcia regional government's week-long symposium held at Murcia at which archaeological field research during the previous twelve months is presented in public.

SOME PUBLICATIONS AND PRESENTATIONS:

(Bold type: significant reading)

- 2012 (en prensa) R. C. Power, M. J. Walker, D.C. Salazar García, A.Henry: "Neandertal plant food consumption and environmental use at Sima de las Palomas, southeastern Spain." *PaleoAnthropology* (ISSN 1545-0031).
- 2012 M.J.Walker, J.Ortega Rodríguez, A.Agut Giménez, M.Soler Laguía, C.P.E.Zollikofer, M.S.Ponce de León: "The Sima de las Palomas Neanderthal skeletons: First steps towards "virtual" reconstruction." P. 191 in J-J.Hublin, W.Roebroeks, M.Soressi, T.Terberger, F.Spoor (eds) *2nd Annual Meeting of the European Society for the Study of Human Evolution ESHE 21-22 September 2012 Bordeaux/France*. Leipzig, Max-Planck Institute for Evolutionary Anthropology, *Proceedings of the European Society for the Study of Human Evolution* 1 (ISSN 2195-0776, 2195-0784).
- 2012 M.J.Walker, A.Agut Giménez, M.Soler, C.P.E. Zollikofer, J. Ortega Rodríguez, Poster presentation "The Sima de las Palomas Neanderthal skeletons: First steps towards "virtual" reconstruction." *2nd Annual Meeting of the European Society for the Study of Human Evolution, September 21-23, 2012*. Bordeaux, Université Montesquieu-Bordeaux IV and Musée d'Aquitaine.
- 2012 **M.J.Walker, M.V.López-Martínez, J.S.Carrión-García, T.Rodríguez-Estrella, M.San-Nicolás-del-Toro, J-L.Schwenninger, A.López-Jiménez, J.Ortega-Rodríguez, M.Haber-Uriarte, J-L.Polo-Camacho, J.García-Torres, M.Campillo-Boj, A.Avilés-Fernández, W. Zack:** "Cueva Negra del Estrecho del Río Quípar (Murcia, Spain): A late Early Pleistocene hominin site with an "Acheulo-Levalloiso-Mousteroid" Palaeolithic assemblage" *Quaternary International* (edición digital temprana) doi:10.1016/j.quaint.2012.04.038, pp. 1-25 (ISSN 1040-6182).
- 2012 **M.J.Walker, M.V.López-Martínez, J.Ortega-Rodríguez, M.Haber-Uriarte, A.López-Jiménez, A.Avilés-Fernández, J.L-Polo Camacho, M.Campillo-Boj, J.García-Torres, J.S.Carrión-García, M.San Nicolas-del Toro, T.Rodríguez-Estrella:** "The excavation of the buried articulated Neanderthal skeletons at Sima de las Palomas (Murcia, SE Spain)." *Quaternary International* 259: 7-21 (ISSN: 1040-6182).
- 2012 M.Walker, M.López Martínez, M.Haber Uriarte, A.López Jiménez, A.Avilés Fernández, M.Campillo Boj, J.Ortega Rodríguez: "Nuevos esqueletos neandertales y restos preneandertales de Murcia: La Sima de las Palomas del Cabezo Gordo (Torre

- Pacheco) y la Cueva Negra del Estrecho del Río Quípar (Caravaca de la Cruz)." Pp. 47-67 in D.Turbón, L.Fañanás, C.Rissech, A.Rosa (eds), *Biodiversidad Humana y Evolución (Actas del XVII Congreso de la Sociedad Española de Antropología Física, Universidad de Barcelona, 2 a 4 de junio de 2011)*. Barcelona, Universitat de Barcelona and Sociedad Española de Antropología Física (ISBN 9788469563229, 9788469563236).
- 2012 M.J.Walker, Public presentation: "Los neandertales y sus ancestros en Murcia". *El Hombre y su Entorno Científico-Cultural, Curso de la Fundación de Estudios Médicos FEM-UMU, May 8 2012*, Molina de Segura, Fundación de Estudios Médicos FEM-UMU.
- 2012 M.J.Walker, Public presentation: "Fossil Man in South-East Spain." *54th Annual Meeting of the Hugo Obermaier Society for Quaternary Research and Archaeology of the Stone Age, April 10-14, 2012*. (12 Apr 2012)Toulouse, Muséum d'Histoire Naturelle et Université de Toulouse
- 2012 R.C.Power, M.J.Walker, D.C.Salazar-García, A.Henry, Public presentation: "Neandertal plant food consumption and environmental use at Sima de las Palomas, southeastern Spain." *54th Annual Meeting of the Hugo Obermaier Society for Quaternary Research and Archaeology of the Stone Age, April 10-14, 2012* (12 Apr 2012) Toulouse, Muséum d'Histoire Naturelle et Université de Toulouse.
- 2011 M.J.Walker, M.López Martínez, M.Haber Uriarte, J.Ortega Rodríguez: "La Sima de las Palomas del Cabezo Gordo en Torre Pacheco: Excavación e Investigación en 2011." *Verdolay. Revista del Museo Arqueológico de Murcia* 13: 31-41 (ISSN 1130-9776). Número especial: *Actas de los Encuentros sobre Arqueología y Paleontología, Museo Arqueológico de Murcia 21 a 25 de noviembre de 2011*.
- 2011 M.J.Walker, M.López Martínez, M.Haber Uriarte, J.Ortega Rodríguez: "La Cueva Negra del Estrecho del Río Quípar en La Encarnación de Caravaca de la Cruz, Murcia, España: Excavación e Investigación en 2011." *Verdolay. Revista del Museo Arqueológico de Murcia* 13: 43-55 (ISSN 1130-9776). Número especial: *Actas de los Encuentros sobre Arqueología y Paleontología, Museo Arqueológico de Murcia 21 a 25 de noviembre de 2011*.
- 2011 M.J.Walker, J.Ortega, K.Parmová, M.V.López, E.Trinkaus: "Morphology, body proportions, and postcranial hypertrophy of a female Neandertal from the Sima de las Palomas, southeastern Spain" *Proceedings of the National Academy of Sciences USA* 108 (25) 10087-10091 (ISSN 1091-6490).
- 2011 M.J.Walker, J.Ortega Rodríguez, M. V. López Martínez, K. Parmová, E. Trinkaus: "Neandertal postcranial remains from the Sima de las Palomas del Cabezo Gordo, Murcia, southeastern Spain." *American Journal of Physical Anthropology* 144: 505-515 (ISSN 0002-9483).
- 2011 M.J.Walker, J.Zapata, A.V.Lombardi, E.Trinkaus, "New evidence of dental pathology in 40,000 year old Neandertals" *Journal of Dental Research* 90: 428-432 (ISSN 0022-0345).
- 2011 M.Walker, M.López Martínez, M.Haber Uriarte, A.López Jiménez, J.Ortega Rodríguez, A.Avilés Fernández, M.Campillo Boj: "Dos yacimientos del Hombre fósil en Murcia: La Cueva Negra del Río Quípar en Caravaca de la Cruz y la Sima de las Palomas del Cabezo Gordo en Torre Pacheco. Segunda Parte. La Sima de las Palomas." *Acta Científica y Tecnológica* 19: 15-23 (ISSN 1575-7951).
- 2011 M.Walker, M.López Martínez, M.Haber Uriarte, A.López Jiménez, J.Ortega Rodríguez, A.Avilés Fernández, M.Campillo Boj: "Dos yacimientos del Hombre fósil en Murcia: La Cueva Negra del Río Quípar en Caravaca de la Cruz y la Sima de las Palomas del Cabezo Gordo en Torre Pacheco. Primera Parte. La Cueva Negra." *Acta Científica y Tecnológica* 18: 22-28 (ISSN 1575-7951).
- 2011 M.J.Walker, Public presentation: "New Neanderthal skeletons and pre-Neanderthal remains from Murcia, S.E. Spain". Invited lecture in seminar "Neanderthals in the Iberian Peninsula" 4 June 2011 in the *XVII Congreso de la Sociedad Española de Antropología Física en la Universidad de Barcelona del 2 al 5 de junio de 2011*. Barcelona, Universitat de Barcelona.
- 2011 M.J.Walker, Public presentation: "Nuevos esqueletos de neandertales y restos preneandertales excavados en Murcia: La Sima de las Palomas del Cabezo Gordo y Cueva Negra del Estrecho del Río Quípar." Invited lecture arranged by the Ateneo de Jerez and Universidad de Cádiz (28 April 2011). Jerez de la Frontera, Universidad de Cádiz en Jerez de la Frontera.
- 2011 M.J.Walker, M.López Martínez, M.Haber Uriarte, A.López Jiménez, Public presentation: "La Cueva Negra del Estrecho del Río Quípar en La Encarnación de Caravaca de la Cruz, Murcia, España: Excavación e Investigación en 2011." *Encuentros sobre Arqueología y Paleontología, Museo Arqueológico de Murcia 21 a 25 de noviembre de 2011*. (21 Nov. 2011) Murcia, Museo Arqueológico de Murcia.
- 2011 M.J.Walker, M.López Martínez, M.Haber Uriarte, J.Ortega Rodríguez, Public presentation: "La Sima de las Palomas del Cabezo Gordo en Torre Pacheco: Excavación e Investigación en 2011." *Encuentros sobre Arqueología y Paleontología, Museo Arqueológico de Murcia 21 a 25 de noviembre de 2011*. (21 Nov. 2011) Murcia, Museo Arqueológico de Murcia.
- 2010 M.J.Walker, A.V.Lombardi, J.Zapata, E.Trinkaus: "Neandertal mandibles from the Sima de las Palomas del Cabezo Gordo, Murcia, southeastern Spain." *American Journal of Physical Anthropology* 142: 261-272 (ISSN 0002-9483).
- 2010 M.J.Walker and T.Higham, co-organizers of Regular Session of the XVI Annual Meeting of the European Association of Archaeologists, held at The Hague (September 2-5), on *Rethinking Palaeolithic Chronologies in Europe and the Circum-Mediterranean Region*, comprising ten papers, some of which are being prepared for publication in an issue of *Quaternary International*:
- (1) T. Higham "Radiocarbon dating the earliest Aurignacian in western Europe";
 - (2) D.C.W.Sanderson, R.A.Housley,D.Mark "Opportunities and Challenges in Developing Multi-technique Chronologies for Human Evolution and Dispersal";
 - (3) J.Z Zilhão "New chronological evidence for Middle and Upper Pleistocene archaeological sites in the Almonda karstic system (Torres Novas, Portugal)";
 - (4) E.Boaretto, N.R.Rebollo, S.Weiner, F.Brock, L.Meignen, A.Belfer-Cohen, O.Bar-Yosef "Anatomically modern humans migrated out of Africa almost 50,000 years ago: Radiocarbon dating of the MP-UP transition in Kebara Cave, Israel";
 - (5) G.A.Clark, "Advances in interdisciplinary research in the West Asian Paleolithic";
 - (6) N.Rolland "The Early Pleistocene hominid dispersals out of Africa: Two outstanding issues, with special reference to the circum-Mediterranean region";
 - (7) F.d'Errico, W.E.Banks, M.F.Sánchez Goñi, M.Kageyama "Palaeolithic chronologies and population dynamics in changing environments. Data and research strategies";
 - (8) B.Weninger, O.Jöris "The Greenland GISP2 Glaciochemical Record:Rapid Climate Change during the Upper Palaeolithic";

- (9) D.Richter, H.Dibble, P.Goldberg, J.-J.Hublin, J.Jaubert, S.McPherron D.Sandgathe, M.Soressi, K.Trebault, A.Turq "Chronometric data for the Late Middle Palaeolithic of south-western France and the chronostratigraphic position of Mousterian technocomplexes";
- (10) M.J.Walker, M.López-Martínez, J.S.Carrión-García, T.Rodríguez-Estrella, M.San Nicolas-del Toro, J.-L.Schwenninger, A.López-Jiménez, M.Haber-Uriarte, J.L.Polo Camacho, J.García-Torres, M.Campillo-Boj, A.Avilés-Fernández "Cueva Negra del Estrecho del Río Quípar (Murcia, Spain): A late Early Pleistocene hominin site with an "Acheulo-Levalloiso-Mousteroid" Palaeolithic assemblage".
- 2010 (published on-line October 2011; full text available as pdf) M.Walker, M.López Martínez, M.Haber Uriarte, A.López Jiménez, J.Ortega Rodríguez, A.Avilés Fernández, M.Campillo Boj: "Dos yacimientos del Hombre fósil en Murcia: La Cueva Negra del Río Quípar en Caravaca de la Cruz y la Sima de las Palomas del Cabezo Gordo en Torre Pacheco." (Asociación Española de Científicos, Madrid). <http://www.aecientificos.es> and then click on Artículos de Interés Científico (or go directly to <http://www.aecientificos.es/escaparate/verpagina.cgi?idpagina=20630480&refcompra=>).
- 2010 M.J.Walker "Evolución Humana", Pág. 8-69 en M.Parra Lledó (ed), *Darwin y De la Espada. Dos Vidas en Paralelo. Caminos de la Evolución*. (Murcia, Excmº. Aytº. de Murcia, Concejalía de Cultura y Programas Europeos, Museo de la Ciencia y del Agua, y Comunidad Autónoma de la Región de Murcia, Consejería de Agricultura y Agua, Dirección General de Patrimonio Natural y Biodiversidad). <http://www.cienciayagua.com> ("Darwin con Nosotros, Ciclo de Conferencias"). (depósito legal: MU-1072-2010; ISBN 9788496760776)
- 2010 M.J.Walker, M.López Martínez, M.Haber Uriarte, A.López Jiménez, J.Ortega Rodríguez, K.Parmová, A.Fernández Avilés, M.Campillo Boj: "La Cueva Negra del Estrecho del Río Quípar en Caravaca de la Cruz y la Sima de las Palomas del Cabezo Gordo en Torre Pacheco: Dos ventanas sobre la vida y la muerte del Hombre Fósil en Murcia" *Eubacteria* 24: 2-14 (ISSN1697-0071).
- 2009 M.J.Walker: "Chapter 7. Long-term memory and Middle Pleistocene 'Mysterians'." Pp. 75-84 in S.A.de Beaune, F.L.Coolidge, T.Wynn (eds), *Cognitive Archaeology And Human Evolution*. New York, Cambridge University Press (ISBN 0521746116).**
- 2009 G.R.Scott & L.Gibert: "The oldest hand-axes in Europe." *Nature* 461: 82-85, 2009 (ISSN 0028-0836).**
- 2009 M.J.Walker: "La Sima de las Palomas del Cabezo Gordo en Torre Pacheco y la Cueva Negra del Estrecho del Río Quípar en Caravaca de la Cruz: dos ventanas sobre la vida y la muerte del hombre fósil en Murcia". Pág. 71 a 96 en T.Ferrández Verdú, F.Almarcha Martínez (coordinators) *Darwin y la Evolución Humana. 1 Jornadas sobre Evolución Humana, 24 y 25 de abril de 2009, CEMACAM Torre Guil, Murcia*, (Murcia, Caja Mediterráneo) (Depósito legal MU-2660-2009).
- 2009 M.J.Walker, J.Ortega, J.Maki, E.Trinkaus, "Inferred body proportions of two southern European Neandertals, Palomas 92 and 96". Poster presented at the *78th Congress of the American Association of Physical Anthropologists, Chicago, March 31-April 4, 2009*.
- 2009 G.R.Scott, L. Gibert: "The oldest hand-axes in Europe", *Nature* 461: 82-85 (ISSN 0028-0836) (Palaeomagnetism at Cueva Negra.)
- 2009 M.J.Walker, M.V.López-Martínez, J.Ortega-Rodríguez, et al. "The buried articulated Neanderthal skeletons at Sima de las Palomas (Murcia, SE Spain)." Public presentation by M.J.Walker in the Session on "Up-dating the Reasoning on Middle to Upper Palaeolithic Biological, and Cultural Shift in Eurasia" organized by L.Longo, S.Condemi, A.Ronchitelli, D.Caramelli held on 18th Sept. 2009 during the *15th Annual Meeting of the European Association of Archaeologists at Riva del Garda, Trento, Italy, 15-20 September, 2009*.
- 2009 M.J.Walker (lecture, January 15th 2009): "Two decades of field research at the hominin sites in Murcia, Spain, of Cueva Negra del Estrecho del Río Quípar and Sima de las Palomas del Cabezo Gordo." *Society of Antiquaries of London (Burlington House, Piccadilly, London)*.
- 2009 M.J.Walker: "Review of *Lithic Technology: Measures Of Production, Use And Curation*, edited by William Andrefsky, Jr., Cambridge and New York, Cambridge University Press, 2008," *Antiquaries Journal* 89: 427-429 (ISSN 0003-5815).
- 2009 J.V.Morales Pérez, A.Sanchis Serra: "The Quaternary fossil record of the genus *Testudo* in the Iberian Peninsula. Archaeological implications and diachronic distribution in the western Mediterranean." *Journal of Archaeological Science* 31: 1152-1162 (ISSN 0305-4403) (Refers to tortoise fossils at Sima de las Palomas).
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Prof. Daniel Turbón, University of Barcelona: "El ADN antiguo en la Península Ibérica"

- Dr. Josep Gibert Clois, Instituto Paleontológico "Dr.M.Crusafont" de la Excm^a. Diputación de Barcelona en Sabadell: "La Cueva Victoria del Llano de Beal de Cartagena, Murcia"
- Prof. Enrique García Olivares, Universidad de Granada: "Paleontología Molecular: Estudio de Biomoléculas en Fósiles"
- Prof. Derek A. Roe, University of Oxford: "The Iberian Peninsula in the Palaeolithic: An Outsider's View"
- Prof. Geoffrey A. Clark, University of Arizona, "Modern Human Origins Research: Putting Iberia in a Global Context"
- Dr. A. Vincent Lombardi, Pittsburgh: "Dental Anthropology and Neanderthal Man "
- Prof. José Enrique Egocheaga, Universidad de Oviedo: "Avance de los Resultados del Estudio paleoantropológico de los Fósiles del Hombre de Sidrón"
- Prof. Juan Luis Arsuaga and Dr. Ignacio Martínez, Universidad Complutense de Madrid: "El Origen de la Mente"
- Prof. Joao Zilhao and Dr. Cidalia Duarte, Instituto Portugués de Arqueología del Ministerio de la Cultura de Portugal: "The Lagar Velho Child: Burial, Anatomy and Implications for Modern Human Origins in Iberia"
- Prof. Michael Walker, Universidad de Murcia, "El Hombre de Neanderthal en Murcia, La Cueva Negra del Estrecho del Quípar y la Sima de las Palomas del Cabezo Gordo"
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- Opened at Naturhistorischesmuseum at Vienna; later travelled to Oxford University's Museum of Natural History, Murcia's Science and Water Resources Museum, Barcelona's Palaeontological Museum at Sabadell, San Sebastian's Science Museum, Murcia University, Logroño, Abarán; currently (2010) on display at Torre Pacheco in Murcia.
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Lectures:
Prof. Emiliano Aguirre Enríquez, Museo de Ciencias Naturales del CSIC: "El Pleistoceno Medio en Atapuerca"
Prof. Camilo José Cela Conde. Universidad de las Islas Baleares: "La clasificación de los homínidos más antiguos"
Prof. Daniel Turbón, Universidad de Barcelona: " "
Dr. José Gibert Clois, Instituto Paleontológico "Dr.M.Crusafont" de la Excm^a. Diputación de Barcelona en Sabadell: "Homínidos del Pleistoceno Inferior en Granada y Murcia"
Prof. Michael Walker, Universidad de Murcia, "El problema del hombre de Neanderthal y el hombre moderno"
Prof. Dr. Michael Walker, Universidad de Murcia, "Dos estaciones murcianas con restos neandertalensis: la Sima de las Palomas del Cabezo Gordo y la Cueva Negra del Estrecho del Río Quípar"
Workshop sessions:
Dr. Miguel Martínez Andreu, Museo Arqueológico Municipal de Cartagena: "Técnicas paleolíticas"
J. Isaac Serrano Izquierdo, Universidad de Murcia, "El microscopio y los elementos paleolíticos"
Prof. Michael Walker, Universidad de Murcia, "Los homínidos del Pleistoceno Medio de Java"
Round Table: Moderator Prof. Jorge Eiroa García, Universidad de Murcia
Official excursion: Sima de las Palomas del Cabezo Gordo de Dolores de Pacheco (Torre Pacheco, Murcia)
- 1996 M.J.Walker: "El yacimiento del Pleistoceno Superior de la Cueva Negra del Estrecho de La Encarnación, Caravaca de la Cruz, Murcia, Campaña 1990." *Memorias de Arqueología* 5: 11-19 (Murcia, Comunidad Autónoma de la Región de Murcia, Dirección-General de Cultura; depósito legal MU-1909-1995; ISBN 8475641415).
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- 1996 M.J.Walker (lecture, November 20th): "Two new Neanderthal sites in S.E. Spain: Sima de las Palomas and Cueva Negra de La Encarnación." *Oxford University "Donald Baden-Powell" Quaternary Research Centre Seminar Series*, University of Oxford, "Donald Baden-Powell" Quaternary Research Centre".
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- 1994 M.J.Walker (lecture, October 17th): "New hominid finds from Cabezo Gordo and Cueva Negra, Murcia, S.E. Spain." *Oxford University "Donald Baden-Powell" Quaternary Research Centre Seminar Series*. Oxford, University of Oxford, "Donald Baden-Powell" Quaternary Research Centre of the Pitt-Rivers Museum.
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- 1994 M.J.Walker (lecture, October 6th): "Research at new Neanderthal sites in S.E. Spain: Sima de las Palomas del Cabezo Gordo and Cueva Negra del Estrecho del Río Quípar." *Harvard University Peabody Museum of Anthropology Seminar Series*. Cambridge (Massachussets, EE.UU.), Harvard University, Peabody Museum of Anthropology.
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- 1992 M.J.Walker (with J.Gibert Clois, lecture, September 24th): "New hominid remains and Mousterian artefacts from Murcia, S.E. Spain: Cabezo Gordo (Torre Pacheco) and Cueva Negra de La Encarnación (Caravaca)." *International Symposium on the Mitochondrial Debate and the Origin of Modern Humans, September 23-25, 1992*. Cortona (Italy), International Institute for the Study of Man.
- 1992 M.J.Walker (lecture, September 3rd): "A fossilized human incisor from Cueva Negra (Caravaca, Murcia, Spain)." *Illrd International Congress of Human Palaeontology August 29-September 5, 1992*. Jerusalem, Hebrew University.
- 1992 M.J.Walker (with F.Sánchez, J.Gibert, A. Malgosa, A.Arribas, lecture, September 3rd): "Mousterian hominid remains from Cabezo Gordo (Torre Pacheco, Murcia, Spain)." *Illrd International Congress of Human Palaeontology 29 August.5 September 1992*. Jerusalem, Hebrew University.
- 1992 M.J.Walker (with J.Gibert, lecture, September 9th): "Hominid remains from the Middle Palaeolithic sites at Cabezo Gordo (Torre Pacheco, Murcia, Spain) and Cueva Negra de La Encarnación (Caravaca, Murcia, Spain)." *VIII Congress of the European Anthropological Association September 5-10, 1992*. Madrid, Universidad Complutense de Madrid, Facultad de CC. Biológicas.
- 1991 M.J.Walker: "Cueva Negra de La Encarnación (Caravaca)." Pp. 7-8 in *Segundas Jornadas de Arqueología Regional Murcia 4-7 Junio 1991*. Murcia, Comunidad Autónoma de Murcia, Consejería de Cultura, Educación y Turismo, Dirección General de Cultura, ServicioRegional de Patrimonio Histórico ((depósito legal MU-1.371-1991).
- 1989 M.Martínez Andreu, R.Montes Bernárdez, M.San Nicolás del Toro: "Avance al estudio del yacimiento musteriense de la Cueva Negra de La Encarnación (Caravaca, Murcia)." Pp. 973-983 in *XIX Congreso Nacional de Arqueología Castellón de la Plana 1987, Ponencias y Comunicaciones Volumen I*, Zaragoza, Universidad de Zaragoza, "Congreso Nacional de Arqueología".

FIELD TRAINING

Topics covered by me in informal lectures, on-site briefings, and guided excursions to helpers and staff assistants include:

- *** excavation methodology and practice
- *** treatment and classification of finds
- *** fundamentals of hominin and human evolution
- *** Quaternary landscapes
- *** Palaeolithic archaeology and stone tools
- *** *Sima de las Palomas* and *Cueva Negra* in their context
- *** flora and fauna of the ice age
- *** field excursions to other Quaternary or archaeological sites, museums, and places of historical interest.

YOUR ASSIGNMENTS

All our helpers are integrated into the project alongside staff assistants. Most senior site helpers are young university graduates or senior undergraduate students who have field experience at Palaeolithic sites, and most of them will be present for most of the six-week field season at our two sites. Their task includes assisting helpers who come for shorter periods or who have little or no prior experience in palaeolithic excavation.

The physical work of excavation is carried out in the morning. Morning assignments involve excavation, removing excavated material, and sieving it, as well as service tasks at the sites. Some heavy tasks, such as carrying bags of soil, are hard for some older participants, who may choose to carry out lighter tasks such as sieving or service tasks such as starting or stopping the water-pump.

Work assignments are usually given to task groups of between two and six members. These groups contain both senior site helpers and other helpers. Members of task groups are rotated during the morning, or from one morning to the next, so all members get a chance to participate in all aspects of the project if they wish.

Knowledge of basic Spanish is always helpful. Only a few of my senior site helpers speak English fluently, although helpers who come from overseas find all of them welcoming, friendly, helpful and patient. I do try to encourage those helpers who have no Spanish at all to help groups alongside those senior site helpers who can speak some English, wherever this is possible.

Don't feel bashful about trying out a few words of phrase-book Spanish! Much as I should like to be, I cannot be always on hand to answer every question that may occur to a helper, because some of my time is taken up giving instructions in Spanish to my senior site helpers or discussing scientific and technical issues with them or logistical matters that have your well-being as our aim. So please do make every effort, despite any language barrier, to address questions to senior site helpers or ask them for assistance, rather than bottling up your queries or worries to deluge the Principal Investigator (-me!-) with them because his explanations can hold up the Project from moving forwards just so as to help one person to look backwards - they can put a brake on the work not just of the one anxious volunteer but of perhaps a dozen other people. So please do try to get to know the staff as well as just the Principal Investigator. Your efforts here will be greatly appreciated and should lead to a responsive social ambience both during working hours and leisure time.

Afternoon assignments involve washing materials found during the morning, arranging them for drying, and preliminary classification of materials which are dry (usually those found the day before). Helpers take part in these activities alongside staff assistants, who help them to recognize the principal categories of material finds, and how to help with their initial sorting and identification, in ways which greatly simplify later laboratory analysis of them.

Tasks do not change much over the duration of our field campaign, although the precise details of the ways in which the tasks are performed differ somewhat between the two sites because of their different topography.

Skills and talents which are useful to the project range from acquaintance with such intellectual disciplines as archaeology, physical anthropology, anatomy, geology, soil science or palaeontology, to such practical activities as draughtsmanship, photography, surveying, working with ropes, and familiarity with petrol-driven water-pumps, portable electricity generators, power drills or jack-hammers. We've incorporated some useful technical tips from helpers with engineering skills to others who go in for home mechanics or have built their own home...

STAFF

I am the Principal Investigator and I direct the Project. I am present with you all during working and instruction hours, namely from eight o'clock in the morning to about eight o'clock in the evening, at least.

At *Sima de las Palomas*, until his death in September 2007 I had as my co-director of excavations a geologist and palaeontologist, the late Dr. Josep Gibert, who was both my good friend and a distinguished public-service research-scientist at the Instituto Paleontológico "Dr.M.Crusafont" de la Diputación de Barcelona at Sabadell, a satellite city of Barcelona. At *Cueva Negra* I have as my co-director of excavations, **Mariano López** (<marianolopez@hotmail.com>), an archaeology graduate who also is helping me to study the stone artifacts and speaks English; he is employed as archaeologist by a private company which specialized in rescue excavations "Arqueoweb", and formerly he was employed by the production company ("Biovisual") of our travelling exhibition, and he has also worked for Murcia's Science and Water Resources Museum. In 2012 he will co-direct excavations with me at both *Sima de las*

Palomas and Cueva Negra, as he did in 2008, 2009, 2010 and 2011. Our third co-director in 2009, 2010, 2011 and 2012, who will co-direct with us again in 2012, is **Dr. María Haber** <mariahaber@um.es> <mariahaber@pi-ma.es> who since 2010 is a lecturer in the Department of Prehistory and Archaeology at Murcia University. She is an archaeology graduate and PhD who wrote her doctoral thesis on Neanderthals in Spain and has taught in doctoral programmes at Salamanca University; she then moved to Murcia and has also worked for "Arqueoweb" and collaborated in a Murcia University study of a Copper Age multiple burial skeletal assemblage; she is also competent in osteological analysis as in prehistoric archaeology and she speaks English. Another senior collaborator is Murcia University prehistory lecturer and Palaeolithic use-wear analysis Dr Ignacio Martín Lerma.

Our senior site helpers are young university graduates or senior undergraduate students who collaborate with me - some of them have already been named above, and there are other regular staffers who have worked with us for several years. There is roughly one senior site helper for each helper with little experience, so you are never left alone wondering just what you ought to be doing, because there is always someone alongside to help and show just what has to be done and how to do it. Archaeology graduate Matías Campillo and biology graduates Antonio López, Jon Ortega and Azucena Avilés, who are all researching with me at Murcia University, will be present for most or at least some of the time; they speak English well and have plenty of field experience (Antonio and Jon are preparing Ph.D. theses). Two or three other graduates who have helped before may be around for some periods, depending on when they can take their holidays. Graduates of British universities have presented both undergraduate and postgraduate dissertations at their universities on aspects of our field research after having taken part in our fieldwork and we look forward to their continuing collaboration.

We have very many specialists in different disciplines at centres around the world who collaborate with us actively, and possibly one or two may visit our sites during the 2013 field season. Prominent among them are the distinguished paleoanthropologists Professor Erik Trinkaus (Washington University of St. Louis), who is the leading authority on Neanderthal anatomy, and Professor Bernard Wood of the George Washington University of Washington DC whose publications on early *Homo* in Africa are world-famous. Another distinguished scientist is the palaeogeneticist Dr. Svante Pääbö, (Director of the world-famous Max Planck Institute for Evolutionary Anthropology at Leipzig), who has sent members of his team to take samples here. Likewise Dr. Michael Richards (now Professor of Anthropology at the University of British Columbia, who until recently held senior appointments at Durham University and the Leipzig institute), an expert on research into stable isotopes that provide useful knowledge about Palaeolithic diets, visited us two years ago with his then PhD student, now Dr. Domingo Carlos García Salazar (Valencia University) who is particularly involved with our research. Also at the Leipzig institute, Dr. Amanda Henry is studying phytoliths in Neanderthal dental calculi, which tell us about plants eaten at *Sima de las Palomas*.

The eminent palaeoanthropologist Professor Chris Stringer (Natural History Museum London and London University Imperial College) follows our research keenly and he sent his Head of Conservation, Chris Collins, here to give us the benefit of his experience. Subsequently, we have had more advice in this regard from Dr. Christoph Zollikofer from Zurich University and Dr. Francisco Giles Pacheco and Juan José López Amador from the El Puerto de Santa María Museum. Notable colleagues include thermoluminescence expert Dr. Daniel Richter (University of Bayreuth and the Leipzig institute) and the expert on optically stimulated luminescence sediment dating Dr. Jean-Luc Schwenninger (Oxford University Research Laboratory for Archaeology and the History of Art, RLHA), as well as the well-known radiocarbon dating specialist at RLHA, Dr. Tom Higham, uranium-series dating expert Dr. Alistair Pike (Bristol University), palaeomagnetism specialists Professor Gary Scott (Berkeley Geochronology Center) and Dr. Lluís Gibert-Beotas (Barcelona University), cosmogenic nuclide dating expert Dr. Régis Braucher (Laboratoire de Nucléides Cosmogéniques LN2C, CEREGE UMR 6635, CNRS, Aix-en-Provence), the specialist in Fourier-transform infra-red spectroscopic analysis of burnt finds Dr. Francesco Berna (Boston University), and the expert in spectroscopic characterization of crustal atoms Dr. Alex Andronikov of Arizona University's Planetary and Lunar Laboratory.

Notable colleagues who collaborate actively include the retired dental anthropologist Dr. Vincent Lombardi (one-time adjunct professor at Harvard University Dental School), physical anthropologists Dr. Alejandro Martínez-Pérez-Pérez (Barcelona University), Dr. Kornelius Kupczik (Max Planck Institute for Evolutionary Anthropology at Leipzig) and Dr. Josefina Zapata-Crespo (Murcia University), Palaeolithic archaeologists Emeritus Professor Derek Roe (Oxford University), Professor João Zilhão (Barcelona University), Emeritus Professor Nicolas Rolland (University of Victoria, Canada), Professor Wil Roebroeks (Leiden University), pollen analyst Professor José Sebastián Carrión-García (Murcia University), anthracologist Dr. Ernestina Badal (Valencia University), micromammalian palaeontologist Professor Antonio Ruiz-Bustos (Granada University), mammalian palaeontologists Dr. Carles Ferrández (Barcelona University) and Dr. Jan van der Made (Museo de Ciencias Naturales del Consejo Superior de Investigaciones Científicas, Madrid), reptile palaeontologist Dr. Xaber Murélagu (University of the Basque Country), soil micromorphologist and prehistorian Dr. Diego Angelucci (Trento University, Italy), geomorphologist Dr. Yanni Gunnell (Lyons-2 University), geologists Dr. Tomás Rodríguez-Estrella (Cartagena Polytechnic University) and Dr. Miguel Ángel Mancheño-Jiménez (Murcia University), analytical chemist Dr. Juan Luis Polo-Camacho (Murcia University), archaeologist Professor Milton Núñez-Gilabert (Oulu University, Finland), archaeologist and physical anthropologist Dr. Phillip Habgood (Queensland University), avian palaeontologist Anne Eastham (Cleddau Laboratory for Archaeozoology, Fishguard, Wales), archaeologist Miguel San Nicolás-del Toro (Instituto de Patrimonio Histórico, Comunidad Autónoma de Murcia), palaeoimmunology and palaeobiochemistry expert Professor Enrique García-Olivares (Granada University).

FIELD LOGISTICS

RESEARCH AREA

Both *Cueva Negra* and *Sima de las Palomas* lie in the southeastern Spanish province of *Murcia*. It is a popular Summer tourist area, especially the *Mar Menor* ("Lesser Sea") which is a large coastal lagoon near to *Sima de las Palomas*. *Murcia* is extremely *dry* and its coastal region becomes is *very warm* from mid-June to mid-September: by noon the temperature is usually 30-40° C (85-105° F.).

The region has a *Mediterranean* scrub vegetation and its aridity means that for the most part its hills and mountains are not covered by dense woodland but, instead, show rocky slopes and cliffs. The majestic hills and peaks emit the heady scented fragrance of thyme, juniper, laurel, fennel, marjoram, camomile and rosemary.

Little is left of the original wildlife, apart from occasional eagles, vultures, and, in the hinterland near *Cueva Negra* wild boar, and occasional wild deer and cats. For the most part, only occasional herds of sheep or goats move across the landscape. All the same, a few

less pleasant animals lurk among the rocks, from stinging tarantula spiders and small scorpions to poisonous vipers. If you wear boots when you are not on footpaths, these little creatures will scurry away quickly, so don't worry!

Dramatic visual contrasts in the landscape are provided between the bright rock of steep hillsides and the lush green agricultural crops on valley floors which are oases maintained by irrigation canals from the *River Segura* and its tributaries.

These canals were first dug by *Syrian* engineers after this part of Spain fell under *Muslim* domination in the eighth century A.D., when *Islamic* soldiers crossed the *Gibraltar Strait* from *North Africa* and soon conquered most of Spain. The very name *Murcia* is an old Arabic word, "*mursiyah*", which means "*Place of Waters*". It is the name both of the self-governing political region and of its administrative capital which is a city of 400,000 people. It was the capital of an important Muslim emirate or kingdom. (Geographical coordinates for Murcia city are: Latitude 37° 58' 35.5296" or 37.97653574833937; Longitude -1° 5' 35.304" or -1.0931396484375.)

Murcia was an important Muslim kingdom until it was reconquered by Christian Spaniards in the thirteenth century. The reconquest is celebrated every year at *Caravaca de la Cruz* by a mock battle between Christian knights and Moorish soldiers. *Caravaca* was the summer capital of the Muslim kings, who retreated there from *Murcia* which is stiflingly hot and humid in the summer. Helpers at *Cueva Negra* can visit their palace and castle at *Caravaca* now also contains a beautiful church which was built to commemorate a vision there of a Holy Cross with two cross-bars (like the Cross of Lorraine in France) that supposedly helped convert the people to Christianity. *Caravaca* is at 500 metres above sea level, and is cooler than is *Murcia* at a mere 50 m above sea level. *Cueva Negra* is just under 15 kilometres from *Caravaca*, and is higher still, at 750 metres above sea level. On the hill above the cave there are the walls and house-foundations of a late prehistoric Iberian (Iron Age) town and of an Iberian and early Roman temple over part of which a small church was later built. Helpers at *Cueva Negra* can visit these. Not far away, at *Mula*, there was an important Iberian town and there is an excellent museum of Iberian finds.

Murcia was long famous for its *silk* industry, based on its rich orchards of mulberry trees, although that industry has died out over the past 100 years, to be replaced by fruit orchards and canneries. Murcian *peaches* are the sweetest in Europe. Murcian tomatoes, lemons, oranges, melons, and fruit and vegetables of all kinds, from avocado pears and quinces, to date palms, asparagus, artichokes, lettuces, grapes, almonds and olives, are trucked up the 900 kilometre-long motorway which links Murcia to France, Germany, Scandinavia and Russia. Many reach northern markets long before fruit in other *European Union* countries has even started to ripen. The first tomato crop is picked in Murcia at New Year, thanks to a very warm climate which is really an extension of that of *North Africa*.

After dividing at the city of *Murcia* one branch of the motorway goes to Andalusia and the other heads south to link *Murcia* both with its airport at *San Javier* 45 kilometres away and also its sea-port of *Cartagena*, which is a corruption of the name given to it by the *Romans* of "*Cartago Nova*" meaning "*New Carthage*". This reminds us that the port was founded by *Carthaginians* from *North Africa* more than two hundred years before Christ, and formed part of the *Hannibal's Punic Empire* before it came under the Roman heel. Long before Rome was important in the world, *Cartagena's* enclosed natural harbour and its surrounding mountains rich in silver, lead and iron ores, were coveted by the *Carthaginians* who competed with Greece for control of Mediterranean sea-routes, because whereas the Greeks had silver mines for coinage near Athens itself, Tyre and Carthage had none. The Greeks established ports in Catalonia (*Ampurias*) and France (*Marseilles*), whereas Carthage maintained control of *Cartagena* until the Roman general Scipio besieged it and thereby also took control of its valuable silver mines.

To-day, *Cartagena* is the main port for the *Spanish Navy* and is an attractive city of 200,000 people with many remains of the *Carthaginian* and *Roman* periods which can be visited. They include part of the *Carthaginian* city wall built in 300 years before Christ, the *Roman* theatre, *Roman* house foundations and streets preserved as museums in the basements of modern buildings, part of the *Byzantine* city wall of 500 A.D., and much more besides. There is a breathtakingly splendid archaeological museum, a very attractive museum of maritime archaeology. It also has the world's first electrically-driven submarine, made in 1888 by Spanish naval engineer and inventor *Isaac Peral*, which weighs 80 tonnes, has 3 propellers and reached a speed of 7.7 knots. The city and its naval base were heavily fortified in the 18th century under King Carlos III, and his walls and forts dominate the hills and cliffs which enclose the superb natural harbour.

In the hills near *Cartagena* is another cave which was entered by miners, *Cueva Victoria*, where my friend, the late José Gibert excavated fossils in what was an Early Pleistocene hyaena den into which the carnivores brought one or two hominin bones, which are among the oldest in Europe (see "CV-0, an early Pleistocene human phalanx from Cueva Victoria (Cartagena, Spain)". J. Gibert, L. Gibert, F. Ribot, C. Ferrández-Cañadell, F. Sánchez, A. Iglesias, M.J. Walker, in *Journal of Human Evolution*, 2008), even older than those from *Atapuerca Cave* in northern Spain which only go back as far as the end of the Early Pleistocene 780,000 years ago. Helpers at *Sima de las Palomas* may have opportunities to visit *Cartagena* and perhaps *Cueva Victoria*, or they may prefer to visit the city of *Murcia* instead. Dr. Gibert also excavated Lower Pleistocene hominin and early Palaeolithic sites at *Orce* in northern Granada.

Sima de las Palomas is roughly 45 kilometres from both *Cartagena* and *Murcia*. *Murcia* has a magnificent *cathedral* with a splendid baroque west front and an enormous tower which offers a fine view of the city. 1994 was the 600th anniversary of the founding of the cathedral. The centres of both *Murcia* and *Cartagena* are narrow pedestrian thoroughfares which are always thronged with people. During *Easter Week* both cities have enormous religious processions which are often televised throughout Spain.

Both cities have a very wide range of bars and taverns, where the strong dry Murcian *red wine* from the *Jumilla* vineyards and wineries should be drunk straight from the cask, accompanied by the wide variety of *tapas* or snacks for which Murcian bars are rightly famous. However, every Murcian town is rich in bars, taverns and discotheques, which come alive at night after dinner, which during the Summer means after about eleven o'clock at night. They are still going strong and noisily at five o'clock in the morning. Helpers at *Caravaca* can sample a wide range of them there, and those at *Dolores de Pacheco* can do so at the seaside resorts of *Santiago de la Ribera* and *Los Alcazares*.

Lack of time, alas, means it may not always be possible for helpers to visit *Murcia* city itself. Should you wish to spend some time in the cities of *Murcia* and *Cartagena*, you could do what some other volunteers have done in the past, and come a few days early or stay on for a few days afterwards. Some of you may wish to visit the marvellous Alhambra palace at *Granada*, which can be reached by coach from *Murcia* though you will probably need to spend two nights at *Granada* in order to have a full day free to see everything. If you want to do any of these, do please let me know, so that I can offer you useful advice.

Murcians, like other Spaniards, are extraordinarily outgoing, effusive and noisy, especially in Summer. They are fundamentally egalitarian and democratic in outlook, and although most are Roman Catholic, they wear their Catholicism lightly and see its processions, baptisms, first communions and weddings as occasions for exuberant enjoyment and festivity, rather than solemnity. Even during solemn religious processions each penitent give out hundreds of sweets to eager children.

Both the Spanish parliament, the Murcian regional parliament, and the city halls of *Murcia* and *Cartagena*, are all controlled by the conservative *Popular Party*. The party has an absolute majority in the national parliament since its leader Mariano Rajoy won the general election in November 2011. He inherited an economic disaster from the socialist government that he ousted and the Spanish economy is in frank recession and there is a frighteningly high unemployment rate. Spain belongs to the eurozone but it has inherited massive debts and the government is paying very high interest to bond-holders because the European Central Bank is loth to buy government bonds of European Union eurozone countries (the German government will not let it do so).

YOUR SCHEDULED ACTIVITIES

Each 3-week period will begin on Day 1 (arrival day, Tuesday) with rendez-vous at Murcia-San Javier National Airport (we start and finish on Tuesdays because there are not only connecting Iberia (Air Nostrum) flights from Madrid and Barcelona on weekdays for intercontinental travellers arriving in Spain from the U.S.A, Australia or elsewhere (there are no connecting Iberia (Air Nostrum) flights on Saturdays and Sundays), but also numerous low budget flights from the U.K. and some other E.U. countries. The following low budget airlines fly in to Murcia-San Javier, or have flown recently (the economic crisis has led to a reduction in flights and companies flying to Murcia-San Javier): Bmibaby (from Birmingham), Easy-Jet (from London-Gatwick and Bristol), Flybe (from Birmingham, Exeter, Southampton, and Norwich), Flyglobespan (from Edinburgh), Jet2.com (from Edinburgh, Blackpool, Leeds-Bradford, and Newcastle), Virgin Express (from Brussels), Ryanair (Dublin, London-Stansted, London-Luton, Bremen, Glasgow-Prestwick, Liverpool, Nottingham-East Midlands). We do not know which airlines will be flying still in June-July 2013 let alone their schedules; even Ryanair has said it may reduce the number of flights.

If helpers so wish, Day 2 (Wednesday) will be devoted to orientation, settling in, visiting the site, and free time when you can shop and get to know the town where they are based: namely, *Caravaca de la Cruz* (first period); and *Dolores de Pacheco* or nearby seaside towns such as *Santiago de la Ribera*, *Los Narejos* or *Los Alcazares* (second period). However, we have usually found that many helpers, after getting to the site by mid-morning on Day 2, prefer to get stuck in straightaway by working lightly there until lunch-time, and then to have half a morning free on some *other* day in order to buy gifts at stalls in the popular out-door weekly markets that are held in every Spanish village, town and city (just as in many other European countries) because their prices are often lower than in the shops (which, of course, are also open for shopping at the same time) - there are no nearby out-door markets on Day 2 (Wednesday). Each group will therefore be asked how it prefers to have Day 2 and its wishes will be respected.

Days 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 (Thursday, Friday, Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, Monday,) are all potential working days, though we shall most certainly have some excursions and rest days among them! We often work on Saturday and Sunday so as to prevent a possibility of interference with our unattended excavation equipment by uninvited weekend visitors and day-trippers in our absence. However, one day in each three-week period will be used for day-long excursions to sites of interest. The first one will probably be a visit to mesolithic rock paintings in Murcia or Albacete. The second one will probably be a visit to *Cartagena* and perhaps *Cueva Victoria* or, if they prefer, the city of *Murcia*. Day 22 (Tessday) is departure day (when there will probably be a chance in the morning for helpers at Cueva Negra to visit *Sima de las Palomas* provided their flight back home from Murcia-San Javier Airport is after lunch).

Also, we do find it sporadically necessary to have a rest and recreation (R&R) day, particularly in the second period for the benefit of the senior site helpers who needs a little time to themselves after having already been some weeks in the field at everybody's beck and call. On these R&R days, other helpers may explore their surroundings by themselves (we can tell them how to hire cars should they wish to do so and lend them maps) or simply laze the day away restfully and take their meals as usual. The P.I. and senior site helpers from Murcia will *not* usually be available on such R&R days.

If you are excavating at *Sima de las Palomas* you will have a chance to see our travelling exhibition that was cofinanced by the European Commission and which is now in the Murcian town of Torre Pacheco (near *Sima de las Palomas*). It is called "*Archaic Europeans and Neanderthals, The Homo Project: Hominins, Technology and Environment in the Middle and early Upper Pleistocene*". It had a successful international tour from 2001 to 2004 which included the Vienna Natural History Museum, the Oxford University Natural History Museum, the Barcelona Palaeontological Museum at Sabadell, Murcia's Museum of Science and Water Resources and later on in the Murcia University Library, and elsewhere in Spain (San Sebastian; Logroño; etc.).

DAILY SCHEDULE

A typical daily schedule of a working day might be roughly as follows:

- 07.00 Reveille
- 07.30 *Light breakfast* of coffee, bread roll, cereals, fruit juice.
- 07.45 Leave for site in vehicles
- 08.30 Begin work at site
- 11.00 *Mid-morning break for sandwich*
- 11.30 Restart work
- 13.45 Clean up at site, return to vehicles and to accomodation
- 14.15 Shower and change
- 15.15 *Luncheon*

15.45 Comments on day's work, briefing for next day
16.00 Siesta (afternoon nap)
17.30 Washing, ordering and bagging of finds
20.00 Informal talk, discussion, or free time
21.00 *Dinner*
21.45 Free time

I have followed a similar schedule in southeastern Spain since 1980 and find it well suited to the hot climate which is unsuitable for work between about 14.00 and 17.30 hours. It has been a successful schedule for archaeological excavations carried out at Murcia University for 30 years.

GROUP DEVELOPMENT

Group development is assisted by daily sessions after lunch when resués of the day's activities and briefings for the next day can be commented on. The daily sessions after siesta when we are washing and sorting finds also bring everybody together in one place involved in common activities related to the finds from the day and sorting those which have dried out from the previous day. These work sessions may be followed by one of the three talks I give to each group: about the Project itself, about Plio-Pleistocene Human Evolution, and about the origin and evolution of Neanderthals. On other days, there is time for leisure and relaxation before dinner. On other than R&R days, and whenever administrative matters do not demand that I absent myself after 20.00 hours, I have tried to be present with the group upto and during Dinner and quite often I have joined with all our members after Dinner in visiting local entertainments. Increasingly administrative and representational obligations intrude on my time, when my co-directors María Haber and Mariano López take full charge. Very many senior site helpers join in after-dinner events and our new helpers usually have a good time with them.

It is anticipated that helpers will take part in guided excursions to archaeological and historical sites of interest. I have found these to offer excellent opportunities for group development in surroundings which provide a complete alternative to those of the work situation at our two sites. Everybody gets to know not only each other, but also something new, interesting and different. We try to take in local bars and eating places, and sample local food and wine.

PASSPORTS, VISAS AND RECONFIRMING YOUR TICKETS

CHECK THAT YOUR PASSPORT HAS NOT EXPIRED! IF IT HAS, GET IT RENEWED! People who are not citizens of a European Union Member State usually need *valid passports*, and may need *visa stamps* in them for visiting Spain and other European Union countries unless their country has reciprocal agreements for visitors to and from the European Union - thus I understand that visas are *NOT* required for U.S. or Canadian visitors because such agreements exist, although citizens of many British Commonwealth nations do still need visas for entering Spain and all other E.U. countries. If in any doubt, travel agents or the nearest Spanish Consulate-General will advise whether or not a visa is required. Visas are issued at Spanish Consulate-General offices and there is always one attached to the Spanish Embassy in national capitals, and many large cities have one also (listed in the phone book).

United Kingdom and Irish citizens, even though they do not need visa stamps, should still carry their passport with them because these two Member States of the E.U. neither automatically assign each citizen with an I.D. card nor have they joined the "Schengen Group" of those E.U. nations which have abolished border control of travellers between the countries of this group. I believe that E.U. citizens from "Schengen Group" states need only carry their national I.D. card to enter Spain which has joined it.

Reconfirmation of your return flight is *not usually necessary* nowadays (*whatever* your travel agent tells you to the contrary), because international return flights on major airlines - and even charter flights - *are almost always reconfirmed automatically by the airline, without you having to contact them again at all*. Many tickets carry the rather confusing advice that reconfirmation should be 72 hours before departure, though you may well be able, in fact, to reconfirm a month before departure (especially on intercontinental flights) and so feel secure that you have got a seat reserved for you. You can often *even* reconfirm your return flight before you set out on your travels at all, at the desk of the airline in the airport from which you leave home; I myself often do this nowadays.

Some travellers still like to make sure later on. So if you are one of them **IT IS YOUR RESPONSIBILITY AND YOURS ALONE** to reconfirm your ticketing -- not mine nor that of my staff. You can do it **MOST EASILY** like this. If you arrive in Madrid by plane from outside Europe you can reconfirm your international return flight at **ANY** airline desk (including that of Iberia Airlines) in *Madrid-Barajas International Airport BEFORE* you leave the international section of the airport -- regardless of whether you are going to spend a few days in the city or are simply going straight to the national section of the airport to catch a connecting national *Iberia Airlines* flights down to *Murcia-San Javier Airport*.

The reason **WHY** you should do that *straight away* in **MADRID** is that once you get to *Murcia-San Javier National Airport* you will find that it is possible to reconfirm **ONLY Iberia Airlines** international outward flights from Madrid or Barcelona, **BUT NOT THOSE OF OTHER INTERNATIONAL CARRIERS** because the *Iberia Airlines* desk at *Murcia-San Javier* is **NOT** connected by computer-link to any company except *Iberia Airlines*. You can, however, reconfirm local return flights (*i.e.* flights within Spain) out of *Murcia-San Javier Airport* at the *Iberia Airlines* desk; so if you are addicted to reconfirming your flights you should reconfirm your return flight back to Madrid on *Iberia Airlines* on your arrival at *Murcia-San Javier* also. If you are coming from *London* by *British Airways*, *Ryanair*, *Easyjet* or other companies, then see to it that **YOU** find the receptionist of the flight in question on your arrival in order to reconfirm your return flight with him or her, if you are addicted to reconfirming return flights. *British Airways* has just joined up in a single company with *Iberia*; this may affect flight designations in 2012: you should find out.

Again, all this is **YOUR** responsibility, not mine nor that of my senior site helpers. People are often forgetting to do this on arrival, and then continually pestering us to organize telephone calls for them from *Caravaca* or *Dolores de Pacheco* to international carriers in Madrid. I and my senior site helpers are busy enough, as it is, running a research project; we are **NOT** tour-operators nor a travel agency for wayward or forgetful new helpers, let alone for those who are merely neurotic obsessives.

IMPORTANT MONEY MATTERS

The Spanish currency is the euro €, which is divided into one hundred cents of a euro. At the time of writing, January 2013, one euro is equal to about \$1.30 US or to about 80 pence UK.. However, currency rates are fluctuating rapidly because of the international economic crisis. I recommend most definitely that you bring some banknotes in euros with you - **say €100 euros at least.**

In Spain you can both get cash or pay for things with **VISA** or **MASTERCARD** credit cards. Please note, however, that **AMEX** cards and **DINERS CLUB** cards are often refused (because most retailers or hoteliers won't accept the stiff terms imposed by those two credit-card companies), and, furthermore, my experience of volunteers' difficulties has shown me that bank cash cards (e.g. **ATT**) from your home banks (especially from U.S. banks) **tend not to work in Spain** when you try to use them in automatic ATM cash machines here (whatever you may have been told to the contrary back home!) so don't rely on your bank cash card. Therefore you should also bring a **VISA** or **MASTERCARD**, and most particularly you must make sure that it has been **configured by your home bank for European Union countries**, and most especially for **Spain**. Don't be slack about insisting on this because I've even had trouble getting my Spanish-issued **VISA** card to work in France and my son had trouble with his in the UK! (Yeah, I know you've got to pay interest charges with **VISA** and **MASTERCARD**: That's how the cookie crumbles!).

In 2010 and especially in 2011 and 2012 we have found that local banks in the towns where we have our bases **are refusing to cash traveller's cheques**. This is because they now have to enforce a very restrictive interpretation imposed on them by the Spanish government of European Union regulations intended to prevent money-laundering. The Spanish authorities will now only allow banks in Spain to credit pre-existing customers' bank accounts with money paid in to them from non-account-holders' traveller checks -such as the US-dollar traveller checks of our helpers from other countries; the bank account holders here (us) would then have to pay those helpers back in euros from their (our) personal bank accounts, but the money paid into our accounts in that way is treated by Spanish tax authorities as part of our personal income on which we, the account holders, have to pay income tax to the Spanish government, **so we now refuse to do that for you! THE BOTTOM LINE IS THAT YOU MUST NOT BRING TRAVELLER'S CHEQUES HERE.** So what to do? The only alternative is to bring as many euro banknotes with you as you think you will need here in the possible event of having problems when using your **VISA** or **MASTERCARD** in ATM machines. One way that seems to work quite safely is to get a cloth money-belt you can wear under your clothes and bring with you euro banknotes in denominations of 50 or 100 euros.

RENDEZ-VOUS

For field helpers arriving by plane for both *Sima de las Palomas* and *Cueva Negra*, the rendez-vous is *Murcia-San Javier National Airport at San Javier (MJV)*.

Rendez-vous is on **Tuesdays with set-downs and pick-ups mainly between 15.00 hours (3 p.m.) and 21.30 (9.30 p.m.)** on these dates (precise hours will be adjusted to take account of afternoon-evening flight arrivals and departures when the 2012 Summer schedules are published):

Cueva Negra: pick up Tuesday **July 2nd**, set down Tuesday **July 23rd 2013**

Sima de las Palomas: pick up Tuesday **July 23rd**, set down Tuesday **August 13th, 2013**

Murcia-San Javier (MJV) Airport is a small airport and because it forms part of a complex with the Spanish Air Force Academy for training officer pilots its air space is closed to civil traffic between 8 a.m. and 3 p.m.. This means that international flights in and out take place in the late afternoon or evening, and it also means they land or leave at broadly similar times, give or take an hour, regardless of whether the Winter or the Summer schedule is in force. Internal civil flights between the airport and Madrid by *Iberia Airlines* (the Spanish national carrier) are mainly in the afternoon or evening though there is one early morning flight to Madrid: none of these internal national flights run on Saturdays or Sundays, however, because they are aimed at internal businessmen's weekday needs to do the return trip in one day, and not those of international visitors on weekends. Intercontinental travellers from the U.S.A. or elsewhere are advised to book an onward *Iberia Airlines* afternoon or evening flight from Madrid Barajas Airport to MJV, and an afternoon or evening one back to Madrid. Just to complicate things a bit more, a new Murcia Airport has been built but is not yet functioning. If it starts operating in July, and the old airport has been closed, then you will be met at the new one, so don't worry.

Because of the aspects outlined above, we find it most convenient to only pick up and set down travellers at MJV Airport at 3-weekly intervals in the afternoon and evening of only **one** particular weekday, which in 2013 is **Tuesday**. If you arrive earlier on the Tuesday, you will have to be prepared to wait several hours for us to appear. If you want to leave earlier in the day, you will have to be prepared to hire a taxi (at your own expense) to get you to MJV Airport - and you will also have to be prepared to do this if you choose to arrive or depart on any **other** dates than **July 2nd, July 23rd and August 13th, 2013**.

Beware of British Midland flights advertized as going to "Murcia", when in fact they fly in and out of *Alicante International Airport* and we do **NOT** pick up or set down travellers at *Alicante International Airport under any circumstances*, because its heavy volume of air traffic leads to long delays in many flights, especially non-scheduled cheap charter flights from the U.K. or other E.U. states, and I am simply not prepared to have my drivers hanging around the airport for hours waiting for late planes to land, let alone to have to keep our cooks up all night keeping dinner warm for my drivers and late arrivals they bring back with them.

On **Tuesdays** there are flights between London and Murcia-San Javier Airport (flying time is two-and-a-half-hours; there is a 1-hour time-zone difference between Spain and the U.K.). **PLEASE NOTE** THAT THESE FLIGHTS MAY NOT RUN EVERY DAY OF THE WEEK. Please consult your travel agent, or the time-table of the airline on the web, about possible up-dates for July and August 2013.

The direct flights between London and Murcia-San Javier (MJV) Airport by either **Ryanair** from London (Stansted) and London (Luton) or **Easyjet** from London (Gatwick) are suitable for our rendez-vous arrangements because they will mean you don't have to hang around for twelve hours (or even find somewhere to stay overnight!) while waiting for us to pick you up. **Easyjet** flies also flies between

Bristol and Murcia-San Javier and between Newcastle and Murcia San-Javier. There are even flights from Edinburgh by **Jet2**. You will find the details on the web. Please check the web because some carriers may be eliminating some services in 2013, we have been told.

Remember that each 3-week period will begin on Day 1 (arrival day, Tuesday) with rendez-vous at Murcia-San Javier National Airport (we start and finish on Tuesdays because there are not only connecting *Iberia (Air Nostrum)* flights from Madrid and Barcelona on weekdays for intercontinental travellers arriving in Spain from the U.S.A, Australia or elsewhere (there are no connecting *Iberia (Air Nostrum)* flights on Saturdays and Sundays), but also numerous low budget flights from the U.K. and some other E.U. countries. The following low budget airlines fly in to Murcia-San Javier, or have flown recently (the economic crisis has led to a reduction in flights and companies flying to Murcia-San Javier): *Bmibaby* (from Birmingham), *Easy-Jet* (from London-Gatwick and Bristol), *Flybe* (from Birmingham, Exeter, Southampton, and Norwich), *Flyglobespan* (from Edinburgh), *Jet2.com* (from Edinburgh, Blackpool, Leeds-Bradford, and Newcastle), *Virgin Express* (from Brussels), *Ryanair* (Dublin, London-Stansted, London-Luton, Bremen, Glasgow-Prestwick, Liverpool, Nottingham-East Midlands).

Only if you have told us in advance, AND WE HAVE REPLIED SAYING WE SHALL, will our drivers pick up late arrivals after 21.30 hours on July 2nd at MJV Airport once the *Iberia/Air Nostrum* plane from Madrid has landed (the reason is because the drive to Caravaca takes 75 minutes and on the first evening of our first session we like all our helpers to have dinner together at our Caravaca base, and certainly no later than 22.30 hours). On the other hand, we can set you down from 15.00 hours onwards, whichever of the afternoon or evening direct flights to London or Madrid you choose. Provided that **beforehand** you have given us your **flight number**, then if your plane is delayed, and arrives late at MJV, we will wait for you, so don't panic! But if you have **not** given us your flight number beforehand, and your plane arrives late, it is unlikely there will be anybody to meet you at the airport (unless, if you're very lucky, a driver may be waiting for someone else off the same late flight who **had** given us the necessary details beforehand). **IT IS ALSO IMPORTANT TO STRESS THAT WE NEED YOUR FLIGHT DETAILS BEFORE JUNE FIRST 2013, EVEN IF YOU ARE NOT COMING BEFORE JULY 23rd, BECAUSE AFTER JULY 1ST WE DO NOT HAVE REGULAR OR RELIABLE INTERNET ACCESS WHEN WE ARE DIGGING AT CUEVA NEGRA AT CARAVACA, AND THEREFORE WE MAY WELL FAIL TO RECEIVE EMAIL MESSAGES SENT BY YOU BETWEEN JULY 2nd AND JULY 23rd: SO BEFORE June 3th WE NEED ALL FLIGHT DETAILS UPTO AUGUST 13th IF YOU WANT US TO PICK YOU UP BY US AT MJV AIRPORT. (Why June 30th and not July 2nd? Because we go to Caravaca two days before we pick you up in order to prepare the site for excavation.)** Transport between Murcia Airport and our accommodation bases is free of charge to helpers who arrive for the Tuesday afternoon-evening rendez-vous WHO HAVE GIVEN US THEIR FLIGHT DETAILS BEFORE JUNE FIRST 2013. If you are flying back to Madrid, avoid the early morning flight because we cannot ferry you to MJV Airport to catch it and you will therefore have to hire a taxi at your own expense.

There are several operators of low-cost flights from the UK to Murcia-San Javier. You should check for up-dating of services on the web or through your travel agent, although we also shall try to keep ourselves informed so as to be able to offer advice. Summer flight schedules are usually available by the beginning of April. Train and coach times are usually much the same, though there may be additional services scheduled during the busy Summer holiday months.

Here are **Ryanair** flight times advertized from/to London-Stansted or London-Luton and Murcia advertized for Tuesdays in 2013. Check with **Ryanair**.

Airport	Time
Dep. London-Stansted	18.10 h
Arr. Murcia-San Javier	21.45 h
Dep. London-Luton	14.25 h
Arr. Murcia-San Javier	18.00 h
Dep. Murcia-San Javier	16.55 h
Arr. London-Stansted	18.30 h
Dep. Murcia-San Javier	18.25 h
Arr. London-Luton	20.00 h

Here are **Easyjet** flights advertized from/to London-Gatwick and Murcia on Tuesdays in 2013. Check with **Easyjet**.

Airport	Time
Dep. London-Gatwick	12.50 h
Arr. Murcia-San Javier	16.25 h
Dep. Murcia-San Javier	16.55 h
Arr. London-Gatwick	18.30 h

British travellers may like to know that there in recent years there have been also some *British Airways* flights to Madrid from Birmingham and Manchester and to Alicante from London-Gatwick, and that there were also some flights from these airports to Frankfurt where connecting flights onward to Murcia-San Javier Airport can be taken. I do not know what is available in 2013.

Intercontinental travellers, please note that if you are flying back from Murcia to London in the afternoon –especially if flying on budget airlines such as **Ryanair** or **Easyjet**, and then on to another destination from London, *you ought to arrange to spend the night in London* because flights from Spain to London are *very, very often delayed* in Summer when air traffic between northern Europe and the Mediterranean holiday coast is always *very heavy indeed* and because scheduled flights are given priority for take-off or landing budget airline flights can easily be delayed by a few hours without warning. You must take into account the likelihood of this occurring so as *not to miss your onward connecting flight* (e.g. to the U.S.A. or wherever). It could be very imprudent indeed to think you can arrive at London Gatwick at, say, 19.00 h and be in time to catch a 22.00 h plane from that same airport to the U.S.A. - and if you have to change airports and get to Heathrow, allow a good six hours, as you may have to collect your luggage at Gatwick before getting the coach from Gatwick to Heathrow (which takes at least an hour - more if traffic is heavy) and once there you'll have to check it in again before your next flight is closed.

Iberia Airlines Please bear in mind that, at Spanish airports, flights are **closed one hour before scheduled take off**. This means that if you are going to change planes in Madrid, even between national flights, let alone for international and intercontinental flights, then when you arrange your flights you must make sure that you allow around **two hours** between your plane's scheduled landing (it might be delayed) and the take-off of your next plane. If you're coming from the U.S.A. it is probably quickest and cheapest to change from a U.S. carrier to *Iberia (Air Nostrum)* at Madrid (*Air Nostrum* is simply a subsidiary company belonging to *Iberia Airlines* and many internal flights in Spain are serviced by this subsidiary), as your U.S. carrier may well include the price of one onward flight within Europe in the cost of your ticket to Madrid.

Alicante: Please note that even though there are *British Airways* flights between *London-Gatwick* and *Alicante International Airports*, **we refuse absolutely to pick up or set down travellers at Alicante Airport, under any circumstances whatsoever.** We refuse to do this because *Alicante International Airport* is both too far from our centres of activity and its air-traffic density is so very great that the frequent long delays in arrival and departure times there could mean that our staff assistants who drive the vehicles might be inconveniently away for unpredictably long periods. Also, there are so many hundreds of flying holidaymakers there at all times of the day and night during the summer, that you could easily miss us and we could easily miss you, whereas *Murcia-San Javier Airport* is very small and quiet, and we've never missed meeting anyone there yet! We appreciate this might disappoint some international travellers, but the smooth running of our project must take precedence over individual convenience of travellers.

If you decide, however, to travel to Alicante Airport, on arrival there do **NOT** try to make your way to our pick-up rendez-vous at Murcia-San Javier Airport. Instead you **MUST MAKE YOUR OWN WAY** to our **bases at Caravaca or Dolores de Pacheco**, respectively. **You will have to go first to Murcia.** A regular coach service leaves every two hours from Alicante Airport for Murcia city bus station (taking 55 minutes), from 07.15 h to 21.15 h, and the return service leaves Murcia every two hours from 07.00 h to 21.00 h.

About the buses to Caravaca, to San Javier, and to Los Alcázares from the *Estación de Autobuses* (Murcia city bus station) (AND SEE BELOW FOR MORE DETAILS, UNDER TRAVEL OPTIONS BY RAIL OR COACH)

On arrival at Murcia city bus station, you must find the counter for the service you need (i.e. Caravaca for Cueva Negra; or San Javier or Los Alcázares for Sima de las Palomas), and buy your ticket, which you then show to the bus driver when you board.

On working week-days, buses leave for Caravaca at ten minutes past the hour, every hour from 06.10 h through to 21.10 h (there are fewer buses on public holidays and weekends) and the journey takes roughly an hour-and-a-half. Return buses leave Caravaca for Murcia at ten minutes past the hour, every hour from 06.10 h through to 21.10 h (except that instead of 15.10 h it leaves at 15.30 h).

On working week-days, buses leave for San Javier on the hour every hour from 07.00 h to 21.00 h (there are fewer buses on public holidays and weekends) and take three-quarters of an hour; the return trip leaves at half-past each hour.

On working week-days, buses leave for Los Alcázares at half-past the hour every hour from 08.30 h to 20.30 h and you should get off at the first stop where the road on which you are travelling from Torre Pacheco enters the town of Los Alcázares (there are fewer buses on public holidays and weekends) and the journey takes roughly an hour; return journeys run from 07.20 h to 19.20 h once an hour but with varying departure times (consult us).

Alicante, again: If you do decide to travel through *Alicante International Airport*, then on your head be it! You, and you alone, are responsible for getting from there to our field bases. You must go to them *directly*, without going to Murcia-San Javier Airport, (1) because it will be cheaper and much less time-consuming for you, especially if you are going to Caravaca to help at Cueva Negra, and (2) because if your flight were to be delayed and you were to arrive after our rendez-vous pick-up had left Murcia-San Javier Airport, you would find yourself absolutely stranded, at an airport in the middle of nowhere, if you had to get to Caravaca on a Thursday night! - and there would be no way we could help you as we would be a long way away by that time. You would have been better off heading for Murcia city bus station from Alicante in the first place, because even if you were to have missed the last bus up to Caravaca from Murcia, you would nevertheless be in a city with lots of hotels where you could easily find a bed for the night before getting a bus up to Caravaca next morning (Friday).

Low-budget travellers from the British Isles might also be interested in low budget flights to **Madrid, Valencia, or Barcelona**, that fly out of other British and European cities. Coaches are much cheaper than trains in Spain and there are many overnight coaches from Madrid or Barcelona which save you the cost of a bed (whereas overnight trains nowadays have disappeared in Spain).

IT IS MOST IMPORTANT TO REMEMBER THE MURCIA-SAN JAVIER AIRPORT IS BY THE SEA AND THE MURCIAN COAST IS A MAJOR HOLIDAY RESORT AREA, SO HIGH-SEASON FLIGHTS IN THE JULY-AUGUST HOLIDAY PERIOD GET FULLY BOOKED UP SEVERAL WEEKS AHEAD. SO IF YOU ARE COMING YOU SHOULD FINALIZE YOUR TRAVEL ARRANGEMENTS, BY THE END OF APRIL IF YOU WANT TO BE SURE OF GETTING A SEAT THROUGH TO MURCIA-SAN JAVIER. REMEMBER THAT ON-LINE BOOKING WITH COMPANIES LIKE RYANAIR OR EASYJET OFTEN GIVES YOU A VERY CHEAP DEAL IF YOU BOOK A FEW MONTHS BEFOREHAND.

IF YOU ARE MAKING ALTERNATIVE TRAVEL ARRANGEMENTS AND WANT US TO TRY TO MEET YOU AT ANY OTHER TIME OR PLACE, IT IS ESSENTIAL THAT BY JUNE 1st YOU HAVE INFORMED ME IN WRITING. YOU MUST INFORM ME DIRECTLY BEFORE JUNE 1st 2013, either BY WRITING AIRMAIL TO:

**Professor Michael Walker
Subdepartment of Physical Anthropology
Department of Zoology and Physical Anthropology
Biology Faculty
Murcia University
30100 Murcia
Spain**

or BY FAXING me on 34-868-883963 at any place, date, or time of day, *other than* the rendez-vous place, dates, and times, given above, you will be expected to pay for our petrol even if we have agreed to come to meet you or set you down. **Whether or not we agree to do so, will depend on whether it is convenient for us**, because a major field project has many commitments which tie up our vehicles and staff.

Unless you have received a reply from me personally, that we shall meet you, you **MUST** find your own way to the accommodation base at your own expense. For *Cueva Negra*, our base is the residential Ascrúz state-run school (Colegio Ascrúz) on the edge of the town of Caravaca de la Cruz, and for *Sima de las Palomas* it is the state school at Dolores de Pacheco where we can be contacted via the village Civic Centre where we take our meals at its restaurant.

If you get into difficulties when travelling to us, and cannot arrive at an agreed time or place, try phoning us, so that we aren't hanging around unnecessarily, and can try to help you with an alternative rendez-vous. You can try my cell phone number 620-267104 (34-620-267104 from outside Spain) though when in the field this number may very well be out of cover (especially at *Cueva Negra*) and you would need to ensure before leaving your country of origin that your own mobile phone is set up so as to be able to dial cheaply within Spain and not via a hideously expensive international phone call that re-routes your call first through your country of origin and back again to Spain!!! If dialling from a public phone box, we recommend you put a one euro (1€) coin into the phone and dial either 968-700844 (the Ascrúz school at Caravaca, after 15.00 hours Central European Time (CET) when we have got back from the field; 34-968-700844 from outside Spain) or 968-173200 (Dolores de Pacheco Civic Centre, after 15.00 hours Central European Time (CET) when we have got back from the field; 34-968-173200 from outside Spain), depending on which field base you need to get to. Check on the time zone before you phone; 14.00 hours U.K. time is equivalent to 15.00 hours CET, but if you're phoning from the U.S.A. there are several hours of difference!

If you arrive at any place, date, or time of day, *other* than the rendez-vous place, dates, and times, given above, you will be expected to pay for our petrol even if we have agreed to come to meet you or set you down. Whether or not we agree to do so, will depend on whether it is convenient for us, because a major field project has many commitments which tie up our vehicles and staff.

Unless you have received a reply from me personally, that we shall meet you, you *MUST* find your way to the accommodation base at your own expense. In that regard, the following information may be helpful.

***Cueva Negra*:** From Murcia Airport to our accommodation base at Caravaca's "Colegio Público "Ascrúz" de Educación Especial" (Residential Public School "Ascrúz" for Disabled Children), the distance of 120 kilometres means your taxi fare will cost you at least €80 euros a head and maybe a good bit more. It could therefore be *very* expensive for you if you fly in on a day or at a time other than the scheduled rendez-vous ones.

***Sima de las Palomas*:** From Murcia-San Javier Airport to our accommodation is at the village school at *Dolores de Pacheco* but we eat three times a day at its village "Centro Cívico" (Civic Centre) which is only about 8 kilometres by road from the Airport, and so if you are flying in on a day or at a time other than the scheduled rendez-vous ones, we can probably pick you up at the Airport, provided we have advance information; if we do not, a taxi to our accommodation base from the Airport should cost about €10 euros.

TRAVEL OPTIONS BY RAIL OR COACH

If you plan to arrive by rail or coach on a rendez-vous Thursday afternoon, do **NOT** head for *Murcia-San Javier Airport* **without first consulting me, Michael Walker, directly**, because it will probably be **SIMPLER** for us (and you) to arrange to meet you that day - elsewhere, and at another time- especially if you are coming to *Cueva Negra*: e.g. at *Calasparra* railway station if you're coming by train, or where the coaches from Murcia stop in *Caravaca* itself if you're coming by coach. Under **NO** circumstances will we meet passengers off trains at Murcia city railway station, because there is always such a throng of travellers there that you could easily miss us or we could easily miss you. The distance between *Caravaca* and *Murcia-San Javier Airport*, together with our shortage of cars and drivers, means that unfortunately there is very little room indeed for flexibility in our arrangements to meet people coming to *Cueva Negra* other than at the official Thursday rendez-vous time and place. We can be more flexible with regard to people coming to *Sima de las Palomas* because our base at *Dolores de Pacheco* is quite near to both the *Murcia-San Javier Airport* and the *Balsicas-San Javier* railway station.

***Cueva Negra*:** If you plan on coming to *Caravaca* by rail from Madrid, take the Madrid-Murcia-Cartagena train to the station of *Calasparra*. If you have not been informed by me that you will be met by us at *Calasparra* station, then you *must* find a taxi to our accommodation base at *Caravaca* (20 kilometres away) at your own expense. You need to look very carefully at the train time-table (see below) for trains plying the Madrid-Albacete-Murcia-Cartagena line, because no more than **TWO** of the 4 or 5 daily trains each way, stop at *Calasparra* station and so you must make sure you take one that does.

If you want to come to *Caravaca* by train from Barcelona, you will have to take a train to Murcia from Barcelona on the Wednesday, spend that night in an hotel at Murcia, and catch an early bus up to *Caravaca* from Murcia city bus station on the Thursday morning (they leave hourly at ten-past the hour and take 90 minutes); it would be simpler and cheaper for you to take an overnight long-distance coach from Barcelona to Murcia city bus station. Your return to Barcelona from Murcia by train from *Caravaca* would mean catching probably a through train which leaves at about 13.30 h from Murcia railway station, after getting to Murcia city bus station by bus from *Caravaca* during the morning, or you could simply change to a long-distance coach at the bus station in the city. The railway station and bus station in Murcia are at opposite ends of the city, and a long hot walk with luggage in the July sun!

One small snag, if you insist on prebooking your tickets from outside Spain, is that travel agents (especially in the U.S.A.) may well tell you that they can only sell you tickets between Murcia and *Calasparra* at the full cost of the Murcia-Albacete part of the Cartagena-Murcia-Albacete-Madrid line: this would be very expensive for you and you'd be better off buying your ticket at Murcia station for the Murcia-*Calasparra* leg of your journey.

A better way is to book your tickets yourself on-line over the web from the Spanish national railway company *RENFE*, and you can get information in different languages about how to do it at <glinfo@renfe.es> ("gl" here stands for "grandes líneas" or "great lines", i.e. "main lines"; do not read it as "g1" because it is GL not G1!) It is best to book on-line to be sure of a seat. You are not allowed to stand as a passenger. Prices of tickets are slightly less if you buy on-line than at the station, but there is due to be a price rise soon because value-added tax is to be increased. Price rises are likely in 2013. A couple of years ago, on the Murcia-Cartagena railway line, the economy

class single fare between Madrid and Murcia was about € 45 euros (about € 40 to Calasparra, about € 47 to Balsicas-Mar Menor and about € 50 to Cartagena), but if you buy a *return ticket* at one go you may be able to get a 20% discount; the preferential class single-fare prices are about € 70 to Murcia (about € 63 to Calasparra, about € 73 to Balsicas-Mar Menor and about €80 to Cartagena). On the Barcelona-Cartagena railway line, the economy class single fare between Barcelona and Balsicas-Mar Menor Murcia was about € 55 euros and the preferential class fare was about € 75, but if you buy a *return ticket* at one go, then you get a 20% discount. Since the single fare from Murcia to Cartagena was only € 3.10 economy class and € 4,70 preferential class, and since Balsicas-Mar Menor is about half-way between those two cities, the onward cost to Balsicas from Murcia is trivial, whether you come from Madrid or Barcelona by train. However, if you are booking from outside Spain you may be told you have to book right through to Cartagena if you are going to Balsicas-Mar Menor though the extra cost will be very slight.

If you are coming by train from Madrid to spend some days at **Cueva Negra** followed by some days at **Sima de las Palomas**, then you could book a return ticket to *Balsicas-San Javier* railway station, from which you will be returning to Madrid, but get off at *Calasparra* railway station when you come to join us. *Calasparra* is nearer to Madrid, but you will find it is cheaper to book a return ticket to *Balsicas-San Javier* than to book two single tickets. **UNDER NO CIRCUMSTANCES** will we meet passengers at Murcia city railway station (*Murcia "El Carmen"*), as there is always such a throng of travellers there that you could easily miss us or we could easily miss you. If you are coming by train from Barcelona to dig at both *Cueva Negra* and *Sima de las Palomas* afterwards, you could book a return to *Balsicas-Mar Menor-San Javier* but get off at *Murcia* to change for *Calasparra*.

Cueva Negra: If you plan on coming to *Caravaca* by coach you will need to get a coach to Murcia city bus station and then change to the local coach out to *Caravaca*. From both Madrid and Barcelona there are several daily coaches to Murcia city bus-station; however, if you take a daytime coach - particularly from Barcelona, which is a long journey down to Murcia, or those which leave Madrid in the late afternoon rather than a morning coach - then you will arrive too late in the evening to catch the last *Murcia-Caravaca* coach, and will have to find an hotel for the night in Murcia city. To avoid that expense, you can catch *overnight* coaches to Murcia city on Wednesday from both Madrid and Barcelona, and then an early Thursday morning bus from Murcia out to *Caravaca*. From the *Caravaca* bus station it is about a kilometre and a half to our accommodation base at the "*Colegio Público "Asacruz" de Educación Especial*" (Residential Public School "Asacruz" for Disabled Children). If you want us to pick you up at the *Caravaca* coach-stop, phone us at the school (dial 968-700844) when you arrive, and, if we are there, we will do so (between 07.30 and 14.30 hours we are **NOT** there, because we are all at *Cueva Negra* excavating). Otherwise you can either take a taxi to the school, or walk if your luggage is a backpack. If walking, ask, first, how to get to large the "Templete" monumental fountain (a neo-Classical structure of columns and a cupola). It is beside a set of traffic-lights where you take the right-hand fork, which is the road signposted to Moratalla. Walk up the road for about 300 metres until you see a sign on the left to "*Fuentes del Marqués*" and *Colegio Asacruz* which, after walking about 800 metres along a country lane, is a large concrete modern building up on a low bluff on your right). There is a short-cut if you're daring enough: once you've left the *Templete* behind you, and have gone about a hundred metres along the road to Moratalla, at the next set of traffic-lights you come to (beside a bar called "Zaián"), you can take the left-hand street, and, after about another 200 metres, where the street suddenly bends to the left, you, instead, go straight ahead along a pedestrian walk which passes some houses on your right and then becomes a very wide country footpath between a shady avenue of trees, which you follow for about 600 metres, until you reach a tarmac lane where you turn right and then take the first left up to the school.

Sima de las Palomas: If you plan on coming from Madrid or Barcelona by rail to *Dolores de Pacheco*, you must catch the Madrid-Albacete-Murcia-Cartagena or Barcelona-Murcia-Cartagena trains to the station of *Balsicas-San Javier* which is a compulsory stop for **ALL** trains. In fact one of the Barcelona trains that stops at *Balsicas-San Javier* starts at the large southern French city of Montpellier. If you have given us advance notice of your time of arrival, we can probably meet you; if not, you must find a taxi - the distance is about 15 kilometres and may cost you about €15 euros. **BUT IT IS NOT CERTAIN THE TRAINS FROM BARCELONA TO MURCIA AND CARTAGENA WILL STILL BE RUNNING IN JULY 2013 (SEE BELOW).**

If you plan on coming from Madrid or Barcelona by coach to *Dolores de Pacheco*, you have several options. From both cities there are long-distance coaches to Murcia city bus station. If you take overnight coaches to Murcia city from Madrid or Barcelona on Mondays you can easily get buses that leave in the early hours of Tuesday from the Murcia city bus station which will take you Los Alcázares which is about 6 kilometres from *Dolores de Pacheco*, and, provided we have advance information about the place and time of your arrival, we may well be able to pick you up from *Los Alcázares*. You can always try phoning us at the *Dolores de Pacheco "Centro Cívico"* (dial 968-173020), but remember we are not there between 07.30 and 14.30 as we are at *Sima de las Palomas* excavating. In any case, a taxi should only cost you about €12 euros from where you leave the coach.

It is rumoured there will be fewer trains running to Murcia in 2013 than last year. The following shows the approximate times of trains advertized on the Madrid-Albacete-Murcia-Cartagena railway line on **Tuesdays** in 2013 which does not involve your changing trains anywhere - except for the *first* train in the table. However, some of the trains shown may be taken off, according to rumours, owing to severe economic problems in Spain. Times have been rounded to the nearest 5 minutes (trains are not very punctual). Take very good note that only **two** of them each way stop at Calasparra, whereas they **all** stop at Balsicas-Mar Menor. You should check them first over the web by going to *Renfe* on the web or sending an email to <glinfo@renfe.es>, or at the railway station, or else with a travel agent (note: the times may be different on *other* days of the week, especially at weekends and on public holidays).

YOU MUST NOT GET OFF, OR GET ON, ANY TRAIN AT MURCIA CITY "EL CARMEN" RAILWAY STATION, BECAUSE WE DO NOT PICK UP OR SET DOWN THERE; THE BIG CITY STATION IS SO BUSY THAT WE CAN ALL TOO EASILY FAIL TO MEET UP WITH ANY PASSENGERS WHO GET OFF THERE. However, if booking on-line you may nevertheless have to make your bookings to/from Murcia city (*Cueva Negra* session), or Cartagena (*Sima de las Palomas* session), if the on-line booking system does not let you book on-line to/from Calasparra (*Cueva Negra* session), or Balsicas-Mar Menor (*Sima de las Palomas* session), but all the same you **must get on/off your train only at Calasparra/Balsicas-Mar Menor railway stations**; if you oversleep on the train and get carried downline to Murcia or Cartagena, you will have to make your own way to our bases, probably by hiring a very expensive taxi (you wouldn't be the first to have done that!!!!)

dep. Madrid-Chamartín	dep. Madrid-Atocha	arr. Calasparra	arr. Murcia	arr. Balsicas-Mar Menor
07.00 h	07.25 h	10.50 h	11.45 h ends here, <i>but you can then change to a Murcia-Cartagena train: dep. Murcia 12.05 h</i>	12.35
09.40 h	*09.55 h*	*does not stop here*	*14.00 h*	14.50 h
12.35 h	*12.50 h*	*does not stop here*	*16.45 h*	17.30 h
16.30 h	*16.45 h*	*does not stop here*	*20.50 h*	21.20 h
19.00 h	19.20 h	22.30 h	23.30 h	00.15 h
dep. Balsicas-Mar Menor	arr. Murcia	arr. Calasparra	arr. Madrid-Atocha	arr. Madrid-Chamartín
09.00 h	09.35 h	10.20 h	14.05 h	14.15 h
-----	13.00 h	????????	17.10 h	17.20 h
16.15 h	16.45 h	does not stop here	20.45 h	21.00 h
18.35 h	19.05 h	19.55 h	23.15 h	23.30 h

* * If you are coming to *Cueva Negra* and take any of these three trains, then, because we do **not** pick up arrivals at Murcia city railway station, once you get to Murcia city railway station you should take a taxi to Murcia city bus station (*Estación de Autobuses*) and from there take the bus from Murcia to Caravaca. BUT OVER THE YEARS WE HAVE NOTICED THAT SPANISH RAILWAYS HAVE HAD A BAD HABIT OF MAKING CHANGES IN THE TIME-TABLES, AND PARTICULARLY REGARDING JUST WHICH OF THE DAILY TRAINS MAY STOP AT **CALASPARRA**, SO THE ABOVE ARRANGEMENTS WHICH HAVE BEEN ANNOUNCED MIGHT BE CHANGED EVEN YET AGAIN IN 2013 – SO CHECK WITH YOUR TRAVEL AGENT!

Madrid-Chamartín railway station is the Madrid terminus on the northeastern edge of the city, but all trains *also* stop at *Madrid-Atocha* railway station which is in the heart of Madrid and may be more convenient from some hotels. Return tickets are 20% cheaper than buying a single ticket each way. If you're coming to both *Cueva Negra* and *Sima de las Palomas*, then buy a return ticket to Balsicas but get off at Calasparra, as it will be cheaper for you than buying two single tickets.

Below were the advertized times of trains on the Barcelona(*Sants*)-Valencia-Alicante-Murcia-Cartagena railway line on *Tuesdays* in 2013 showing the stations of interest to us, but you should check first at the station or with a travel agent (note: they may be different on *other* days of the week, especially weekends and public holidays). Times are shown for the *Sants* station at Barcelona. **HOWEVER, ALTHOUGH THESE TRAINS SEEM TO BE RUNNING UNTIL MAY, IT IS NOT CLEAR THEY WILL STILL BE RUNNING IN JULY AND AUGUST AS THEY MAY BE TAKEN OFF ON ACCOUNT OF CUT-BACKS TO COPE WITH THE DREADFUL ECONOMIC CRISIS IN SPAIN: SO YOU MUST CHECK BEFORE BOOKING OR YOU MAY BE IN FOR A MOST UNWELCOME SURPRISE.**

This train takes you directly from Barcelona to Balsicas-Mar Menor:

dep. Barcelona-Sants	(arr. Murcia)	arr. Balsicas-Mar Menor
12.00 h	(18.50 h)	19.25 h
dep. Balsicas-Mar Menor	(arr. Murcia)	arr. Barcelona-Sants
13.10 h	(13.45 h)	20.40 h

The following involve **changing trains** at Murcia:

dep. Barcelona-Sants	Arr. Murcia	dep. Murcia	arr. Balsicas-Mar Menor
15.00 h	21.50 h Train goes NO further	-----	-----
17.00 h	23.45 h	23.50 h	00.05 h
dep. Balsicas-Mar Menor	arr. Murcia	dep. Murcia	arr. Barcelona-Sants
09.05 h	09.35 h	09.45 h	16.35 h
13.10 h	13.50 h	13.55 h	20.40 h
-----	-----	26.45 h	23.58 h

Not shown here – because connections with Murcia are complicated - are the high speed (and very expensive) “*Euromed*” trains that ply between Barcelona and Alicante taking only some three hours; for information about these consult a travel agent. It is also possible to come by train from Montpellier in France via Barcelona to Murcia where you will have to change to get to Balsicas or Calasparra.

There are no direct coaches between Madrid and Caravaca. You have to travel via Murcia city bus station.

As a rough guide, below were advertized times of coaches and buses on *Tuesdays* two or three years ago (these could change in the summer and in any case may be different on other days of the week, and may be somewhat different in 2013; I have not had time to check them out for 2013, alas). All “*ALSA*” coaches leave from Madrid’s “*Estación del Sur*” bus station (ES), though one of them – which is also very much more expensive than the rest - also not only called there back in 2010 but also started and finished at Madrid’s *Barajas Airport Terminal 4* (BAT4) (you must check 2013 schedules, though).

dep. Madrid BAT4	dep. Madrid ES	arr. Murcia
-----	08.00 h	14.00 h
-----	10.00 h	15.00 h
-----	12.00 h	17.00 h
-----	15.00 h	20.15 h
-----	**16.15 h	20.45**
-----	17.00 h	23.00 h
-----	*19.00 h	00.00 h*
23.00 h	23.59 h	05.00 h (next morning)

dep. Murcia	Arr. Madrid ES	arr. Madrid BAT4
--------------------	-----------------------	-------------------------

00.30 h	05.15 h	05.45 h
01.00 h	06.30 h	-----
09.00 h	13.30 h	-----
10.00 h	16.00 h	-----
13.00 h	18.05 h	-----
16.00 h	21.05 h	-----
17.00 h	23.00 h	-----
19.00 h	00.10 (next morning)	-----
23.59 H	05.20 (next morning)	-----

Normal single fare was about €26 and return about €50.

Faster coaches were more expensive: * was about €37 single and €70 return; ** was about €44 single and €84 return.

There are direct coaches between Madrid and Los Alcázares where we can easily take you or meet you as it is only five kilometres from our Sima de las Palomas base at Dolores de Pacheco, though you can also change buses in Murcia if it is more convenient for you. Here are the direct coach timetables:

dep. Madrid ES	arr. Los Alcázares
08.00 h	14.40 h
12.00 h	19.15 h
23.59 h	07.10 (next morning)

dep. Los Alcázares	arr. Madrid ES
08.30 h	15.35 h
11.00 h	18.40 h
22.10 h	06.30 h (next morning)

"ALSA" coaches leave from Barcelona's "Estación del Norte" bus station EN, though a few call at Barcelona "Sants" railway station BS.

dep. Barcelona EN	dep. Barcelona BS	arr. Murcia
07.00 h	07.15 h	16.00 h
09.00 h	-----	20.00 h
12.00 h	-----	23.15 h
17.00 h	17.20 h	03.35 h (next morning)
19.00 h	-----	05.15 h (next morning)
21.30 h	-----	05.45 h (next morning)
23.59 h *	-----	09.20 h (next morning) *

dep. Murcia	arr. Barcelona BS	arr. Barcelona EN
00.30 h	-----	09.30 h
03.15 h	-----	12.15 h
06.45 h	-----	18.00 h
11.45 h	-----	23.00 h
12.15 h *	-----	20.45 h *
15.00 h	23.59 h	00.15 h (next morning)
20.50 h	-----	07.15 h (next morning)
22.30 h	-----	08.45 h (next morning)

* Fast coach, slightly more expensive than the others (€53 single as against €47; €100 return as against €89).

Some of the coaches from Madrid or Barcelona go only as far as Murcia, whereas others stop at Murcia but then go on either to Cartagena and La Manga or to Los Alcázares or Torre Pacheco (especially those from Madrid), or to the Andalusian cities of Almería, Granada, Málaga, Seville and Algeciras (especially those from Barcelona). Helpers at *Cueva Negra* will have to get off at Murcia city bus station and change to the bus to Caravaca. Helpers at Sima de las Palomas can get off at Murcia city bus station and change to buses to either San Javier or Los Alcázares, but there are also some coaches that go on to one or other of those two towns and they are also shown, although arrival times are very rough-and-ready as they depend very much on traffic-density on crowded holiday-season roads (in some cases they get to San Javier or Los Alcázares by going not through Murcia but through Elche). The times will doubtless be subject to change and there will certainly be more coaches and more times scheduled during the busy holiday season of July and August. I've not been able to find out about arrival times at San Javier so far, I'm sorry to say.

From Murcia city bus station (*Estación de Autobuses*), *Cueva Negra* helpers can catch buses to Caravaca, where we can probably meet you at the bus stop provided we know on which bus you are arriving and provided it is after 14.30 h (before then we are excavating at *Cueva Negra*), which will save you a thirty-minute walk out to the "*Colegio Público "Asacruz" de Educación Especial*" (Residential Public School "Asacruz" for Disabled Children) which is our base and a bit hard to find until you've learnt to find your way around as it lies on the northwestern outskirts of the town: although there is a short cut, you won't get lost if you take the long way round, by asking first for the "Templete" monumental fountain and, once there, take the Moratalla road for about 300 metres until you see a sign on the left to "*Fuentes del Marqués*" and *Colegio Asacruz* which, after going about 800 metres along a country lane, is up on a low bluff on your right). *Sima de las Palomas* helpers can catch buses either to San Javier or Los Alcázares (each of which is about 6 kms from Dolores de Pacheco) where we may just be able to meet you though **we would most certainly need advance notice of your time and place of arrival**, otherwise you'll have to find a **taxi** to the "Centro Cívico de Dolores de Pacheco" – the Civic Centre where we stay at Dolores de Pacheco, because there's no way in the world you're going to want to walk carrying your luggage for 6 kilometres in the searing heat of July and August (it's a lot hotter there than at Caravaca).

About the buses to Caravaca, to San Javier, and to Los Alcázares from the *Estación de Autobuses* (Murcia city bus station):

At Murcia city bus station, find the counter for the service you need (i.e. Caravaca for Cueva Negra; or San Javier or Los Alcázares for Sima de las Palomas), and buy your ticket, which you then show to the bus driver when you board.

On working week-days, private buses ("*Autobuses Costa Cálida, S.L.*") leave for **Caravaca** at ten minutes past the hour, every hour from 06.10 h through to 21.10 h (there are fewer buses on public holidays and weekends) and the journey takes roughly an hour-and-a-half. Return buses leave Caravaca for Murcia at ten minutes past the hour, every hour from 06.10 h through to 21.10 h (except that instead of 15.10 h it leaves at 15.30 h).

On working week-days, the public "*LATBUS*" (no. 70) buses leave for **San Javier** on the hour every hour from 07.00 h to 21.00 h (there are fewer buses on public holidays and weekends) and take three-quarters of an hour; the return trip leaves at half-past each hour. San Javier is *not* the end of the line of the no. 70 bus, as many of these buses go further on to San Pedro del Pinatar, Torre de la Horadada and some as far as Campoamor.

On working week-days, private buses ("*Gómez García y Hermanos, S.A., Autobuses*") leave for **Los Alcázares** at half-past the hour every hour from 08.30 h to 20.30 h and you should get off at the first stop where the road on which you are travelling from Torre Pacheco enters the town of Los Alcázares (there are fewer buses on public holidays and weekends) and the journey takes roughly an hour; return journeys run from 07.20 h to 19.20 h once an hour but with varying departure times (consult us). Some of these buses finally end at the beach resort of **Los Narejos** though there are some that go on to as far away as **La Unión**; ***although these pass quite near to our base at Dolores de Pacheco only one bus each working week-day from Murcia to Los Alcázares and La Unión actually passes through our village and can drop you off there, which is the one that leaves Murcia at 20.30 h and reaches Dolores de Pacheco at 21.25 h; likewise the only bus back to Murcia from Dolores de Pacheco calls there at 07.30 h, reaching Murcia at 08.30 h.***

If you're a full-time student, bring an *International Student Card*; it may get you to discounts on trains and long-distance coaches. Young people can buy *Interail* travel passes for Europe but you will probably have to be prepared to pay supplements on most of the Spanish trains that you would want to use - even so, the overall discount may be worth having if you're thinking of visiting other countries whilst in Europe.

Seeing Granada and the Alhambra Palace

From Murcia bus station there are several coaches every day to Granada which take roughly four or five hours each way. To see the breathtakingly beautiful Moorish architecture of the mediaeval Alhambra palace you need to stay overnight in Granada (I recommend the *Hotel Tilos* in the Plaza Birrambla in the heart of the old city) and get up at 6 o'clock to climb the hill to the palace and get a good place in the queue for tickets so that you can join the morning visits and don't end up only with an afternoon ticket that means going back down into the city and then having to trudge back again up the hill in the sizzling early afternoon heat - so you'll need to spend two nights there at least. You could get a coach on the Thursday when your stay ends, see the Alhambra on the Friday, get a coach up to Madrid on Saturday, and fly out of Madrid on the Sunday. You could hire a drive-yourself-car which you could prebook to pick up on the Thursday at *Murcia-San Javier Airport* and return, say, to *Madrid-Barajas Airport* on the Saturday, and you'll find *Hertz*, *Avis* or *Eurocar* will give you cheaper rates than those they give in Spain provided that you book it from outside Spain *BEFORE* you leave your own country (shift-stick gears are much cheaper to hire than automatics). Coaches for Granada leave Murcia city bus station at 08.30 (fast), 09.00 (slow), 11.30 (fast), 16.00 (both slow and fast coaches) and 22.00 hours (slow) - the 16.00 fast one is very convenient as it gets you there in a fast three-and-a-half hours so you arrive in good time to check in to your hotel and get a good night's sleep before waking early to go up to the Alhambra palace.

EARLY AND LATE ARRIVALS; STAYING ON IN SPAIN AFTERWARDS

I am used to coping with both early arrivals and requests for assistance from helpers who want to visit Murcia, Cartagena, or other places in Spain, after excavating with us. In all of these cases (including late arrivals), it helps me to help you if I have received advance notice of your needs and wishes - preferably by May 1st and, in any case *NO LATER* than June 1st because once I am looking after you in the field I cease to be immediately contactable by phone, fax or e-mail.

Phone calls after July 2nd from late arrivals should be made between 15.00 and 24.00 hours Central European Time, from July 3rd-24th to 968-700844 (from within Spain) or 34-968-700844 (from countries outside Spain), and for July 23rd to August 13th to 968-173020 (from within Spain), or 34-968-173020 (from countries outside Spain). You can also try my cell phone though I may well be out of range if I am at Cueva Negra: the number to ring is 620-267104 from inside Spain or 34-620-267104 if you are outside Spain.

Don't despair! In worst case scenarios, I have offered the hospitality of our home to helpers who have arrived early, and we have helped others organize both hotel accommodation after they have excavated with us and guest-house ("pensión") accommodation and personal tutors in the Spanish language! So, the short answer is, "Yes, we will do our best to help your personal requirements", and the long answer is, "We can do that best, if you help us by giving me two or three months' advance notice of what you want to do". Remember, we are in a prime tourist area and planes and accommodation are in great demand during July and August, **SO DO YOUR BOOKING EARLY IN THE SPRING.**

For **EMERGENCY RAPID CONTACT**, up to about June 15th please contact my fax which is 34-868-883963 from outside Spain or 868-883963 inside Spain, or my e-mail which is *walker@um.es*. If there is an **EXTREME EMERGENCY**, and you need urgently to phone me *BEFORE June 30th* you can try to reach me (I *cannot* guarantee to be there as I am often travelling in England at the end of June) by telephone *provided you find out from the international operator that the time is between 6 a.m. and midnight CENTRAL EUROPEAN TIME* - so as not to wake up my family during the night. If dialling from a country outside Spain try (home) 34-968-265608, (home) 34-966-769367, or (work) 34-868-884997, or cell phone 34-620-267104. If dialling from anywhere within Spain those numbers become 968-265608, 966-769367, 868-884997 and 620-267104.

FUNDING OUR FIELD RESEARCH

CHARGES

The full cost to helpers is € 50 (euros) a day; it covers instruction as well as board, lodging, and local transportation. A discounted cost may be offered to one or two experienced helpers willing to stay from June 30th to August 11th. All intending helpers must send a non-returnable deposit by June 1st 2013. You will be told how to do this when you have informed us that you intend to come. The deposit is 250 € (euros) per 7 days of intended stay, with the balance payable on arrival. So if you're coming for 3 weeks, you make a deposit in British pounds sterling (GBP£) equivalent to 750 € (3 x 250 €) and pay the balance of 300 € in euros on arrival: 1,050 € altogether (21 days x 50 € = 1,050 €).

What happens if you're coming not for 21 days but for 18 only? You must still pay the GBP£ deposit equivalent to 21 days of 750 €, but on arrival here you will only pay us 150 €, which will be the balance owing between the cost for 18 days of 900 € (=50 € x 18 days) and the amount received in deposit of 750 € (= 50 € x 15 days).

Deposits are non-returnable; **they guarantee your reservation**. A few years ago we reserved places for some people who had not sent deposits whom we felt we could trust, but who for medical or other understandable reasons found themselves unable to attend, when it was too late for us to contact other people who might well have liked to have taken their places and paid the due amount. As a result we were struggling financially to make ends meet. So we had to take the hard decision **NOT**, from then on, to hold any place if the deposit for it has not been received by June 1st; nor can deposits be returned, as by then it is getting too late to find replacements for you – even if they are willing to come, flights may be fully booked already in May (let alone June), because July and August are the summer “high season” and Murcia’s beaches and golf-courses attract dense international tourist traffic. It might therefore be useful to take out insurance against inability to attend; then, in the event of having to make a claim to your insurance company, a statement from us indicating the deposit received and its purpose would be sent *directly to your insurance company* provided you send us the reference number to your claim and your company’s (or its official agent’s) address.

Currency fluctuations cause horrendous problems to us. Therefore, in order to safeguard our subsequent field campaigns, we insist that payments within Spain must be now made always in € euros (for instance, the balance). We organizing a Spanish bank account thanks to the creation of our new association MUPANTQUAT into which your deposit may be paid in euros, but be patient as we are still working on it. However, we still use also a London bank and any deposit into our London bank account must be made in British pounds sterling (GBP£) to the amount equivalent to the € euro deposit corresponding to the number of weeks of your intended stay with us.

All payments must be made by bank transfer (cheques sent to me will not be cleared but will simply be returned to you, even if they are bank cheques). We do not have credit card facilities. Offers to pay directly in US\$ dollars (or other currencies) will be refused. However, deposits from UK residents can be made in pounds sterling (GBP£) into our London bank, though you must pay the balance in € euros in cash on arrival here. I am sorry to have to inform you that if you live outside the euro zone or the U.K., any cost involved in making bank transfers must be borne by you before conversion of your currency. This means that if, let us say, your bank in the USA, Australia, or wherever, tells you that 750 € euros is equivalent to, let us say, 635 GBP£ or 900 US dollars (USD\$), and that it will charge you another 20 USD\$ as a conversion fee to **buy** the 635 GBP£, then you must pay your bank 920 USD\$. If you do not, your bank will deduct its fee from what it sends to us, and so we will receive *less* than 635 GBP£. If we see that this has happened when we study our bank statement, then on arrival you must pay us a 30 € euro surcharge on top of the 300 € euro balance, so as to ensure we are not out of pocket. It will therefore usually be cheaper for you to make well sure that your bank debits your account with the USD\$ equivalent of 635 GBP£ **plus** whatever **conversion fee** your bank says it is required by law to charge you for buying GBP£.

By no means all countries of the European Union use the euro €, but nevertheless there is a common flat-rate fee for currency conversion within the EU, and there are never any problems. For unfathomable reasons, even though daily newspapers world-wide offer exchange rates, and currency conversion is available at the click of a mouse world-wide, US and Canadian banks seem utterly clueless, and their witless bank clerks often allege to clients that they cannot frontload a debit from an account in order to make a currency purchase (say of GBP£) by adding the corresponding charge for currency conversion to that debit. This is utter rubbish. The truth is that they either cannot be bothered to find out how to do it, or have been instructed from above not to do it because it allegedly takes up too much of the company's time. Don't take no for an answer. Remember, the customer is always right! You can always threaten to take your account to another bank!

INSURANCE

All participants must arrange their own health and personal accident insurance cover before leaving home, and sign an indemnity form on arrival. EU residents should bring the EU form from their country that entitles them to public health care in other EU Member States.

WHERE YOUR MONEY GOES TO

Accommodation and food are included in the overall charge, as is instruction and local transportation by us. A major field project has a number of fixed costs that must be met. One such cost is in maintaining part-time staff. Our basic staff largely consists of about half-a-dozen local undergraduate and graduate students who help in the study of the excavated material throughout the year in my research laboratory at Murcia University. In the field, they help with giving basic instruction, and one or two even bring a private vehicle to give us greater transportational flexibility. Several staffers have long experience of our field techniques, some of which require special technical skills. Most have neither regular income nor undergraduate or postgraduate student grants. In return for their services, paying for their board and lodging is one of our fixed costs in the field, therefore, and one or two of the most experienced graduates

receive a small emolument. Another fixed cost, of course, is the wages of our professional cooks and cleaning staff - wages that are the same whether we be fifteen or thirty at table! Yet another set of irreducible costs is the maintenance of vehicles and maintenance or acquisition of field equipment, and sometimes its replacement after seasons of wear and tear.

WHY DEPOSITS ARE NON-REFUNDABLE

Our annual summer field school and excavations rely heavily on self-funding. As just stated, a major field project has a number of fixed costs that must be met; indeed, one such cost is in maintaining a skeleton staff on hand to conduct the basic physical work of excavation in the event of a short-fall in participants.

If intending short-listed helpers who have paid their deposit are unable to come at the last minute, it will very probably be far too late even for airline tickets to be obtained at all by any other possible helpers who had been relegated to a waiting-list, and perhaps too late even for us to contact them in order to ask if they would be willing to come in place of whoever has not been able to.

This is why we are not able to return deposits; there are simply too many fixed costs for this to be feasible. Under particularly exceptional circumstances responsible for inability to attend, though, and providing our principal costs were more or less covered, it may just be possible for us to be able occasionally to offer to offset a deposit made in one year against cost of participation by the helper in a following year, though we cannot guarantee to do so.

OTHER SOURCES OF INCOME

Self-funding is necessary for our summer field school and excavations to take place every year. Why?

Well, in the first place, Murcia University does not make money available to us for research, because, like most Spanish universities, it receives public funds that are ear-marked exclusively for teaching purposes. Some financial assistance for research is occasionally forthcoming from Spain's national Ministry of Education and Science, for which research groups have to compete at national or regional level, and sometimes help comes from the private sector or individuals.

In universities, research would come to a standstill were it not for the enthusiasm and self-sacrifice of unemployed young graduates, as there are very, very few grants for graduate or undergraduate students to help them live from day to day. It goes without saying that staffing at universities is quite inadequate for their research endeavour (technical back-up staff is utterly inadequate), and this is because staffing is determined by what Education regards as necessary to instruct undergraduates, whereas Science and Technology will not usually pay for research staff at universities, only at scientific research institutes. The official unemployment rate in Spain is around 9.5% but many "employed" people are on contracts that may only last for six weeks or so at a time, throughout the entire Spanish economy.

Even when official research grants are awarded to university research groups, there are several strings attached, as we have found after having had some. First of all, unemployed graduate students are debarred from receiving any support from them, because official grants can only be spent (with obligatory detailed accounting) by salaried employees at public institutions. Secondly, in order to acquire such a grant, usually at least four or five such employees must propose a project, but the flip-side is that any grant awarded will be divided up in equal proportions between them, rather assigned to the overall needs of the project; this means that those who are actively involved in the project, rather than those "sleepers" whose signatures were needed to put up the proposal, get a lower proportion of money to spend on the project than the project itself needs in order to come to fruition. Thirdly, there are severe limits imposed by the Spanish bureaucracy on the proportion of the overall grant that may be assigned to living expenses or travelling expenses, because the bureaucrats want to see receipts for material purchases that give "added value" to the stock-inventory of the university department that is officially in receipt of the grant, because they hold that the main purpose of official grants is, first and foremost, to upgrade the physical infrastructure required for a department's research.

Those three sets of problems lead to major short-falls for field research, which is labour-intensive rather than needing expensive laboratory equipment, and involves maintenance and travelling costs of many people. This is why field research projects rely on support from individual helpers.

Alas, we had no public grant for 2008 whatsoever and although we received one in 2009 there was no public money available in 2010, 2011 and 2012 owing to the severe economic crisis here in Spain and there will be none in 2013. Just to let you know what official support has been received in the past, here are some brief details. The real grants received are 87.5% of the amounts shown below because Murcia University administrators retain 12.5% (one-eighth) of each grant for putative "administrative overheads". In November 2002, the Spanish Government's Ministry of Science and Technology announced the award to me and 6 institutional colleagues to continue work at *Sima de las Palomas* and *Cueva Negra* of *Major Research Grant* BOS2002-02375 of 50,000 euros for the triennium 2003/2004/2005. In October 2005 it made available a small grant for 2006 of 6,000 euros (CGL2005-02410/BTE). Most of this money had to be spent on infrastructure at the university departments to which the official signatories of the project belong, as they are mainly university lecturers or professors or public service researchers, who spend little time with us in the field, alas. Nevertheless, this was an extremely gratifying recognition of our research endeavour over the years. It was the third such governmental award we received. At the end of 1999, the Spanish Government announced the award of *Major Research Grant* PB98-0405 to us for the triennium 2000/2001/2002, though unfortunately the total sum of money awarded was a mere 24,000 euros altogether (barely \$9,000 a year). The first such award we received for our project was for the 3-year period 1994/1995/1996. The *Murcian Regional Government* has also made small grants for 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003 and 2004. These annual grants have ranged from 3,000 to 10,000 euros. In September 2007 we were extremely lucky to obtain a 30,000-euro grant from the *Regional Government* which allowed us to buy much new equipment for our 2008 field season, including -for site-surveying- an expensive *TopCon* "Total Station" and a portable computer for its use, new platforms and scaffolding for the tower in *Sima de las Palomas*, many new books and monographs, etc.; all the money had to be spent by mid-December 2007. In 2009 we received a grant of about 25,000 euros and once again all of the money had to be spent by the end of the year; unfortunately the scaffolding tower required further considerable expense in order to bring it into line with

updated safety requirements, and we also had to acquire a new water pump and another safe for guarding the Neanderthal remains, whilst dating at overseas centres also involved further expense.

From 1995 to 2001 volunteers who belong to *The Earthwatch Institute* helped in our field research. Their help and support was greatly appreciated, though it has to be said that the experience for each of them was more expensive than the charges we are making now - this was because the *Institute* was charging each one around eighteen-hundred dollars per 14 days per person, of which our project received less than one thousand, the rest going to the *Institute's* overheads. By cutting out the intermediary and extending to 21 days each of our sessions, we are able to offer you a far better deal. (I seem to recall that the organization also insisted on receiving non-returnable deposits from intending volunteers.)

(The *Spanish Government* and *British Council* have also paid for joint *Anglo-Spanish exchanges* of scientists in 1993-4 and 1996-7 in connexion with the project; these were principally with *Oxford University*. Much scientific research is paid for by arrangements with other institutions. Thus, as mentioned earlier, a U.K. Government *NERC* grant to Oxford's *Research Laboratory for Archaeology and the History of Art* has supported some dating at Cueva Negra, whilst other dating there has been done at the Laboratory's own expense. Other institutions have also done specialized work for us for free, though a list of these would be boring here.)

LOOKING AFTER YOU

ACCOMODATION

Cueva Negra helpers will be accomodated throughout in *Caravaca de la Cruz* at the "*Colegio Público "Asacruz" de Educación Especial*" (Residential Public School "Asacruz" for Disabled Children). The children are away on holiday when we use the school. There are hot and cold showers and conventional sanitation, in separate men's and women's facilities. Meals are provided in a dining room. There is a common room and also a large well-lit workshop where we wash and sort our finds. There are bunks in separate men's and women's dormitories. A separate room may be made available for a couple, depending on how many people we are altogether and how many dormitories we need. You need only bring towel, sheets and pillowslip. You must bring soap or shower-gel and shampoo. Our cooks-cum-housekeepers take men's dirty clothes one day alternating with women's clothes another day, for washing separately in the large industrial washing-machine at the school, which can only work with full loads; once washed, the clothes are hung out on the washing-line to dry, before being ready for you again. There is an iron if you want to use one. All of us have to make our own beds and help keep dormitories tidy, and keep toilets clean by using the lavatory brushes. A professional cleaning staff sweeps and mops the floors and bathrooms.

Sima de las Palomas helpers will be accomodated throughout in the village of Dolores de Pacheco, where we take three meals a day at the at the restaurant of the "*Centro Cívico*" (Civic Centre) which has its own cooks. 400 metres away, we sleep in bunks in separate men's and women's dormitories, converted temporarily for us from class-rooms in the roomy village school which has showers with hot and cold water. We use large class-rooms for washing and sorting finds. A separate room may be made available for a couple should this be requested in advance. We use the village swimming pool and its shower block with hot and cold showers, which is half-way between the Civic Centre and the school. You need bring only towel, sheets and pillowslip. You must bring soap or shower-gel and shampoo. We collect men's dirty clothes one day, alternating with women's clothes another day, for washing separately in a large industrial washing-machine and drier at a nearby establishment, which can only work with full loads. All of us have to make our own beds and help keep dormitories tidy, and keep toilets clean by using the lavatory brushes. A professional cleaning staff sweeps and mops the floors and bathrooms.

FOOD

All meals you take are included in the charge. This way we pay for the food and cooks whose responsibility it is to organize the catering in accordance with their experience and skills. The standard of catering is high. The Spanish cooks at both the Caravaca "Asacruz" Residential School and the Dolores de Pacheco Civic Centre are of the highest calibre.

We CANNOT offer either "Vegan" menus or kosher cooking. Helpers may **NOT** use the kitchens to cook for themselves. Special diets **CANNOT** be provided, **and that goes for vegetarians too**, although those non-rigid vegetarians who eat fish, shell-fish, milk, cheese, yoghurt, and eggs, or who have no objection to sauces or soups based on strained meat or chicken broths, will find they will easily get enough to eat if they simply avoid eating pieces of actual meat; eggs or cheese can readily be supplied for them if they feel hungry -- "**Vegans" or other rigid and inflexible vegetarians unable, or unwilling, to relax their self-imposed restrictions in those regards CANNOT BE CATERED FOR.**

Murcian lunches and dinners are invariably accompanied by communal platters of mixed salad, and there is no shortage of fresh fruit. Because our word "salad" simply means "salted", and salted is the meaning of the Spanish word "ensalada", it is no surprise that in Spain the platters are obviously served prepared with salt, olive-oil and vinegar or lemon-juice, and everyone digs in with his/her fork into the comunal platters (it is considered the height of bad manners in Spain to remove some of it onto your own plate). Lettuce with tomato cannot by itself be a "salad" without violating the meaning of the word! Diabetics, or people who require low fat or low sodium diets will have to juggle with these options for themselves, bearing in mind that vegetable oil (olive oil) is used far more in Mediterranean cooking than unhealthy animal fats. Special diets **CANNOT** be offered, however.

It should be remembered that meals are of typical Spanish food, and eaten at typical Spanish hours which are much later than those in northern Europe or North America. Breakfasts are light and taken early: coffee, bread rolls or toast, cereals, fruit juice. A mid-morning sandwich is taken to the site together with appropriate cold water. Luncheon is usually after 15.15 hours and is a copious cooked meal. Dinner is no earlier than 21.00 hours and is another copious cooked meal. Wine, beer, soft drinks, and water are provided with lunch and dinner. Tap water is safe to drink, but bottled water is also available. We all usually sit down at table as one man to main meals which are an opportunity for chitchat and relaxing.

Spanish cooking contains two ingredients that are not to everybody's taste, but which simply cannot be eliminated, namely, olive oil and garlic. For people who have no problems with those, the meals are delicious and very filling. Typical dishes range from delicious barbecued yearling lamb chops, pork chops, steak, fried chicken, fish, stews based on potatoes, chickpeas, lentils or beans, stir-fried vegetable dishes, and rice dishes based either on chicken and rabbit or on chicken and shellfish.

Soups, hors d'oeuvres, pastas, and omelettes - especially the potato and onion omelette known as "tortilla española" - are often served as first courses at lunch. A local Murcian speciality is a meat pie baked in mouth-watering flaked pastry ("pastel de carne").

Murcia is renowned in southern Spain for its gastronomy. It has a staggeringly wide range of taverns and restaurants for eating out. You can either eat out on the basis of drinks and *tapas* (snacks) or you can have slap-up sit-down meals. Depending on the venue, you can reckon on paying anywhere from €4 euros to €40 euros. Often the cheapest places offer food and wine every bit as good as the most expensive. That is where our Spanish project volunteers and senior site helpers - especially our students - can assist other helpers, especially those from other countries, because they go to places which are within their modest means! Our excursions often take in typical bars and eating places, allowing us to sample local food and wine.

Although olive oil and garlic are fundamental ingredients of Murcian cooking, it is not heavily spiced by and large, although some dishes traditionally contain cloves, chili peppers, or other spices. Usually, however, hot peppers are offered on small dishes, together with olives, for people who wish to accompany their meals with those.

People from northern Europe or North America often feel that Spanish cooking has much stronger flavours than they are used to at home. It is a very healthy low cholesterol and high fibre diet -- which in itself is enough to make your bowels looser than you might be accustomed to. These aspects, together with hard work in great heat, can sometimes make people feel queasy and uncomfortable - not just foreigners, because Spaniards, too, get funny tummy troubles in summer. The solution is to come armed with a standby of a kilogram of your favourite, high-calorie, concentrated nibbles, and to drink still fruit juice rather than fizzy drinks or cheap Spanish spirits. By contrast, most proprietary pharmaceutical preparations (such as "Enterovioform" pills) are of questionable pharmacological worth. If you need medication, I will make sure you take something which is medically appropriate; I am a British medical graduate and for many years was a medical practitioner in the Australian state of New South Wales.

PHYSICAL CONDITIONING/MEDICAL ADVICE

Although no great physical fitness is necessary, the project is not suitable for severely physically or mentally disabled, lame, deaf, or poor-sighted people, nor for people who are very overweight, suffer from advanced degenerative joint disease, or from haemophilia, cardiovascular or heart ailments, or suffer great discomfort or extreme sunburn in hot weather. There are daily uphill walks of about 15 minutes up to the sites from where our vehicles have to stop. This may have to be repeated during the morning in order to carry out service tasks.

Physical demands on you may involve any or all of the following: walking and scrambling, kneeling and scraping, digging with mattock or pick, bending and sieving, pushing wheelbarrows, carrying loads, sitting. None of these is likely to last for longer than a couple of hours at a stretch on any one day, since you can be switched from one task to another if you feel uncomfortable. Probably the heaviest tasks involve heavy digging and carrying 10 kilogram bags of soil downhill at *Sima de las Palomas* where the heat of the sun is very severe.

It is *ESSENTIAL* that you inform me of any health problems before you come so that they can be taken account of fully.

For the walk up to *Cueva Negra*, you only really need stout shoes or joggers, although walking boots are useful for field excursions and walking off the footpaths; once inside *Cueva Negra*, however, you must bring footwear to change into which has no pattern on the sole, such as flat-soled sneakers, plimsolls, pumps, slippers or sandals, because otherwise hideous footprints are left behind in the soil which spoil our photographic records. At *Sima de las Palomas* conditions are very different, and firm boots with a heel should be worn at all times, both because of the rocky nature of the hillslope and the demands of working on scaffolding.

When we are wet-sieving, the Project has several pairs of rubber boots available for those people who, like me, don't like getting their other footwear soaked and muddy. In fact, wearing muddy footwear is forbidden inside *Cueva Negra*, because wet mud and damp footprints show up starkly against the dry soil and spoil the photographs.

Shorts, sunhats and gardening or work gloves are appropriate wear, along with sunglasses and your preferred suntan lotions or creams. There will be opportunities for swimming also, so remember to pack swimming togs.

As a British medical graduate and registered medical practitioner in New South Wales (Australia), I strongly recommend all intending volunteers to ensure their anti-tetanus vaccination is upto date, and that, if they are asthmatic, diabetic, or suffer from allergic disorders, they bring with them their customary medications. Those with back or knee problems should bring with them appropriate corsets, girdles or elastic athletic supports.

People who suffer from vertigo in high places, or from claustrophobia in enclosed ones, are recommended to come to *Cueva Negra* in preference to *Sima de las Palomas* though even at *Sima de las Palomas* they can be given tasks on the hillside which avoid exposing them to conditions that otherwise might precipitate attacks inside the shaft or on the scaffolding tower.

There are efficient public hospitals both at Caravaca (Hospital del Noroeste) and not far from Dolores de Pacheco (Hospital de Los Arcos at Santiago de la Ribera), in each case about 15 minutes drive from our sites. The city of Murcia has 3 large public hospitals, about an hour's drive from our sites. If a medical emergency arises it should usually be possible to deal with it efficiently.

Helpers should find out whether their home country has reciprocal health agreements for automatic free treatment at Spanish public hospitals. Most European Union countries do, **but you nevertheless have to fill out a form before you leave your home E.U. Member State which allows you to be given the card you must bring here entitling you to public treatment in other EU countries**

on the same basis as their own nationals. If your home country is outside the EU and therefore has no reciprocal arrangement with it, then Spanish public hospitals will demand accounts to be settled on discharge by patients, who may then present the official receipts afterwards to their own health insurance companies for possible reimbursement on their return home. Be sure to find out *precisely how* your private health insurance company requires receipts you present to be made out by the purveyor of services involving your hospital, medical, dental or pharmaceutical expenditure, lest it reject them when you return home.

Helpers who prefer private health treatment in Spain will usually have to pay immediately in cash for treatment, and present the official receipts afterwards to their own health insurance companies for possible reimbursement on their return home. There are, however, some private hospitals and doctors who work with private health insurance schemes which have reciprocal arrangements with those in some other countries (thus, British BUPA members could ask in Britain if there are reciprocal arrangements with BUPA's affiliated company in Spain).

The Project is not responsible for paying hospital, medical, dental or pharmaceutical bills of helpers. Before you come, you should have made your own arrangements for health, injury or disability insurance in connexion with illness or accidents which might be sustained during your participation in the Field School.

Health conditions around the world are constantly changing, so we recommend that you consult your local public health department or, in the United States, the Centers for Disease Control in Atlanta at (404) 639-2572 for the latest health information for travellers.

FIELD COMMUNICATIONS

You can be reached by mail. It is advisable for letters to be REGISTERED and marked AIRMAIL and URGENT in order to ensure fast delivery, which may still mean upto 5 consecutive working days from the U.K. to Spain, or more from outside Europe.

Addresses and phone numbers of our accomodation bases are given below. Please advise friends and relatives to make phone calls only between 15.00 and 24.00 hours Central European Time (if in doubt about the time in Europe, check with the international operator):

July 2nd – July 23rd, 2013: *Cueva Negra*

**Colegio Público "Asacruz" de Educación Especial
Camino Mayrena 13 (El Copo)
30400 CARAVACA DE LA CRUZ
Murcia**

Spain

Telephone: from outside Spain dial 34-968-700844, -708151, within Spain 34-968-700844, -708151

July 23rd - August 13th, 2013: *Sima de las Palomas*

**Centro Cívico
DOLORES DE PACHECO
Murcia**

Spain

Telephone: from outside Spain dial 34-968-173020, within Spain 968-173020

FIELD SUPPLIES

You **must bring** sheets, pillowslip and towel, as well as soap and shower gel and shampoo. The warm nights mean you do not need blankets or insulated sleeping-bags. Sheet sleeping-bags (Youth Hostel type or similar) are fine, however. Recommended clothes are shorts, sunhat, sunglasses, and work or gardening gloves. Swimming togs can be used at the pool, especially at Dolores de Pacheco. Firm boots are useful for field excursions and essential for fieldwork at *Sima de las Palomas*. Inside *Cueva Negra*, it is essential to wear flat-soled footwear which has no pattern on the sole whatsoever, such as flat-soled sneakers, plimsolls, pumps, slippers or sandals. I recommend volunteers to bring a small haversack to carry their personal daily bits and pieces to the site. Your clothes can be brought out in a backpack, grip, or suitcase.

Lost luggage is a recurrent problem for travellers, whether taking short domestic flights or journeys around the globe. We recommend that you take a carry-on bag with a set of field clothes - and shoes - plus any personal essentials so that you will not be uncomfortable or incapacitated if your baggage takes several days to catch up with you.

READING SUGGESTIONS

NON-FICTION

An excellent general introduction to human evolution, which I recommend to all my beginning undergraduate students, is *How Humans Evolved* by Robert Boyd and Joan B. Silk (1997, New York, W.W. Norton). More specifically related to Neanderthal Man there are, among reputable books of non-fiction to be recommended, some good easy reads which include Paul Jordan's *Neanderthal* (1999 and 2001, Alan Sutton), James Shreeve's *The Neanderthal Enigma* (1995, New York, William Morrow) and Myra Shackley's two books *Neanderthal Man* (1980, London, Duckworth) and her entertaining and fascinating *Wild Men: Yeti, Sasquatch and the Neanderthal Enigma* (1983, London, Thames & Hudson), and two magnificently illustrated coffee-table books certainly should not be missed, Ian Tattersall's *The Last Neanderthal* (1995, New York, Macmillan) and Don Johanson's *From Lucy to language* (1996, New York, Simon and Schuster),

and perhaps Jeffrey Schwartz & Ian Tattersall's *The Human Fossil Record. Volume One. Terminology and Craniodental Morphology of Genus Homo (Europe)* (2002, New York, Wiley-Liss).

If you know next to nothing about the old stone age, then do look up in the library the very reader-friendly easy-to-handle coffee-table book edited by G. Burenhult *The First Humans* (1993, St. Lucia, University of Queensland Press - there is a different U.S. publisher of the United Nations-sponsored series to which this volume belongs, but I don't know who). I always recommend my undergraduates to get back to basics and read François Bordes' brief and well-illustrated *The Old Stone Age* (1968, London, Weidenfeld & Nicolson) and John Wymer's *The Palaeolithic Age* (1982, London, Croom-Helm), both of which should be in university or museum libraries and possibly in major public libraries.

The past few years have seen some excellent new books for specialist students majoring in Prehistoric Archaeology, Human Palaeontology and Physical Anthropology, and graduates in the subjects. An excellent short picture book with explanatory text is André Debenath & Harold L. Dibble's *Handbook of Palaeolithic Typology Vol. 1 Lower and Middle Palaeolithic of Europe* (1994, Philadelphia, University of Pennsylvania University Museum). Equally important is the authoritative volume of Paul Mellars, *The Neanderthal Legacy* (1996, Princeton, Princeton University Press). I find Clive Gamble's *The Palaeolithic Societies of Europe* (1999, Cambridge University Press) interesting but somewhat heavy going; he presumes readers already have a reasonable grasp of European palaeolithic archaeology and typology.

Books about Middle and Upper Pleistocene human evolution are two-a-penny nowadays, but most of them tend to be either very technical works that are more appropriate for advanced students, or else conference volumes of chapters of varying quality. Among integrated books by just one or two authors, I recommend Richard Klein's *The Human Career* (1999, 2nd edition, London and Chicago, Chicago University Press - though I prefer his first edition of 1989!), Chris Stringer and Clive Gamble's *In Search of the Neanderthals* (1993, London, Thames & Hudson) and Roger Lewin's *The Origin of Modern Humans* (1993, New York, Scientific American Library) and his *Principles of human evolution* (1998, Oxford, Blackwell Science), and the weightier *Paleoanthropology* by Milford H. Wolpoff (1995, 2nd edition, New York, McGraw-Hill). A very short basic introduction for outright beginners is Paul Jordan's *Early Man* (1999, Sutton Pocket Histories). (If, like me, you're a *Scientific American* reader who never throws away a back issue, then look up Chris Stringer's "The emergence of modern humans" in vol. 263 (6): 68-74, 1990 and Alan Thorne and Milford Wolpoff's "The multiregional evolution of humans" in vol. 266 (4): 28-33, 1992. If not, don't bother!) Among more specialist works, I like Geoffrey A. Clark and Catherine M. Willermet's edited volume *Conceptual Issues in Modern Human Origins Research* (1997, New York, Aldine-de Gruyter), mainly because it presents alternative explanations of evolution in ancient *Homo sapiens* rather than favouring especially either the Tattersall-Stringer-Klein(1999)-Lewin preference for a cladogenetic interpretation, or the Wolpoff-Thorne reticulate multiregional anagenetic interpretation. For heavier reading, try *A Morphometric Investigation into the Origin(s) of Anatomically Modern Humans* by Phillip Habgood, which was published in the *BAR (British Archaeological Reports International Series, Oxford)* in December 2003.

Here are some English-language publications you might care to look for at your nearest major university or city library (some more recent ones are available from us as pdf) and I include two to be published in the near future. Go to our web-site: <http://www.um.es/antropfisica>:

- 2012 M.J.Walker, M.V.López-Martínez, J.S.Carrión-García, T.Rodríguez-Estrella, M.San-Nicolás-del-Toro, J-L.Schwenninger, A.López-Jiménez, J.Ortega-Rodrigáñez, M.Haber-Uriarte, J-L.Polo-Camacho, J.García-Torres, M.Campillo-Boj, A.Avilés-Fernández, W. Zack: "Cueva Negra del Estrecho del Río Quípar (Murcia, Spain): A late Early Pleistocene hominin site with an "Acheulo-Levalloiso-Mousteroid" Palaeolithic assemblage" *Quaternary International* (edición digital temprana) doi:10.1016/j.quaint.2012.04.038, pp. 1-25 (ISSN 1040-6182).
- 2012 M.J.Walker, M.V.López-Martínez, J.Ortega-Rodrigáñez, M.Haber-Uriarte, A.López-Jiménez, A.Avilés-Fernández, J.L.Polo Camacho, M.Campillo-Boj, J.García-Torres, J.S.Carrión-García, M.San Nicolas-del Toro, T.Rodríguez-Estrella: "The excavation of the buried articulated Neanderthal skeletons at Sima de las Palomas (Murcia, SE Spain)." *Quaternary International* 259: 7-21 (ISSN: 1040-6182).
- 2011 M.J.Walker, J.Ortega, K.Parmová, M.V.López, E.Trinkaus: "Morphology, body proportions, and postcranial hypertrophy of a female Neandertal from the Sima de las Palomas, southeastern Spain" *Proceedings of the National Academy of Sciences USA* 108 (25) 10087-10091 (ISSN 1091-6490).
- 2011 M.J.Walker, J.Ortega Rodrigáñez, M. V. López Martínez, K. Parmová, E. Trinkaus: "Neandertal postcranial remains from the Sima de las Palomas del Cabezo Gordo, Murcia, southeastern Spain." *American Journal of Physical Anthropology* 144: 505-515 (ISSN 0002-9483).
- 2011 M.J.Walker, J.Zapata, A.V.Lombardi, E.Trinkaus, "New evidence of dental pathology in 40,000 year old Neandertals" *Journal of Dental Research* 90: 428-432 (ISSN 0022-0345).
- 2010 M.J.Walker, A.V.Lombardi, J.Zapata, E.Trinkaus: "Neandertal mandibles from the Sima de las Palomas del Cabezo Gordo, Murcia, southeastern Spain." *American Journal of Physical Anthropology* 142: 261-272 (ISSN 0002-9483).
- 2009 M.J.Walker: "Chapter 7. Long-term memory and Middle Pleistocene 'Mysterians'." Pp. 75-84 in S.A.de Beaune, F.L.Coolidge, T.Wynn (eds), *Cognitive Archaeology And Human Evolution*. New York, Cambridge University Press (ISBN 0521746116).
- 2009 G.R.Scott, L.Gibert: "The oldest hand-axes in Europe." *Nature* 461: 82-85 (ISSN 0028-0836).
- 2008 M.J.Walker, J.Gibert, M.V.López, A.V.Lombardi, A.Pérez-Pérez, J Zapata, J.Ortega, T.Higham, A.Pike, J-L.Schwenninger, J.Zilhão, E.Trinkaus: "Late Neandertals in Southeastern Iberia: Sima de las Palomas del Cabezo Gordo, Murcia, Spain." *Proceedings of the National Academy of Sciences USA* 105 (52): 20631-20636 (ISSN 1091-6490).
- 2006 M.J.Walker, T.Rodríguez-Estrella, J.S.Carrión García, M.A.Mancheño Jiménez, J-L.Schwenninger, M.López Martínez, A.López Jiménez, M.San Nicolás del Toro, M.D.Hills, T.Walking: "Cueva Negra del Estrecho del Río Quípar (Murcia, Southeast Spain): An Acheulian and Levalloiso-Mousteroid assemblage of Palaeolithic artifacts excavated in a Middle Pleistocene faunal context with hominin skeletal remains." *Eurasian Prehistory* 4 (1-2): 3-43 (Cambridge, Mass., Harvard University, Peabody Museum, American School of Prehistoric Research; ISBN 8391641597, ISSN 1730-8518).
- 2004 M.J.Walker, J.Gibert, A.Eastham, T.Rodríguez-Estrella, J.S.Carrión, E.I.Yil, A.J.Legaz, A. López, M.López, G.Romero: "Neanderthals and their landscapes: Middle palaeolithic land use in the Segura drainage basin and adjacent areas of southeastern Spain". In *Settlement Dynamics of the Middle Palaeolithic and Middle Stone Age Vol. 2*, ed. by N.J. Conard. Chap. 14, pp. 461-511. Tübingen: Kerns Verlag, "Tübingen Publications in Prehistory 2".
- 2004 M.J.Walker, J.Gibert, T.Rodríguez, M.López, A.Legaz, A.López: "Two Neanderthal Man sites in Murcia (SE Spain): Sima de las Palomas del Cabezo Gordo and Cueva Negra del Estrecho del Quípar". In M. Toussaint, C. Draily y J-M. Cords, eds., *Premiers hommes et paléolithique inférieur. Human origins and the lower palaeolithic. Sessions générales et posters. General sessions and posters. Actes du XIV^e Congrès UISPP (Union Internationale des Sciences Préhistoriques et Protohistoriques), Université de Liège, Belgique, 2-8 septembre 2001. Acts of the XIVth UISPP Congress, University of Liège, Belgium, 2-8 September 2001*, pp. 167-189. Oxford, Archaeopress, "BAR International series 1272".
- 2003 J.S.Carrión, E.I.Yil, M.J.Walker, A.J.Legaz, C.Chain, A.López: "Glacial refugia of temperate, Mediterranean and Ibero-North African flora in south-eastern Spain: new evidence from cave pollen at two Neanderthal man sites." *Global Ecology and Biogeography* 12: 119-129.

- 2001 M.J.Walker: "Excavations at Cueva Negra del Estrecho del Río Quípar and Sima de las Palomas del Cabezo Gordo: two sites in Murcia (south-east Spain) with Neanderthal skeletal remains, Mousterian palaeolithic assemblages and late Middle to early Upper Pleistocene fauna". In *A Very Remote Period Indeed. Papers on the Palaeolithic Presented to Derek Roe*, ed. by S. Milliken and J. Cook, pp. 153-159. Oxford: Oxbow Books.
- 1999 M.J.Walker, J.Gibert, F.Sánchez, A.V.Lombardi, I.Serrano, A.Gómez, A.Eastham, F.Ribot, A.Arribas, A.Cuenca, L.Gibert, S.Albaladejo, J.A.Andreu: "Excavations at new sites of early man in Murcia: Sima de las Palomas del Cabezo Gordo and Cueva Negra del Estrecho del Río Quípar de la Encarnación." *Human Evolution* 14: 99-123.
- 1998 M.J.Walker, J.Gibert, F.Sánchez, A.V.Lombardi, I.Serrano, A.Eastham, F.Ribot, A.Arribas, J.A.Sánchez-Cabezas, J.García-Orellana, L.Gibert, S.Albaladejo, S., J.A.Andreu: "Two SE Spanish middle palaeolithic sites with Neanderthal remains: Sima de las Palomas del Cabezo Gordo and Cueva Negra del Estrecho del Río Quípar (Murcia province)." *Internet Archaeology* 5 (autumn/winter 1998) <http://intarch.ac.uk/journal/issue5/walker_index.html>. You might be able to get access to it for free provided you are an accredited reader at a major library that subscribes to it (most major universities and public libraries in the U.K. subscribe).

FICTION

Very distinguished writers have written about Neanderthals in fictional form. Among them are H.G.Wells (of *War of the Worlds* and *Time Machine* fame) whose 1921 short story "*The Grisly Folk*" can be found in any good public library, republished in his *Selected Short Stories* (Harmondsworth, Penguin Books, 1958). You should also be able to find there William Golding's novel *The Inheritors* (London, Faber & Faber, 1955) - Golding won a Nobel Prize for Literature and his most famous novel is *Lord of the Flies* (about schoolboys on a desert island). The eminent Quaternary palaeontologist Björn Kurtén also tried his hand at an excellent novel called *The Dance of the Tiger* (1980) which you may be lucky enough to find it in the library. Isaac Asimov also had a go, with his short story "*The Ugly Little Boy*" which you can find in his book *The Best Fiction of Isaac Asimov* (1958, London, Grafton) and your library most likely has it too. Other well-known novels include J.H.Rosny-Aîné's *The Quest for Fire* (1982, Harmondsworth, Penguin - originally published way back in 1911 in French) - which also was made into an excellent film that your local video shop no doubt can get you - and Jean Auel's *The Clan of the Cave Bear* (1980, Toronto & New York, Bantam Books) which was also made into a (not so good) film; Jean Auel subsequently published another novel, *The Mammoth Hunters*. Finally, there is the Spielberg film of John Darnton's novel *Neanderthal* (1996, London: Hutchinson and New York, Random House) about which the less said the better!

NEANDERTHAL VIDEO

"NEANDERTHAL" is a full-length video and not too dreadful – I bought my copy in the U.K. in February 2001 for thirteen pounds 99 pence at an "HMV" high-street store. It was made by the Visual Corporation Ltd. in 2000 for television broadcasting in 2001 in the U.K. via Wall To Wall Television Ltd.. You can find out more at <<http://itel.co.uk/neanderthal>> We have mentioned earlier on in BRIEFING YOU some recent television documentaries in which we ourselves have appeared, as well as the animated "*Cueva Negra*" 30-minute film made by the Integra Foundation at Murcia.

YOUR PRINCIPAL INVESTIGATOR, AS SEEN BY HIMSELF

A short c.v.

MY JOB

I have been Professor of Physical Anthropology since 1988 at Murcia University, Spain, where I set up the Sub-Department of Physical Anthropology ("Área de Conocimiento de Antropología Física") in the Department of Zoology and Physical Anthropology in the Biology Faculty. I have to teach in Spanish, which I can cope with, more or less. I teach both undergraduate course units in Biological Anthropology and in Human Evolution, and postgraduate courses in The Origins of Modern Humans and in Human Ecology, Today and Yesterday, and in addition I supervise graduate students undertaking research, as well as directing research at Cueva Negra del Estrecho del Río Quípar and Sima de las Palomas del Cabezo Gordo.

MY LIFE

I was born at Colchester in England in 1941. This was appropriate for an archaeologist, because, even before Julius Caesar reached England, Colchester was the capital of the prehistoric Celtic King Cunobelinus, or Cymbeline as Shakespeare called him, though English children know him even better from the nursery rhyme as "Old King Cole was a Merry Old Soul...". King Cunobelinus was almost alone among prehistoric British rulers in being important enough to mint his own coins. A century later, in A.D. 40 the Roman Emperor Caesar Augustus set up the first capital of his new British colony at Colchester, or Camulodunum as it was known in Latin. However, the Celtic Queen Boudicca (or Boadicea) ransacked it, and a new, safer capital was established on the River Thames at London in A.D. 61.

During World War 2, my father was away from home, being an officer in the Royal Air Force, so my mother took me away from German bombs dropping over Colchester, to her family's home in Yorkshire. After his demobilization in 1948, my father, also a Yorkshireman, came back from Germany to join us.

As a boy in Yorkshire, I studied Maths, Physics, Chemistry, Biology, Latin, Greek, French and German at the Bradford Grammar School in Yorkshire, where the great archaeologist Sir Mortimer Wheeler had studied long before me. The composer Delius had been at my school, as had the famous historian Sir Alan Bullock.

My hobbies were archaeology (I founded an Archaeological Society at the school), rowing, squash, mountaineering, spelaeology, hiking and Scouting (I was a Queen's Scout). I kept up several of them for many years afterwards - up to leaving Sydney in 1988, I was in charge of all Venture Scouts in an inner-city Scout District and also helped both on Scout-Leader training-teams and Scout spelaeology training-teams.

I went up to Oxford University to University College (the poet Shelley was expelled from it!) where I took degrees in Animal Physiology (1963) and Medicine and Surgery (1967). I was awarded Oxford University's Near Eastern Archaeological Essay Prize, its Faculty of Medicine's Ophthalmology Prize, and the British Association for the Advancement of Science's Endeavour Prize for a published physiological review of muscular contractility. I spent a while beside the Thames in London's St. Thomas' Hospital Medical School (where Florence Nightingale founded professional nursing after the Crimean War).

While I was in London, I met my future wife, María Teresa Pina Velasco, a Spaniard from Murcia who was working in Bond Street in haute couture. We were married since 1968 until my wife's sad death from cancer in 1998. I have 3 admirable grown-up sons. I live in a flat in Murcia and have a beach-house at La Torre de la Horadada 15 kilometres from *Sima de las Palomas* where we sometimes throw beach parties for helpers who are excavating at Sima de las Palomas.

MY PROFESSIONAL AND RESEARCH CAREER

In 1968 I took the (first ever) "Distinction" in what was then Oxford University's Postgraduate Diploma in Prehistoric Archaeology (now grandly renamed Master of Studies in ...), studying under the palaeolithic expert Professor Derek Roe, who published with the late Mary Leakey the monumental 1995 volume on the Olduvai Gorge stone tools, in the Cambridge University Press *Olduvai Gorge* (vol. 5) series of monographs. I then went on to take my D.Phil. from Oxford for a thesis on the prehistory and physical anthropology of southeast Spain which was supervised by the eminent scholar Professor John Evans who was Director London University's prestigious Institute of Archaeology at that time.

From 1967 to 1969 I was Randall Maclver Research Fellow in Archaeology at The Queen's College at Oxford University. In 1969 I became university lecturer in Human Anatomy at the Edinburgh University Medical School in Scotland. Although I liked Edinburgh and was on full tenure, but I left in 1973 and emigrated to Australia, where I was first university lecturer, again on full tenure, and later senior lecturer, in Anthropology in the Arts Faculty at Sydney University. As well as being a British citizen by birth, I am also an Australian citizen, and for many years ran a part-time general practice in Sydney, especially for Spanish-speaking patients from Spain and South America.

From Sydney, I carried out research in Indonesia and continued to do field-work in southeastern Spain with colleagues at Murcia University. Much of this field-work was financed by Australian Government Research Grants Scheme and or by the National Geographic Society of the U.S.A.. In 1986 the Spanish Government financed me as a Visiting Professor for 12 months in the Department of Anthropology and Genetics in the Science Faculty at Madrid's Autonomous University. While I was there, the Spanish Government brought in a change to the law, in order to enable foreigners to become *tenured* university teachers in Spain, which had been forbidden under General's Franco dictatorship (1939-1975). There had been foreigners before the Spanish Civil War (1936-1939). I was the *first* non-Spaniard to be given a any *permanent Full Professorial-level position* since the Civil War. By a strange quirk of history, the *last* foreigner to hold one had also been a prehistorian -- the Austrian, Hugo von Obermaier, who had to leave Madrid University when the Spanish Civil War broke out.

So, in 1988, I came back to Europe to set up a Sub-Department of Physical Anthropology (Área de Antropología Física) in the Biology Faculty at Murcia University, under a Spanish Government programme ("PROPIO") designed to pump new blood and ideas into

collaborating universities. In 1989 I was elected a Fellow of the Society of Antiquaries of London. Recently, I returned to Oxford as its official Senior Visiting Research Fellow in Archaeology during 1993 and 1994, when I was also Visiting Fellow at St. Cross College.

I ran my second scientific exchange, sponsored for 1996-7 by the Spanish and British Governments (*Anglo-Spanish Joint Action HB1995-0002B*) together with Professor Derek Roe of Oxford University's Professor of Palaeolithic Archaeology and Director of its Baden-Powell Quaternary Research Centre, in which we and research students José Isaac Serrano and John Mitchell participated; we had run a previous one together in 1993-4, a scientific exchange, sponsored by the Spanish and British Governments (*Anglo-Spanish Joint Action HB1992-104B*) in which Dr. Josep Gibert, Professor Clive Gamble and Dr. Norah Moloney also took part. I was also Senior Researcher responsible for the 3-year Spanish Governmental DGICYT Research Project *PB92-0971* and in 1993 was the same for the 1-year Murcia Regional Government Research Project *PSH93-52*, at my two sites of *Cueva Negra* and *Sima de las Palomas*. In 1997 the Murcian Regional Government awarded me a *Seneca Programme* infrastructure grant (funded by the European Union) of 500,000 pesetas (about 3,000 euros) towards the purchase of a stereomicroscope which is linked up to a digital camera from which findings are sent to computer hard disc - findings about use-wear analysis of Middle Palaeolithic stone tools undertaken by a research student José Isaac Serrano (the total cost was 2,000,000 pesetas, around 12,000 euros). In 1997 I gave talks both at Harvard's Peabody Museum, thanks to a kind invitation from Professor Bar-Yosef, at University College London's Institute of Archaeology, and at Spain's National Archaeological Congress, as well as attending the *Earthwatch Institute* conference where I had a poster at the session at Harvard's Science Center and in 1998 I addressed the *Earthwatch Convention* held at the Oxford University Museum. At the end of 1999, a new Spanish Government *Major Research Grant PB98-0405* was awarded to help with the *Sima de las Palomas* and *Cueva Negra* research in the 3-year period 2000-2001-2002, and a further similar three-year grant has been made, *BOS2002-02375*, for the triennium 2003-2004-2006. In 2005 it made available a small grant for 2006 (CGL2005-02410/BTE). In 2007 the Murcian Regional Government's research funding body, *Fundación Séneca*, awarded a grant of 30,000 euros for research at *Cueva Negra* and *Sima de las Palomas* (*05584/ARQ/07*); the same body awarded me 900 euros in 2006 to present a communication at the XV Congress of the International Union of Prehistoric and Protohistoric Sciences at Lisbon. In 2009 we received a grant of about 25,000 euros for archaeological research at our sites from funds released by the Murcian regional government for archaeological excavations administered by Murcia University. Alas, since 2009 no further public money has been made available for archaeology in Murcia.

The official recognition by *PB98-045* undoubtedly helped us to acquire new international contacts and collaboration, as well as maintaining pre-existing ones, and most particularly favoured our obtaining the royal patronage of King Juan Carlos I of Spain who graciously accepted Honorary Chairmanship for the (December 6-19, 2000) *International Colloquium and Workshop "The Iberian Peninsula and Human Evolution", A Symposium in Honour of Professor Phillip V. Tobias, F.R.S.* which I organized at Murcia. Professor Tobias, who was 75 in 2000, flew to Murcia from South Africa to take part, where he is Emeritus Professor of the Witwatersrand University at Johannesburg and still directs its Palaeoanthropology Research Group. He gave a splendid address on "The role of water in the extra-African dispersal of humanity, with special reference to the peopling of the Iberian Peninsula." The programme included official visits to our sites of the *Sima de las Palomas* of Cabezo Gordo and *Cueva Negra* del Estrecho del Río Quípar, on which I also gave an address entitled "Neanderthal Man in Murcia: *Cueva Negra* del Estrecho del Río Quípar and *Sima de las Palomas* del Cabezo Gordo." Other participants gave addresses as follows. Professor Geoffrey A. Clark of the University of Arizona State University gave an address on "Modern human origins research: putting Iberia in a global context." Professor Derek A. Roe of Oxford University gave an address on "The Iberian Peninsula in the Palaeolithic: an outsider's view." The orthodontal surgeon and dental anthropologist Dr. Vincent A. Lombardi, from Pittsburgh, gave an address on "Dental anthropology and Neanderthal Man." Drs. Joao Zilhao and Cidalia Duarte of the Portuguese government's Archaeological Institute gave an address on "The Lagar Velho child: burial anatomy and implications for modern human origins in Iberia." Professor Camilo José Cela Conde of the University of the Balearic Islands, a Fellow of the American Association for the Advancement of Science, gave an address on "Just how stupid was *Homo habilis*? Problems over a suitable taxonomy of Pliocene hominins." Dr. José Gibert Clols of the "Dr. M. Crusafont" Palaeontological Institute of Barcelona gave an address on "Cueva Victoria at Llano del Beal, Cartagena, Murcia". Professor Enrique García Olivares of Granada University gave an address on "Molecular palaeontology: The study of biomolecules in fossils." Professor Daniel Turbón of Barcelona University gave an address on "Ancient DNA in the Iberian Peninsula". Professor José Enrique Egocheaga of Oviedo University gave an address on "Preliminary results of palaeoanthropological research into the Cueva de El Sidrón Neanderthals." Professor Ignacio Martínez of Madrid's Complutensian University gave an address on "The evolution of mind" on behalf of himself and Professor Juan Luis Arsuaga.

A week-long Murcia University Summer School on Human Evolution and Palaeoanthropology was run by me in September 1996 at Dolores de Pacheco beside *Sima de las Palomas* at which 40 students from all over Spain heard lectures and seminars, and took part in workshops and excursions, given by a staff of 10 which included myself, Professor Emiliano Aguirre Enríquez from Madrid University (the founder of the Atapuerca excavations), Dr. José Gibert Clols from Barcelona and his collaborators at the Crusafont Palaeontological Institute Drs. Florentina Sánchez López and Francesc Ribot Trafti, Professor Daniel Turbón Borrega from Barcelona University (palaeoanthropologist), Professor Camilo José Cela Conde from the University of the Balearic Islands, Professor Jorge Eiroa García of Murcia University (prehistorian), Dr. Miguel Martínez Andreu of the Cartagena Archaeological Museum (palaeolithic archaeologist) and research student José Isaac Serrano Iquierdo. Excursions to *Sima de las Palomas* and *Cueva Negra* took place. During the Summer School there were commentaries in the local press and broadcasting and television networks and a press conference was held in which journalists and commentators from the national media took part.

In May 1996 I gave a lecture at the *International Symposium in Honour of Professor Phillip Tobias, FRS*, during his visit to the University of the Balearic Islands at Palma de Mallorca, and later in the year, in November, I attended the presentation of the *World Cultural Council Awards* at Oxford University by Professor Tobias, the eminent South African palaeoanthropologist, we have known each other for many years and in 1995 he stayed at my house and visited my sites in Murcia. In November I also lectured on the work carried out at *Cueva Negra* and *Sima de las Palomas* to staff and students at Oxford University's Donald Baden-Powell Quaternary Research Centre whose Director then was its Professor of Palaeolithic Archaeology, Dr. Derek Roe.

During the last decade I directed the scientific content of a travelling European Union-cofunded public exhibition about our sites and research at them, called "**Archaic Europeans and Neanderthals: Project HOMO, Hominins, Technology and Environment in the Middle and early Upper Pleistocene**", which is all about our work at *Cueva Negra* and *Sima de las Palomas*, and is now travelling around the European Union, because it was winner of the European Commission's "Culture 2000" Programme (2000-0820CLTCA1A) so that the Commission paid for half (€150,000 euros) of its cost, the other half coming from the participating institutions that have agreed to display it, namely Murcia's Museo de la Ciencia y del Agua (Science and Water Resources Museum), the Austrian national Museum of

Natural History at Vienna (where the exhibition opened in October 2001), the Palaeontological Museum of Barcelona at Sabadell, the Oxford University Museum of Natural History, Logroño Museum, San Sebastián's Science Museum, Murcia University Library, and currently at the Murcian town of Torre Pacheco near our site of Sima de las Palomas. This exhibition is giving research at our two sites great publicity around Europe – it receives hundreds of visits from groups of high school students in all the centres where it is on display. You may still perhaps be able open up a slot on the web about it at <<http://www.contraplano.es/homo>>

In recent years I have given several lectures about the twenty years of field research at Cueva Negra and Sima de las Palomas. In June 2011 I presented a paper about both our sites in a monographic seminar on *Neanderthals in the Iberian Peninsula* during the XVII Congress of the Spanish Physical Anthropological Society held at Barcelona University, and in November I presented a paper on each of our sites during a week-long series of lectures on regional archaeology at Murcia's Archaeological Museum. In September 2010 I gave a lecture about Cueva Negra during the Sixteenth Annual Meeting of the European Association of Archaeologists at the Hague in a Session on Palaeolithic Chronologies which I co-organized with Oxford's Dr Tom Higham. In September 2009 I gave a lecture about Sima de las Palomas during the Fifteenth Annual Meeting of the European Association of Archaeologists at Riva del Garda, Italy, in a Session on the Middle and Upper Palaeolithic. In 2009 I also gave lectures about both our sites at the Society of Antiquaries of London of which I am a Fellow, and also at meetings in Spain, namely, at a symposium organized at Murcia by a leading bank here in honour of Charles Darwin, as well as at the Universidad Miguel Hernández at Elche, at the Cieza Museum in Murcia, and a lecture about Human Evolution at Murcia's Science and Water Resources Museum. In 2008 I gave public lectures about the sites at the Murcian Archaeological Museum in a series of lectures organized in association with an exhibition of the region's palaeontology, and another at a symposium at Orce, Granada, in honour of the late Dr. Josep Gibert.

In April 2007 I gave a talk about our research at Sima de las Palomas and Cueva Negra at the invitation of Professor Svante Paäbo, the internationally renowned geneticist who conducts research into both mitochondrial and nuclear DNA from Neanderthal bones, who is the Director of the ultra-modern, seven-storey-high, Max-Planck Institute for Evolutionary Anthropology at Leipzig in Germany, and whom I had first got to know at a meeting in Madrid back in 1993. The talk was well received and Svante Paäbo made useful suggestions about how we might best excavate the *Sima de las Palomas* Neanderthal skeletal remains, wearing face-masks and surgical gloves, and putting the fossils into sterile containers. This we did in Summer 2007 and in the Autumn Svante's Ph.D. student, Oxford University Biology graduate Adrian Briggs, came to Murcia and we helped him as he extracted samples from our newly-excavated Neanderthal bones in a sterile operating theatre in Murcia University's Veterinary Science Faculty. Later on, he reported back from Leipzig that our excavation technique had been so good that almost no modern human DNA contamination could be detected, though so far, alas, neither has any Neanderthal DNA been identified – possibly because too few samples were taken by him and they may have been too small anyway (less than 200 miligrams each) given the high ambient temperature at *Sima de las Palomas* which may predispose to break up of the nucleotide fragments of DNA.

In September 2006 I gave a presentation entitled "The Demise of the Mysterians" based on our Cueva Negra research, in Colloquium 13 ("The Earliest Inhabitants of Europe") at the XV Congress of the International Union of Prehistoric and Protohistoric Sciences at Lisbon. In November 2005 I gave a lecture about our work at Cueva Negra and Sima de las Palomas at Oxford University's Institute of Archaeology in its Quaternary Seminar Series. In February 2006 I gave lectures on that work at Barcelona University and at Castellón.

In 2009 I presented the excavations at Sima de las Palomas in a session of the XV Annual Meeting of the European Association of Archaeologists devoted to the Middle-Upper Palaeolithic, at Riva del Garda in Italy, published in *Quaternary International* on line in 2011 (the print version will appear in 2012). In 2010 I organized with Dr. Tom Higham (of Oxford University's Research Laboratory for Archaeology and the History of Art) a session of the XVI Annual Meeting of the EAA, held at The Hague, on Rethinking Palaeolithic Chronologies in Europe and the Circum-Mediterranean Region, with the following ten papers which are being prepared for publication in an issue of *Quaternary International*: (1) T. Higham "Radiocarbon dating the earliest Aurignacian in western Europe"; (2) D.C.W.Sanderson, R.A.Housley, D.Mark "Opportunities and Challenges in Developing Multi-technique Chronologies for Human Evolution and Dispersal"; (3) J.Z Zilhão "New chronological evidence for Middle and Upper Pleistocene archaeological sites in the Almonda karstic system (Torres Novas, Portugal)"; (4) E.Boaretto, N.R.Rebollo, S.Weiner, F.Brock, L.Meignen, A.Belfer-Cohen, O.Bar-Yosef "Anatomically modern humans migrated out of Africa almost 50,000 years ago: Radiocarbon dating of the MP-UP transition in Kebara Cave, Israel"; (5) G.A.Clark, "Advances in interdisciplinary research in the West Asian Paleolithic"; (6) N.Rolland "The Early Pleistocene hominid dispersals out of Africa: Two outstanding issues, with special reference to the circum-Mediterranean region"; (7) F.d'Errico, W.E.Banks, M.F.Sánchez Goñi, M.Kageyama "Palaeolithic chronologies and population dynamics in changing environments. Data and research strategies"; (8) B.Weninger, O.Jöris "The Greenland GISP2 Glaciochemical Record: Rapid Climate Change during the Upper Palaeolithic"; (9) D.Richter, H.Dibble, P.Goldberg, J-J.Hublin, J.Jaubert, S.McPherron D.Sandgathe, M.Soressi, K.Trebault, A.Turq "Chronometric data for the Late Middle Palaeolithic of south-western France and the chronostratigraphic position of Mousterian technocomplexes"; (10) M.J.Walker, M.López-Martínez, J.S.Carrión-García, T.Rodríguez-Estrella, M.San Nicolas-del Toro, J-L.Schwenninger, A.López-Jiménez, M.Haber-Uriarte, J.L.Polo Camacho, J.García-Torres, M.Campillo-Boj, A.Avilés-Fernández "Cueva Negra del Estrecho del Río Quípar (Murcia, Spain): A late Early Pleistocene hominin site with an "Acheulo-Levallois-Mousteroid" Palaeolithic assemblage".

In February 2000, the Rector (i.e. President or Vice-Chancellor) of Murcia University and Mayor of Torre Pacheco signed an agreement to study whether it was feasible to establish a museum and residential field-study centre near Dolores de Pacheco beside *Sima de las Palomas* del Cabezo Gordo. The Torre Pacheco Town Council was enthusiastic about developing the site and its environment and has received from the European Union a modest development grant with a view to preserving the hillside around the site. In February 2007 the Murcian Regional government made available eight million euros, later increased to ten, for building the regional **Museum of Palaeontology and Human Evolution** near Sima de las Palomas in Torre Pacheco municipality and the foundation stone was laid finally in September 2010; building started in 2011 and is well underway in 2012.

My European travels in 2004 (see above) in order to gain support for the projected regional *Museum for Paleontology and Human Evolution* took up much of my spare time and energy that year, to the exclusion of other activities such as delivering public lectures, other than to local meetings of archaeologists and anthropologists at Murcia. I gave an invited lecture about our research at Oxford University's Institute of Archaeology in November 2005. I gave a public lecture at the San Sebastián Science Museum in October 2003 and in February 2002 I gave one at Murcia's Science and Water Resources Museum. In 2001 I gave several public lectures at places which included Oxford University, the XIV International Congress of Prehistoric and Protohistoric Sciences which

was held at Liège in Belgium, at the Austrian national Natural History Museum in Vienna. In November 2000, I gave a major lecture about human evolution during the Middle and earlier Upper Pleistocene, at an international scientific meeting in Valencia organized by the Spanish governmental institution known as the Menéndez Pelayo International University. Other participants included Professor Bernard Wood of the Washington University and Professor Günter Bräuer of Hamburg University, as well as Mexican and Spanish scientists, including Emeritus Professor Emiliano Aguirre.

It would be tedious to give a list of conferences, congresses, public lectures and specialist workshops and summer schools in which I have participated, from which no publications in print have emerged. I gave a lecture in an important workshop in 1993 on *Anthropology and Genetics* in the Universidad Complutense de Madrid's summer schools at El Escorial (other participants included Professors Luca Cavalli-Sforza, André Langaney, Svante Pääbo, Guido Barbujani, Mark Stoneking, Alberto Piazza, Jaume Bertranpetit, etc. -- no publication is expected). Another was as recently as 1995 in Murcia University's summer school on the *Archaeology of Death* (other participants included Professors Martín Almagro-Gorbea, Vicente Lull, Dimas Martín Socas, Gonzalo Ruiz-Zapatero, Jorge Eiroa and Dr. Walter Alba from Peru of "Lord of Sipán Tomb" fame).

My principal academic interests include prehistoric communities, their habitat, and their evolution, with special reference to the palaeoanthropology, prehistoric archaeology and human palaeoecology of the Old World, and in particular the Iberian Peninsula. I am interested in the application to these matters of strategies, methods, and techniques of the natural sciences via investigations into - especially attempts to refute - working hypotheses about remains from the past, in endeavours to define appropriate models for its interpretation.

My teaching commitments at both undergraduate and postgraduate levels reflect those interests: palaeoeconomic and palaeoecological interpretations of human evolution and Quaternary prehistory; human evolution and biological anthropology in their Pleistocene and Holocene environmental setting; Quaternary environmental studies; human and mammalian osteology and osteometry; multivariate statistical analysis; characterization analyses of materials; field programmes of excavation at Pleistocene and Holocene sites. At Murcia University I have to teach in Spanish. I have also published papers in Catalan and French, and can read German tolerably.

Southeastern Spain is a Mediterranean region with spectacularly abundant palaeoanthropological, palaeoecological, palaeoeconomic, and prehistoric remains from both the Holocene and the Pleistocene. At present I am carrying out fieldwork at two important Murcian sites that straddle the period 250,000-50,000 years ago: *Cueva Negra* and *Sima de las Palomas*. Both provide hominin remains of early *Homo sapiens neanderthalensis*, together with Middle Palaeolithic artefacts and extinct fauna.

Although my own research projects take up most of my time, I have also collaborated with research into Lower Pleistocene hominin remains *Orce*, in Granada, and *Cueva Victoria*, near Cartagena in Murcia, in DGICYT Project *PB-91-0044*, under the leadership of my dear friend, the late Dr. Josep Gibert. We have presented at the 1995 *International Conference on Human Palaeontology*, held at Orce, a published study, together with other colleagues, of early hominin humeri from the Venta Micena site at Orce; this eventually appeared in the scientific journal *Human Evolution* at the end of 1999. I was on the Scientific Committee of the Conference and gave two papers on my work at *Sima de las Palomas* and *Cueva Negra*, as well as guiding an excursion of international scientists around *Sima de las Palomas*. I also collaborate with a Pleistocene project in the Sierra de Quíbas in Murcia, under the leadership of Dr. Miguel Ángel Mancheño, where Late or Middle Pleistocene fauna occurs.

I have also participated in the Murcian Regional Government Project *PSH91-31*, led by Professor Jorge Eiroa of Murcia University's Prehistory and Archaeology Department, as second principal researcher, undertaking osteological analysis of Copper-Age skeletons from northwestern Murcian sites of *Bagil*, excavated by Professor Eiroa, and *Cueva de los Alcores*. Furthermore, I have collaborated with Murcian Regional Government archaeologist Miguel San Nicolás in other analyses of human skeletons from caves he has excavated, including *Cueva de El Milano* and *Cueva de Pajasola*, and in 1995 we published together a 60-page chapter in a volume edited by the late Dr. Bill Waldren (who also studied under Dr. Roe at Oxford) which is called *Ritual, Rites and Religion in Prehistory* (Oxford: Tempus Reparatum, 1995). At Pajasola a former research student and now colleague of mine, Dr. Josefina Zapata did tremendous work, identifying, consolidating and cleaning the hundreds of jumbled human bones, and her doctoral thesis on a major study of a late Roman cemetery population at *Mazarrón* on the southern Murcian coast is in press with *British Archaeological Reports International Series (BAR)*.

When I was at Sydney University I supervised the doctoral theses of Phillip Habgood, who undertook a multivariate statistical analysis of Middle and early Upper Pleistocene hominin skulls which is in press with *British Archaeological Reports International Series (BAR)*, and of American Cheryl Swanson who undertook a similar study on Australian Aboriginal skulls, and I was co-supervisor of Dimitri Anson's thesis which involved characterization studies of Lapita pottery from the Bismarck Archipelago. For over 20 years I have been involved in the examination of doctoral candidates at several universities.

My laboratories at Murcia University are in the Biology Faculty because Spanish Government regulations which require Physical Anthropology to be located in university Faculties of Biology. So in the Biology Faculty at Murcia University, between 1989 and 1992, a modern, well-equipped Anthropology Research Laboratory and a spacious Teaching Laboratory have been equipped with osteometrical equipment, a Leica MZ-12 "zoom" binocular microscope, a binocular petrographic Zeiss "Jenapol" microscope with photographic accessories, a low-power binocular Olympus microscope with extension arms and photographic accessories, student microscopes, and four microcomputers with digitalizer, plotter, printers, scanners, etc., an oven for drying materials, racks and shelving for bone collections, and a growing library of upto date monographs. A new Tata 7-seater 4-wheel drive vehicle was acquired in November 2005 by the Physical Anthropology Subdepartment for fieldwork, thanks to a special grant from Murcia University for infrastructure. The Faculty Library has also been expanded with textbooks, monographs and a dozen international journals of Physical Anthropology and Quaternary Studies.

Our research enjoys a close relationship with scientists in other university departments, especially the Prehistory and Archaeology Department, the Department of Analytical Chemistry, the Botany Department, the Department of Geology and Soil Science, and the Veterinary Faculty's Veterinary Hospital CAT scanning unit. Comprising physical anthropologists, archaeologists, geologists and analytical chemists, an official university Research Group *E0A0-03* has been established at Murcia University, of which I am its Director. It has collaborators, officially-recognized by Murcia University, who are attached to other institutions (Barcelona University; Cartagena Polytechnic University; Instituto de Patrimonio Histórico of the Murcian regional administration, etc.)

I am also interested in developing interpretations of Southeastern Spanish palaeodemography in the Mesolithic, Neolithic, Copper and Early Bronze Ages, which take into consideration palaeoeconomic and palaeoenvironmental aspects of settlement. Reconsideration of the evidence suggests population and settlement densities far below the levels which are inferred by some prehistorians whose monographs have received wide circulation in recent years (A. Gilman & J.B. Thorne; R.W. Chapman). Palaeoanthropological findings, as well as archaeological evidence, suggest an extremely sparse population indeed between 8,000 and 4,000 years ago in this region, which many prehistorians have considered as one of prehistoric Europe's dynamic growth regions from a standpoint of cultural evolution. I have written a chapter in Spanish for a forthcoming volume on the rock paintings of the Murcian Region which includes a reconsideration of my excavations at the Barranco de los Grajos which I carried out over 35 years ago.

My interest in palaeodemographical aspects of palaeoanthropology and prehistory has led me to enquire into palaeoeconomic and palaeoecological matters. A particular interest of mine is the inter-relationship between palaeodemography, anthropological genetics, and palaeolinguistics in Spain from the Mesolithic and Neolithic to the Copper and Early Bronze Ages. I am working on new manuscripts for publication on these matters.

MY WORK IN PRINT (or soon to be)

Most of this is hideously boring, utterly unreadable, or simply trivial. It mainly serves to boost my own ego rather than being of any conceivable interest to anyone else!

BOOKS

- 2001 M.J.Walker. *Europeos arcaicos y Neanderthales. Proyecto Homo: Homínidos, Tecnología y Medio Ambiente en el Pleistoceno Medio y Superior inicial*. (Murcia: Ayuntamiento de Murcia, Museo de la Ciencia y del Agua).
- 1999 M.J.Walker (guest editor) *Human Evolution* volume 14 numbers 1-2 for 1999, special monographic issue on recent research in Human Evolution in Spain. (Florence, Sedici).
- 1992 J.Gibert, D.Campillo, E.García-Olivares, A.Malgosa, B.Martínez, P.Palmqvist, F.Sánchez & M.J.Walker (eds): *Presencia humana de Granada y Murcia: Proyecto Cueva Victoria-Orce (1988-1992)*. (Orce: Museo de Prehistoria, with collaboration from Caixa de Catalunya and Diputación de Barcelona).
- 1988 M.J.Walker. *Ensayo de caracterización de poblaciones del Sureste español, 3.000 a 1.500 a.J.C.* (Murcia: Universidad de Murcia; revised Spanish, translated by the author).
- 1985 M.J.Walker. *Characterising local southeastern Spanish populations of 3,000-1,500 B.C.* (Oxford: British Archaeological Reports, "BAR International Series, No. 263"; in comparison to the revised Spanish edition, this early version in English I now regard as highly unsatisfactory).

JOURNAL ARTICLES AND CHAPTERS IN BOOKS

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