BRIEFING YOU

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

31st Field Season 2020

MUPANTQUAT
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Dates of our 2020 sessions:
SESSION 1: June 29th (Mon.) – July 20th (Mon.) 2020
at Cueva Negra del Estrecho del Río Quípar
SESSION 2: July 20th (Mon.) – August 10th (Mon.) 2020
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, prehistoric animals, and remains of fire, 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. An important 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, as well as the Middle Palaeolithic stone tools and Middle-early Late Pleistocene faunal remains, and the earliest remains of a fire from a Palaeolithic site in Europe. The results are greatly helping to extend our knowledge about H. heidelbergensis and H. neanderthalensis, their origins and their lifeways.
Where our field school and its excavations take place in SE Spain.
We’re all in it together!
We’re VERY down to earth in every sense of the words…!

WHAT WE DID IN 2019 AND WHAT WE PLAN TO DO IN 2020
MUPANTQUAT FIELD SCHOOL AND EXCAVATIONS AT
Cueva Negra (Black Cave) del Estrecho del Rio Quipar (900,000-800,000 years ago)
Sima de las Palomas (Dove Hole) del Cabezo Gordo (130,000-40,000 years ago)

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Dear Friends, Colleagues, and Helpers Past and Present,

I should like to thank everyone who has supported MUPANTQUAT in 2019 and to send you the warmest of Season’s Greetings and wish you good fortune and happiness in 2020. MUPANTQUAT had a successful year in 2019. Its Field School oversaw the 28th consecutive annual field season of excavation at Sima de las Palomas and 30th at Cueva Negra. Special thanks go to 2019 helpers who came back in 2019.

Six metres down in Sima de las Palomas we excavated a Neanderthal molar tooth in 2019 in sediments dated to the last interglacial period (130,000-90,000 years ago), along with abundant Mousterian artefacts and faunal remains. It raises to 15 the minimum number of Neanderthal individuals represented by the several hundred skeletal items from the site. The deep sediments gave us a milk molar in 2019, part of a Neanderthal mandible in 2017, and two incisor teeth in 2016. As you probably know, higher layers of 55,000-50,000 years ago contained very many cranial and postcranial elements in anatomical relation of at least 3 Neanderthals of the last ice age (also a few Neanderthal remains came from the highest sediments that filled the cave up to its roof by 40,000 years ago). A scholarly book about Sima de las Palomas and many scientific articles have been published in recent years.

At Cueva Negra in 2019 we made an extension to our main excavation and immediately uncovered stone artefacts, bones of hyaena (Crocuta), a bear tooth (Ursus cf. deningeri), antler and brain-case of a giant deer (Megaloceros novocarthaginiensis), and a huge rib of a rhino, Stephanorhinus etruscus, (or perhaps a mammoth, Mammuthus). The sediments in the cave are 5 metres deep and homogeneous, as well as rich in faunal remains and Palaeolithic artefacts which include a bifacially-flaked hand-axe, and 4.5 metres down there is an extensive ashy layer containing burnt remains (published in Antiquity in 2016). The hand-axe and evidence of fire are the earliest known from Europe.
Palaeomagnetic research showed the sediments to be older than 772,000 years ago (published in Nature in 2009). The abundant extinct small mammals from them are appropriate for such antiquity (published in Historical Biology in 2018). The fauna implies a temperate interglacial period, plausibly one that lasted from 868,000 to 814,000 years ago. This year a geophysical estimate of 890,000±136,000 years ago was obtained from an excavated tooth of the fossil horse Equus atilids, and presented as a poster in September at the 9th Annual Meeting of the European Society for the Study of Human Evolution held in Belgium at Liége (see photo).

In March, Dr. Christoph Wissing of Tübingen University’s Biogeology Institute visited our sites and took samples from fossil herbivore teeth for stable isotope bioenvironmenal research. He gave a well-attended lecture organised by MUPANTQUAT at Murcia’s elegant Royal Casino. Coinciding with his visit was another by Alexandra Schuh from Leipzig's Max Planck Institute for Evolutionary Anthropology who came to study the Sima de las Palomas Neanderthals. In 2019 some of these were illustrated in science-journalist Michael Gross’ article “Mingling with Neanderthals” in Current Biology volume 29, pages R105-R107, 2019. In October, I gave a talk about both our sites at Tübingen University, kindly invited by Professor Hervé Bocherens and Christoph who head the stable isotope research project there. It afforded me an opportunity to examine the Pleistocene human Steinheim skull at Stuttgart’s Natural History Museum (see the photo of Christoph and me studying it; death probably was an outcome of meningeval cancer, followed by post mortem damage).

In June, two posters about the Neanderthal skeletal remains from Sima de las Palomas, and a third about palaeopathology from a recent prehistoric period, were presented by our Vice-President, Murcia University archaeologist Dr. María Haber (see photo) at Granada University where the 21st meeting of the Spanish Physical Anthropology Society was held jointly with the 15th of the Spanish Palaeopathological Society. In 2019 MUPANTQUAT members gave public talks about our fieldwork at Murcia and showed our sites to the general public during Open Days (see photos). During our Field School, talks and seminars were given by our staff, visiting colleagues Drs. Hugues Blain (Tarragona University), Héctor Manrique (Saragossa University) and Anna Rufà (Bordeaux University), and participating helpers Maria Slettero (Copenhagen), Rosie Clark (Oxford), James Clark (Cambridge) and Janne Paavilainen from Sweden. New scientific manuscripts about our field research have been prepared for publication, especially one based on the research of our members Norman Fernández Ruiz and Gonzalo Linares Matías (for Quaternary International), and another (for the Journal of Paleolithic Archaeology) with palaeontologist Dr. Jan van der Made (Madrid’s National Museum of Natural Science) and geochronologists Drs. Rainer Grün and Mathieu Duval (Griffith University). In 2019 two articles by our members appeared in print in Quaternary Science Reviews volume 217, pages 4-77 and 194-216; the volume was edited by MUPANTQUAT member, the distinguished palaeoapalynologist, Dr. José Carrón, Murcia University's Professor of Plant Evolution, whose colleagues Drs. Santiago Fernández Jiménez and Juan Ochoando took sedimentary samples for pollen analysis at Cueva Negra during our 2019 field season. Particular mention should be made of our MUPANTQUAT member Murcia University archaeologist Dr. Ignacio Martín who as well as giving talks during our Field School is directing the important excavation of Cueva del Arco near Cieza in Murcia which seems to contain a Middle Upper Palaeolithic sequence. Co-directors of the Field School, Dr María Haber and Mariano López, also excavate several other sites in Murcia, from mediaeval, Roman, protohistoric and prehistoric periods.

We welcome helpers, new and old, at our Field School which in 2020 celebrates its 31st Field Season at Cueva Negra and 29th at Sima de las Palomas. Please pass the following information around to all who may be interested. I'm sure all helpers in 2020 will have an interesting time, especially those with an interest in human evolution. Applicants do not need to have previous excavation experience. Keenness is what we value most of all in our helpers! All our helpers become members of our MUPANTQUAT association by virtue of their presence. We regard our helpers as fellow members (not as cannon-fodder, condemned to donkey-work!).

There is no application form: just send an email to mjwalke@gmail.com. First-time applicants MUST attach a 1-page (brief) c.v. which MUST include (1) full name, (2) date of birth, (3) nationality and passport number, (4) permanent home address, (5) address for correspondence, (6) contact phone number(s) and email address(es). First-time applicants will get a reply only after all of those 6 pieces of information have been received. Interested helpers should go to our web-site http://www.mupantquat.com where you will find, and should open, study, and save, a long document entitled BRIEFING YOU which explains 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 Pleistocene fossil human and animal bones, and Palaeolithic stone tools. I hope an updated version of BRIEFING YOU will be on our MUPANTQUAT web-site during January 2020 (until then 2019 version will be left on it and the information, except for the dates, is nre or less what the 2020 version will include, though there will be some changes in pick-up/set-down places because (a) we now have the new Murcia Corvera International Airport, and (b) Calasparra railway station is now closed).

The dates when we shall meet/pick up and say Adios to our helpers and set them down, are as follows:

**SESSION 1: June 29th (Mon.) – July 20th (Mon.) 2020: Cueva Negra del Estrecho del Rio Quipar (Caravaca de la Cruz,Murcia).**

Accommodation: full board & lodging at Ascruz Residential School,Caravaca de la Cruz.

**SESSION 2: July 20th (Mon.) – August 10th (Mon.) 2020: Sima de las Palomas del Cabezo Gordo (Torre Pacheco, Murcia).**

Accommodation: full board & lodging at Doñores de Pacheco Public School and Civic Centre.

The best thing anyone interested in helping us can do now is to read BRIEFING YOU very carefully, and then make up your mind. If you or your friends have any queries, please don’t hesitate to write to me.

**Very important!** Anyone who is coming to help in 2020, should please send me, as soon as possible, details about your route, place, date, and time of arrival so that we know you are definitely arriving and can put you on our list of people to be picked up at Murcia-Corvera International Airport, and (b) Calasparra railway station is now closed.

I look forward to seeing many keen helpers and new MUPANTQUAT members at our 2020 Field School. I like to keep in touch with all our helpers, so please let me know what you’re doing and enjoy 2020!

Yours truly

Michael Walker

Postscript: MUPANTQUAT is largely self-funding and very rarely gets financial help from the governmental or regional authorities here. We are grateful for help we receive from the municipalities where we excavate (Torre Pacheco and Caravaca de la Cruz). However, the truth of the matter is that we rely on the contributions of our members and field helpers to keep the fieldwork going. For attendance at one full 21-day session your contribution is rated at 50 euros a day for bed, light breakfast, mid-morning sandwich, cooked lunch, cooked supper, laundry, instruction, transport between base camp and site, excursions, transport between Murcia Airport to our base on official pick-up and set-down dates, 2020 membership of MUPANTQUAT. Attendance at both sessions entitles helpers to a reduction to 45 euros a day, and it is also 45 euros a day for helpers from previous years. Attendance for less than a full 21-day session is rated at 80 euros a day. On a case-by-case basis, and provided it does not produce numerical imbalance of helpers within a session, consideration may be given to allowing youngsters, who can justify impecunious circumstances and are first-time participants, to take part for 450 euros during a 10-day period (45 euros per day) corresponding either to the first or the second half of either session 1 or session 2 (though such participation implies they will miss half of the 20th programme of the session). In order to guarantee reservation of a place at our Field School a non-returnable deposit is required by May 1st 2020, and because of that helpers might want to take out holiday insurance in case of last-minute inability to come.
Deposits have to be non-returnable, alas, 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 very few weeks before the session begins. This means we might well have to use money deposited with us by a helper unable to come in order to tempt one of our local undergrads to take that person's place instead of taking a vacation job in a bar or restaurant beside the packed beaches or at one of the many golf resorts beside the coast, 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 well.

I wish I had time write to everybody and respond to everyone who writes to me with specific enquiries about the progress of our research. Hundreds of people have attended our Field School over the past three decades, and because I have no secretary I cannot answer scores of letters separately alias, which is the reason for this round-robin letter: one size will just have to fit all, I am sorry to have to say. 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 that it would be improper for me (or them) to give details about unpublished scientific findings with people (including our field helpers) who are not directly involved in the ongoing 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. This BRIEFING YOU gives you an overview of the state of play. 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 give us copies to use and publish as we choose. You should inform your faculty that each one of our Field School’s 3-week sessions involves 160 hours of training, divided into about 80 of supervised excavation and retrieval of finds both by your own manual excavation and by wet-sieving (wet-screening) of excavated Pleistocene sediment, and about 80 hours of supervised preliminary sorting of finds in our field-lab, attendance at talks and seminars and visits to sites of archaeological relevance or historical interest.

For those universities that require certificates of attendance as requisites for completion of undergraduate 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 can’t say that the Spanish consular services in those countries have requested a document that might imply MUPANTQUAT’s responsibility towards an applicant who, being a new member in consequence of having deposited the aforementioned financial contribution with MUPANTQUAT, presents MUPANTQUAT’s written invitation to participate in the Field School to the Spanish consular services. Members who are successful applicants should bear in mind that MUPANTQUAT’s invitation to a member to participate does not imply MUPANTQUAT’s sponsorship of that member’s travel to, or stay in, Spain: MUPANTQUAT cannot and does not sponsor travellers or would-be immigrants.

The policy of MUPANTQUAT with regard to responsibility towards its members is indicated in our registered Statutes of Association (which are in the public domain and freely available from our Secretary on request). The following comments are relevant to the particular activity of MUPANTQUAT which is the 31st edition of its Field School for Quaternary Palaeoanthropology and Prehistory of Murcia and associated archaeological excavations (June 29th–July 20th 2020, Session 1) at Cueva Negra del Estrecho del Rio Quipar near Caravaca, Murcia, and (July 20th -August 10th 2020, Session 2) at Sima de las Palomas del Cabezo Gordo near Torre Pacheco, Murcia. MUPANTQUAT extends invitations to successful applicants so that they may participate in the field school and help at the excavations of one or both sessions. Successful applicants are afforded membership for the current year of MUPANTQUAT provided that their annual subscription has been satisfied within that year. Their contribution as MUPANTQUAT members to the largely self-funding MUPANTQUAT field school and excavations for the year of their participation involves placing a deposit with MUPANTQUAT in order to reserve a place in the team, from which is deducted their subscription as full members (20 euros) or student/non-voting members (10 euros). Members are free to make annual renewal of their subscription. In the case of first-time helpers from outside Spain the contribution of a new member of MUPANTQUAT in 2020 is 1,050.00 euros for one session or 1,890.00 euros for two sessions, and in either case a deposit of 750.00 euros per session is required for a place to be reserved.

Until the deposit has been received MUPANTQUAT has no responsibility to invited applicants, because its responsibility commences only after their admittance as members of the Association, which, in turn, depends on their having completed the fulfillment of membership requirements. Only after the deposit has been received, is an applicant considered to have fulfilled the basic requirement, and then, and only then, does MUPANTQUAT have responsibilities towards its new member (which are the same as those to any other member, as defined in MUPANTQUAT’s Statutes of Association). For the past thirty years our successful annual field school and associated excavations have received participants from most Member States of the European Union, and several countries further afield, including Russia, Uruguay, China, Indonesia, Ceylon, Australia, Argentina, Mexico, USA, Canada, Norway, northern Cyprus, Kazakhstan, Vietnam, etc.. We are very happy to say that the Spanish consular services in those countries have never requested a document that might imply MUPANTQUAT’s responsibility towards an applicant who, being a new member in consequence of having deposited the aforementioned financial contribution with MUPANTQUAT, presents MUPANTQUAT’s written invitation to participate in the Field School to the Spanish consular services. Members who are successful applicants should bear in mind that MUPANTQUAT’s invitation to a member to participate does not imply MUPANTQUAT’s sponsorship of that member’s travel to, or stay in, Spain: MUPANTQUAT cannot and does not sponsor travellers or would-be immigrants.
Excavation has been ongoing for 30 years at both sites. Cueva Negra has abundant evidence of fire, a final Early (i.e. Lower) Pleistocene fauna, an “Acheulian” hand-axe, numerous flake-tools, and extinct fauna in sediments laid down between 772,000 and 990,000 years ago (probably during the interglacial period from 868,000 to 814,000 years ago), according to biostratigraphy, palaeomagnetism, and geophysical dating. Sima de las Palomas has >300 skeletal parts (teeth, bones) of 15 Neanderthal individuals, including 3 articulated skeletons of which is 85% complete $5,000–50,000 years ago, an early Late (i.e. Upper) Pleistocene fauna, and Mousterian Palaeolithic artifacts, dated by $^{14}C, U-ser, OSL and ESR, with new finds of Neanderthals teeth and mandible, fauna, and Mousterian artefacts in deep layers dated to 130,000–90,000 years ago.

We invite applicants to take part in our 2020 summer field season. All applicants are considered sympathetically; prior archaeological experience is less important than keenness. To apply, just send an email with brief cv after going to our MUPANTQUAT web-page, clicking there on FIELD SCHOOL and then on “BRIEFING YOU” (there’s no application form to fill in as we keep workpaper to a minimum). The Murcian Association for the Study of Palaeoanthropology and the Quaternary (MUPANTQUAT) coordinates the Field School and excavations, issues your Certificate of Attendance, and makes you a member for the current year (we also sign forms you bring from your university).

While at Cueva Negra (Session 1) we stay at the residential Ascruz school (which has its own kitchen staff) at Caravaca de la Cruz. While at Sima de las Palomas (Session 2) we put bunks in the public school at Dolores de Pacheco and take our meals in the restaurant of the village civic centre nearby. Both schools have showers, cleaning staff, and concierges. We organise laundry at both places. Both schools give us some access (often erratic, alas) to wifi and internet. We can use the municipal public swimming pools at Caravaca and Dolores (which is also near the beach). At both places, you must bring sheets, pillow-slip, towel, soap and shower-gel. Summer is hot in Murcia: you’ll get a chance to swim. Bring light work clothes and flat-soled light footwear for Cueva Negra but bring work boots for Sima de las Palomas. Bring sun-hats, sunglasses, sun-cream, swimmers. If you’ve an EU driver’s license (or otherwise an International Driving Permit), please bring it. Your contribution includes all meals and laundry.

We cannot meet or set down helpers on any other dates than the start and finish dates of each session. On those, we meet our helpers at Murcia Corvera International Airport on the first day of each session and set them down on the last. Budget airlines fly to it from the UK and other countries. For Sima de las Palomas we can meet helpers at the Balisacas-Mar Menor railway station where all trains stop that go to Cartagena from Madrid or Barcelona. It is less easy for us to meet helpers for Cueva Negra who want to arrive by train; we prefer to meet at Cieza railway station those who board at Madrid (not all trains from Madrid to Murcia and Cartagena stop at Cieza, so helpers should check which ones do). Trains from Madrid and Barcelona stop at Murcia city where, however, we are extremely reluctant to try to meet helpers because passengers flooding off the trains can result in missed encounters, for which reason also we refuse to meet helpers at Alicante International Airport (where, moreover, flights are often delayed), so helpers for Session 1 arriving at those destinations should take buses to Murcia city station and there take another bus to Caravaca bus station where we can meet them, provided they phone us to tell us when they expect to arrive there. If helpers for Session 2 choose to land at Alicante International Airport they should try either to take a bus directly to San Javier (there is one from Alicante bus station to Cartagena, though that means first getting to the bus station from the airport), or the bus from Alicante Airport to Murcia city bus station and then the bus services from there to San Javier, Los Alcázares, or Torre Pacheco; we may be able to meet them at those towns provided that they phone us to tell us when they expect to arrive there. Tickets are sold at Alicante Airport for the direct coach service from it to Murcia city bus station. In 2019 there was a coach from Madrid Barajas Airport to Cartagena that stopped at Torre Pacheco, of possible interest for Session 2 should it run again in 2020 (anyone taking it should phone us advising us when they will arrive at Torre Pacheco bus station so we can meet them). There are NO buses from Madrid or Barcelona to Caravaca, so bus travellers from those cities for Session 1 will have to take buses first to Murcia city bus station, and there take another bus to Caravaca bus station (it leaves every hour from 06.10 h to 21.20 h on weekdays) where we could meet them provided that they phone to say when they expect to arrive there.

Your contribution of 50€ (euros) per day for a complete 21-day session (1,050€ altogether) includes board, meals, instruction, local travel from pick-up point and back, daily travel between our base and site, official excursions, and your registration as a MUPANTQUAT member for the year 2020. If you come for two complete sessions your contribution is reduced to 45€ per day (1,890€ altogether). If you come for less than a complete session your contribution is 60€ per day. All former participants contribute at 45€ per day for whatever length of stay. On a case-by-case basis, and provided it does not produce numerical imbalance of helpers within a session, consideration may be given to allowing younger, who can justify impecunious circumstances and are first-time participants, to take part for 45€ per day (450€ altogether) during a 10-day period corresponding either to the first or the second half of either session 1 or session 2 (though such participation implies they will miss half of the 20-day programme of the session). All participants pay for their own air/rail/coach fares to our pick-up/set-down points and for their personal expenses.

Daily routine: we rise at 7 a.m. and after a light breakfast we excavate from 8 a.m. till 2 p.m. with a mid-morning sandwich. A cooked lunch at 3 p.m. is followed by a nap. We sort finds from 5 p.m. till 9 p.m. when we have a hot dinner. In each 3-week period, there are talks and seminars about our work and human evolution, and we also visit local places of interest. The programme is thus based on a 3-week Session (if you stay for a shorter time you’ll miss part of the programme). The normal contribution from helpers staying for a full Session corresponds to 650 euros (€650) a day; covering instruction, board, lodging, and local transportation, or €645 a day when both full sessions are attended (first-time participants staying for less than one full session should contribute €60 a day). To guarantee a place you must send a non-returnable deposit, preferable by May 1st 2020, of €250 (euros) per each 7 days of intended stay. You pay the balance on arrival. You must arrange your own health and personal accident insurance cover beforehand, holiday/travel insurance if desired, and sign an indemnity form on arrival. EU residents should bring the EU card from their country entitling them to public health care in other EU Member States.
Description
Excavation and instruction at Pleistocene Palaeolithic sites with hominid remains:
Cueva Negra: final Early (i.e. Lower) Pleistocene (900,000-300,000 years ago); with evidence of fire, abundant Palaeolithic artefacts (including a hand-axe), and a rich palaeontological assemblage.
Simas de las Palomas: early Late (i.e. Upper) Pleistocene (130,000-40,000 years ago), with abundant Homo neanderthalensis skeletal remains, Mousterian Palaeolithic artefacts and abundant faunal remains.

Periods
Session 1: June 29 – July 20, 2020; Session 2: July 20 – August 10, 2020.

Country
Spain

Locality
Session 1: Cueva Negra del Estrecho del Río Quípar (Caravaca, Murcia, Spain);
Session 2: Sima de las Palomas del Cabezo Gordo (Torre Pacheco, Murcia, Spain)

Travel
June 29, July 20, August 12: On these dates participants are picked up/set down by our staff at Murcia Corvera International Airport or at the railway stations of Ceiza (Session 1) or Balsicas-Mar Menor (Session 2). We ask Session 1 helpers to try to book flights that land at Murcia Corvera Airport before 7 pm and depart after 10 am. Participants wishing to make alternative travel arrangements should consult us beforehand, though it may not be possible to meet you and you may have to make your own way to our bases.

Duration
Two 3-week sessions. In order to get the most out of their stay we strongly recommend participants come for one full session at least.

Age
Minimum 18 years

Qualifications
Previous experience is not essential though preference is given to undergraduates and graduates in appropriate subject areas.

Work
All participants take part in excavation and cleaning and sorting finds, and will receive both practical instruction and talks about our research and about human evolution and Palaeolithic archaeology in the Pleistocene.

Language
English (any knowledge of Spanish is also useful).

Accom.
Bunks in schools with showers etc. Light breakfast, mid-morning sandwich, cooked lunch, cooked evening meal. Vegan, halal, and kosher menus are NOT available. Bring your own sheets and towel.

Contribution
FOR A COMPLETE SESSION: 50 euros per day includes bed, meals, instruction, local travel from pick-up and back; daily travel between our base and site, official excursions. You must pay for your own travel to the pick-up points and personal expenses. FOR TWO COMPLETE SESSIONS: 45 euros per day. FOR LESS THAN 21 days: 60 euros per day. Former helpers who return: 45 euros per day. On a case-by-case basis, and provided it does produce numerical imbalance of helpers within a session, consideration may be given to allowing youngers, who can justify impecunious circumstances and take part for 45 euros during a 10-day period (45 euros per day) corresponding either to the first or the second half of either session 1 or session 2 (though such participation implies they will miss half of the 20-day programme of the session).

Application
There is no application form: just send an email to mjwalke@gmail.com and you MUST attach a 1-page (brief) c.v. as a simple WORD document without inserts or special features, which MUST include (1) your full name, (2) date of birth, (3) nationality and passport number, (4) permanent home address, (5) address for correspondence, (6) contact phone number(s) and email address(es) - until we have received all 6 pieces of information, we do not respond to an enquiry.

We request that you confirm your interest in the programme by sending an email to mjwalke@gmail.com and attach a brief CV by May 1st 2020.

Contact: Hon. Emeritus Professor Michael J. Walker, Murcia University, Biology Faculty; Chair MUPANTQUAT
Emails mjwalke@gmail.com; info@mupantquat.com

Further information: http://www.mupantquat.com

Notes
Each session includes one full-day excursion to other nearby sites of archaeological interest.
At both sites meals are provided only (so as to keep costs down). Strict halal, kasher, and vegan menus cannot be prepared, though salads, fruit, and eggs are always available. Participants with particular medical conditions involving specific intolerance (e.g., to gluten, lactose, shellfish, etc.) should inform us so that our kitchen staff can make due provision.
We issue attendance certificates with number of hours of practical experience and instruction. (Although US college credit is NOT available from us, undergrad US college students often can arrange beforehand with their faculty professors to gain credit for participation by presenting papers about it on return home and we are willing to assist in orientating them during their period on site.)
We regard all of you as field helpers and in 2020 your contribution will include automatic 2020 membership of MUPANTQUAT.

HEALTH, SAFETY, AND INSURANCE
The Murcian Association for the Study of Palaeoanthropology and the Quaternary (MUPANTQUAT) is a non-profit organization that promotes the study and diffusion of the Quaternary and Palaeoanthropology. It is registered with the governmental authorities of the Region of Murcia. Our members are our most valuable asset. Their welfare, health and safety are our main concern. Membership of MUPANTQUAT is given automatically to all participants in our annual Field School and its associated archaeological excavations. All participants are insured by us for accident and third-person liability (required by legislation applying to excavations) during their participation, thanks to a formal agreement of cooperation signed between the University of Murcia and MUPANTQUAT to which the University extends its insurance cover for those aspects under the same terms as those that apply to all students and staff of the university.

Health & Safety Plan for Cueva Negra del Estrecho del Río Quípar and Sima de las Palomas del Cabezo Gordo

Site Locations, Accessibility, Daily Schedule
Cueva Negra is a large rock-shelter at 740 m above sea level, near the village of La Encarnación and 10 km S of the municipality of Caravaca de la Cruz (Murcia, SE Spain; Site: lat 38º03’27.8” N, long -1.9052’53.2” E). Cueva Negra is in an escarpment of Miocene calcarenite on the right bank above the River Quípar where it flows northwards out of the Quípar Gorge (Estrecho del Río Quípar) on its way to join the River Segura. Caravaca town council allows the excavation of Cueva Negra for archaeological research under the direction of a professional archaeologist. Before entering the site you will receive a briefing about our research and in 2020 your contribution will include automatic 2020 membership of MUPANTQUAT.

Some of the equipment you will need includes a folding chair or stool, a large rucksack and adequate footwear for walking on grass, stone and dirt. We have at the field site a large kitchen and dining area which can cater for food allergies (though halal, kosher, and full vegan diets are not available). Helpers must bring towel, sheets, pillowslip. We can use the municipal swimming pool. Transportation between the site and the village is provided by drivers with suitable licenses. Reaching the site involves a 10-minute uphill walk which is undemanding and trainers are adequate footwear for the walk, though once inside the rock-shelter we change into flat-soled light footwear without a tread or pattern to avoid footprints in the sediment. The town council installs a portaloo below the site. Work on site starts at 8 a.m. There is a mid-morning break for...
a sandwich at 11 a.m. Work on site ends about 1.30-2 p.m. when we return to the school to shower before taking for lunch at 3 p.m. followed by a rest until 5 p.m. when lab work and seminars occupy our time until dinner at 9 p.m. Excavation of the 5 m depth of sediment in the rock-shelter takes place in a step-wise fashion. Safety helmets are worn when working in the deepest layers. Excavated sediment is washed over sieves on the terrace in front of the site with water pumped up from the river 40 m below the site.

Simas de las Palomas: This is a natural karstic shaft at 125 m above sea level, in the Permo-Triassic marble hill of Cabezo Gordo, looking over the Mediterranean lagoon of the Mar Menor and the village of Dolores de Pacheco in the municipality of Torre Pacheco (Murcia, SE Spain; Site: lat 37.793508/37°49’59” N, long -1.859436/0°53´45´´W). In July-August, the Torre Pacheco town council allows the MUPANTQUAT Field School to use the Dolores de Pacheco Public School, installing beds in classrooms, and there are separate showers for men and women. Helpers must bring towel, sheets, pilloslip. We can use the municipal swimming pool. We take our meals (breakfast, cooked lunch, cooked dinner) at the nearby municipal Civic Centre which also organises our laundry. The cooks can cater for food allergies (though halal, kosher, and full vegan diets are not available). Transportation between the school and the site is provided by drivers with suitable licenses. The town council installs a portaloo below the site. Work on site starts at 8 a.m. There is a mid-morning break for a sandwich at 11 a.m. Work on site ends about 1.30-2 p.m. when we return to the school to shower before taking lunch at 3 p.m. followed by a rest until 5 p.m. when lab work and seminars occupy our time until dinner at 9 p.m.

Working Safely on our Sites: All participants receive a safety briefing during their first day on site and given information on how to recognise and control potential hazardous situations, and shown must be reported to supervisory staff for appropriate remedy and action to prevent recurrence. Supervisory staff are present on site at all times. The Cueva Negra rock-shelter shades the excavators throughout the morning, though after mid-day, when the sun is high in the sky, participants should use sun-block lotion when undertaking wet-sieving on the terrace in front of the rock-shelter (which is in the shade before mid-day). Because drinking water is available at all times, dehydration is never a problem. Daily use of mosquito repellent is recommended to avoid mild discomfort from bites. Trowels, shovels, buckets, hand-picks, hammers and other tools must be regularly cleaned and handled carefully by the research staff, and used for designated purposes as instructed by the staff who supervise work at all times. The total station and such heavier tools as a pick-axe or sledge-hammer that may be required on occasions are kept away from the edge of the cutting. Participants can bring their own suitable digging equipment, such as trowels. Light work gloves are advisable. Hard hats are provided for wear when excavating deeper levels.

At Cueva Negra the maximum depth of sediment is 5 m down to bedrock. The excavation strategy ensures a safe working environment by following a series of stepped levels in a single open wide cutting. They minimize the risk of section collapse, enable excavation to take place in conditions of natural daylight, and facilitate removal of excavated sediment. Step-ladders assist access from the surface and between levels. Rotation between digging and sieving sediments ensures that participants are not required to kneel for long stretches of time, and short breaks or activity changes are permitted if required by participants. Most heavy lifting is limited to no more than a bucket of soil. Staff supervise wet sieving and give appropriate instruction on use and maintenance of the equipment involved. There are no wild animals that might attack participants. Electrical and gas supplies or hazardous compounds are not present within or near the working area, and no biological, chemical or radioactive contamination has ever been documented in the area. No area of the site encompasses a confined or enclosed space with an oxygen-deficient atmosphere.

At Sima de las Palomas a secure scaffolding tower was constructed within the 18-m deep natural shaft (by the Spanish ULMA engineering company which carries out inspections and makes adjustments when appropriate or necessary). The scaffolding tower is extremely stable because its base is very much wider and broader than its topmost part. The natural shaft is like an upside-down funnel, narrowing upwardly where horizontal scaffolding tubes extend outwards to reach the rock wall until at the top they fill the narrow shaft thereby ensuring the stability and rigidity of the tower. From the hillside access at the mouth of the natural shaft is by a short fixed ladder that takes excavators down to the platform at the top of the scaffolding tower. There is a lower access from the hillside to the base of the tower via a 20- m long horizontal tunnel (made by miners over 100 years ago) through which we bring out, on a wheelbarrow, excavated sediment that is lowered down the shaft in buckets steadied by a pulley on an aerial ropeway. (Presence of two entrances from the hillside should facilitate any possible rescue that ever might be incurred; we have regular contact with the regional speleological training team at Murcia and I have myself taken part in cave rescue operations in England and Australia, having been a caver since my teenage years). Since first it was erected in 1994 the scaffolding has never presented problems and there have never been accidents or incidents affecting the safety of excavators or endangering them.

Field School and associated excavations at Cueva Negra and Sima de las Palomas, which have been run for 30 years without experiencing major health problems or safety incidents. Gastrointestinal affections and others owing to heat (temperatures can reach 40ºC) such as sun-burn may occur from time to time but are easily treated with routine medication. We advise our helpers to bring suitable creams and sun-hats which in any case can be purchased by them in the nearby village where we stay in its public school.

Health Recommendations: Field School Director Prof. Michael Walker, B.M.,B.Ch.,M.A.,D.Phil.,Dipl.Prehist.Haerachaeol.(Oxon) (cell phone +34-620-257104) is an Oxford University medical graduate, with experience in general practice in Australia, and strongly recommends all intending participants to ensure their anti-tetanus vaccination is up to 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. Sun-block, sun-glasses, sun-hats and light clothing are necessary. Dr. Walker maintains a First Aid box with medical supplies that is more comprehensive than the basic First Aid kit on site. Health and safety are of the greatest importance to our annual Field School and associated excavations at Cueva Negra and Sima de las Palomas, which have been run for 30 years without experiencing major health problems or safety incidents. Gastrointestinal affections and others owing to heat (temperatures can reach 40ºC) such as sun-burn may occur from time to time but are easily treated with routine medication. We advise our helpers to bring suitable creams and sun-hats which in any case can be purchased by them in the nearby village where we stay in its public school. Participants who are European Union residents are entitled to free public health care in Spain provided they present the EU Health Card issued in their name in their EU country of residence. Those from outside the E.U. are advised to arrange private medical insurance. There are well-equipped modern public hospitals with 24-hour attention 7 days a week, about 15 minutes' drive from each of our sites: namely, near Cueva Negra, Hospital Comarcal del Noroeste (address: Avenida Miguel Espinosa 1, 30400 Caravaca de la Cruz; tel: +34-94-698-70100), and, near Sima de las Palomas, Hospital General Universitario de Los Arcos del Mar Menor, (address: Paraje Torre Octavio 54, 30739 Pozo Aledo, San Javier, tel: +34-94-656-0050). Furthermore, the city of Murcia has 3 large, modern, university teaching hospitals about an hour's drive from our sites. Should a medical emergency arise it will be dealt with speedily and efficiently. Dr. Walker enjoys a good relationship with various medical practitioners at Murcia, and university colleagues in Murcia University’s Medical Faculty and its several associated teaching hospitals in the administrative Region of Murcia. The health and welfare of Field School participants are of paramount concern.


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New chronological constraints for the Lower Palaeolithic site of Cueva Negra del Estrecho del Rio Quipar, Caravaca de la Cruz, Murcia, Spain:

Preliminary ESR dating of the Late Early Pleistocene fauna.

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890,000 ± 136,000 BP

CSUS-ESR age = 890 ± 136 ka (0.89 ± 0.136 Ma (1.03-0.78 Ma)

Combined uranium-series electron spin resonance dating is being applied currently to a series of fossil herbivore teeth (Equus cf. altidens and Stephanorhinus sp.) from several stratigraphical units of the final Early Pleistocene 5 m-deep sedimentary sequence at the Palaeolithic site of Cueva Negra del Estrecho del Rio Quipar, situated at 740 m above sea level in the Segura drainage basin, in southeastern Spain.

The tooth samples first were pre-screened using high-resolution laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). Interestingly, these uranium-series analyses showed no evidence of uranium leaching from the dental tissues, thus suggesting the suitability of the samples for ESR dating. A mean apparent U-series age of 302±112 ka was derived from all dental tissues sampled (n=78). This must be regarded as a minimum age constraint for these fossil teeth, as uranium uptake may be delayed significantly after death of an organism. Combined U-series and electron spin resonance age results are obtained using both the US (U-series) and CSUS (Closed system U-series) uptake models [1]. The latter typically provides a much higher age constraint for a given sample. For instance, a preliminary initial result points to a CSUS-ESR age of 892±136 ka (ca. 0.89 Ma) for equid tooth CN-1511 from Cueva Negra. The chronology of the site is supported by two independent methods [2].

Magnetic stratigraphical findings imply correlation of the entire sedimentary infilling with the Matuyama Chron, and therefore an inferred age >0.78 Ma.

Biochronological considerations are consistent with a final Early Pleistocene age because the palaeontological assemblage includes both characteristic large fauna (e.g., the cervids Dama cf. valentoniensis and Megaloceros novacchanagensis) and small mammals (Jiménez de Asúa, 2010). The fossils occur throughout a 5 m-deep undisturbed sedimentary sequence which was deposited by intermittent fluviolacustrine alluviation, during a short period of geotectonic time [3] (plausibly MIS-21, ca. 0.87-0.81 Ma), and has provided pollen typical of temperate environmental conditions. Consequently, magnetostratigraphy, biochronology and numerical dating consistently support a late Early Pleistocene age for Cueva Negra, most likely between ca. 1.03 and 0.78 Ma when considering the 1-sigma upper range of the preliminary CSUS-ESR age available for CN-1511. Ongoing combined U-series/ESR dating of other fossil teeth will enable further definition of chronological constraints.

Excavation at Cueva Negra has uncovered a bifacially-flaked Achellean handaxe, a complex industry of small artefacts, including flakes removed by repetitive flaking of small cores and pieces with retouched edges, as well as evidence of combustion in a deep level [4].

There are no hominin fossils (anterior teeth of a small Ursus deningeri, perhaps a female, were mistaken for Neanderthal teeth and wrongly appear as such in some publications). Given the contemporaneity of the Cueva Negra sedimentary deposits with Homo antecessor, dated to ca. 0.95-0.78 Ma [5] at the Gran Dolina in the Sierra de Atapuerca in northern Spain, an intriguing question is whether we over the Palaeolithic assemblage and combustion at Cueva Negra to that hominin species.

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Combustion at the late Early Pleistocene site of Cueva Negra del Estrecho del Río Quipar (Murcia, Spain)

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Control of fire was a hallmark of developing human cognition and must have played a role in the colonisation of colder latitudes. In Europe, the earliest evidence comes from recent work at the site of Cueva Negra del Estrecho del Río Quipar in south-eastern Spain. Charred and calcined bone and thermally altered chert were recovered from a deep, 0.8-million-year-old sedimentary deposit. A combination of analyses indicated that these had been heated to 400–600°C, compatible with burning. Inspection of the sediment and residue suggests that combustion and degradation of the bone. The charcoal present is not Early Palaeolithic use of fire and is significant for human evolution.

Keywords: Early Pleistocene, Palaeolithic, Ash, combustion, cognitive evolution.

Cueva Negra del Estrecho del Río Quipar

>780,000  <990,000

MIS 21: 812,000-867,000

Excavation in situ of calcined bones and chert shattered by thermal shock that had been heated to 500-600°C (ESR, FTIRs, TL).
Cueva Negra del Estrecho del Rio Quípar:
Teeth of small mammals

(occlusal surfaces)

a,b,c,d  *Victoriamys chalinei* (m1)
e,f,g  *Mimomys savini* (m1)
h,i,  *Iberomys huescarensis* (m1)
k  *Stenocranius gregaloides* (m1)
l  *Pliomys episcopalis* (m1)
m  *Erinaceus* cf. *europaeus* (m3)
n  *Prolagus calpensis* (p3)
o  *Apodemus sylvaticus* (M1)

m1 = lower first molar
m3 = lower third molar
p3 = lower third premolar
M1 = upper first molar

A.López Jiménez et al, 2018, Small-mammal indicators of biochronology at Cueva Negra del Estrecho del Rio Quípar (Caravaca de la Cruz, Murcia, SE Spain), *Historical Biology*
doi: 10.1080/08912963.2018.1462804
Above: big arrow marks the cave, small arrow marks nearest chert source. Below left-to-right: geoarchaeologist Dr Diego Angelucci sampling sediment; team excavating; Drs Jean-Luc Schwenninger (OSL-dating specialist), Yanni Gunnell, Marc Calvet and Régis Braucher (cosmogenic nuclide expert) sampling in 2011 - foreground arrow shows burnt layer and upper arrow shows a small erosive feature; far right, Drs. Gary Scott and Lluis Gibert conducting palaeomagnetic research in 2008 which showed the entire depth of sediment to be older than 772,000 years ago (0.772 Ma).
The earliest European Acheulean:
The significance of recent findings for human evolution in Europe

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Cueva Negra del Estrecho del Rio Quipar

El Form, Barranc de la Boella: Valverdón et al. 2014

La Noira: Moncel, 2013

Notechricio: Piperno & Tagliacozzo 2001

Caue de I’Arago: Barsky 2013

Of interest from the standpoint of the technological evolution of Homo in Europe is a Palaeolithic assemblage excavated at Cueva Negra del Estrecho del Rio Quipar, CNEROQ (Cueva Negra del Estrecho del Rio Quipar, Murcia, SE Spain) of a bifacially-flaked “Acheulean” handaxe and abundant small chipped stone artefacts [1,2] from undisturbed [3] sediments of the Matuyama Chron [4] containing evidence of combustion [5], late Early Pleistocene herbivores [2], 400 teeth of extinct arvicolid rodents taxa known in Spain between the Jaramillo Subchron and the Matuyama-Brunhes boundary [6], and temperate arbooreal pollen [7], plausibly from MIS-21 of 0.687-0.812 Ma [8] and, if so, slightly later than a 2-km and bifacially-flaked cleaver [9] from El Form (EF) at Barranc de la Boella in Catalonia (0.67-1.07 Ma) where there also were numerous small chipped stone artefacts.

CNEROQ small chipped stone artefacts resemble those from other Spanish localities: Valparaiso (~0.9 Ma), Oriol (FN3, BL5, ~1.2 Ma) and Atapuerca (Simia del Elefante, ~1.2 Ma; Trinitrera Dolina TDB, ~0.9 Ma where Homo antecessor is the earliest hominin in Spain defined at species level (Simia del Elefante and Oriol remains are assignable only to Homo sp.). Before inheriting a dichotomy between “Acheulean” and “Oldowan” or “expedient” pebble-core industries with regard to those and other early European assemblages lacking handaxes or cleavers, it is prudent to keep in mind that absence of evidence need not imply evidence of absence. At the E-African Penng ST site ~1.4 Ma, elongated, bifacially-flaked “Acheulean” handaxes and cleavers could be tectosaccoid cores for flake-release [8,10,11]. The deeply-typed flint flaking construction feature recalls the conjunctures of handaxes and combustion at Wunderwerk Cave (S.Africa, ~1 Ma) and Gesher Benot Ya’akov (Israel, ~0.78 Ma).

Human cognitive versatility, manual dexterity, and technical ability are reflected at widely-separated later Early Pleistocene sites. It is unlikely they were direct consequences of spreading Homo communities bearing an “Acheulean” techno-complex. Indeed, the European Palaeolithic contains few bifacially-flaked elongated tools before 0.5 Ma. Early ones date from ~0.67-0.66 Ma at Notarchirico in Italy [12,13], ~0.665 Ma at La Noira in the Loire basin [14], and perhaps the high terrace at Abbeville, whereas the Caune de l’Arago level P handaxes, some prepared with a soft hammer [15], and abundant small chipped stone artefacts date from ~0.5 Ma, and lower down a tooth from level Q probably belongs to H. heidelbergensis (a species still represented in higher levels). A handaxe at Atapuerca Simia de los Huesos came from the 0.43 Ma deposit of pre-Neanderthal H. heidelbergensis remains. At Isernia La Pineta (Italy) chipped stone tools, not unlike those at CNEROQ, came from sediments dated to ~0.58 Ma containing a human tooth (the assemblage has been called “Acheulean” without bifaces).

In Europe, no substantive archaeological or palaeoanthropological evidence negates the ascription to any other hominin lineage that which gave rise to Neanderthals of late Early Pleistocene and early Middle Pleistocene assemblages containing bifacially-flaked handaxes and cleavers together with abundant small chipped stone artefacts. An economical working hypothesis is that evolutionary propensities for technical skillfulness requiring manual dexterity and cognitive versatility sufficed to allow archaic humans in Europe, from the late Early Pleistocene onwards, to make different kinds of stone artefacts sometimes, and manipulate aspects of their environment in ways common to Homo in Africa [16,17]. Nevertheless, different “Acheulean” flaking techniques may have appeared in different places at different times, with possible repercussions for the interpretation of later Middle Pleistocene assemblages in Europe [cf. (18)].

Prudence counsels avoidance of time-honoured labels such as “Acheulean” burdened with connotations of “cultural history”. Equally unhelpful is Granado-Cainz’s “Acheulean-evolutionary” scheme which if applied to CNEROQ or EF might regard them, in self-righteous fashion, as either “mode 1 assemblages with incipient ‘mode 2’” or incipient “mode 2 assemblages with a heavy ‘mode 1’legacy, thereby explaining away their particularities rather than explaining these meaningfully. John Shea’s modal scheme [19] based on evolutionary comparison of technological features has the advantage of classifying the components of a Palaeolithic assemblage in clinically aseptic fashion and is applied here to CNEROQ. It may be the most helpful for coming to terms with the earliest European Palaeolithic and banishing unhelpful conjectures about what is or is not significant.

Presented at the 8th Annual Meeting of the European Society for the Study of Human Evolution, Faro, Portugal, Sept. 13-15th, 2018

Cueva Negra del Estrecho del Río Quipar (Caravaca de la Cruz, Murcia, SE Spain): Intrasite analysis of a late Early Pleistocene Palaeolithic palimpsest

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INTRODUCTION

Preliminary analysis indicates a stratigraphical palimpsest at Cueva Negra, a large rockshelter located in the southeast of Spain, near the city of Caravaca de la Cruz at 740 m a.s.l. next to the river Quipar. Contains 5-6m of fluvioclastic sediments deposited intermittently from nearby lake 1 during the Early Pleistocene (0.78-0.99 Ma) according to magnetostratigraphy [2] and biochronology [3]. The lithic assemblage consist of a handaxe and a large number of elements <5 cm, mainly of chert, limestone, quartzite, or quartz. Most excavated material came from nearby outcrops, though a little may derive from 30 km away [4]. Unipolar, bipolar, multipolar, orthogonal and centripetal removals occurred, including repetitive flaking preceding flake-removal. Secondary knapping (mainly unifacial retouch) occurs on flakes and fragments (notched, denticulate, pointed pieces and scrapers); a few retouched pieces are “microbladics” (<3cm) [5].

METHODLOGY

A grid of 1x1m squares allows excavation of their 0.5x0.5m subdivisions in 5x5cm deep splits until sedimentary discontinuity is encountered when a new unit is assigned as a precaution. A stepwise excavation strategy is followed. A total station provides geodetic recording of 3D coordinates and orientation, dip and azimuth of major axes of all lithics >2cm, bones >2cm and stones >2cm. We present preliminary intrasite analyses of lithic data from units II (15m3) and VI (6m3), respectively near the top and bottom of the sequence. Here we use lithic taphonomy, metric measures, tapetum, raw material characteristics, horizontal and vertical distributions, and retouching possibilities. Our aim is to explore spatiotemporal relations taking into account sedimentary facies and accumulation or dispersal of finds. The data-base allows a multidimensional GIS approach to their archaeostratigraphical analysis with spatiotemporal resolution good enough for detection of micropalimpsests and of discrete periods of occupation. Statistical methods used include Gaussian distribution analysis, Wiener-Kolmogorov prediction, Ripley’s K function, nearest-neighbour analysis, Moran’s I for spatial autocorrelation, and Isenhart PCA pattern analysis; multivariate analyses of lithic orientation and dip could throw light on knapping procedures.

RESULTS

- The archaeostratigraphical analysis indicates two populations for the unit III (Layers 3a-3b-3c) and a single population for the unit VI-2.
- Point distribution plots and kernel density indicate clustered patterns also corroborated by the spatial statistics (Ripley’s K function, Moran’s I and Analysis of the nearest neighbor).
- The statistics of the archaeological fabrics places them within planar types, indicating a weak development of the remains and corroborating the integrity of the deposit appreciated through the other analyses.
- There is no differential distribution by sites as you would expect from fluvial movements.
- There seems to be a predominance in the use of certain raw materials, as well as a relationship between cores, nodules and debris concentration.

CONCLUSIONS

Demonstrable differences between assemblages imply distinct sedimentary and occupational episodes, thus in unit II (which is high up) we have identified two occupational horizons, corresponding to distinct sedimentary inputs, demonstrating a palimpsest of discrete activities. By contrast, much lower down, no indications of a palimpsest structure were detectable in unit VI where the oldest Palaeolithic finds come from, though the small area excavated to date cautions against overinterpretation. Nevertheless, statistical data for the two units seem robust, notably as regards grouped patterns, appropriate for sediments showing little alteration, and minor disturbances permitted most lithics to remain lying flat; our observations agree with geoarchaeological evidence of fluvialite sedimentation deposited with low transport energy in a geologically short time.

REFERENCES


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Evidence that fire had affected not only bone fragments but also Palaeolithic artefacts was first recorded in 1961 during excavation of a layer 4.5 m below the top of the sedimentary sequence, 5 m inside from the entrance, and more burn remains have been excavated in the same layer in 2012, 2013 and 2014. Charred bone and numerous white calcined bone fragments include some that show conchocline long-bone spalling typical of circumferential shrinkage after thermal volatilization of organic components at about 300°C to 450°C. These modified bone fragments a nodule was excavated that was heated to between 300°C and 400°C. These modified bone fragments include fused elements of cortical bone and blackened bone with angular, razor-sharp splinters still in place and a split surface showing pock-marked rippling typically seen when heating chert produces ‘pot-lid’ fracture surfaces. An artificially-flaked flake cracked open by ‘thermal shock’ was excavated with charred bone fragments in place. Thermochemical alteration of these two finds cannot have undergone displacement of more than a few cm from the centimetre in size. As a result, a total of over 350 fragments of bones of small and large mammals, birds and tortoise, and about 150 of chert which included abundant small splinters indicative of chert shattering at about 740-800°C (of Ludwik, 1992).


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

Hierarchical (“Levalloisian”-type) removal of prepared flakes of predetermined shape to use as, or retouch into tools

“Acheulian” bifacial fashioning of a core into a “hand-axe” tool
Trace elements were analysed by laser-ablation-ICPMS at the University of Arizona, on chert samples collected by Winston Zack when he was a student there and a field helper here (shown with geologist Dr Tomás Rodríguez Estrella). Whilst a nearby conglomerate outcrop (top right) has chert similar to much chert excavated at Cueva Negra (in circle, bottom right), some chert excavated at the cave resembled samples collected further afield (middle and bottom right), implying that at 0.8 Ma the cave was used by people who roamed up to 30-40 km around it. Presented in 2014 at the 55th Annual Meeting of the Hugo Obermaier Society for Quaternary Research and Archaeology of the Stone Age and published in 2013 (Zack et al., Quartär vol. 60 pp. 7-28, pdf available on request)

Preliminary dating of deep layers at Sima de las Palomas del Cabezo Gordo
(Torre Pacheco, Murcia, Spain)

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Neanderthal skeletons SP92,-96,-97 dating from ~50 ka were embedded in a partly-cemented ebbwals. Conglomerate A, that, along with surrounding sediments, yielded up remains altogether of 10 Neanderthals, Mousterian artifacts, and dates between ~37 and ~65 ka taking account of confidence intervals for U-series, OSL and 4C determinations [1]. Conglomerate A plausibly falls between Heinrich 5 (47 ka) and 6 (61ka) in MIS-4. Below it, Conglomerate B, a ~10-15 cm thick rock-hard bed of heavily-cemented dense silt, completely sealing underlying sediments, in 1999 had given a 239Th/232U estimate on calcite of 56±13-10 ka. Sediments below Conglomerate B yielded up two Neanderthal incisor teeth in 2016 and contain abundant Palaeoliths and palaeontological finds, including burnt bone fragments (maybe domestic rubbish that Neanderthals threw 5 m down the shaft from its mouth). U-series dates (right-hand-side and bottom figures) have been determined of 67.7 (±4.0) 40krypton 40 and 65.07 (±0.03) ka (230Th/234U, 230Th/238U), undertaken at the University of Reading on calcite crystals extracted from a block of Conglomerate B. Sub-samples were extracted from the sample via micro-drilling and then analysed on Thermo-Fisher ICP-QM for 232U, 234Th, and 230Th/232Th and 232Th/238U ratios. Samples were run also on a BeGe Gamma detector where 230Th/232Th and 232Th/238U ratios were determined and combined with MS data. Below Conglomerate B, 5 sediment samples (V1 to V5) taken from the exposed excavation profile were dated by optically stimulated luminescence (OSL) (left-hand-side figures). Samples were prepared and measured at the Luminescence Dating Laboratory of the Research Laboratory for Archaeology and the History of Art at the University of Oxford using instruments manufactured by Risø National Laboratories (Denmark) and Freiberg Instruments (Germany). Palaeodose determinations obtained from sand-sized (180-250 mic) quartz mineral grains, using a single-aliquot regenerative (SAR) dose measurement protocol, gave these preliminary MIS-4/MIS-5 age estimates: 102.1±12.2 ka (X6889; V1), 97.0±4.0 ka (X6890; V2), 125.0±13.6 ka (X6891; V3) and 130.2±11.9 ka (X6892; V4), with uncertainty affecting 90.3±7.3 ka (X6893; V5) for technical reasons. Nevertheless, geologically-speaking the sedimentary deposit was more or less contemporaneous, and the dates accord with the excavated stratigraphical sequence in which the published Neanderthal skeletal remains lay above Conglomerate B that is dated here to the MIS-5a/MIS-4 transition, sealing the deep sedimentary deposit from which stage MIS-5 estimates are offered, and which has yielded up Neanderthal teeth and Mousterian artifacts.

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**INTRODUCCIÓN**

El vaciamiento de Sima de las Palomas del Cabezo Gordo (Dolores de Pacheco, Murcia) demuestra la presencia de Neandertales en el SE peninsular hasta hace entre 60,000 y 40,000 años BP, más probablemente entre 55,000 y 50,000 años BP como se desprende de los resultados de diferentes técnicas de datación sobre fauna (U-series) y el propio sedimento (OSL).

Se han establecido tres fases principales de depósito: El Complejo Superior, una segunda fase o “Conglomerado A” (capa de lamas y grandes piedras de mármol), todas parcialmente cementadas por carbonato cálcico, en el que se han recuperado dos adultos (SP92 y SP96 o “Paloma”) y un infantil (SP97) en conexión anatómica, posible ejemplo de enterramiento. Este conglomerado se apoyaba en el Conglomerado B, de pequeños distos fuertemente cementados, formado entre hace 70 y 62,000 años BP hasta hace entre 56-48,000 años BP. El espesor inferior se corresponde con el MIS-5, y en él se han recuperado hasta la campaña de 2019 tres dientes y un fragmento de mandíbula juvenil neandertal asociado a útiles de tipo lítico muestrero.

**DISCUSIÓN Y CONCLUSIONES**

SP96 conserva el 98% de su esqueleto y su estatura es ligeramente más pequeña que la del resto de neandertales, aunque con menor probabilidad de la endomorfa. Estudios radiográficos y tomográficos del esqueleto y los dientes reafirman su adscripción neandertal. Su cráneo está aplastado y llena un triángulo de mandíbula, pero conserva 22 piezas dentales; su perfil de cráneo está fragmentado pero no disociado. La identificación de fragmentos en su serro dentario (Power et al., 2018; Salazar et al., 2018) implica la ingesta de hidratos de carbono de origen vegetal que pueden explicar la presencia de carillas. Llama la atención la ausencia de lesiones craneales en la muestra del yacimiento. SP97 es un cráneo infantil que está en proceso de estudio; los restos de retratamiento parecen predominar en la muestra. Respecto a las mandíbulas destacar sus configuraciones y angulares anteriores, foramén mentoniano relativamente distal, el espesor cortical o la presencia de espacio retroalveolar en tres de los especímenes.

**MATERIAL Y MÉTODOS**

Como consecuencia del volumen de restos óseos recuperados se expone por primera vez un listado en el que se individualizan cada uno de ellos con su ID, lateralidad (LAT) y Estado de Conservación (CONSERV). La Lateralidad se establece como D (derecha) o I (izquierda), mientras que la Conservación se define como CO (completa) o F (fragmentada). Hay algunos casos en los que se han establecido algunas pautas que defienden la posibilidad de que se hayan quedado parcialmente, sin identificarse la causa. No se han incluido los fragmentos mandibulares (10), maxilares (3) ni dientes aislados (85) de adultos e infantiles a pesar de su fragmentación todos estos restos aportan información, estableciendo el neandertalismo más completo de la mano de TRENHAUS y WALKER (2017). Para su descripción y análisis se han utilizado métodos radiográficos y tomográficos que han permitido delimitar zonas óseas incrustadas en las rocas cementadas y que han sido fundamentales para la limpieza en laboratorio con métodos químicos y vibraciones.

**BIBLIOGRAFÍA**


ESQUELETO APENDICULAR DE LOS NEANDERTALES DE LA SIMA DE LAS PALOMAS DEL CABEZO GORDO (DOLORES DE PACHECO, MURCIA)

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INTRODUCCIÓN

El yacimiento de Sima de las Palomas del Cabezo Gordo (Dolores de Pacheco, Murcia) demuestra la presencia de Neandertales en el SE peninsular hace entre 60.000 y 60.000 años BP, más probablemente entre 55.000 y 50.000 años BP, como se desprende de los resultados de diferentes técnicas de datación sobre fauces (U-series) y el propio sedimento (OIS). El conglomero A, talud de lejos y grandes piedras de milímetro, parcialmente cementadas por carbonato cálcico, se han recuperado dos adultos neandertales (cuello, muslo, cadera, fémur o “Palomas” 1 y 2) y un feto (SP9) en conexión anatómica, posible apoyo de enterramiento. Este conglomero se apoyaba en el Conglomérado B, de pequeños cistos fuertemente cementados, formado entre hace 70 y 82.000 años BP hasta hace 56-60.000 años BP. El pequeño feto se corresponde con el MIS 5, y en él se han recuperado hasta la campaña de 2019, fragmentos de mandíbula juvenil neandertal (150-160.000 años BP) asociados a útiles de tipología muatínica.

MATERIALES Y MÉTODOS

Además de los cuerpos articulados se han recuperado numerosos restos óseos aislados que no se incluyen en los listados: 8 del postcraneal superior, 6 del inferior, 2 cervicales y una costilla. El mayor problema a la hora de afrontar su análisis es su cementación, lo que provoca necesariamente un proceso de limpieza en el laboratorio que incluye lavados químicos con un disolvente ácido etílico y un ciclo de aseos en el que se emplean consolidantes químicos, secado, baño de ódio y restauración mediante barniz. Con el tiempo, esta metodología se ha sustituido por el uso de un electroestático de aire comprimido. Para prevenir la ubicación y dispersión de los restos en el interior de las rocas nos ayudamos de análisis radiográficos y tomográficos. Así se han podido ir analizando los restos postcraneales, es solo de los restos aislados aún más, y lo que se much más interesante, de los restos articulados, lo que ofrece una información privilegiada de sus morfologías. Entre los restos neandertales destaca el feto, que conserva el 40% de su esqueleto. Su estructura es ligeramente más pequeña que la del resto de neandertales, está conservada de la mandíbula, y su ere de completada robusta, como lo demuestra su caja torácica. Su pelvis es la más completa recuperada hasta el momento.

BIBLIOGRAFÍA


Presented at the 21st meeting of the Spanish Physical Anthropology Society, 24th-26th June, 2019, University of Granada.

Archaeology of the Stone Age

Neanderthal attention to the dead at Sima de las Palomas del Cabezo Gordo (Murcia, Spain)


Fleeced knees and elbows, with hands raised up beside the face, of both a young Neanderthal woman (SP06) and a child beneath her (SP07), suggest intentional arrangement before rigor mortis developed. Excavation discovered the skeletons in anatomical connection, their heads to W, lying within cemented rocks 1.5–2 m below the rock overhang above the karstic shaft (sima); there was no burial pit. Beneath the child lay articulated parts of another adult skeleton with an extended elbow (SP02). Near the child were 2 articulated leopard paws. A panninomial interpretation is that a single anthropogenic process had impinged on both human and leopard body parts such that articulation was retained and scattering by scavengers avoided (further determinants perhaps afforded by rocks thrown over the bodies). The aforementioned bones show neither化疗 nor cut-marks. Charred articulated bone ankle bones, 9 Mousterian flint tools, 12 flares and 100 fragments of knapping waste were excavated nearby. A direct U-series date on Neanderthal bone of 54,100±7700 BP (APSILP-1) is in line with excavated material dated at 51,000±2500 (APSILP-5) by U-series and 54,700±1700 BP (S2509) by OSL, as well as a U-series sample from near to SP07 and SP02 of 56,000±13000-17000 (though yet another U-series date and two 14C are likely underestimates; Walker et al., 2012). An intriguing context exists between the 3 nearly-complete articulated skeletons and sparse remains of 6 other Neanderthal individuals known from the site, including some burnt bones (a burnt leopard temporal bone could imply Neanderthal dominance). The skeletons were separated by an almost impenetrable conglomerate bed from underlying sediments containing yet more Mousterian tools and abundant fragments of burnt animal bones.

SP06 (“Paloma”) was a short 15-20 year-old woman, lying on her left side, with skeletal parts connected anatomically (rib cage, shoulder and pelvic girdle, fleeced knees and elbows, hands beside her crushed skull and mandible; altogether >20 different bones exist. Including all major limb bones except for her feet: Walker et al., 2011).

Arranging cadavers before rigor mortis develops implies Mousterian attention paid to fleeced knees and elbows, with hands raised to the face, among Neanderthals (Regnault; Shanidar 7) and anatomically modern humans (Skhul 4 and 7), though knee flexion is more widespread (Delfour, 1993, esp. p. 233). The completeness of SP06 “Paloma” highlights comments both by Anne-Marie Tillet (1982), namely, “La présence du squelette ou d’une grande partie du squelette en connexion n’est pas un phénomène naturel et il ne semble pas indispensable de mettre en évidence une structure artificielle pour envisager un dépeint volontaire du corps…” (cf. Pettitt, 2002), and also by Erik Trinkaus (1980) who remarked, in response to Robert Gorissen’s scepticism about some allegedly intentional Neanderthal burials, that several Neanderthal articulated skeletons “managed to be preserved in highly accessible Upper Pleistocene mci-shelters and caves in near-anatomical position and on-all skeleton-part frequencies identical to those of recent cemetery samples. These partial skeletons retain many fragile elements largely intact, despite the ubiquitous presence of carcass-destroying carnivores…the lack of evidence in most cases for sufficiently rapid natural sedimentation rates to shield them from scavengers, and the absence of comparably preserved nonhuman skeletons in similarly accessible Upper Pleistocene locales” – Trinkaus was referring to whole animal skeletons which our leopard paws are anything but!
“Paloma” SP96, the short adult Neanderthal woman from Sima de las Palomas, in the context of measurements of other Neanderthals and early humans shown in graphs taken from a poster presented at the 78th Congress of the American Association of Physical Anthropologists 2009.

Many studies have focussed on enamel thickness (ET) and dental tissue proportions (DTP) in Neandertals and their comparison with modern humans. Neandertal deciduous and permanent teeth (mainly molars) have been described as having similar enamel volumes to modern humans, albeit deposited over a topographically more complex enamel-dentine junction surface and with larger dentine volumes. Thereby Neandertal teeth show thinner average and relative enamel thicknesses.

- Little quantitative information on anterior teeth and premolars
- Chrono-geographical trends in Neandertals?
- The variation encompassed by Neandertal molars has been reported as less than in modern humans [1].

### MATERIALS AND METHODS

Dating from ca. 55-50 ka cal BP (within outermost limits of ca. 64 and 38 ka cal BP), 300 skeletal fragments from SPCG correspond to 9 Neandertals, and include articulated parts of 3 adult skeletons [2-3].

31 SPCG teeth were examined for ET and DTP (Table 1). Teeth were scanned on a Skyscan 1172 X-ray equipment. We used Noreen v.1.6.6 (Skyscan) to reconstruct the full volumes with an isotropic voxel size ranging from 21 μm for isolated teeth to 36 μm for jaw fragments. After segmentation, 13 linear, surface, and volumetric variables were measured or calculated for describing 3D and 2D DTP and ET, and 3D maps of topographical ET distribution were created.

### RESULTS

On the whole, the SPCG internal tooth structure is in line with the Neandertal range of variation for deciduous and permanent dentition and for all tooth positions (Figure 1). However, the data from SPCG substantially extend the previously known range of variation in Neandertal teeth, as illustrated by the Palomas 51 M1, a tooth showing low enamel, dentine and pulp volumes/surfaces, low enamel-dentine junction surface/length and low 2D and 3D average (AET) and relative (RET) enamel thickness values (Figure 2). Also, a substantial variation is observed within the SPCG sample for some tooth positions, as illustrated by the four C3, or among the P3, with the buktuler teeth showing the lower 2D and 3D ET.

As measured on permanent teeth of other Neandertals [4], the deciduous and permanent upper SPCG incisors show a different signal from the rest of the dentition. For example, the differences between Neandertals and modern humans are lower in the deciduous incisor (+1% difference for 2D AET, and +9% for 2D RET) than in the canine and molars (+6-10% for 2D AET, and +11-15% for 2D RET). Even if functional interpretations have been suggested to explain this pattern already observed on 2D slices, future investigations are needed to unlock the genetically- and/or functionally-related factors sustaining these observations.

On intra-tooth comparisons, SPCG teeth are thin-enamelled on the whole crown, as are other Neandertal teeth (Figure 3). For lower molars, maximum differences between the Neandertal specimens and the recent human condition are shown on the bucco-distal aspect of the hypoconulid, which is particularly thick in the modern specimens. These distinct patterns between Neandertals and modern humans may reflect differences in bite force magnitudes exerted among cuspids during chewing [e.g. 5; and 6 for functional significance of intra-tooth variation in enamel thickness].

The microCT-based survey of the Palomas teeth considerably increases the number of Neandertal specimens known so far for 2D and 3D DTP and ET, particularly of incisors and canines. It also offers the unique opportunity to study the variation of these traits in a constrained chrono-spatial context. As a whole, the Palomas internal tooth structure aligns with the Neandertal range of variation, for the deciduous and permanent dentition and for all tooth positions. Notably, as shown on permanent teeth of other Neandertals, the deciduous and permanent upper incisors from Palomas also show a different signal from the rest of the dentition. However, the Palomas data extend the Neandertal variation known so far for several teeth. It also provides substantial variation within tooth types, suggesting that the intra- and inter-population variation in Neandertal internal dental structure is far from being documented.

### REFERENCES


### ACKNOWLEDGMENTS

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Dental calculus indicates widespread plant use within the Neanderthal dietary niche

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INTRODUCTION

Research has focused on how Neanderthal dietary ecology is linked to their biogeography, population history and eventual demise. The ability of these humans to settle in contrasting habitats implies success at adapting to new conditions. Many isotope and zooarchaeological studies indicate that Neanderthal diet focused on ungulates, with little variation (Richards et al. 2009; Stiner 2013; Willing et al. 2016). However there are difficulties detecting some foods, especially plants (Henry et al. 2015; Salazar-Garcia et al. 2013). To deduce if Neanderthal plant use varied, we explored plant microremains in dental calculus from Neanderthal remains from across their range, and used microremains as a metric to assess if breadth of consumed plants varied across their range.

METHODS

We sampled calculus deposits from 14 Neanderthal teeth from a variety of sites (Table 1). From each site we also collected controls, including cave sediment and dust from the skeletal material, as well as calculi from herbivores and carnivores.

Phytoliths were classified into conventional morphotypes, while starch was classified into types we developed based on shared morphology (Maddux et al. 2005).

We predicted that if Neanderthal plant use was driven by ecology, then the number of consumed types is driven by temperature and free cover. We used an random effect Poisson model to test dietary breadth patterns.

RESULTS

We find no relationship between the number of types and the chronological age or environmental conditions, even when accounting for variation of tree cover, sites, analyst, age, and weight of the sample (x² = 5.14, df = 4, P = 0.27). We obtained the same results even when we accounted for a potentially different age for the Vindija bones (x² = 2.68, df = 4, P = 0.61).

CONCLUSIONS

The number of microremains types is relatively homogenous across regions. There was no evidence to suggest that vegetal dietary breadth was considerably lower in cool regions. Our data suggests that plant-harvesting strategies existed, in both cool and warm regions, providing valuable micro- or macronutrients rather than caloric energy alone.

REFERENCES


ACKNOWLEDGMENTS

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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: Biologist and MUPANTQUAT committee member 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 analysing the digitalised scanned images at Zürich University's Anthropology Institute (top left).
Poster presented in 2012 at the 2nd Annual Meeting of the European Society for the Study of Human Evolution

THE SIMA DE LAS PALOMAS NEANDERTHAL SKELETONS

First steps towards “virtual” reconstruction

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3- Anthropological Institute; University of Zurich

Sima de las Palomas del Cabo de Gata (Torre Pacheco, Murcia, Spain) is a natural limestone shaft in a volcanic landscape. Formed about 150,000-200,000 years ago, the site was occupied by Neanderthals during the Late Middle Palaeolithic Termination of the Last Glacial Maximum. Three Neanderthal individuals dated to 60,000 BP and associated sediments were excavated in 1991. The 1991 excavation included a partial human fossil, a Neanderthal mandible dating to 150,000 years ago. The remains were found in association with Mousterian lithic artifacts (Walker et al., 2000, 2010, 2011a, 2011b, 2012).

Laboratory cleaning and preparation of the skeletal components at Murcia University’s Department of Physical Anthropology have been enhanced by both computer-aided tomography (CAT) imaging and three-dimensional (3D) printing. The 3D printout of the complete skeleton is a step towards “virtual” reconstruction of the remains. The 3D printed models are intended to aid in the understanding of the morphology of the remains and to facilitate their study and analysis.

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Staff and students at Murcia University’s Department of Physical Anthropology, the Murcia Province Archaeology Board, and the Department of Anatomy, Medicine and Surgery, University of Murcia are thanked for their assistance. The authors are grateful to Professor Miguel Navarro for permission to use the Sima de las Palomas del Cabo de Gata site. This work was supported by the European Union’s Seventh Framework Programme (FP7/2007-2013)/ERC Grant Agreement 291486 (South Africa; European Union). The work was also supported by the University of Zurich, the Institute of Human Evolution and Prehistory, and the University of Murcia. We also thank the School of Biological Sciences, University of Palermo, for providing the equipment and access to the facilities at the University of Palermo. The work was also supported by the University of Zurich, the Institute of Human Evolution and Prehistory, and the University of Murcia. We also thank the School of Biological Sciences, University of Palermo, for providing the equipment and access to the facilities at the University of Palermo.

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About 2 m below the overhanging roof of marble rock, three remarkably complete Neanderthal skeletons, of unusually small adult stature, were excavated in the area of a large circular stone structure between 2005 and 2009 by an international research group coordinated by Michael Walker at Murcia University’s School of Physical Anthropology. Very many bones were found in correct anatomical position, which has enabled adult stature to be assessed. CT scanning has shown that the Neanderthals have a larger hand bone, a flatter face, and a larger mouth. However, several bones have undergone some deformation, which is likely post-depositional. It is possible that the three Neanderthal skeletons were covered with large stones to avoid disturbance by leopards and hyenas whose bones also occur in the site. Lifting; excision of deeper levels has found extensive evidence of earlier use of the site in the form of abundant burnt animal bones together with stone tools, and the site may well have been significant to the local Neanderthals.

Initial steps have been taken towards understanding “virtual” reconstruction using CAT methodology with Autodesk software with thanks to collaboration with large stones. Further consideration is being given to the site’s function for Neanderthal adults and children and to the study of its physical properties.
what scientists think happened...

And so we bury him in the curled up position like a baby in its mummy’s tummy so he can be reborn in the next life, and we put the sacred horse bones in with him so he can find his way to the next life, and the sacred big-cat bones to protect him.

what really happened

He’s not breathing and he’s cold. I don’t think he’s going to wake up ever again.

What are we going to do with him? He can’t sleep forever in the middle of the cave. He’s beginning to stink.

Dunno. Maybe bury him in the ground?

He won’t fit in the hole.

Well I’ll put his head in like this, and squash his arms and legs up like this...

While you’re at it, bury his moth-eaten smelly cat-paw toys with him.

It’s not a very big hole.

middle palaeolithic tools

I’d like to see someone dig a bigger hole with these!

Careful, you’re getting the bones from that horse roast we ate yesterday on him.

I’ll cover him up with big rocks.

Neanderthals had an unimaginative down-to-earth approach to everyday life - and death - and lacked mental capability for abstract speculation.

with apologies to cavepeopleandstuff.wordpress.com
Analysis of Hystrix specimens recovered from Sima de las Palomas, Murcia, Spain: Identification and Paleoenvironmental Revision


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Citations:


Results

The results of the PCA revealed that over 80% of the variance between populations can be explained by the first principal component, which mostly relates to size (based on eigenvector loadings). The results show that size is the most important factor in understanding the variation among the Hystrix specimens. The PCA also suggests that there is a trend towards larger specimens in the later samples, which may be indicative of a change in diet or other environmental factors.

Conclusions

- The Sima de las Palomas specimens clearly belong to the genus Hystrix.
- The Hystrix specimens found at Sima de las Palomas are similar to those found in other Neanderthal sites in the Iberian Peninsula, suggesting a shared dietary and ecological strategy.
- The occurrence of Hystrix in the Iberian Peninsula suggests a relatively late expansion of the species, possibly in response to environmental changes that occurred during the late Neanderthal period.

Paleoenvironmental Implications

The discovery of Hystrix at Sima de las Palomas is significant as it provides new insights into the paleoenvironmental conditions of the time. The presence of Hystrix in the Iberian Peninsula suggests a relatively late expansion of the species, possibly in response to environmental changes that occurred during the late Neanderthal period. This could indicate a shift in dietary strategies or a response to changing environmental conditions.
Evidence for cultivated fire during the late Early Paleolithic in southeastern Spain: preliminary results from a micromammal taphonomic approach


Materials and methods
The micromammal assemblage comes from a site of the late Middle to Late Acheulian in the Sierra de Alcaraz, Murcia Province, southeastern Spain. The site, named Los Castaños, was excavated by the University of Murcia and the University of Granada. The micromammal assemblage was recovered from multiple levels, including levels AB, AC, and AD. The assemblage consists of a diverse range of small mammals, including rodents, lagomorphs, and insectivores. The micromammal assemblage was analyzed using standard micromammal taphonomic methods, including fossilization, fragmentation, and preservation. The micromammal assemblage was compared to modern analogs to determine the degree of taphonomic alteration.

Results
An analysis of the micromammal assemblage revealed a significant increase in the abundance of species associated with cultivated fire. This increase is most pronounced in the levels AB and AC, where the proportion of cultivated fire species is highest. The results are consistent with previous studies that have documented the taphonomic imprint of cultivated fire on micromammal assemblages.

Conclusions
The results of this study suggest that cultivated fire was present in the Iberian Peninsula during the late Early Paleolithic. The presence of cultivated fire species indicates that early human groups were able to manipulate and control fire in a way that is consistent with cultural practices. This finding is significant because it provides new insights into the evolution of fire use among early hominins.

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References

Keywords
Micromammals, taphonomy, cultivated fire, early hominins, Iberian Peninsula, late Early Paleolithic.
BRIEFING YOU

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MUPANTQUAT (MURCIAN ASSOCIATION FOR THE STUDY OF PALAEOANTHROPOLOGY AND THE QUATERNARY)
OUR FINDINGS HELP TO FORMULATE PUBLIC POLICY WITH BENEFITS FOR THE TOURIST INDUSTRY AND LOCAL BUSINESS
OUR PROJECT BENEFITS THE EDUCATIONAL COMMUNITY
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OTHER SOURCES OF INCOME

LOOKING AFTER YOU
ACCOMODATION
FOOD
PHYSICAL CONDITIONING/MEDICAL ADVICE
FIELD COMMUNICATIONS, PHONE, INTERNET
FIELD SUPPLIES

READING SUGGESTIONS
NON-FICTION
FICTION
NEANDERTHAL VIDEO

YOUR FIELD SCHOOL DIRECTOR, AS SEEN BY HIMSELF: Michael Walker and his C.V.
RESEARCH PLAN

THE PROJECT AND ITS RESEARCH GOALS

The Project aims at achieving careful recovery, by scientific excavation, of Palaeolithic stone tools, extinct Pleistocene fauna, and even (at Sima de las Palomas) skeletal remains of Neanderthal folk, at two southeastern Spanish sites in the province of Murcia of

**CUEVA NEGRA del Estrecho del Río Quípar** (Black Cave in the River Quípar Gorge or Narrows – “estrecho” means narrow in Spanish), beside La Encarnación, near Caravaca de la Cruz, Murcia (900,000-772,000 years ago), and

**SIMA DE LAS PALOMAS del Cabezo Gordo** (Hole of the Doves on Cabezo Gordo hill – “gordo” means “bulky” or “fat”, and “cabezo” means hill in Spanish, not to be confused with “cabeza” which means head!), overlooking Dolores de Pacheco, near Torre Pacheco, Murcia (130,000-40,000 years ago).

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 which has provided numerous skeletal remains of 15 Neanderthal individuals, and those at the much earlier 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. antecessor* and *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.

**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 SOON: MURCIAN REGIONAL MUSEUM FOR PALEONTOLOGY AND HUMAN EVOLUTION (Museo de Palaeontología y Evolución Humana de la Región de Murcia)**

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 (with luck in 2020). We accompanied our regional Minister for Culture together with its distinguished architect, Federico Soriano, who showed us around the unfinished structure 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 is taking several years to come to fruition, alas, owing to economic problems at national and regional levels. The museum is 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 it.
BACKGROUND AND SIGNIFICANCE OF THE PROJECT

Introduction

Michael Walker writes: I was keen to extend knowledge about Neanderthal presence in southeastern Spain following my appointment there as foundation Professor of Physical Anthropology at Murcia University in 1988 (I am now one of its Honorific Emeritus Professors following my retirement from teaching at age 72 in 2013). I had came to Murcia from Sydney University in Australia, from where I had already carried out research into both the southeastern Spanish Quaternary (e.g. Cuenca & Walker 1986 and refs.; Cuenca, Pomery & Walker, 1986, and refs.) and Neanderthal origins (Habgood & Walker 1986), and supervised Phil Habgood's exhaustive PhD thesis A Morphometric Investigation into the Origin(s) of Anatomically Modern Humans (published in the British Archaeological Reports International Series, BAR S-1176, 2003). (For other references, see Reading Suggesstions.)

CUEVA NEGRA DEL ESTRECHO DEL RÍO QUÍPAR

I lost no time in accepting an offer in 1985 (during a year's sabbatical professorship at Madrid's Autonomous University) 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 possibly Middle Palaeolithic stone tools, and extinct animals such as rhinoceros (Martínez et al., 1989). Apart from that test pit, no further work had been done there.

No sooner did I see the test pit, than I at once recognised 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 the barren landscapes of the Sierra Nevada 200 kilometres to the south (where small glaciers still lingered), and which probably 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 by the River Quípar (a tributary of the River Segura which reaches the Mediterranean Sea 110 kilometres East of our site, though the cave is only 75 kilometres, as the crow flies, from the Mediterranean coast of southern Murcia). Swamps and lakes watered by the Quípar 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 about 30,000 years ago when the last major cold stage of the last ice-age began, and after the middle terrace had stopped accumulating, around 40,000 years ago at the end of the middle stage of the last ice-age. The last ice age ended about 12,000 years ago (when the Holocene period began). It had begun about 80,000 years ago. The last ice age and the preceding temperate conditions of the last interglacial period (Marine Isotope Stage MIS5, which began about 130,000 years ago) together comprise the Late Pleistocene (formerly called the "Upper" Pleistocene). Before 40,000 years ago Neanderthal folk and Middle Palaeolithic "Mousterian" stone tools predominated throughout Europe. It seemed plausible that excavation at Cueva Negra might uncover more of them. The basis of our conjecture, however, was ill-founded. We had not reckoned with the neoeotectonic activity of the Quípar Fault along which the river runs below the cave.

Things turned out to be very different indeed from what originally I had imagined. They have astounded us all. They are very exciting for our understanding of early Palaeolithic archaeology in western Eurasia. To cut a long story short, we know now that the sediments in Cueva Negra were laid down far, far earlier than I had imagined initially. In fact, we know now that they were laid down between 990,000 and 772,000 years ago (0.99-0.772 Ma, million years ago): that is to say, at the end of the Early (or "Lower") Pleistocene, and just before the start of the Middle Pleistocene 772,000 years ago (0.772 Ma). Of course, this was long, long before the last ice age!

In fact six or seven ice ages had come and gone since Cueva Negra was frequented by early humans (plausibly the extinct fossil humans called Homo antecessor and Homo heidelbergensis from which Homo neanderthelensis was descended). Cueva Negra’s Palaeolithic small stone flakes struck from small cores subjected to repetitive ("Levallois-like" or "Levalloisoid") flaking, some of which have edges modified by steep ("Mousterian-like" or "Mousteroid") retouch, are among the oldest of this kind in Europe, and were accompanied by a bifacially-flaked ("Acheulian") hand-axe on a limestone cobble. Furthermore, the sediments contain the oldest evidence of fire at any Palaeolithic site in Europe! In short, the sediment had been laid down in the cave long, long before nearby river terraces came into existence. It was protected from Middle and Late Pleistocene riverine erosion and sedimentation by tectonic uplift of the hillside in which Cueva Negra lies very soon indeed after the sediments inside it had been laid down.

But let me begin at the beginning. The project got under way when I started to excavate Cueva Negra in 1990. Since then I and our MUPANTQUAT team have excavated there during three weeks every year. The excavations are carried out under the auspices of the annual Field School of the Murcian Association for the Study of Palaeoanthropology and the Quaternary, MUPANTQUAT (http://www.mupantquat.com), and co-directed by myself and my Spanish archaeologist friends here at Murcia, Mariano López-Martínez and Dr. María Haber-Urarte who teaches Prehistoric Archaeology at Murcia University. Now let us look at some results.

The prehistoric fauna at Cueva Negra includes remains of a extinct species that include a proboscidean (probably mammoth), rhinoceros, hyaena, bear, monkey (macaque), bison, wild horse, ibex, giant deer, fallow deer, boar, lynx, porcupine, badger, pike, hare, hare, tortoise, snakes, lizards and frogs, and 66 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 have had been extinct 700,000-600,000 years ago, 0.7-0-6 Ma) studied by Murcia University-trained biologist Antonio López Jiménez whom you will probably meet during the 2020 field season: especially, the fossil Arvicoline voles Victoriamys chalinei, Mimomys savini, Stenocranius gregaloides, Terricola arvalidens, Pliomys episcopalis, and other extinct rodents include a fossil, Cricetulus (Allocrietus) bursei, whilst lagomorphs include early forms of rabbit, hare, and also the pika, Prolagus calpensis, that became extinct in Spain during the Middle Pleistocene. In 2018 Antonio’s research was published in the prestigious international palaeontological journal which is Historical Biology (see pages 8 and 12 above). Pollen analysis conducted by Murcia University’s Professor of Plant Evolution José Carrión with his colleagues Drs. Santiago Fernández...
A preliminary age determination of 890,000±136,000 years ago (0.896±0.136 Ma) has been obtained in 2019 at Griffith University (Australia) from a Cueva Negra fossil horse (Equus cf. altidens) tooth by Professor Rainer Grün and Dr. Mathieu Duval, using electron-spin resonance combined with closed-system uranium-series analysis, who are applying the method to several Cueva Negra herbivore teeth (Dr Duval, who is associated to Spain’s National Centre for Human Evolution Research at Burgos, took sediment samples at Cueva Negra in order to be able to take background effects into account). In September 2019 the preliminary determination was published in a poster at the 9th Annual Meeting of the European Society for the Study of Human Evolution held at Liège in Belgium (see pages 8 and 10 above). Sediment samples also were taken at Cueva Negra for palaeomagnetic research by Professor Gary Scott and Dr. Lluis Gibert at the Berkeley Geochronology Center (Lluis now teaches at Barcelona University). In 2009 they published in Nature (see page 8) the results of their research on the magnet stratigraphy by which demonstrates that the entire 5-m-thick Pleistocene sediment at Cueva Negra belongs to the (Matuyama) magnetostratigraph of reverse magnetic polarity, and therefore must predate the palaeomagnetic change at 772,000 years ago (0.772 Ma) to the normal polarity that characterizes the subsequent, present (Brunhes) magnetostratigraph; the change is widely regarded as separating the Early and Middle Pleistocene periods. The fossil rodents belong to extinct species that are common in Spain after the short (Jaramillo subchron) period of normal polarity between 1.07 and 0.99 Ma that interrupted the latter part of the Matuyama chrons. Extinct large mammals at Cueva Negra are being studied by the distinguished palaeontologist Dr. Jan van der Made of Spain’s National Museum of Natural Sciences. One of them is the giant deer Megaloceros novocarthaginiensis that he had identified first at Cueva Victoria near Cartagena in Murcia where palaeomagnetic research corroborated assignation of its rich palaeoentological assemblage to about 1 Ma. On the basis of morphological comparisons and contrasts, Dr. Van der Made deduces that the giant deer Megaloceros novocarthaginiensis at the two Murcia sites was ancestral to the giant deer Megaloceros savini that appears early in the Middle Pleistocene at European sites such as the 700,000-year-old site of Pakefield in England. He also has identified the extinct fallow deer Dama vallonetensis which dates from 900,000 years ago at the cave of Vallonet near Nice. Excavation in the uppermost levels of an extension of our cutting in the cave produced more remains of the giant deer as well as hyaena, bear, and other large mamals, which suggest that the cave was a carnivore lair at the time when the last sediments were laid down there.

The above considerations support placing the 5-metre-deep Cueva Negra sedimentary sequence somewhere between 990,000 and 772,000 years ago. During that time there were two interglacial periods (MIS23 and MIS21), as well as part of the third (MIS19) during the palaeomagnetic change took place 772,000 years ago. Detailed sedimentological analysis by Professor Diego Angelucci (Trento University, Italy) shows the sequence to be homogeneous, with no significant inturruption, implying gradual accumulation by intermittent sedimentation, under conditions of low-energy water-borne transport, caused undoubtedly by sporadical (perhaps seasonal) overflow from a swampy lake (fed by the River Quípar) which therefore must have have been at the same level as the cave. Evidence for that are bones excavated in the sediment of several species of waterfowl, including diving ducks (pochards) that live on lakes, tree pollen indicating temperate garden woodland, and nature of the sediment itself. Uplift of the right side of the gorge raised the cave, with its sedimentary fill, up above the river, now flowing 40 metres below it: neotectonic activity of the Quípar Fault was responsible without doubt. This must have taken place very soon indeed after the sedimentary sequence had formed, otherwise it would have been subject to damaging incursions of water, with erosion of the sedimentary sequence (and/or deposition of later sediments), in consequence of the many climatic oscillations that characterised all of the glacial and interglacial periods after 772,000 years ago. Bones of birds such as jays and woodpigeons which eat acorns hinted at presence of oaks even before their pollen was identified by Professor José Carrion. Yet other birds such as larks and plovers show that there were also wide areas of open country near the site, appropriate for the larger grazing mammals. 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 stepping with stands of pines and other conifers, and finally steep hillsides with crags and mountainsides.

Of the many expert specialists who have helped us, we give particular thanks to Oxford geoarchaeologist Dr. Jean-Luc Schwenninger, distinguished Welsh avian palaeoentologist Anne Eastham, Bordeaux University avian palaeontologist Dr. Anna Rüfa, Taragona’s Rovira i Virgili University herpetoentological palaeontologists Professor Hugues Blain and Dr.Iván Lozano, University of the Basque Country’s palaeontologist Professor Xaber Murullaga, and our MUPANTQUAT member, recently-retired Cartagena Polytechnic University hydrogeologist Professor Tomás Rodríguez Estrella. An up-and-coming generation of young archaeologists is advancing our research, in particular our MUPANTQUAT and 2020 Field School staff members with masters degrees who are Norman Fernández Ruiz, who is developing microstratigraphical analysis based on etched georeferencing of all finds undergoing excavation (see page 15) and Gonzalo Linares Matás who is undertaking taphonomical analyses for his doctoral research at Oxford University (see page 19).

Together with our MUPANTQUAT and Field School staff member, Prof.Dr. Ignacio Martin of Murcia University’s Dept. of Prehistory and Archaeology, who specialises in microscopical use-wear analysis, we are paying detailed attention to several thousand stone artefacts excavated at Cueva Negra. Although the majority are spalls and “waste” fragments of knapping that clearly took place in the cave (attested by flaked cores, together with innumerable, razor-sharp, diminutive spalls less than 2 mm in size), several flakes were struck from small cores subjected to repetitive (“Levallois”-like or “Levalloisoid”) flaking, and some have edges modified by steep (“Mousterian-like” or “Mousteroid”) retouch; moreover, a bifacially-flaked (“Acheulian”) hand-axe on a limestone cobble (see page 14) was excavated deep in the sedimentary sequence. Furthermore, the deepest layers in the sediments contain the oldest evidence of fire at any Palaeolithic site in Europe (see pages 11 and 16). Such Palaeolithic diversity indicates hitherto unrecorded aptitudes of manual dexterity and cognitive versatility at any western European 900-800,000 years ago (see pages 11, 14 and 17).

Most of the Palaeolithic assemblage was made from poor quality chert, quartzite, limestone and marble; cobbles of these were taken to the cave. An important source of raw materials for making the stone artefacts was an outcrop of conglomerate 800 metres (half a mile) away from Cueva Negra. The outcrop is the vestige of a fossil sandle beach of the shore of the Miocene Tethys Sea that, 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 of later Miocene, biocarbonate rock. Our identification of the nearby local rock source was greatly enhanced in 2011 thanks to collaboration at Arizona University, where a young anthropology graduate Winston Zack, who spent three field seasons here, submitted many samples that he took, from both the site itself and chert outcrops in its vicinity, to Dr. Alex Andronikov, at Arizona University’s Lunar and Planetary Sciences Laboratory, who conducted spectroscopic analysis of rare-earth (lanthanoid) trace elements in the cherts (see pages 9 and 18).
At the conglomerate outcrop, we have picked up a typically discarded end-product (a small "Levallois-type" core), left behind after early humans had removed from a pebble here several flint flakes for use as everyday cutting, scraping, or piercing tools. At Cueva Negra in 2016 we excavated another similar, small chert core in a deep level. Both cores demonstrate hierarchical knapping, by which small flakes are removed to prepare a discoidal core such that the angle they make with its major surface favours subsequent (hence "hierarchical") removal from it of a larger flake the shape of which can be controlled and perhaps be regular in form (e.g., oval, triangular, oblong). We have also picked up on the conglomerate outcrop small retouched Palaeolithic implements including a small scraper similar to others excavated at Cueva Negra. Another small discoidal core, this time of limestone, was also found near the mouth of Cueva Negra. Upto now, small discoidal cores (even those with minimal peripheral prepared facetting) had not been found that date from before 400,000 years ago (0.4 Ma) in Europe or the Near East. At Cueva Negra our excavations show that flakes removed from such cores are present in deep layers, from which a small discoidal chert was excavated in 2016. Of special interest at Cueva Negra are finds of 3 possible "soft" hammers (i.e., soft knapping billete) which were used for knapping stone delicately and made from the butts and pedicles of the antlers of deer. Nevertheless, we have excavated several hammer-stones that probably were used much more often.

Who made the stone tools? Neanderthal ancestors ("pre-Neanderthal" humans) roamed Spain and left abundant skeletal remains in the Sierra de Atapuerca near Burgos in northern Spain, notably in a cave called the Sima de los Huesos where they have been dated to ca. 430,000 years ago (0.43 Ma, million years ago). These "pre-Neanderthal" humans are called often in the Sierra de Atapuerca near Burgos in northern Spain, notably in a cave called the Sima de los Huesos where they have been dated to ca. 430,000 years ago (0.43 Ma, million years ago). These "pre-Neanderthal" humans are called often Homo heidelbergensis in honour of a human mandible found in Germany near Heidelberg which dates from 600,000 years ago (0.6 Ma). Even older human remains come from the Gran Dolina site at Atapuerca where they date from 900,000-800,000 years ago and have been assigned to Homo antecessor which may be phylogenetically close to the split between evolutionary lineages that eventually led, respectively, to Homo neanderthalensis and Homo sapiens. Even older human remains come from the Sima del Elefante at Atapueca, dating from perhaps 1,200,000 years ago (1.2 Ma), which unfortunately have few diagnostic features but because of their great antiquity could perhaps be comparable, at least in time, to Homo erectus in Africa and Asia. Although we once thought Cueva Negra had pre-Neanderthal teeth we now know them to belong to a female bear of the extinct species Ursus deningeri that lived about 800,000 years ago (0.8 Ma), thanks to helpful advice given to us by Vienna University’s Professor Geront Rabeder who is an eminent authority on fossil bears. Moreover, our excavation in 2019 uncovered a lateral third incisor of a bear. We therefore conclude that as yet Cueva Negra has not yielded any clearly human fossils.

Since 2004 we have excavated some splendid flakes produced by the aforementioned “hierarchical” core-reduction technique that involves repetitive centripetal ("Levalloisian-type") removal of flakes from cores that had undergone previous knapping to prepare them into the shape of small discs. Some of these flakes came from layers close to where in 2003 we had excavated an "Acheulian" hand-axe - a bifacially-flaked tool that had been made by removing flakes from both faces of an almond-shaped core that once had been a large limestone cobble or pebble. The two core-reduction methods have opposite outcomes (see pages 18 and also 14). The first produces flakes, to be used as tools, by "hierarchically" controlled removal of flakes of triangular, oval or oblong shapes (sometimes the cutting or scraping edge is strengthened by secondary knapping or "retouch"), until the core becomes too small for removal of any more flakes and is discarded as waste. By contrast, the second fashions a tool out of a large core by removing flakes from it by peripheral knapping until an almond-shape object with sharp edges results.

It is extremely interesting to be able to show presence of two 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 3x1 metre area explored a consistent Palaeolithic living surface with remnants of stone knapping, broken bone fragments, and other débris. It lay at an intermediate depth with regard to the levels that previously had been defined at the site, but probably it had not been not encountered during earlier campaigns that went deeper because where those excavations took place there had been a massive slab of rock that had fallen from the roof during the Pleistocene and occupied most of the area behind where we had identified the living surface in 2001. In 2003 we began to excavate an adjacent 3x1 metre area, culminating in the astonishing excavation of an “Acheulian” hand-axe, and the excavation in 2004 of well-made chert flakes that had been produced by repetitive centripetal (“Levalloisian-type”) flaking of small prepared chert cores confirmed the extent of an important activity area.

I have attempted to get to grips with the implications of those findings for understanding cognitive evolution in the genus Homo 850,000 years ago at Cueva Negra in a major article (see page 8: Carrión & Walker, 2019) and 2 books (Palaeolithic Pioneers, Palgrave Macmillan, 2017: Early Evolution of Human Memory, Palgrave Macmillan, 2017):

A rigorous “modal” approach to ordering stone tools has been published by Professor John Shea of New York University at Stony Brook (John J. Shea, 2016, Stone tools in human evolution, Cambridge University Press, and 2013 “Lithic Modes A–I: A new framework for describing global-scale variation in stone tool technology...” Journal of Archaeological Method and Theory vol. 20, pages 151-186). This has led us to try to apply to Cueva Negra his scheme for interpreting stone artefacts (see page 14 above), and to abandon terms such as “Acheulian”, “Levalloisian” and “Mousterian” altogether, see our article (we can send you a pdf) in the journal Human...
Neither the complexity nor the antiquity of our Cueva Negra tool-kit need come as a complete surprise. In Africa, the “Levalloisian-type” core-reduction technique goes back to 1,400,000 years ago (see: de La Torre et al., 2003, *Journal of Human Evolution* vol. 44, pages 203-224). In Africa, reduction of stone to fashion hand-axes goes back as far as 1,760,000 years ago (1.76 Ma). 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”-like core discs, 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 (1.5 Ma).

Our 2011 season’s astounding discovery of traces of ancient fire lying deeply within the cave sediments (see pages 11 and 16) 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. The 2012, 2013, 2014, 2015, 2016, 2017, 2018 and 2019 field seasons have extended our excavation here that now has exposed 4.5 m² of the surface affected by combustion - Further extension will be undertaken in the 2020 season, but it is extremely slow work because 4.5 m of overburden have to be excavated and wet-sieved down to 2 mm in order to reveal 1 m² of the combusted sediment. Tending fire allowed our ancestors to keep warm at night and wild animals at bay, but also 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 before 1,000,000 years ago, 1 Ma). We have found many fragments of charred and even calcined bone. Some calcined long-bone fragments had undergone length-wise splintering which occurs when heat has volatilised the organic components of bone which then shrinks and cracks open. We also have excavated 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.

The temperature of the fire had reached 550°C, according to spectrometry analyses of the burnt bone and chert, which have been undertaken by Dr Daniel Richter using thermoluminescence methods at Leipzig’s Max-Planck Institute for Evolutionary Anthropology, Dr Anne Skinner at Boston’s Williams College using electron spin resonance methods, and Dr Francesco Berna at Simon Fraser University using Fourier-transform infra-red techniques with which he carried out postdoctoral research at Boston University under the guidance of the distinguished geoarchaeologist Professor Paul Goldberg who developed the method there. Dr Berna’s friend, geoarchaeologist Dr Diego Angelucci of the Italian University of Trento, has studied the micromorphology of thin sections he took at Cueva Negra with his PhD student Daniela Anesin. Our Murcian MUPANTQUAT scientists also have conducted relevant research. Chemical and mineral research consistent with combustion of sediment was undertaken by geology Professor Tomás Rodríguez-Estrella of the Cartagena Polytechnic University, and microscopical inspection of chert from the layer indicates exposure to heat according to archaeological use-wear specialist Dr. Ignacio Marín-Lerma of Murcia University. Dr. Sara Rhodes is a Canadian who has excavated with us in various field seasons and in 2019 obtained her doctorate at Tübingen University; she carried out a taphonomical study of burnt and unburnt small mammal bones at Cueva Negra using scanning electron microscopy and energy dispersive spectrometry together with the distinguished Spanish taphonomist Dr Yolanda Fernández-Jalvo of the CSIC at Madrid, and demonstrated that the dark colour of several burnt bones owes to charring and not to mineral staining: for their important results, see pages 16 and 30, also Rhodes et al., 2016, *Journal of Archaeological Science Reports* 9, pp.427-436).

**SIMA DE LAS PALOMAS DEL CABEZO GORDO**

A ncient researcher into Neanderthal skeletal fossils who was principally responsible for it is Professor Erik Trinkaus of the Washington University of St. Louis, Missouri (USA). He came to Murcia to study the Sima de las Palomas remains twice in 2007 and returned in January 2011. An important morphological study of “Paloma” (SP96) resulted, which was published in the *Proceedings of the National Academy of Sciences of the USA* (see page 9 above). Thanks to his tireless work, the scholarly monograph was published in 2017 which is The People of Palomas.
Over 100 years ago, miners on the hill of Cabezo Gordo were attracted by a vein of the iron ore magnetite which made a dark stain in the pale-grey marble rock of the hillside. Hundreds of millions of years ago 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 speleologist 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 speleologist 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 realising what it was. Being a careful person and a nature-lover, he saved it and showed it to us. On cleaning, it turned out to belong to the face of a Neanderthal: parts of the upper and lower jaws fused together. Neanderthals lived in Europe between 200,000 and 40,000 years ago, and are assigned to the extinct Neanderthal humans 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 what used to be the "Dr M. Crusafont" Palaeontological Institute and Museum at Sabadell (a satellite city of Barcelona), and our helpers, sifted through rubble which the iron-miners who entered the natural cave 100 years before 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 had become largely filled up with rubble which had fallen down the shaft, and had to be removed y us. 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 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 ago, 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 leopards that maybe climbed down into 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 almost had 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 perhaps 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 covering 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 coarse sediment to pass through it afterwards and accumulate behind it. However, quite deeply down in this uppermost sediment there was an irregular lens of sediment with signs of combustion (we called it the “upper grey layer”), perhaps indicating that human activity took place there before “conglomerate A” had formed completely.

The uppermost sediment contained 65 dispersed fragments of bones and teeth of Neanderthal adults and children, as well as Middle Palaeolithic (Mousterian) 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 accelerater radiocarbon (AMS-^{14}C) determination of 34,450±600 BP (OxA-10666) that corresponds to a true age that could lie anywhere within the range 40,950-37,622 BP, after calibration and application of 95% confidence limits; moreover, the burnt fragment could have become cemented to the Neanderthal jaw fragment hundreds or even thousands of years after the Neanderthal had died. The determination was made by Professor Tom Higham of the Oxford Radiocarbon Accelerator Unit at Oxford University’s Research Laboratory for Archaeology and the History of Art (RLAHA). Subsequently, on burnt rabbit bone found in the “upper grey layer” not far away, Dr Higham obtained a determination of 35,030±270 BP (OxA-15423) which corresponds to a true age that could lie anywhere within the range 40,986-38,850 BP, after calibration and application of 95% confidence limits - the importance of this qualification will become clear below.

Dr Jean-Luc Schwenninger, who heads RLAHA’s Optical Sediment Luminescence Dating Unit, came to Sima de las Palomas where he bored a horizontal core of sediment into the “upper grey layer”, and when the hermetically-sealed core was opened at Oxford the aforementioned burnt rabbit bone was found inside that gave OxA-15423. Dr Schwenninger also had measured the background irradiation on site using RLAHA’s portable gamma-ray spectrometer, allowing him to calibrate the OSL measurement accurately. Quartz grains in the sediment gave the OSL determination of 45,700±4700 BP (X2509) which could correspond to a true age anywhere within the 95% confidence limits of 64,000-44,300 BP. A uranium-series determination of 43,800±750 (APSLP4) obtained on a fragment of unburnt animal bone by Professor Alistair Pike (then at Bristol University’s Archaeology Department, now at Southampton University), could correspond to a true age anywhere within the 95% confidence limits of 45,300-42,300 BP. X2509 and APSLP4 were excavated at positions that were near to each other, both horizontally and vertically, and their 95% confidence intervals overlap at 45,000-44,000 BP.
From "conglomerate A" Professor Pike obtained uranium-series (User) determinations of 54,100±3850 years ago (APSLP-1) and 51,000±1250 (APSLP-6) on fragments, respectively, of unburnt bone from the female Neanderthal skeleton SP-96 ("Paloma") and unburnt animal bone; their respective 95% confidence limits are 61,600-46,600 and 53,500-48,500 years ago. They may be compared to a uranium-series date obtained by Professor Joan-Antoni Sánchez-Cabeza, at the Physics Department of the Autonomous University of Barcelona, from an aragonite crystal from "conglomerate B" (which underlies "conglomerate A") of 56,000 +13000/-10000 years ago (M-5). Preliminary ESR-User dates by Dr Stuart Black of Reading University show that conglomerate B dates from 67,700±0.405 and 65,070±0.038 years ago. OSL estimates from sediment the deep layers below it have been obtained by Oxford University's Dr. Schwenninger are of 102,100±12,000 years ago (X6889; V1), 97,000±9,000 (X6890; V2), 125,000 ±13,600 (X6891; V3) and 130,002 ±11,900 (X6892; V4), with noteworthy uncertainty applying a fifth estimate of 90,300±7,300 (X6893; V5); the samples were taken for him by his then research student Marianna Sontag-Gonzalez who spent some time with us during our 2015 field season (she is now undertaking doctoral research at Wollongong University in Australia). The new dating was the subject of a poster (see page 19) presented in 2017 at the 7th annual meeting of the European Society for the Study of Human Evolution held at Leiden in the Netherlands. (Before excavation commenced, aragonite crystals extracted from the sedimentary column a few metres above the floor of the Main Chamber had given Dr. Sánchez-Cabeza uranium-series estimates of 124,000 and 118,000 years ago.)

Discussion about dating of the articulated Neanderthal skeletons can be found in our 2017 book The People of Palomas, and in scientific journals (see: Walker et al., 2012, Quaternary International vol.259 pages 7-21, and Carrión et al., 2019, Quaternary Science Reviews vol. 217, pages 194-216). A salient aspect of the determinations given above is that there is some overlap between several of the 95% confidence limits that apply to them. One minimal inference is that skeletons embedded in "conglomerate A" belong to a period around 55,000-50,000 years ago when their Neanderthal owners had died. A second one is that Neanderthal teeth and bone fragments continued to be incorporated into later sediment before 40,000 years ago, though it is open to dispute whether this incorporation took place in two successive periods or during one period of uncertain length. Whereas it is not beyond the bounds of possibility that Neanderthals were still able to enter the cave at the time the "upper grey layer" was forming (perhaps ca. 45,000-44,000 years ago) and may even have contributed to it by tending fire near the lower part of "conglomerate A", Neanderthal teeth and bone fragments and Mousterian artefacts in sediment deposited above the "upper grey layer" must have come in from the hillside because some were excavated close to the rock roof up to which the sediments had accumulated, leaving no space for humans to have crawled in. In other words, those remains correspond to a way in which the Neanderthals were behaving outside the cave, presumably one that involved a different manner of dealing with dead bodies. Professor José Carrión has found pollen in these final sediments of trees and shrubs (e.g., Maytenus and Withania) that never could have withstood the bitterly cold ice-age conditions that blighted Europe just after 39,900 years ago, which implies the sediments had filled up the space completely by 40,000 years ago. The absence of Upper Palaeolithic artefacts in them is consistent with such antiquity.

From about 2 metres, below the top entrance that gives access to both our upper excavation cutting and the main shaft of Sima de las Palomas, between 2005 and 2010 we excavated 3 articulated Neanderthal skeletons, two of which had skulls and attached mandibles. The very first find, which had been made back in 1991 by Juan Carlos Blanco Gago, had come from a similar position, and as it was of a mandible in anatomical connexion with the maxillae (SP1), it is clear that in fact there may have been at least 3 Neanderthal individuals here, or maybe 4. The articulated skeletal remains of 3 Neanderthals (2 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 still undergoing careful albeit slow cleaning, with removal of breccia adhering to the bones by use of vibroscalpels ("air-scribe") powered by compressed air in our new laboratory at Torre Pacheco.

The Neanderthal skeletal remains were excavated a few centimetres above where Juan Carlos had plucked out the Neanderthal skull fragment (SP1) of the two maxillary bones and teeth cemented to the jawbone, when he descended on his abseil rope in 1991. Our skeleton SP96 is 85% complete and belonged to a young woman whom we now call "Paloma". Below her was a child's skeleton (SP97). Both have well-preserved skulls and mandibles. Both had flexed elbows with the hands raised against the face; this implies intervention by other individuals before rigor mortis set in. Near the child there were two articulated leopard paws, 3 horse astragali, and waste flakes and fragments of knapped chert. Underneath those two skeletons lay that of another adult (SP92); perhaps SP1 had been its skull (this is debatable). None of the three skeletons showed signs of burning (the only signs of burning were on horse bone). Maybe the bodies were covered up with large stones, perhaps to stop hyaenas and leopards from scavenging. Our Neanderthal skeletons are of worldwide importance because almost 40 years had passed since the last time a European Neanderthal was excavated with its skeleton articulated in anatomical connexion (at St-Césaire in France). The female skeleton SP96 was the subject of an article published in June 2011 in the Proceedings of the National Academy of Sciences of the USA (PNAS) (see page 9).

The total number of separate bone fragments and teeth from Sima de las Palomas identified to date amounts to over 300 separate skeletal items (see pages 20 and 21 above). The number of mandibles (or fragments of them) that belong to different Neanderthal individuals is 10 (3 were found in mine rubble; 3 come from the uppermost part of our excavation; 2 belong to excavated articulated skeletons SP96 and SP97, another is SP1, and part of yet another mandible was excavated in 2017 in deeper sediments that are older than 90,000 years ago. If SP1 and SP92 do not belong together, then at least 11 individuals are represented by bones. Analysis of the many loose Neanderthal teeth from the site implies existence of another 4 individuals. Therefore 15 is the minimum number, to date, of Neanderthal individuals from Sima de las Palomas.
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 Pääbo, the internationally renowned geneticist who conducts research into both mitochondrial and nuclear DNA from Neanderthal bones, who is the Director of the ultra-modern, 7-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 Pääbo 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 PhD student, Oxford University Biology graduate, now 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. Pääbo 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 had any Neanderthal DNA been identified. In 2008 Dr. Pääbo sent over another of his PhD students, now 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. Pääbo’s team at Leipzig still failed to detect either nuclear DNA or mitochondrial DNA. Because they could not detect contamination by modern DNA either, Dr. Pääbo thought that the field methodology was adequate but that over many thousands of years high ambient summer temperatures at the site had destroyed Neanderthal DNA.

However, in 2018 Professor Ron Pinhasi of the University of Vienna visited us and using a new non-destructive technique that he is developing he extracted from Sima de las Palomas loose Neanderthal teeth material that he is analysing for DNA in his laboratory, and we await his results. In 2019 we learnt during the annual meeting, held at the Belgian city of Liège, of the European Society for the Study of Human Evolution, that the Leipzig laboratory, now co-ordinated by Dr. Matthias Meyer, is re-analysing fragments of samples still at Leipzig that had defied previous attempts to find DNA, and he is now trying to identify DNA in remaining samples from Sima de las Palomas that had been kept in store at Leipzig. We await the results of his research eagerly.

Another distinguished collaborator among them is Barcelona University anthropologist Professor Alejandro Martínez Pérez-Hóezho took casts of all of the teeth from Sima de las Palomas which help him to conduct research into attrition and wear on the crown; his research on microstructures on the sides of tooth crowns throws light on the kinds of foods eaten by prehistoric folk. 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 2014, and in the Subdepartment of Physical Anthropology at Murcia by Dr. Josefina Zapata who has photographed curious lesions in two teeth. 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 travelling microscanner (brought in a very large van), accompanied by its specialist engineer Nick Corps, which gave excellent resolution with the microscanner. "As a microscope," Bayle said, "it is the loupe of the future." She said she was gripped by the Sima de las Palomas teeth, on which detailed research is continuing. Two students of Professor Trinkaus also have assisted in our research.

In 2017 with a view to developing in collaboration with us a new research project involving the Sima de las Palomas Neanderthal fossils. We discussed the matter together in September 2019 during the 9th annual meeting of the European Society for the Study of Human Evolution held at Liège in Belgium. In 2019 some of our Neanderthal fossils were illustrated in science-journalist Michael Gross’ article “Mingling with Neandertals” in Current Biology volume 29, pages R105-R107, 2019.

We have had visits from Professor Amanda Henry (now at Leiden University) and her colleagues at the Max Planck Institute for Evolutionary Anthropology at Leipzig where she and Drs. Domingo Carlos Salazar-García, Robert Power and Cynthia Spiteri have studied the plant component of Neanderthal diets, by investigating phytoliths in dental calculus and other biological residues, and detected their presence in Sima de las Palomas dental plaque (see on page 23 a poster shown at the 2016 ESHE meeting, see also Salazar-Garcia et al., 2013, Quaternary International vol. 318 pages 3-18, and Power et al., 2018, Journal of Human Evolution vol. 119, pages 27-41).

In 2019, Dr. Christoph Wissing of Tübingen University’s Biogeology Institute in Germany visited our sites and took samples from fossil herbivore teeth for stable-isotope biogeochemical research. He gave a well-attended lecture organised by MUPANTQUAT at Murcia’s elegant Royal Casino, and in October I gave a talk about both our sites at Tübingen University, kindly invited by Professor Hervé Bocherens and Christoph who head the stable-isotope research project there. We look forward to the progress of their collaborative project with us in 2020. (Coinciding with Christoph’s visit was another by Alexandra Schuh from Leipzig’s Max Planck Institute for Evolutionary Anthropology who came to study the Sima de las Palomas Neandertals.)

Research is being conducted on a possibility of prehistoric biological residues on a dozen large, sub-spherical. river cobbles that must have been carried up to Sima de las Palomas by the Neandertals, no doubt from eraswhile fluviatile gravels on the plain below, perhaps in order to grind or pound foodstuffs, or maybe mineral pigments. The river cobbles were excavated in the deep layers of 130,000-90,000 years ago that we are excavating (well below where the articulated Neanderthal skeletons were uncovered). The cobbles were examined at the Leipzig Institute for Evolutionary Anthropology by Dr. Cynthia Spiteri and our long-timem Australian colleague Dr. Birgitta Stephenson who is both an anthropologist and a pharmacologist (and has developed histochemical techniques that have led to identification of biological residues on prehistoric Australian Aboriginal grinding stones). Alas, to date no light has been thrown on the use to which the stones was put by our Neandertals, either by their study or that of our Murcia University MUPANTQUAT member Dr. Ignacio Martín who has inspected the cobbles using confocal microscopy with Raman spectrometry. The mystery continues...

The deep levels are extremely interesting because they demonstrate that the site was used for domestic purposes, such as cooking, over a long period of time indeed. Presumably, food was prepared on the hillside beside the mouth of the shaft into which refuse was allowed to fall. From the deep layers come mandibular fragments of two porcupines (Hystrix javanica) that have been studied (see page 29 above) by Sara Rhodes who excavated with us in 2011, 2012 and 2013 when she was studying for her Master’s degree at Toronto University. Before finishing her German government scholarship to do research for the PhD she has been awarded in 2019 at Tübingen University."
CONCLUDING REMARKS

In 2011 we began to carry out CAT scanning of the excavated Neanderthal skeletons (see pages 26-27 above) 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 there in autumn 2012 for a few weeks to acquaint himself with the IT technique. Professor Zollikofer and Dr. Ponce de León returned to Murcia in 2015 and undertook further scanning here in order to resolve one or two anatomical details.

Animal remains from Sima de las Palomas include teeth of rhino and hyaena, and bones and teeth of leopard, possibly cave lion, aurochs, wild horse, ibex, red deer, lynx, porcupine, fox, badger, hare, tortoise and perhaps wolf. Between 1992 and 2019 several hundred classifiable skeletal elements have been found and thousands of bone splinters and fragments many of which still have adherent cemented breccia. Of particular interest are leopard remains. In 1991 a leopard skull and other bones of Panthera pardus had been found, exposed in a low position in the breccia column, by the same spelaeologist who found the first SP1 Neanderthal fossil. In 2006 the bones in articular connexion of two leopard paws were excavated near to the skull of Neanderthal child SP97. Those bones were unburnt, though also nearby there were horse ankle bones that had undergone burning; in one case found in articulation with the distal end of a tibia. Three struck chert or flint flakes and one hundred tiny knapping spalls were excavated near the lowest of the three Neanderthal articulated skeletons, SP92. The undisturbed nature of skeletons SP96, SP97 and SP92/SP1 suggests that scavengers never disturbed them and that the articulated leopard paws may have been cut off by Neanderthals themselves. SP96 and SP97 were found with their knees drawn up and elbows flexed with their hands against their faces, suggesting arrangement before rigor mortis had set in (this position has been documented at some other sites with Mousterian artefacts). Perhaps the bodies were covered with stones to deter scavengers form interfering with them. We may never know.

Even before we were able to build a 20-metre high scaffolding tower and take aragonite crystals for uranium-series 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 Pomeroy 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 age of the remains although 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 ice age.

The new estimates from Drs Schwenninger and Black mentioned above indicate that much of the sedimentary fill began to accumulate about 130,000 years ago, at the onset of marine isotope stage MIS5.

The Mousterian industry from the site includes some 1,200 classified pieces, from retouched scrapers to simple struck flakes and cores (and there are over 3,000 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). Excavation in the deep layers has provided several retouched Mousterian implements and many fragments and spalls, as well as part of what may be a bone artefact (maybe a “slicker” for preparing skins; in French a “illisor”) – bone artefacts are very uncommon in Mousterian assemblages, though the piece in question is still undergoing detailed analysis and may not even be a tool at all. Many artefacts are on good quality flint (and even occasionally jasper), but there are also rock-crystal implements and others of marble, limestone, siliceous metamorphous 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 palaeoecological 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 calcrite 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 hypothetical 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 were not particularly informative and we ceased work there.
For a palaeoanthropologist, having two important 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 opened up fascinating possibilities for comparing and contrasting how they utilised the different environments and the natural resources they offered, namely the upland environment of Cueva Negra and the milder coastal one, even in the ice-age, of Sima de las Palomas.

RESEARCH GOALS AND HOW WE ACHIEVE THEM

Our 2020 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 sediments containing faunal and Neanderthal human remains, and Middle Palaeolithic Mousterian artefacts, which form 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.


Every morning we all walk up a steep, narrow foot-path 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 area, we wear safety helmets (hard hats) and when unnecessary we may use safety harnesses belayed from the tower. 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 (1994-2010) was that the upper part of the sediment does, indeed, contain remains of Neanderthal folk and associated Mousterian artefacts and food remains, from between 60 and 40,000 years ago. Latterly, (2011-2019) we have recognised that also there are deeper layers still, which we have now dated to between 130,000 and 90,000 years ago, and these also contain Mousterian artefacts and Neanderthal skeletal remains, as well as abundant animal bones. We yet do not know how far down in these layers the remains will continue to be present.

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. antecessor and H. heidelbergensis) carried out more day-to-day activities in areas that were well-lit by daylight, 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 2011-2019 excavation 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 or trainers 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 pimmsolls 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 pimmsolls 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, utilised natural resources in different ice-age environments. Our Cueva Negra and Sima de las Palomas researchers have therefore set up a new body:

MUPANTQUAT (MURCIAN ASSOCIATION FOR THE STUDY OF PALAEOANTHROPOLOGY AND THE QUATERNARY)
(Associación Murciana para el Estudio de la Paleoantropología y el Cuaternario)
http://www.mupantquat.com
Email: <mupantquat@gmail.com>

The MUPANTQUAT 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 Quipar and Sima de las Palomas del Cabezo Gordo, and to disseminate information to the general public about palaeoanthropology and the Quaternary. In 2013 an Agreement of Collaboration with Murcia University was signed. Subsequently we have signed agreements of collaboration with the town councils of Caravaca de la Cruz and Torre Pacheco, the Murcian Regional Society of Geographers, the Murcian Cultural Association for Palaeontology, and the Society for Historical Studies of Quipar, Argos and Alharabe Valleys. The Chair of MUPANTQUAT is Murcia University’s Michael Walker, and his co-directors of the Field School and excavations are archaeologist Mariano López Martínez (Secretary, MUPANTQUAT) and archaeologist and palaeoanthropologist Dr. María Haber Uriarte (Vice-Chair, MUPANTQUAT) who teaches at Murcia University. The committee of MUPANTQUAT has as its Treasurer biologist Antonio López Jiménez who undertakes research on the Cueva Negra rodent fossils. Other MUPANTQUAT committee members are Palaeolithic archaeologist Dr. Ignacio Martín Lema who teaches at Murcia University and carries out microscopical use-wear analysis of stone artefacts; biologist Jon Ortega Rodrígáñez who undertakes Neanderthal skeletal restoration and reconstruction, biologists Azucena Avilés Fernández, Ángel Buitrago López and Hugo Cano Fernández, audiovisual communications expert Jesús García Torres, archaeologists Norman Fernández Ruiz who conducts precise microstratigraphical analysis during excavation, Gonzalo Linares Mata’s who conducts taphonomical research, and Consuelo Caravaca Guerrero. Our association has several other university teachers and high-school teachers among its membership; they include Murcia University’s palaeopalynologists Professor José Carrón. Dr. Santiago Fernández and Dr. Juan Ochando, analytical chemist Dr. Juan Luis Polo, palaeontologist Dr. Gregorio Romero, and Cartagena Polytechnic University geologists and engineers Drs Tomás Rodríguez Estrella, Ignacio Manteca and José María Cano. Several of these members give talks at our annual Field School or help with research on material from the excavations.

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:

EDUCATIONAL TALKS, GUIDED VISITS, etc.

In 2019 MUPANTQUAT organised the well-attended lecture "Neanderthals versus early modern humans: Similar diet, different mobility pattern" given at Murcia’s Real Casino on March 18th by Dr. Christoph Wissing, of the University of Tübingen’s Biology Institute, about paleoenvironmental analysis based on studies of stable isotopes, during his visit to Murcia when he sampled herbivore teeth from Cueva Negra and Sima de las Palomas for stable-isotope analysis. As in previous years, MUPANTQUAT has held meetings at which members presented aspects of their research, and they also have given lectures invited by other organisations in the region, and presented posters about it at national and international scientific meetings. Photographs of Sima de las Palomas Neanderthals appeared in the article "Mingling with Neanderthals" written by the Oxford-based science journalist Michael Gross which was published in Current Biology volume 29, pages R105-R107, 2019.

In 2018 MUPANTQUAT organised the extremely well-attended public lecture “Human history through ancient DNA genomics” delivered on May 10th by Professor Ron Pinhasi of the University of Vienna at the elegant nineteenth-century Real Casino in the centre of Murcia which has a lecture theatre that holds over 100 people; Dr. Pinhasi is investigating the DNA of our Sima de las Palomas Neanderthals, which was the object of his visit. On September 30th and October 1st 2017 MUPANTQUAT organised an extremely well-attended seminar comprising 8 public lectures, with free admittance, in the 100-seat lecture room of the grand Real Casino in Murcia city centre, which were opened by the distinguished palaeontologist and pioneer of the hominin research at Atapuerca Dr. Emiliano Aguirre Lerma who teaches at Murcia University and carries out microscopic use-wear analysis of stone artefacts; biologist Jon Ortega Rodrígáñez who undertakes Neanderthal skeletal restoration and reconstruction, biologists Azucena Avilés Fernández, Ángel Buitrago López and Hugo Cano Fernández, audiovisual communications expert Jesús García Torres, archaeologists Norman Fernández Ruiz who conducts precise microstratigraphical analysis during excavation, Gonzalo Linares Mata’s who conducts taphonomical research, and Consuelo Caravaca Guerrero. Our association has several other university teachers and high-school teachers among its membership; they include Murcia University’s palaeopalynologists Professor José Carrón. Dr. Santiago Fernández and Dr. Juan Ochando, analytical chemist Dr. Juan Luis Polo, palaeontologist Dr. Gregorio Romero, and Cartagena Polytechnic University geologists and engineers Drs Tomás Rodríguez Estrella, Ignacio Manteca and José María Cano. Several of these members give talks at our annual Field School or help with research on material from the excavations.
In 2015 MUPANTQUAT hosted a 3-day series of public lectures (with free attendance), on October 5th, 6th and 7th, on Human Evolution in Spain (La Evolución Humana en España) that our local savings bank’s beneficial foundation (Fundación Caja-Murcia) sponsored at its 300-seat lecture theatre in Murcia city centre, which had an astonishing attendance with people having to sit in the aisles! Our speakers were the palaeoneurologist Dr. Emilio Bruner (of the Centro Nacional de la Investigación de la Evolución Humana at Burgos, i.e. Spain’s National Centre for Human Evolution Research), the prehistorian Professor José Ramos (of Cadiz University) who excavates on both sides of the Gibraltar Strait at Palaeolithic sites, and the editor, author, and documentary film-maker about archaeology and human evolution, Manuel Pimentel, whose “Arqueomanía” production team has produced several series for Spanish national television and filmed us on several occasions, including at Cueva Negra in 2018 once again, so we presented him with a certificate designating “Arqueomanía” an Honorary Member of our association (this was at his request after we had proposed conferring honorary membership on him.

Our MUPANTQUAT members regularly give talks at high schools and organize guided excursions to our sites for students. Each year there is an Open Day when the general public can visit Cueva Negra during the period of our annual excavation as well as a public presentation of our findings at the Caravaca town hall, and a similar Open Day at Sima de las Palomas before the excavation campaign finishes with a similar public presentation at Torre Pacheco town hall. The Open Days draw large crowds, especially at Sima de las Palomas where over a thousand visitors have appeared on some occasions! In 2017 Torre Pacheco town council asked us to organize an additional Open Day at Sima de las Palomas, which MUPANTQUAT hosted on March 26th and drew another large crowd of visitors, and the additional Spring open event was repeated in 2018 and 2019 and will be repeated on March 1st 2020.

MUPANTQUAT offers a reduced subscription to student members and we encourage undergraduate participation in the field and lab. Our Field School helps become members of the Association during the year when they participate and some of them have renewed their annual subscription. MUPANTQUAT has several university teachers and high-school teachers among its membership. Several of them give talks about their work or research to members and invited guests (often quite a lot, especially undergraduates!).

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 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 unalike 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.

**BOOK PUBLISHED IN 2017:**
The People of Palomas: The Neandertals from the Sima de las Palomas del Cabezo Gordo, Southeastern Spain. (Edited by Erik Trinkaus and Michael J.Walker; published by Texas A&M University Press, College Station, Texas, ISBN 9781623494803). This is a dense scientific book which makes for heavy reading. It is aimed at a specialised scientific readership. Most chapters are coauthored by our research colleagues or MUPANTQUAT members.

**BOOK IN PRESS**
In 2020 the English text of a semi-popular book about our three decades of work at Cueva Negra and Sima de las Palomas will be in press with the archaeological publisher Archaeopress at Oxford with the title Fire Down Below! Neanderthals Back From The Dead! Unlocking The Amazing Secrets Of Two Caves In Spain. The Spanish edition of the book will go to press here at Murcia and the publisher here will be our own association MUPANTQUAT. Our book takes a “hands-on” approach, emphasising, 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 another erudite weighty tome, only of interest to a specialised readership of scholars and academics (such learned volumes go unread as often as not and soon become remaindered as discount “bargain” offers).

**VARIA**
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 – thus, in August 2018 M.J. Walker was interviewed live on Spanish national television and commented on the new discovery of a Neanderthal tooth made during the 2018 fieldwork season at Sima de las Palomas. In July 2018 the documentary film producer Manuel Pimentel interviewed M.J. Walker at Cueva Negra; his ARQUEOMANÍA production team is well-known in Spain and has produced several series for Spanish national television and filmed our excavations on several occasions.

In January 2013 PBS-NOVA showed a TV documentary in English “Decoding Neandertals” in which we took part in 2012 (try http://video.pbs.org/video/2323758207); and in 2011 ARTE-XENIUS showed a TV documentary “Neandertaler” 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 4-part series, ARQUEOMANÍA DOSSIERES was shown in October 2013 in which we have taken part 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 CUARTOCRÈNCIENE, and sold to the international channel of Spanish national television (TVE) whose HISPASAT satellite beams to a wide audience in Latin America (the viewers increased over ten times). In June 2011 Spanish national television (TVE “Tres-14”) put out an hour-long programme (“Lo que nos une a los neandertales”) 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 special issue on the Neanderthals has been the object of visits by radio and TV crews, and every year since 1994 broadcasts have been 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 attended 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 that 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 several 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).

OUTREACH: LECTURES, PRESENTATIONS AND EXHIBITIONS ABOUT OUR RESEARCH

Please skip over this section because it is utterly boring and included only because some funding institutions and organisations that need to know about our outreach can access relevant data:

Over the years M.J. Walker and other members of MUPANTQUAT have given many lectures and presentations about these decades of field research at Cueva Negra and Sima de las Palomas, and on scientific matters arising from it. Most of them are given on behalf of the research team and its many collaborators, who often are coauthors of publications on which they are based or that emanate from them. In October M.J. Walker gave a lecture at Tübingen University about Cueva Negra and Sima de las Palomas, kindly invited by Professor Hervé Bocherens and Dr. Christoph Wissig who undertake stable-isotope palaeoenvironmental research at the Tübingen University Geobiology Institute. In 2019 M.J. Walker presented the poster (see p. 11) about the geophysical dating of Cueva Negra at the 9th annual meeting held in September at Liège, Belgium, of the European Society for the Study of Human Evolution, and in June our Vice-President María Haber presented two posters (see pp. 21-22) at the 21st meeting of the Spanish Physical Anthropology Society held at the University of Granada.

In 2018 M.J. Walker was involved in several presentations of our work at international or national scientific gatherings, occasionally as sole author, more often on behalf of several MUPANTQUAT coauthors. M.J. Walker gave a talk at 60th Annual Meeting, Tarragona, 3rd-7th of April, 2018, Hugo Obermaier Society for Quaternary Research and Archaeology of the Stone Age held at the Tarragona’s Rovira i Virgili University (“Neanderthal activities between ~130 ka and ~40 ka at Sima de las Palomas del Cabezo Gordo (Tore Pacheco, Murcia, Spain)”) (1). On June 20th M.J. Walker gave the same talk in the Oxford University Institute of Archaeology Palaeolithic and Quaternary (PalQuat) Seminar Series. Just before that, M.J. Walker gave several presentations at the University of Paris Sorbonne Conference at the 18th UISPP World Congress, Paris, June 4-9 2018 – XVIII Congrès UISPP, Paris, 4-9 juin 2018 “Exploring the World’s Prehistory”, namely, “Chronological and behavioural discontinuities at the Neanderthal site of Sima de las Palomas del Cabezo Gordo (Torre Pacheco, Murcia, Spain)” (2), “Artifact or advantageous accident? The problem of combustion at the late Early Pleistocene site of Cueva Negra del Estrecho del Río Quipar (Caravaca de la Cruz, Murcia, Spain)” (3), “Late Early Pleistocene age of the hand-axe and Palaeolithic assemblage at Cueva Negra del Estrecho del Río Quipar (Caravaca de la Cruz, Murcia, Spain)” (4), “Raw-material variety and Palaeolithic variability ca. 0.8 Ma at Cueva Negra del Estrecho del Río Quipar (Caravaca de la Cruz, Murcia, Spain)” (5). On September 13th-15th 2018 two posters (see pp. 15-16) were presented at the 8th Annual Meeting of the European Society for the Study of Human Evolution ESHE held at the University of the Algarve, at Faro, Portugal, namely, “The earliest European Acheulian: The significance of recent findings for human evolution in Europe” (M.J. Walker) (6) and “Cueva Negra del Estrecho del Río Quipar (Caravaca de la Cruz, Murcia, Spain): Intrasite analysis of a late Early Pleistocene Palaeolithic palimpsest.” (F.Nernández, M.Haber, M.López, M.J.Walker) (7), in October M.J. Walker was invited to address the symposium Jornadas de Prehistoricidad held at Jerez de la Frontera the 5th-6th October, organised by the Asociación de Amigos del Archivo de Jerez and University of Cadiz, on “Nuevas perspectivas paleoantropológicas en la Región de Murcia: La Cueva Negra del Estrecho del Río Quipar en Caravaca de la Cruz y la Sima de las Palomas del Cabezo Gordo en Torre Pacheco” (8).

In September 2017 M.J.Walker attended the 7th Annual Meeting at Leiden in Holland of the European Society for the Study of Human Evolution and presented two posters (one is on p. 20 above). Other presentations he gave in 2017 were “La evolución del cerebro en Homo desde hace dos millones de años,” in MUPANTQUAT seminar Evolución del Cerebro Humana y la Arqueología Cognitiva, Real Casino de Murcia, Murcia, Sept. 30-Oct. 1, 2017 (publication in preparation); June 17, “Nuevas perspectivas sobre la Paleoantropología en la Región de Murcia: La Cueva Negra del Estrecho del Río Quipar” (UISPP, Union des Sciences Préhistoriques et Protohistoriques, Paris, 2018), pp. 1333-1334. The full version has just been published in English under the title “Drawing neuroscience and palaeoanthropology together. Palaeoneurophysiology and cognitive evolution in Pleistocene Homo.” A full version has just been published in English under the title “Drawing neuroscience and palaeoanthropology together. Palaeoneurophysiology and cognitive evolution in Early Pleistocene Homo: Biological and palaeoanthropological perspectives on the role of ‘haptic’ working memory in the evolution of procedural long-term memory”, pp. 177-193 in: Ribo F. (Ed.), Homenaje al Dr. José Gibert Cibils. Una vida dedicada a la ciencia y a los primeros europeos (Publicaciones de la Diputación de Granada, Granada, Spain). At the Oxford Unravelling the Palaeolithic conference M.J.Walker gave 3 talks: “Stone tools and the origins and evolution of early human technology: affordances, constraints, memory,” “Observational learning and evolution of the human brain; aspects of neurophysiology and neuroanatomy; mirror neuron circuitry and shared attention; the relation between working memory and long-term procedural memory; prospective memory and multitasking”, and “On wishful thinking: Did Palaeolithic humans customarily engage in symbolic behaviour before 40,000 years ago?”
M.J. Walker had been busy in 2014, having been invited to present “Stone procurement and transport at the late Early Pleistocene site of Cueva Negra del Estrecho del Rio Quipar (Murcia, SE Spain)” at the 55th Annual Meeting of the Hugo Obermaier Society for Quaternary Research and Archaeology of the Stone Age held in April at the Braunschweig Landesmuseum in Germany. In early June M.J. Walker was Benjamin Meaker Visiting Professor at Bristol University, thanks to a joint research project with Bristol’s Professor of Archaeology Kate Robson.Brown, and gave both a public lecture “Archaeological excavations at Sima de las Palomas del Cabezo Gordo (Murcia, SE Spain) and palaeoanthropological research into its 50,000 year-old Neanderthal remains” and a research seminar on “Cognitive evolution in Pleistocene Homo: Biological and palaeoanthropological perspectives on the role of “haptic” working memory in the evolution of long-term procedural memory”. During his UK visit he was invited to talk about our Murcian research at Archaeology Departments at other English universities and lectured on “Pre-Neanderthals and Neanderthals: 25 years of research at Cueva Negra del Estrecho del Rio Quipar and Sima de las Palomas del Cabezo Gordo (Murcia, Spain)”. Later that month, at Florence University in Italy, he presented the talk “Evidence of fire etc...” at 4th Annual Meeting of the European Society for the Study of Human Evolution. In October he was in Italy again, and spoke on “Palaeoneurophysiology and cognitive evolution in Pleistocene Homo: Biological and palaeoanthropological perspectives on the role of “haptic” working memory in the evolution of long-term procedural memory” at the meeting What Made Us Human held at the Fondazione Ettore Majorana e Centro di Cultura Scientifica, at Erice in Sicily. While there he was invited to give a version of that talk in November as a seminar to the Journal Club of the Psychology Faculty at the University of the Balearic Islands at Palma on Majorca.

After the 2014 excavation campaign M.J. Walker was on the road once more. Early September saw Spain host the XVII Congress of the International Union of Prehistoric and Protohistoric Sciences (held in a different country every five years). It was held at Burgos University with visits to the nearby Atapuerca sites for the 1,800 Congress participants. M.J.Walker gave two invited talks, namely, “Hominin activities ~0.8 Ma at Cueva Negra del Estrecho del Rio Quipar (Caravaca, Murcia, SE Spain): Fire, technological diversity, environmental exploitation” and “Evidence of fire at the late Early Pleistocene Palaeolithic and hominin site of Cueva Negra del Estrecho del Rio Quipar (Caravaca, Murcia, SE Spain)” and also presented the poster “Neanderthal attention to the dead at Sima de las Palomas del Cabezo Gordo (Murcia, Spain)”. Later that month, at Florence University in Italy, he presented the talk “Evidence of fire etc...” at 4th Annual Meeting of the European Society for the Study of Human Evolution. In October he was in Italy again, and spoke on “Palaeoneurophysiology and cognitive evolution in Pleistocene Homo: Biological and palaeoanthropological perspectives on the role of “haptic” working memory in the evolution of long-term procedural memory” at the meeting What Made Us Human held at the Fondazione Ettore Majorana e Centro di Cultura Scientifica, at Erice in Sicily. While there he was invited to give a version of that talk in November as a seminar to the Journal Club of the Psychology Faculty at the University of the Balearic Islands at Palma on Majorca.

In April 2013 M.J. Walker gave an invited talk about “The Sima de las Palomas Neanderthals” at the 55th Annual Meeting of the Hugo Obermaier Society for Quaternary Research and Archaeology of the Stone Age, held in Vienna’s imposing Natural History Museum, and in April 2012 he addressed the 54th Annual Meeting on “Fossil Man in SE Spain” at the Toulouse Natural History Museum. In June 2011 he 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 he 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 he gave a lecture about Cueva Negra during the 16th Annual Meeting of the European Association of Archaeologists at the Hague in a Session on Palaeolithic Chronologies which he co-organised with Oxford’s Professor Tom Higham. In September 2009 M.J.Walker gave a lecture about Sima de las Palomas during the 15th Annual Meeting of the European Association of Archaeologists at Riva del Garda, Italy, in a Session on the Middle and Upper Palaeolithic. In 2009 he also gave lectures about both our sites at the Society of Antiquaries of London of which he is a Fellow, and also at meetings in Spain, namely, at a symposium organised 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 he gave public lectures about the sites at the Murcian Archaeological Museum in a series of lectures organised 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 Gilbert.

Several 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 (2000-08/OC/TA1A) 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 Abarrán. Currently the updated exhibition is displayed near to Sima de las Palomas in the town of Torre Pacheco at its historic Casa Consistorial. 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

In April 2007 M.J.Walker gave a talk about our research at Sima de las Palomas and Cueva Negra at the invitation of Professor Svante Paabo, 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 M.J.Walker had first got to know at a meeting in Madrid back in 1993. The talk was well received and Svante Paabo 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 PhD student, Oxford University Biology graduate (now 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. 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 M.J.Walker 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 he 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 he gave lectures on that work at Barcelona University and at the Jaime I University at Castellón. He gave an invited lecture about our research at Oxford University’s Institute of Archaeology in November 2005, a public lecture at the San Sebastián Science Museum in October 2003, and in February 2002 another at Murcia’s Science and Water Resources Museum. In 2001 he 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, he gave a major lecture about human evolution during the Middle and earlier Upper Pleistocene, at an international scientific meeting in Valencia organised 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 Brauer of Hamburg University, as well as Mexican and Spanish scientists, including our late lamented friend who was 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 M.J.Walker organised at Murcia. Our late lamented friend, Professor Tobias, who was 75 in 2000, flew to Murcia from South Africa to take part, where he was Emeritus Professor of the Witwatersrand University at Johannesburg and directed its Palaeoanthropology Research Group. He was 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 Quipar, on which M.J.Walker gave an address called “Neanderthal Man in Murcia; Cueva Negra del Estrecho del Río Quipar 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 Gilbert Clots 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 palaeoanthropology: 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 M.J.Walker 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 he 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 Archeology and Palaeoanthropology in September at which other leading Spanish scientists took part (Professors Emiliano Aguirre, Daniel Turbón, José Gilbert and José Camilo Cela Conde) as well as other junior researchers (Drs Francis Ribot and Miguel Martinez Andreu, Ms Florentina Sánchez, and Mr. José Isaac Servano). In 1995 M.J.Walker 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. He 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 Palaeoanthropology at Orce (two lectures and an exhibition, and he also guided an excursion to Sima de las Palomas). He also organised an exhibition at Murcia University’s “Biological Week” and a guided excursion to Sima de las Palomas for Murcia University’s Summer School on “Archaeology of Death”. In 1994 he gave several lectures on the two sites in England during his 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, M.J.Walker, María Haber or Mariano López (codirectors of our Field School and excavations) have addressed the Murcia regional government’s annual symposium held at Murcia at which archaeological field research during the previous twelve months is presented in public.

**SOME ENGLISH PUBLICATIONS ABOUT OUR SITES AND RESEARCH:**

Since 2005 very important developments in research at both our sites have led to such significant changes in the way we understand them that most articles with publication dates earlier than 2008 are so out-of-date as to be now misleading in many respects (they can be found in M.J.Walker’s C.V. at the end of BRIEFCING YOU); they have been wholly superseded by later publications of which the following are the main ones that we recommend (pdfs of most of these are available on request to us):

2020 (forthcoming, Archaeopress, Oxford), Fire Down Below! Neanderthals Back From The Dead! Unlocking The Amazing Secrets Of Two Caves In Spain.

2019 J.S.Carrón, M.J.Walker, “Background to Neanderthal presence in Western Mediterranean Europe.” Quaternary Science Reviews 217: 7-44 (ISSN: 0277-3791). (Refers to Cueva Negra.)


You can access the two ACyT articles in one on-line edition at the Asociación Española de Científicos web-site: 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=).


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 SCHEDULED ACTIVITIES

Each 3-week period will begin on Day 1 (arrival day, Monday) with rendez-vous at Murcia-Corvera International Airport (we start and finish on Fridays because there are not only connecting flights from the U.S.A, Australia or elsewhere (there often are no connecting Iberia (Air Nostrum) flights on Saturdays and Sundays), but also there are numerous low budget flights from the U.K. and some other E.U. countries.

The following airlines fly to the newly opened (on 15th January 2019) Murcia-Corvera International Airport: Ryanair (from Stansted, Luton, Dublin, Birmingham, Manchester, Glasgow-Prestwick, Bournemouth, E.Middles, Leeds-Bradford, Frankfurt and Eindhoven), Easyjet (from Gatwick, Bristol and Newcastle), Jet2, TUI, FlyBelgium, Norwegiabn, Aerlingus, Voloteas, Virgin, Vueling, and IberiaExpress. Airline timetables should be available in March 2019. (The old airport of Murcia-San Javier has been closed.)

If helpers so wish, Day 2 (Tuesday) 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 Riba, 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 (Tuesday). Each group will therefore be asked how it prefers to have Day 2 and its wishes will be respected.

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Days 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 (Wednesday, Thursday, Friday, Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday) are all potential working days, though we shall most certainly have some excursions and rest days among them! We usually 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. 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 (Monday) is departure day (when there may be a chance in the morning for helpers at Cueva Negra to visit Sima de las Palomas; provided their flight back home from Murcia-Corvera 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., the co-directors of excavation and senior site helpers from Murcia will not usually be available on such R&R days.

**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 accommodation
- **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

We have followed a similar schedule at excavations in southeastern Spain for many years 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 50 years.

**DAY-BY-DAY FIELD SCHOOL PROGRAMME AND TEAM DEVELOPMENT**

Team development is assisted by daily sessions after lunch when resumés 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 M.J. Walker gives 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 he absent himself after 20.00 hours, M.J. Walker has tried to be present with the group up to and during dinner and quite often has joined with all our members after dinner in visiting local entertainments. Increasingly administrative and representational obligations intrude on my time, when 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. We 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 an wine.

The following gives a rough day-by-day idea of what the Field School programme will look like, though the final day-by-day programme will probably be finalised only in May or June 2020:

(Morning activities: 07.30-14.00 hours; afternoon activities: 17.30-21.00 hours)

**SESSION 1:** June 29th -July 20th  Cueva Negra excavation and Caravaca field base

**Day 1 (Monday)**
- Afternoon/evening: Airport pick-up and transport to Caravaca field base.

**Day 2**
- Morning: open and set up the Cueva Negra excavation.
- Afternoon: talk about The “Cueva Negra-Sima de las Palomas” Research Project (Michael Walker).

**Day 3**
- Morning: excavation at Cueva Negra; instruction in field techniques, wet-sieving, recording finds, etc.
- Afternoon: showing of animated film “Cueva Negra”; instruction in field lab; sorting finds.

**Day 4**
- Morning: excavation at Cueva Negra; instruction in field techniques, wet-sieving, recording finds, etc.
- Afternoon: free time (no afternoon lab).

**Day 5**
- Morning: excavation at Cueva Negra; visit to Roman temple remains at nearby La Encarnación.
Afternoon: sorting finds in lab; talk-seminar on Human Evolution from the Pliocene to the Middle Pleistocene (Michael Walker).

Day 6
Morning: excavation at Cueva Negra; visit to chert outcrop 800 m from the cave.
Afternoon: sorting finds in lab; brief talk about excavating the Caravaca Camino del Molino Neolithic burial chamber with 1,300 crania and skeletal remains (María Haber and Mariano López).

Day 7
Morning: excavation at Cueva Negra; anyone wanting to go shopping at Caravaca’s open market can be taken into town at 10.30 am.
Afternoon: free time (no afternoon lab); optional excursion to collect chert at Collado del Gitanito outcrop.

Day 8
Morning: excavation at Cueva Negra.
Afternoon: seminar Faunal Remains and Biostratigraphy at Cueva Negra (Antonio López, Gonzalo Linares, Ángel Buitrago); sorting finds in lab.

Day 9
Excursion to see prehistoric rock paintings; picnic lunch at Nerpio swimming pool (no morning excavation, no afternoon lab).

Day 10
Morning: excavation at Cueva Negra.
Afternoon: workshop on Flint-knapping (Mariano López Martínez); sorting finds in lab.

Day 11
Morning: excavation at Cueva Negra.
Afternoon: seminar on The Evolution of the Human Brain and of the Early and Middle Pâlaeolithic (Michael Walker); sorting finds in lab.

Day 12
Morning: excavation at Cueva Negra.
Afternoon: seminar on Use-wear Analysis and Stone Tools (Dr gnacio Martín); sorting finds in lab.

Day 13
Morning: excavation at Cueva Negra.
Afternoon: inspection of flint tools from Cueva Negra at Caravaca Municipal Archaeological Museum; sorting finds in lab.

Day 14 (Sunday, July 12)
Morning: Open Day at Cueva Negra. Free time for helpers, because only Field School staff are involved with our Spanish visitors.
Afternoon: free time (no afternoon lab).

Day 15
Morning: excavation at Cueva Negra.
Afternoon: seminar on Pollen Analysis and Quaternary Climate (José Carrón and Santiago Fernández); sorting finds in lab.

Day 16
Morning: excavation at Cueva Negra.
Afternoon: seminar on Use-wear Analysis and Stone Tools (Ignacio Martín); sorting finds in lab.

Day 17
Free time all day (no morning excavation; no afternoon lab)

Day 18
Morning: excavation at Cueva Negra; Press Conference Meet-the-Media at Cueva Negra.
Afternoon: seminar on Fire and Flint at Cueva Negra (Michael Walker); sorting finds in lab.

Day 19
Morning: excavation at Cueva Negra.
Afternoon: sorting finds in lab.

Day 20
Morning: excavation at Cueva Negra.
Afternoon: sorting finds in lab.

Day 21
Close up excavation and field lab; take down and pack up equipment and finds; Open Round Table of staff and helpers to evaluate Session 1.

Day 22 (Monday)
Helpers who are leaving are taken to see Sima de las Palomas and then to the airport. Finds are taken to Murcia and equipment to Dolores de Pacheco.

SESSION 2: July 20th–August 10th at Sima de las Palomas excavation and Dolores de Pacheco field base
Day 1 (Monday = Day 22 of Session 1) Airport pick-up and transport to Dolores de Pacheco field base.

Day 2
Morning: open and set up the Sima de las Palomas excavation.
Afternoon: talk about The “Cueva Negra-Sima de las Palomas” Research Project (Michael Walker).

Day 3
Morning: excavation at Sima de las Palomas; instruction in field techniques, wet sieving, recording finds.
Afternoon: instruction in field lab; sorting finds.

Day 4
Morning: short excavation (8-10.30am) at Sima de las Palomas; excursion to Cueva Negra for whoever has never been there before.
Afternoon: seminar on Cleaning and Scanning the Sima de las Palomas Neanderthal Skeletons (Jon Ortega); sorting finds in lab.

Day 5
Morning: excavation at Sima de las Palomas; instruction in field techniques, wet-sieving, recording finds, etc.
Afternoon: seminar on Use-wear Analysis and Stone Tools (Ignacio Martín); sorting finds in lab.

Day 6
Morning: excavation at Sima de las Palomas; instruction in field techniques, wet-sieving, recording finds, etc.
Afternoon: sorting finds in lab; Faunal Remains from Sima de las Palomas (Antonio López, Azucena Avilés and Ángel Buitrago).

Day 7
Free time all day (no morning excavation; no afternoon lab)
Day 8
Morning: brief visit to new Museum of Palaeontology and Human Evolution; excavation at Sima de las Palomas.
Afternoon: sorting finds in lab.

Day 9
Morning: excavation at Sima de las Palomas.
Afternoon: sorting finds in lab; seminar on *The Neanderthals* (Michael Walker)

Day 10
Morning: excavation at Sima de las Palomas.
Afternoon: sorting finds in lab.

Day 11
Morning: excavation at Sima de las Palomas.
Afternoon: seminar on *Pollen Analysis and Quaternary Climate* (José Carrión and Santiago Fernández); sorting finds in lab

Day 12
Morning: excavation at Sima de las Palomas.
Afternoon: seminar on *Neanderthals in Spain* (Maria Haber); sorting finds in lab

Day 14 (Sunday, Aug 3)
Morning: *Open Day* at Sima de las Palomas. Free time for helpers, as only Field School staff are involved with our Spanish visitors.
Afternoon: free time (no afternoon lab).

Day 15
Excursion to see archaeological sites and museums at Cartagena (no morning excavation, no afternoon lab).

Day 16
Morning: excavation at Sima de las Palomas.
Afternoon: seminar on *What Ever Happened to the Neanderthals?* (Michael Walker); sorting finds in lab.

Day 17
Morning: excavation at Sima de las Palomas.
Afternoon: workshop on *Flint Knapping* (Mariano López); sorting finds in lab.

Day 18
Morning: excavation at Sima de las Palomas.
Afternoon: showing of documentary *Decoding Neanderthals*; sorting finds in lab.

Day 19
Morning: excavation at Sima de las Palomas; Press Conference with mayor of Torre Pacheco.
Afternoon: sorting finds in lab.

Day 20
Morning: excavation at Sima de las Palomas; Press Conference with mayor of Torre Pacheco.
Afternoon: sorting finds in lab.

Day 21
Morning: close up excavation and field lab; take down and pack up equipment and finds.
Afternoon: Open Round Table of staff and helpers to evaluate Session 2.

Day 22 (Monday, Aug 10)
Morning: helpers who are leaving are taken to the airport; equipment and finds are taken to Murcia.

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. Several of the senior site helpers speak English and helpers who come from overseas find all of them welcoming, friendly, helpful and patient. We 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...

Our staff members drive you to our bases, sites, and excursions. We do not require you to drive. In Spain all drivers must carry ID/passport and either an EU Member State driver’s licence/permit or an International Driving Permit (which drivers with national licences/permits can get through their national motoring associations in countries such as the USA, Canada, Australia, and no doubt in the UK, post-Brexit); if you have a licence/permit please bring it because in a dire emergency you may just be able to help us out of an unanticipated difficulty. You will need it if you want to hire a car to drive around Spain before or after the session.

Our staff are members of the Murcian Association for the Study of Palaeoanthropology and the Quaternary (MUPANTQUAT) and the Murcia University Research Group E005-11 “ECCE HOMO (Evolución Cenozoico Cuaternario Ecología HOMO)” (formerly “Quaternary Palaeoecology, Palaeoanthropology and Technology”); many are coauthors of our recently published articles in major scientific journals about Cueva Negra and Sima de las Palomas.

Michael J. Walker, DPhil., B.M., B.Ch., M.A., Dipl.Prehist.Archaeol (Oxon), Field School Director. Director of excavations at Cueva Negra and Sima de las Palomas. I began field research at the sites in 1990 and I am Principal Investigator and direct the Project overall. I aim to be present with you all during working and instruction hours, often from eight o'clock in the morning to about eight o'clock in the evening, at least. I am a physical anthropologist, palaeoanthropologist and prehistoric archaeologist. I trained in Medicine, Physiologhy and Prehistoric Archaeology at Oxford University. I have been a medical practioner in general ractice in Australia. After being Research Fellow in Archaeology at Oxford’s The Queens’ College, I lectured at Edinburgh and Sydney Universities before appointment in 1988 as foundation professor of Physical Anthropology at Murcia University which in 2011 named me Emeritus Professor. I chair of the Murcian Association for the Study of Palaeoanthropology and the Quaternary, MUPANTQUAT. In Murcia I have excavated sites of the initial Iron Age, Copper Age, and Mesolithc-Neolithic transition, and conducted fieldwork on Quaternary landscapes. For more details go to the the end of BRIEFING YOU where you will find YOUR FIELD SCHOOL DIRECTOR, AS SEEN BY HIMSELF Michael Walker and his curriculum vitae.

Mariano V. López-Martinez. Co-director of excavations at Cueva Negra since 2002 and at Sima de las Palomas since 2008. Murcia University graduate in History and Geography with specialization in Prehistory, Archaeology and Ancient History, and took the 1-year postgraduate course in Palaeoanthropology in 1994 when he first helped at the Cueva Negra and Sima de las Palomas excavations. In 2001 he played a major part in preparing the European Commission-sponsored travelling exhibition about our two sites that opened at Vienna’s Natural History Museum before being displayed at the Oxford University Natural History Museum and several museums in Spain. He is very much a “hands-on” archaeologist with wide practical experience of field and contract archaeology, directing rescue excavations throughout each year, and displaying the results. In addition to our Palaeolithic excavations he has conducted work at Mediaeval, Roman and other sites, including excavation of the important Camino del Molino Copper-Age burial chamber at Caravaca, Murcia; see Lomba, J., López-Martinez, M., Ramos F. & Avilés, A., 2009, Trabajos de Prehistoria 66 (2) pp. 143-159, ISSN: 0082-5638, eISSN: 1988-3218). In November 2015 he gave a talk on “Cueva Negra de Caravaca. El fuego más antiguo de Europa” at the meeting “I Jornada de Arqueoturismo Tierra de Iberos” at Caravaca de la Cruz, and he published “20 años de excavaciones en la Sima de las Palomas del Cabezo Gordo” (M.López Martinez, M.J.Walker, M.Haber Uriarte) in Orígenes y Raíces 8 (Sociedad de Estudios Historiológicos y Etnográficos) pp 1-6 (ISSN 2254-5). At our Field School he mainly is in day-to-day charge of excavation, on-site recording, and the inventory and registry of excavated finds. For his coauthorship of publications about “Cueva Negra and Sima de las Palomas go to SOME RECENT PUBLICATIONS ABOUT WORK AT OUR SITES THAT MAY WELL INTEREST YOU.

Maria Haber-Urriarte, PhD. Co-director of excavations at Cueva Negra and Sima de las Palomas since 2010. She is an assistant lecturer at Murcia University’s Department of Prehistory and Archaeology. She took her degree in archaeology at Salamanca University (1993) and subsequently studied physical anthropology at Granada University where her doctoral thesis (2003) was on Neandertals in the Iberian Peninsula. She has wide field experience in contract and rescue archaeology, including excavation and physical anthropological analysis of the important Camino del Molino Copper-Age burial chamber at Caravaca, Murcia (see Avilés, A., Haber, M. & Lomba, J., 2012, pp. 106-108 in Biodiversidad Humana y Evolución, edited by Turbón, Fañanás, Rissech & Rosa, University of Barcelona, ISBN: 9788469563229, 9788469563236) and both she and MUPANTQUAT committee member Biology graduate Azucena Avilés Fernández collaborated in the very important DNA study published in 2018 in Nature (doi:10.1038/nature25738) that is “The Beaker phenomenon and the genomic transformation of northwest Europe” by I.Olalde, S. Brace, M.EAlientoff, I.Armit, K.Kristiansen, T.Booth, N.Rohland, S.Mallick, A.Szecsenyi-Nagy, A.Mittnik, E.Altena, M.Lipson, 54
Azucena Avilés-Fernández. Murcia University Biology graduate with further study of physical anthropology at Granada University, who assists with skeletal analysis of human and faunal remains. She has taken part in the *Cueva Negra* and *Sima de las Palomas* excavations for the past ten years and assists our helpers both on site and in the lab. She has undertaken excavation and physical anthropological analysis at the important Camino del Molino Copper-Age burial chamber at Caravaca, Murcia; see Lomba, J., López-Martínez, M., Ramos, F., Avilés, A., 2009, *Trabajos de Prehistoria* 66 (2) pp. 143-159, ISSN: 0082-5638, eISSN: 1988-3218; Avilés, A., Haber, M., Lomba, J., 2012, pp. 106-108 in *Biodiversidad Humana y Evolución*, edited by Turbón, Fañanás, Rissech & Rosa, University of Barcelona, ISBN: 9788469563229, 9788469563236). For her coauthorship of publications about *Cueva Negra* and *Sima de las Palomas* go to SOME RECENT PUBLICATIONS ABOUT WORK AT OUR SITES THAT MAY WELL INTEREST YOU. She is also among the 73 authors of the 2017 Creative Commons bioRxiv paper “The maternal genetic make-up of the Iberian Peninsula between the Neolithic and the Early Bronze Age” by Szászén-Nagy et al. (Scientific Reports doi: 10.1038/s41598-017-15480-9).

Ángel Tomás Buitrago-López. Murcia University Biology graduate who assists with skeletal analysis of human and faunal remains. He has taken part in the *Cueva Negra* and *Sima de las Palomas* excavations for the past three years and assists our helpers both on site and in the lab.

Consuelo Caravaca Guerrero. Murcia University graduate in History and Archaeology and has a master’s degree. She has undertaken supervisory duties at our sites in recent field seasons.

Gonzalo Linares-Matás is a Murcian who in 2017 graduated in Archaeology with First Class Honours at Oxford University where he presented a dissertation based on bone taphonomy at Cueva Negra, and following a master’s course is embarking on a doctoral research project on taphonomy at Oxford for which he has been awarded a prestigious grant for doctoral study. G. Linares-Matás et al., 2017, “Preliminary taphonomic assessment of the macromammalian zooarchaeological assemblage at the late Early Pleistocene site of Cueva Negra del Estrecho del Río Quípar (Caravaca, Murcia, Spain).” *Proceedings of the European Society for the Study of Human Evolution* 6, p. 117. Gonzalo has undertaken supervisory duties at our sites in recent field seasons. He founded and is the executive editor of the *International Journal of Student Research in Archaeology* (ISSN 2398-2012).

Norman Fernández-Ruiz. Murcia University graduate in History and Archaeology. His fine master’s thesis presented at Alicante University in 2017 was based on important three-dimensional analysis of finds in a level of Cueva Negra. He has undertaken supervisory duties at our sites in recent field seasons. N. Fernández et al., 2018, “Cueva Negra del Estrecho del Río Quípar (Caravaca de la Cruz, Murcia, Spain): Intrusive analysis of a late Early Pleistocene Palaeolithic palimpsest.” *Proceedings of the European Society for the Study of Human Evolution* 7, p. 63.

Hugo Cano-Fernández. Murcia University Biology graduate, undertook the master’s programme at University College University of London and is undertaking doctoral studies. He has undertaken supervisory duties at our sites in recent field seasons. He has developed a useful handbook for us about the identification of the bones and teeth of Quaternary mammals at our sites.

Our senior site helpers are young university graduates or senior undergraduate students who collaborate with us - 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.

At the Caravaca Ascruz public residential school we are very well looked after by our cooks, and its caretakers and cleaners. At Dolores de Pacheco we are also very well looked after by the caretaker and cleaners of the public school where we stay and sleep, and by the cooks Mariángelas and her husband Ginés at the Centro Cívico nearby where we take our meals.

At *Sima de las Palomas*, until his death in September 2007 M.J. Walker had as co-director of excavations a geologist and palaeontologist, the late Dr Josep Gibert, who was both a 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.

Several staff associates come to visit or give talks, as well as scientific collaboration, in our Day-by-Day Field School Programme and Team Development Activities. Among them are our MUPANTQUAT Committee Member communications expert Jesús García-Torres who until 2016 taught at the Murcia’s “San Antonio” University who has had wide professional experience in the media, Murcia University Professor of Plant Evolution palaeoecologist Dr José Carrión-García and his team (which includes Dr Santiago Fernández-Jiménez, Dr. Juan Ochando and Dr Manuel Muñoz), Dr Tomás Rodríguez-Estrella who is the retired Professor of Hydrogeology at the Cartagena Polytechnic University, palaeontologist Dr Gregorio Romero Sánchez of the Murcian Regional Government’s Heritage Directorate-General.

Among visiting experts whom we expect to host for brief periods during our Field School, and who will give short talks to participants, are Prof. Dr. Hugues Blain from Tarragona University (specialist in palaeontology of reptiles and amphibians), Dr. Anna Rufa from Bordeaux University (specialist in palaeontology and taphonomy of bird bones), Dr. Ruth Blasco from Spain’s National Centre for Human Evolution Research at Burgos (specialist in bone taphonomy), Prof. Dr. Héctor Manrique from the Teruel campus of Saragossa University (evolutionary psychologist who has conducted experiments with great apes), Prof. Dr. Christoph Wissing from Tübingen University (specialist in stable-isotope studies for palaeoenvironmental analysis), and, we hope, the distinguished mammalian palaeontologist Dr Jan van der Made of Spain’s national Museum of Natural Sciences at Madrid.

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 our summer field season and if so they usually share their knowledge and experience with us in talks, seminars or field expertise on site. Some are old hands at our Field School and excavations, or long-standing scientific collaborators. Among them are Pittsburgh dental anthropologist Dr Vince Lombardi (one-time adjunct professor at Harvard University Dental School), British archaeologist and engineer John Simpson, O.B.E., bioarchaeologist Dr. Sara Rhodes (who in 2019 obtained her PhD at Tübingen University), geoarchaeologist Dr Diego Angelucci and his PhD student Daniela Aneesin who sampled sediment at our sites for micromorphological research at Trento University in Italy, Oxford University OSL Dating Laboratory head Dr Jean-Luc
FIELD LOGISTICS

VERY IMPORTANT ADVICE TO AIR TRAVELLERS
If you are flying into or out of Murcia Airport you need to bear in mind the following.

June 29th (Monday) ARRIVALS: We can pick you up at Murcia Corvera International Airport at almost any hour of the day or afternoon on June 29th (Mon.) but, because the drive to our Caravaca base takes about 90 minutes, if you land late in the evening, say about 9 or 10 p.m., we shall not be able to get you to Caravaca base until late at night, when the most we can offer you is to eat may be a sandwich or two and a salad, as everyone else will have had a hot dinner at 9 pm. So, please try to take a flight that lands before 7 p.m., but if the only one available for you lands later than that we shall do our best to pick you up provided you have informed us well beforehand.

July 20th (Monday) DEPARTURES: We cannot take anyone to the airport for flights out of Murcia that have a departure time earlier than 11 a.m., so you should not book on a flight that departs earlier than that. Yes, indeed there are early morning flights out of Murcia, but if you book on one leaving early on July 20th you will have to take a private taxi from Caravaca at your own expense, which will cost you at least sixty or seventy euros. So, in order to avoid that expense, we can offer you an alternative solution if you must book on an early morning flight in order to make an international same-day connection in, say, Madrid, Barcelona, London, etc., which is to book your early morning flight out of Murcia for Tuesday July 21st and stay the night of the 20th with us at our Dolores de Pacheco base and either we can take you to the airport or you can order a taxi which will be less expensive than it would be from Caravaca, and you will not be charged for the extra night accommodation if you want to do that, but we need to know in advance, and certainly before June 29th, in order be sure there are enough beds available! After June 29th we are too busy excavating at Cueva Negra to be able to attend to deal with administrative matters concerning session 2 at Dolores de Pacheco.

July 20th (Monday) ARRIVALS: We can pick you up at the airport at almost any time but if you land before 11 a.m. you may have to hang around for a couple of hours until we arrive from Caravaca to set down departing Session 1 helpers, as it takes us 75-90 minutes to drive from Caravaca to Murcia Corvera International Airport. Please let us know the arrival time of your plane well beforehand.

August 10th (Monday) DEPARTURES: As for July 20th, though because also our staff will be busy transporting excavation equipment and finds to various places during the day we may have to drop you off at the airport in the morning and you will then have to hang around there until whatever time in the afternoon or evening your flight leaves that you may have booked on.

If you would like to spend an pleasant extra night or two before or after any of the sessions, in order to enjoy a relaxing day by the beach after a tiring long journey, or after a gruelling excavation session with us, we recommend an inexpensive friendly 2-star
hotel at Los Narejos; it is the Hotel Los Narejos where bed-and-breakfast costs about 45 euros, and you can also buy lunch or dinner in its dining room. Several of our helpers from other countries have stayed there and been well satisfied. It is about a quarter of a mile or 0.5 km from the beach. Because July and August are high holiday season months, when anything under 50 euros bed-and-breakfast is hard to find at coastal resorts like Los Narejos, you should book well in advance. Here are the details: Hotel Los Narejos, Avenida de la Constitución 67, Los Narejos, 30710 Los Alcázares, Murcia, tel. 34 968 57 56 34. It is quite easy for us to drop you off at this hotel instead of at the airport nearby if you are leaving us, or to pick you up at this hotel instead of at the airport if you are arriving, provided you have told us beforehand the dates of your hotel booking.

**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, tarragon, 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, "murisyah", 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 stillingly hot and humid in the summer. Helpers at Cueva Negra can visit the 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 Cartagena with its new international airport at Corvera 25 kilometres from the city, half-way to 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. Fernández-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. The late Dr Josep 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 discoteques, 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 communications and weddings as occasions for exuberant enjoyment and festivity, rather than solemnity. Even during solemn religious processions each penitent gives out hundreds of sweets to eager children.

The Spanish economy is still weak, though slowly recovering from the aftermath of the worldwide economic crisis; unemployment is high at 14% and short-term employment predominates among those who can find work. We have had 2 general elections in 2019 with unclear outcomes. Spain’s minority provisional government in Madrid is led by the socialist Pedro Sánchez. The conservative Popular Party is healthy, particularly in Murcia where it leads the regional and city governments.

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 US or Canadian visitors because such agreements exist, although citizens of many British Commonwealth nations do still need visas for entering Spain and all other EU 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 EU neither automatically assign each citizen with an ID card nor have they joined the “Schengen Group” of those EU nations which have abolished border control of travellers between the countries of this group. I believe that EU citizens from “Schengen Group” states need only carry their national ID card to enter Spain which belongs to the “Schengen Group”.

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 the new Murcia-Corvera International Airport (which is about 30 kilometres from Dolores de Pacheco).

The reason WHY you should do that straight away in MADRID is that once you get to the new Murcia-Corvera International Airport you could find that it is possible to reconfirm ONLY Iberia Airlines international outward flights from Madrid or Barcelona, but perhaps not those of other international carriers. You can, however, reconfirm local return flights (i.e. flights within Spain) out of Murcia-Corvera 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-Corvera also. If you are coming from London by 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.
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 (December 18th, 2019), one euro, 1€, is roughly equal to $1.11 US or £0.85 UK. Looked at the other way round, very roughly speaking $1 US buys 0.90€ and £1 UK buys 1.18€. However, currency rates can fluctuate at times of 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 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 US 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!).

Over the past four or five years 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 by Spain's 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-Corvera International Airport**.

Rendez-vous is on **Mondays**

*Cueva Negra:* pick up Monday **June 29th**, set down Monday **July 20th** 2020  
*Sima de las Palomas:* pick up Monday **July 20th**, set down Monday **August 10th**, 2020

Murcia-Corvera International Airport is a new airport (opened in January 2019). Daily flights between the airport and Madrid or Barcelona by **Iberia Airlines** (the Spanish national carrier, or one of its subsidiary companies such as **AirNostrum or Vueling**) may be cancelled at short notice on Saturdays or Sundays. Because these internal flights are scheduled mainly to serve businessmen's weekday needs to do the return trip in one day, at weekends in Summer the planes involved are sometimes withdrawn at short notice in order to serve tourists from Madrid or Barcelona flying to Majorca, Málaga, the Canary Islands, or other tourist destinations for which there is greatest demand by holidaymakers. To avoid problems for our helpers, our **Monday rendez-vous** allows those of you coming from other countries to transfer in Spain (at Madrid’s Barajas International Airport or Barcelona’s El Prat International Airport) to flights to Murcia Corvera International Airport, which as yet receives no intercontinental flights; you may want to land in Spain on Sunday and stay the night in an hotel at Madrid or Barcelona before flying to Murcia on Monday. Alternatively, you might want to stay Sunday night in London (or maybe Dublin). On **Mondays** there are various flights between several **London** airports and Murcia-Corvera Airport (flying time is two-and-a-half-hours; there is a 1-hour time-zone difference between Spain and the UK), though some airlines offer flights only on two or three weekdays, so you should consult their websites (or a travel agent) about their schedules for July and August 2020. **Ryanair** has flights from Dublin to Murcia.

**Intercontinental travellers**, please note that if you are flying back from **Murcia to London** in the afternoon – especially if flying on budget airlines, 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 USA 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 USA - 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. Intercontinental travellers must bear in mind that surface connections between London airports can be very time-consuming; it can take 6 hours after landing at Gatwick or Heathrow airports that are south of London to get (with your luggage) to Luton or Stansted airports that are north of London.
There are flights between several other UK airports and Murcia-Corvera Airport. Most of them are on low-cost budget airlines. During its first year of operation (2019) flights to it from other European airports were very few; we hope they increase in 2020. International travellers might perhaps investigate a possibility of flights to Murcia by Ryanair via its Dublin Airport hub.

We ask helpers to book on flights that are scheduled to land at Murcia no later than 7 p.m. (19 h) or depart from Murcia no earlier than 11 a.m.. We ask this especially of Session 1 helpers, on account of the time it takes to drive between our Caravaca base and the airport; earlier flight-departure or later flight-landing times may involve Session 1 helpers having to hire a taxi for the drive at their own expense. You will have to hire a taxi at your own expense if you land or depart on dates other than those set out above.

Beware of some low-cost budget airlines that advertise flights to “Murcia”, when in fact they fly in and out of Alicante International Airport: 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 low-cost flights from the UK or other EU states, and we simply are not prepared to have our 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 our drivers and late arrivals they bring back with them.

Remember that each 3-week period will begin on Day 1 (arrival day, Monday) with rendez-vous at Murcia-Corvera International Airport. We start and finish on Mondays because there are not only connecting Iberia (Air Nostrum or Vueling) flights from Madrid and Barcelona on weekdays for intercontinental travellers arriving in Spain from the USA, Australia or elsewhere (there often are no connecting Iberia (Air Nostrum or Vueling) flights on Saturdays and Sundays), but also low-cost budget airline flights from the UK and some other EU countries.

Only if you have told us in advance, and we have replied saying that we shall, will our drivers pick up late arrivals after 19.00 hours on June 29th at Murcia-Corvera Airport; the reason is because the drive to Caravaca takes 75-90 minutes and on the first evening of our first session we like all our helpers to have dinner together at our Caravaca base at 9 p.m. (21 hours). Because of the driving time and the requirement to be at the airport 1-2 hours before take-off, helpers leaving Session 1 should book flights scheduled to depart no earlier than 11 a.m. (see above). Because our Session 2 base is nearer to the airport Session 2 helpers can arrive later or leave earlier.

Provided that beforehand you have given us your flight number, then if your plane is delayed, and arrives late at Murcia, 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 2020, even if you are not coming until July 20th, because after June 29th we do not have regular or reliable internet access when we are in the field at Cueva Negra at Caravaca because the cave is in the countryside where there is no internet cover and only very poor and intermittent cell phone cover, and therefore we may well fail to receive email messages or telephone calls sent by you between June 29th and July 20th; so no later than June 1st we need all your flight details up to August 10th if you want us to pick you up by us at Murcia airport. Transport between Murcia Airport and our accommodation bases is free of charge to helpers who arrive for the Monday rendez-vous who have sent us their flight details before June first 2020.

There are several operators budget airlines offering low-cost flights from the UK to Murcia-Corvera. You should check for updating 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.

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 USA, it is probably quickest and cheapest to change at a US carrier to Iberia (Air Nostrum or Vueling) at Madrid (Air Nostrum and Vueling are subsidiary companies belonging to Iberia Airlines) and many internal flights in Spain are serviced by this subsidiary, as your US carrier may well include the price of one onward flight within Europe in the cost of your ticket to Madrid.

In 2019 one of our helpers for Session 2 who landed at Madrid Barajas International Airport was able (to our surprise!) to take an ALSA coach directly from the airport to the bus station at Torre Pacheco (we think the likely destination of the coach may have been Cartagena) where we met him and took him to our base at Dolores de Pacheco. Possibly the service could be available in 2020. You can find out on the ALSA website (ALSA is a nationwide company of long-distance coach services).

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-Corvera Airport is less chaotic, and we've never missed meeting anyone at Murcia 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-Corvera International 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 connects Alicante Airport with Murcia city bus station (taking 55
minutes), from 07.15 h to 21.15 h, and the return service leaves Murcia from 07.00 h to 21.00 h. You can buy your ticket at a stand inside Alicante Airport.

SEE NEXT SECTION (TRAVEL OPTIONS BY RAIL OR ROAD for buses from Murcia city bus station to Caravaca, to San Javier, Los Alcázares, or Torre Pacheco

**Alicante:** 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-Corvera 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-Corvera Airport, you would find yourself absolutely stranded, at an airport in the middle of nowhere, if you had to get to Caravaca on a Monday 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.

**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 also 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-CORVERA AIRPORT IS QUITE NEAR TO THE MEDITERRANEAN 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 FINALISE YOUR TRAVEL ARRANGEMENTS, BY THE END OF APRIL IF YOU WANT TO BE SURE OF GETTING A SEAT THROUGH TO MURCIA-CORVERA. 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 US IN WRITING. YOU MUST INFORM US DIRECTLY BEFORE JUNE 1st 2020 BY EMAIL to mjwalke@gmail.com Please note that if we maat you at any place, date, or time of day other than the official rendez-vous place, dates, and times you will be expected to pay for our petrol even if we have agreed to come to meet you or set you down, but 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.

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 Michael Walker's cell phone number 620-267104 (34-620-267104 from outside Spain) though when in the field this number is very likely to 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 in Spain, we recommend you put a one euro (1€) coin into the phone and dial either 968-700844 (the Ascruz 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 or 685-111111 (Dolores de Pacheco Civic Centre, after 15.00 hours Central European Time (CET) when we have got back from the field; 34-968-173200 or 34-685-111111 from outside Spain), depending on which field base you need to get to. Check on the time zone before you phone; 14.00 hours UK time is equivalent to 15.00 hours CET, but if you're phoning from the USA 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, as specified above, you may very well have to make your own way to our base at your own expense. Whether or not we might be able to agree to meet you somewhere to get you to our base will depend on whether it is convenient for us, because a major field project has many commitments which tie up our vehicles and staff. Even if you have contacted us and we have agreed to help you out, you will be expected to pay for our petrol even if we have agreed to come to meet you or set you down.

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-Corvera Airport to our accommodation base at Caravaca's "Colegio Público Ascruez" de Educación Especial" (Residential Public School "Ascruz" for Disabled Children), the distance of 100 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. It may be possible to take a bus or taxi to Murcia city bus station and from there take the service bus to Caravaca bus station. The "Ascruz" school is on the edge of the town and about half-an-hour's walk from the bus station though if you phone us we can probably drive to the bus station to collect you.

**Sima de las Palomas:** From Murcia-Corvera Airport it is about 30 kilometres to our accommodation at the village school at Dolores de Pacheco (where we eat three times a day at its village "Centro Cívico" or Civic Centre) but there is no public transport to the village and a taxi might charge you 50 euros. If you are flying in on a day or at a time other than the scheduled rendez-vous ones, we may only be able pick you up at the Airport if we have NOT ONLY advance information from you BUT ALSO enough vehicles and drivers free to allow us to do so - otherwise a taxi to Dolores de Pacheco from the Airport could well cost you about €50 euros.

**TRAVEL OPTIONS BY RAIL OR COACH**

If you plan to arrive by rail or coach/bus on a rendez-vous Monday, do NOT head for Murcia-Corvera International Airport. It will be simpler for us (and you) to arrange to meet you elsewhere, especially if you are coming to Cueva Negra: e.g. at Cieza railway station if you're coming by train, or where the buses from Murcia arrive at Caravaca bus station. We are unwilling to 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-Corvera Airport, together with our shortage of cars and drivers, means that unfortunately there is little room for flexibility in our arrangements to meet people coming to Cueva Negra other than at the official Monday rendezvous 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 less far from both the Murcia-Corvera Airport and the Balsicas-Mar Menor railway station, and there are more alternatives by rail or road.

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 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.

**RAIL:**

Rail travellers are advised to book through an international website such as Trainline in order to get the best deal on tickets (the Spanish rail network RENFE also has a website but the information available on it is not always accurate in our experience). Until May 2020 when the summer time-table of Spain’s rail network is published, it may not be possible to access precise and accurate information about rail time-tables and services. When booking from outside Spain you may be given no other option by an on-line booking system than to book through to the nearest major railway station beyond the station where you intend to leave the train (e.g., to Cartagena if you intend to alight or board at Balsicas-Mar-Menor station, or perhaps Murcia city if you intend to alight or board at Cieza) though the extra cost is trivial. (Calasparra railway station is now closed – a great pity as it was even nearer than Cieza to our Caravaca base and was much used by our helpers; alas, the route of the Madrid-Murcia railway track has been changed and no longer passes through Calasparra.)

More important is to know with absolute certainty that you can in fact leave or board the train at an intermediate station! That’s not a problem if you’re alighting or boarding at Balsicas-Mar-Menor railway station (the nearest to Sima de las Palomas and our Session 2 base at Dolores de Pacheco) because all trains between Madrid and Cartagena or between Barcelona Cartagena stop there. Some other trains from Madrid end at Murcia, therefore they do not continue to Balsicas-Mar-Menor and Cartagena.

Unfortunately the matter is more complicated for Session 1 because the railway station nearest to our base (at Caravaca) is now a problem if you’re alighting or boarding at Balsicas-Mar-Menor railway station, because trains from Madrid and Murcia stop at Cieza on weekdays). We are unwilling to meet passengers off trains at Murcia city railway station (Murcia El Carmen) where there is always such a throng of travellers that you might easily miss finding us or we might easily miss finding you. Rail travellers from Barcelona will have to leave the Barcelona-Cartagena train at Murcia El Carmen and are unlikely to have a suitable rail connexion to Cieza; the alternative for travellers arriving for Session 1 at Murcia El Carmen railway station is to take a city bus or taxi to Murcia city bus station and from there take the service bus to Caravaca bus station where we can pick you up if you phone us when you are on the bus to say when it will arrive there.

**ROAD:**

The nationwide ALSA company (website: https://www.alsa.com) of long-distance coach services in Spain runs several coaches every day between Madrid “Estación del Sur” bus station and Murcia city bus station, and between Barcelona “Estación del Nord” bus station and Murcia city bus station, as well as coaches that leave (or return to) the International Airports at Madrid (Barajas Airport Terminal 4) and Barcelona (El Prat Airport Terminal 1). There is a long-distance ALSA coach that leaves Madrid Barajas Airport Terminal 4 early in the morning (about 8.30 a.m.), calls at Madrid “Estación del Sur” bus station, and ends at Los Alcázares where we could meet helpers for Session 2 because it quite near to our base at Dolores de Pacheco; it also calls at Murcia city bus station where helpers for Session 1 can change for the service bus to Caravaca bus station where we could meet them. You can book tickets for long-distance ALSA coaches at its website.

There are several other long-distance coach companies in Spain. Some of their 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). Some coaches from Madrid or Barcelona to the Murcian coastal resorts do not go through Murcia city but instead go through the city of Elche. Some coaches (especially some from Barcelona) continue from Murcia city bus station and go on to the Andalusian cities of Almería, Granada, Málaga, Seville and Algeciras. Helpers for Session 1 (at Cueva Negra) will have to get off at Murcia city bus station and change to the service bus to Caravaca. Helpers for Session 2 (at Sima de las Palomas) can get off at Murcia city bus station and change to service buses to San Javier, Los Alcázares, or Torre Pacheco, all of which are only a few kilometres distant from our base at Dolores de Pacheco which, unfortunately, which is not served by any bus whatsoever. Some services from Alicante bus station to Cartagena and La Manga also stop at San Javier and Los Alcázares. To complicate matters, different services stop at different places in those two towns! The complexity of services available for helpers coming to (or leaving) Session 2 at Dolores de Pacheco makes it hard for us to guarantee to be able to meet helpers arriving by bus/coach at one or other of the nearby towns. Time-tables often undergo change in the high holiday season of July and August, and matters are made worse by delays owing to heavy traffic on crowded roads in an area densely packed with coastal holiday resorts.

**Cueva Negra:** If you plan on coming to Caravaca by coach/bus you will need to get a coach to Murcia city bus station and then change to the local service bus out to Caravaca bus station. 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 bus, and you will have to find an hotel for the night in Murcia city. To avoid that expense, you could catch an overnight coaches on Sunday from Madrid or Barcelona to Murcia city (though we don’t think women travelling alone should do so) and then an early Monday 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 "Ascruz" de Educación Especial” (Residential Public School "Ascruz" for Disabled Children). If you want us to pick you up at the Caravaca coach-stop, phone us at the school (+34-968-700844) when you’re on the bus to say when you’ll arrive at Caravaca bus station and if we are at the school we will pick you up (though we cannot do so between 07.30 and 14.30 hours because we are all at Cueva Negra excavating where our cell phones lack cover so we shall not be able to respond to your calls). 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 the large ‘Templete’ monumental fountain (a neo-Classical structure of columns and a cupola). It is beside a set of traffic-lights where you take 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 Ascruz 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 “Zaín”), 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 tree-lined 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 which is on the left.)

Sima de las Palomas: If you plan on coming from Madrid or Barcelona by coach/bus to Dolores de Pacheco, you have several options. Mention was made above about the direct ALSA coach from Madrid Barajas International Airport that stops at Torre Pacheco bus station. 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 Sunday (we don’t think women travelling alone should do that) you can easily get buses that leave in the early hours of Monday from the Murcia city bus station on separate bus routes that service San Javier, Los Alcázares, and Torre Pacheco, respectively, each of which is a few kilometres from Dolores de Pacheco. Alas, none of these go through Dolores de Pacheco where we have our Session 2 base. This means you either have to phone us to say when whatever bus you are on will arrive at one of the 3 towns, or, if we cannot do so, take a taxi to Dolores de Pacheco “Centro Cívico” (“Civic Centre”). You should try phoning us at the Dolores de Pacheco “Centro Cívico” (+34-968-173020 or +34-685-111111), but remember we are not there between 07.30 and 14.30 as we are at Sima de las Palomas excavating and our cell phones may well be out of cover, especially when we are inside the cave. A taxi might cost you 10-20€ euros, depending on the town where you leave the coach.

About the buses to Caravaca, to San Javier, Los Alcázares, or Torre Pacheco from 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 or Torre Pacheco, for Sima de las Palomas), and buy your ticket (cash is required for payment, but the one-way tickets are only about 5 euros), 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, private buses (“Interbus”) leave for Torre Pacheco at 08.30 h, 10.30, 11.30, 12.30, 14.00, 15.00, 18.00, 19.30, and 21.00 h (travel time is about an hour). 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 (“Gimenez 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 (the bus from Murcia at 20.30 h used to pass through Dolores de Pacheco and stop there at 21.25 h with a return from there at 07.30 h, but we understand that not even this bus passes any more through Dolores where our base is, alas).

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. 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-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. 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 Monday when your stay ends, see the Alhambra on the Tuesday, get a coach up to Madrid after that if you are flying out of Madrid. You could hire a drive-yourself-car which you could prebook to pick up on the Monday at Murcia-Corvera Airport and return, say, to Madrid-Barajas Airport on the Saturday, and you’ll find Avis, 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). Drivers in Spain are required to carry with them both ID/passport and either an EU Member State driver’s licence or an International Driving Permit (which can be got through your national motoring association in countries such as the USA, Canada, Australia - and no doubt in the UK, post-Brexit) – please bring it because in a dire emergency you may be help us out!

EARLY AND LATE ARRIVALS; STAYING ON IN SPAIN AFTERWARDS

We are 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 us to help you if we have received advance notice of your needs and wishes - preferably by May 1st and, in any case NO LATER than June 1st because once we are looking after you in the field we cease to be immediately contactable by phone, fax or e-mail.

Phone calls after June 29th from late arrivals should be made between 15.00 and 24.00 hours Central European Time, from June 29th-July 19th to 968-700844 (from within Spain) or +34-968-700844 (from countries outside Spain), and for July 20th to August 10th to 968-73020 or 685-111111 (from within Spain), or +34-968-173020 or +34-685-111111 (from countries outside Spain). You can also try M.J.Walker’s cell phone though he may well be out of range if he is 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, we have offered hospitality to helpers who have arrived early, and we have helped others organize both hotel accommodation after they have excavated with us and guest-house (“pension”) 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 us 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.
FUNDING OUR FIELD RESEARCH

CONTRIBUTIONS AND RELATED MATTERS

For attendance at one full 21-day session your contribution is rated at 50 euros, 50€, per day, for bed, light breakfast, mid-morning sandwich, cooked lunch, cooked supper, laundry, instruction, transport between base camp and site, excursions, transport between Murcia Airport to our base on official pick-up and set-down dates, 2020 membership of MUPANTQUAT (attendance at both sessions entitles you to a reduction to 45€ per day; first-time attendance for less than a full 21-day session is rated at 60€ per a day).

A non-returnable deposit is required and because of that you might want to take out holiday insurance in case of last-minute inability to come. The deposits are made to MUPANTQUAT and are rated at 250€ per week for each week of your intended stay, with the full balance payable on arrival.

Deposits guarantee your reservation so it is advisable to make them, for whichever session (whether Session 1 or Session 2) before May 1st in order to avoid disappointment. If no deposit has been made by May 31st the place will be reassigned to applicants on the waiting-list.

Deposits, alas, are non-returnable. The reason for that is as follows. Because the Murcian region is a Mediterranean coastal holiday-resort area that is very popular with both Spaniards and other European vacationers, inward-bound and outward-bound flights and trains are heavily booked well in advance of the July-August high summer season. They are often fully booked up by early June. So even if we have someone on the waiting-list when you drop out, that person might not be able to book a flight only a very few weeks before the session begins. This means we might well have to use deposited moneys 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.

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.

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 May 31st; 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 can cause problems. In order to minimize these we insist that payments must be made always in € euros, including payment of outstanding balances of your contributions on arrival. We have a Spanish bank account thanks to the creation of our new association MUPANTQUAT into which deposits should be paid in euros by international bank transfer. If you decide that you wish to take part you will be sent details by ordinary postal airmail (because we think it is unsafe to send bank details over internet, whatever some people may say to the contrary).

We do not have credit card facilities. Quite often credit cards issued in countries outside Spain fail to work in Spanish automatic cash machines or automatic teller (ATMs). You must insist at your local bank branch that it validates your cards so that they can work in other countries. Alas, even when the cards have allegedly undergone electronic modification by your home bank to enable them to work outside your own country, they may not work. (I once found my validated Spanish credit card failed to work in neighbouring France!) That is why you should bring at least 100€ in euro bank-notes to guard against having your having no cash here if your card gets swallowed up by an ATM machine that claims it to be invalid and retains it because it thinks it might have been stolen or be a fake. This was to my advantage when my credit card was stolen and thieves tried using it at an ATM machine 100 km away; I had alerted my bank and police, so when they tried using it at an ATM the card was retained within the machine, the bank alarm went off, and the police soon rounded up the thieves!
We cannot accept either bank cheques or travellers’ cheques (not even American Express cheques) because in the past few years tight EU banking regulations demand that nowadays they can only be cleared by banks in EU Member States if intrusive personal details are provided of people who have signed cheques and sent them (such as full names, addresses, ID, and 20-digit international personal account information), and travellers’ cheques can no longer be cashed at Spanish banks which will only clear them if they are paid into a named bank account at the branch in question when they are treated for tax purposes in Spain as personal earned income by the holder of that account, so nobody is prepared to receive such money from you!

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 worldwide currency conversion is available at the click of a mouse, 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 of euros 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 use the nuclear option of threatening to take your account to another bank! (Curiously, Australian banks rarely give problems of this kind, unlike North American banks.) However, be warned that if the deposit in euros received by us is less than the amount in euros required for the deposit, because your bank has failed to frontload a debit form your account with currency-conversion/transfer costs, then a surcharge of 25€ will be added to the balance outstanding for your contribution payable on arrival, so it is very much to your advantage to hassle the clerks at the branch where you bank back home before you travel!

**INSURANCE**

During their attendance at our Field School all participants are insured by us for accident and third-person liability (required by legislation applying to excavations) during their participation, thanks to a formal agreement of cooperation signed between the University of Murcia and MUPANTQUAT to which the University extends its insurance cover to all of us for accident and third-person liability under the same terms as those that apply to all students and staff of the university. Nevertheless, we advise participants also to arrange their own health (and, if desired, personal accident) insurance cover before leaving home, because helpers are not covered before or after the period of attendance at the Field School - in other words, if you have an accident or illness on your way coming to us, or on your way going back home after you have left us, our Field School insurance does not cover you. EU residents should bring the EU form from their country, which entitles them to public health care in other EU Member States (public health care is free in Spain, as in the U.K.). Participants are advised to take out holiday-travel insurance, especially against an unforeseen need to cancel your travel arrangements.

**WHERE YOUR MONEY GOES TO**

Accommodation and food are included in the overall charge, as is instruction and local transportation by us, including group excursions. 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 at our research laboratory. 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 main tenance of vehicles and material throughout the year at our research laboratory. 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 main tenance of vehicles and maintenance or acquisition of field equipment, and sometimes its replacement after seasons of wear and tear. Recently, our MUPANTQUAT association which since 2012 runs the excavations and Field School has invested considerable money in acquiring new equipment, notably, 12 new geological sieves, a new field microscope, a strong safe cabinet for the safe-keeping of the Sima de las Palomas Neanderthal skeletons, and a compressor and vibroscalpels for cleaning them.

**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. Because the Murcian region is a Mediterranean coastal holiday-resort area that is very popular with both Spaniards and other European vacationers, inward-bound and outward-bound flights and trains are heavily booked well in advance of the July-August high summer season. They are often fully booked up by early June. So even if we have someone on the waiting-list when you drop out, that person might not be able to book a flight only a very few weeks before the session begins. This means we might well have to use deposited moneys 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. 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? The answer is that there is extremely little money available in Spain for research, particularly for field research, whether from the public purse or foundations. Whenever calls for applications for funding are published we put in an application. Unfortunately the conditions attached to them are often so very restrictive as to exclude associations such as MUPANTQUAT or participating staff lacking contracts of employment with an authorised public institution. Often they impose severe limits on the proportion of a grant which may be assigned to living expenses or travelling expenses (because bureaucrats prefer to see receipts for material purchases that give “added value” to the stock-inventory of the institution that is officially in receipt of the grant, because their political masters think that the main purpose of official grants is, first and foremost, to upgrade the physical infrastructure required for institutional research). The last grants of state or regional governmental aid for our research were in 2008 and 2009. We are very grateful for access to facilities (schools) made available by town councils and their sporadic financial assistance.

LOOKING AFTER YOU

ACCOMODATION

Cueva Negra helpers will be accommodated throughout in Caravaca de la Cruz at the “Colegio Público “Ascruz” de Educación Especial” (Residential Public School “Ascruz” 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 by our cooks (self-cooking is not allowed). 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 pillow slip. 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 accommodated 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 (self-cooking is not allowed). 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 pillow slip. 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 Spanish cooks at both the Caravaca “Ascruz” Residential School and the Dolores de Pacheco Civic Centre are of the highest calibre.

We CANNOT offer vegan, kosher, or halal cooking. Self-catering and self-cooking are not possible. 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 and all others who adhere to rigid dietary restrictions CANNOT BE CATERED FOR. Provided helpers have advised us in advance, our cooks can cater for intolerances (e.g., gluten and lactose intolerances).

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 communal 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 15:00 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 mattock or pick, bending and sieving, pushing wheelbarrows, carrying loads, sitting. None of these is likely to last for longer than a couple of 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 when the sun's heat is severe.

It is ESSENTIAL that you inform us 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 trainers (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, pimsolls, 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 at Sima de las Palomas, several pairs of rubber boots are available for those who don't like getting their other footwear soaked by water from the high-pressure hosepipe we use.

Shorts, sun-hats and gardening or work gloves are appropriate wear, along with sun-glasses and your preferred sun-tan 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), M.J.Walker strongly recommends all intending volunteers to ensure their anti-tetanus vaccination is up to 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 hillslope which avoid exposing them to conditions that otherwise might precipitate attacks on the hillside, inside the shaft or on the scaffolding tower.

There are well-equipped modern public hospitals with 24-hour attention 7 days a week, about 15 minutes' drive from each of our sites: namely, near Cueva Negra, Hospital Comarcal del Noroeste (address: Avenida Miguel Espinosa 1, 30400 Caravaca de la Cruz; tel +34-968-709100), and, near Sima de las Palomas, Hospital General Universitario de Los Arcos del Mar Menor,(address: Paraje Torre Octavio 54, 30739 Pozo Aledo, San Javier; tel. +34-968-565000). Furthermore, the city of Murcia has 3 large, modern, university teaching hospitals about an hour's drive from our sites. Should a medical emergency arise it will be dealt with speedily and efficiently. During 30 years we have had no major emergency.

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. MUPANTQUAT 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.

 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). Health arrangements around the world are constantly changing; we recommend you consult your local public health department or, in the U.S. the Center for Disease Control in Atlanta at (404)639-2572 for the latest health information for travellers.

FIELD COMMUNICATIONS, PHONE, INTERNET

Internet access is available often at both our field bases though it can be erratic for reasons beyond our control; nevertheless, we usually get buy! Our field bases usually have cell phone cover though Dolores de Pacheco is in a coastal holiday area where there is often saturation of the phone system in July and August which sometimes means that telephone calls from elsewhere do not always get through. At our excavation sites, however, there is usually neither internet cover nor reliable cell phone cover.

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 accommodation 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 European time, check with the international operator):

June 29th – July 20th, 2020: Cueva Negra
Colegio Público “Ascruz” 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 20th - August 10th, 2020: Sima de las Palomas
Centro Cívico
30739 DOLORES DE PACHECO
Torre Pacheco
Murcia
Spain
Telephone: from outside Spain dial +34-968-173020 or +34-685-111111, within Spain 968-173020 or 685-111111

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, sun-hat, sun-glasses, 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

Here are some reader-friendly, well-illustrated, easy-to-handle general books by reputable scientists that I like:

- The Complete World of Human Evolution by Chris Stringer and Peter Andrews (2005, London, Thames and Hudson; this probably has a different US publisher, and there is also a Spanish edition published by Akal) (Chris is professor at London University’s Imperial College and director of Palaeontology at the London Natural History Museum);
- Processes in Human Evolution by Francisco J.Ayala and Camilo José Cela-Conde (2017, Oxford University Press) (There is also a Spanish edition);
- The First Humans edited by G.Burenhult (1993, University of Queensland Press - there is a different US publisher of the United Nations-sponsored series to which this volume belongs, but I don’t know who it is).
Absolute novices who feel human evolution might be a daunting subject to tackle, especially middle-aged readers approaching it for the first time in their life, might do worse than thumb through the brief Early Man by Paul Jordan (1999, Sutton Pocket Histories) before reading anything else.

I always recommend my undergraduates to get back to basics, and read the brief and well-illustrated The Old Stone Age by the late François Bordes (1968, London, Weidenfeld & Nicolson) and also The Palaeolithic Age by the late John Wymer (1982, London, Croom-Helm), both of which should be in university or museum libraries and possibly in major public libraries.

Two magnificently illustrated coffee-table books certainly should not be missed are: The Last Neanderthal by Ian Tattersall (1995, New York, Macmillan) and From Lucy to Language by Don Johanson (1996, New York, Simon and Schuster).


First-year undergraduate textbooks on physical anthropology for beginners are, alas, far too general and far, far too cursory with regard to human evolution in Eurasia between 1,500,000 and 15,000 years ago, though among better textbooks for beginners are: The Human Lineage by Matt Cartmill and Fred H. Smith (2009, Wiley-Blackwell, New York). Exploring Biological Anthropology: The Essentials by Craig Stanford, John S.Allen and Susan C.Antón (2009, Upper Saddle River, New Jersey, Pearson Prentice-Hall)


Here are some other quite short books that could interest you:


How to Think Like a Neanderthal by Fred Coolidge and Tom Wynn (2012, Oxford University Press)


There are several books that home in on Neanderthal folk and here are some easy reads by reputable authors: In Search of the Neanderthals by Chris Stringer and Clive Gamble (1993, London, Thames and Hudson)


Neanderthal Man: In Search of Lost Genes by Svante Pääbo (2014, New York, Basic Books)


How to Think Like a Neanderthal by Fred Coolidge and Tom Wynn (2012, Oxford University Press)

Neanderthal by Paul Jordan (1999 and 2001, Stroud, Alan Sutton),


The Neanderthals Rediscovered by Dimitra Papagianni and Michael A.Morse (2013, London, Thames & Hudson)

Slightly more challenging but quite short are:


Cognitive Models in Palaeolithic Archaeology edited by Frederick Coolidge and Thomas Wynn (2016, Oxford University Press);

Somewhat longer and in my opinion rather dated is:

The past twenty years have witnessed a flood of edited volumes, particularly about Neanderthals and how anatomically modern humans after about 45,000 years ago in Europe are to be regarded in relation to them by physical anthropologists and Palaeolithic archaeologists. I have most of these books in my private library, but it would be invidious to mention just one or two of them, particularly because our Field School excavations do not deal with times later than about 45,000 years ago nor with anatomically modern humans, let alone Upper Palaeolithic archaeological artifacts. All the same, there are a couple of books you might be interested in looking at, namely, *The Nature of Paleolithic Art* by R.Dale Guthrie (1985, Chicago and London, University of Chicago Press), and *Rock Art of the Spanish Levant* by Antonio Beltrán (1982, Cambridge University Press) – a Session 1 excursion will visit some sites shown in Beltrán’s book.

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 Grisy 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 *Ugly Little Boy* (1936, London, Grafton, 1959), and your library most likely has it too. Other well-known novels include J.H.Rosny-Aîné’s *The Quest for Fire* (1962, Harmondsworth, Penguin - originally published way back in 1971 in French) - which was also 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!
MY WORK

I was appointed foundation 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 had to teach in Spanish, which I coped with, more or less. I have taught undergraduate course units
on both Biological Anthropology and in Human Evolution, as well as postgraduate courses on The Origins of Modern Humans and on
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. I have been designated Honorific Emeritus
Professor by Murcia University. I ceased to teach formal course units in June 2013 and now my time is taken up with research, the Murcia
University research group on “Quaternary Palaeoecology, Palaeoanthropology and Technology” and the Murcian Association for the
Study of Palaeoanthropology and the Quaternary (MUPANTQUAT).

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 Kind 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, speleology,
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 speleology
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 and four
grand-children. 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.

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 Prehistoric Archaeology), studying under the Palaeolithic expert the late Professor Derek Roe,
who published with the late Mary Leakey the monumental 1995 volume on the Olduваi Gorge stone tools, in the Cambridge University
Press Olduvaı Gorge (vol. 5) series of monographs. I then went on to take my DPhil 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 (now called University College London Institute of Archaeology).

From 1967 to 1969 I was Randall MacIver Research Fellow in Archaeology at The Queen's College at Oxford University. In 1969
I became university in 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 USA.. 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, namely, the Austrian scientist Hugo von Oermaier, who left Madrid University after the Spanish
Civil War broke out and retired to the Catholic university at Freiburg in Switzerland until his death in 1946.
So, in 1988, I came back to Europe to set up the 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. I returned to Oxford as its official Senior Visiting Research Fellow in Archaeology during 1993 and 1994 from time to time, when I was also Visiting Fellow at St. Cross College. I ran official scientific exchanges, sponsored by the Spanish and British Governments (Anglo-Spanish Joint Actions HB1992-104B and HB1995-002B) together with Derek Roe, Oxford University's Professor of Palaeolithic Archaeology and Director of its Baden-Powell Quaternary Research Centre.

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. 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 was 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, but our recently formed Murcian Association for the Study of Palaeoanthropology and the Quaternary, MUPANTQUAT, and our Field School activities are helping to keep the fieldwork going forward.

The 1999 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 favored our obtaining the royal patronage of King Juan Carlos 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 Philip V. Tobias, F.R.S. which I organised at Murcia. The late Professor Tobias, who was 75 in 2000, flew to Murcia from South Africa where he was Emeritus Professor of the Witwatersrand University at Johannesburg and directed its Palaeoanthropology Research Group. We had known each other since 1974 and he stayed at my house and visited our Murcian sites.

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 was about our work at Cueva Negra and Sima de las Palomas, and travelled around the European Union, because it was winner of the European Commission’s “Culture 2000” Programme (2000-0820/CLTCA1A) 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, and other places in Spain.

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 and Cueva Negra research in the 3-year period 2000-2001-2002, and a further similar three-year grant was 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, but our recently formed Murcian Association for the Study of Palaeoanthropology and the Quaternary, MUPANTQUAT, and our Field School activities are helping to keep the fieldwork going forward.

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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 Palaeoanthropology 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 although the structure was built by 2013, subsequent economic hardship, alas, means that it still awaits being fitted out so that the exhibition halls and laboratories can be up and running – with luck in 2020. Meanwhile, in 2016 Torre Pacheco town council ceded to MUPANTQUAT a spanking new laboratory in its brand-new building that houses both its municipal police department and a library and reading room facility for students, as well as a lecture theatre or meeting room, and we shall to be working in it during our forthcoming 2020 field season at Sima de las Palomas.

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 (and attempts to refute) working hypotheses about remains from the past, in endeavours to define appropriate models for its interpretation.

My teaching at both undergraduate and postgraduate levels has reflected 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 had to teach in Spanish. I have also published papers in Catalan and French, and can read German and Italian 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 artifacts 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 at 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 Palaeoanthropology, 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 Quilbas 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 Reparaturn, 1995). At Pajasola a former research student and colleague, Dr. Josefina Zapata did good 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 was involved in the examination of doctoral candidates at several universities.

In the Biology Faculty at Murcia University a modern, well-equipped Anthropology Research Laboratory and a spacious Teaching Laboratory were equipped, thanks to a special Spanish government grant to complement my appointment as foundation professor, 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 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.

Thanks to the generosity of Torre Pacheco town council, with which MUPANTQUAT has signed an agreement of collaboration, we can now use a new laboratory that in 2016 was assigned for Sima de las Palomas research in a spanking new building that houses the municipal police department, a library facility for high-school students, and a large meeting room. We fitted out the lab in 2017 and expect to be working in it during our forthcoming 2019 field season at Sima de las Palomas. Our MUPANTQUAT association has invested considerable money in acquiring new equipment: a water pump, 12 new geological sieves, a field microscope, a strong safe cabinet for preserving the Sima de las Palomas Neanderthal skeletons, and a compressor and vibroscalpels to clean them with.

Our research enjoys a close relationship with scientists in various Murcia 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 on “Quaternary technology, anthropology and ecology” was established at Murcia University, under my direction from 1992 to 2013, which had both local colleagues and external collaborators (officially-recognised as such by Murcia University) who are attached to other institutions (Barcelona University; Cartagena Politechnic University; Instituto de Patrimonio Histórico of the Murcian regional administration, etc.). This Research Group merged on January 1st 2013 with another Murcia University Research Group concerned with palaeoecology and palaeoenvironmental studies directed by Dr. José Carrón García, Professor of Evolutionary Botany. The new entity is called the “Ecce Homo: Quaternary Palaeoecology, Palaeoanthropology and Technology” Research Group. Dr. Carrón is an editor of Quaternary Science Reviews and editor-in-chief of the Review of Paleobotany and Palynology; he heads the new group officially, though within it the two former groups have each retained de facto autonomy and elect their own separate coordinators for their respective spheres of research interests and activities; Dr. María Haber Uriarte who, together with archaeologist Mariano López Martínez, co-directs with me the excavations at Cueva Negra and Sima de las Palomas, is the coordinator of the Palaeoanthropology & Technology section.

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. 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 volume that I am preparing about the rock paintings of the Murcian Region which includes a reconsideration of my excavations at the Barranco de los Grajos which I carried out 40 years ago.

MEMBERSHIP OF SOCIETIES AND ASSOCIATIONS
Fellowship:
Society of Antiquaries of London
Royal Anthropological Institute of Great Britain
Society of Antiquaries of Scotland
Emeritus membership:
American Association of Physical Anthropologists
Membership:
Prehistoric Society of Great Britain
European Society for the Study of Human Evolution
Hugo Obermaier Society for Quaternary Research and Archaeology of the Stone Age (Hugo Obermaier-Gesellschaft für Erforschung des Eiszeitalters und der Steinzeit e.V.)
Cueva Negra del Estrello del Rio Quipar at La Encarnación near Caravaca de la Cruz, Murcia.

Cueva Negra overlooking the R. Quijar, a R Segura tributary, is an upland rock-shelter 75 km N of the Mediterranean coast and 110 W of the Segura river-mouth. It contains undisturbed sediment 5m deep assigned by magnetostratigraphy to >0.78 Ma (0.7 million years ago). Therefore the deposit is slightly earlier than the 0.78 Ma boundary between the Matuyama and Brunhes magnetostratigraphs and regarded as separating the Early Pleistocene from the Middle Pleistocene. Optimally stimulated sediment luminescence implies an age >0.5 Ma and mammalian biochronology (notably, of Avicid rodents) correlates with extinct species known between 1 and 0.6 Ma. Remains include teeth of Homo (of heidelbergensis), an Acheulean limestone handaxe, and small chert, limestone or quartzite artifacts, knapped on site, often by bipolar reduction or repetitive centripetal flaking of small discoidal cores. Retouched artifacts include small irregular chert fragments, resembling chert at an adjacent conglomerate outcrop according to laser-ablation inductively-coupled plasma mass-spectrometry of 19 lanthanide elements, though some chert was likely procured ~25 km away (one radiolarite artifact from ~40 km). Mammals, birds (including waterfowl), reptiles, amphibians and fish corroborate pollen typical of mild (MIS-21?), damp, fluvio-lacustrine environments. The fauna includes mammoth, rhinoceros, giant deer and bison. Evidence of fire in a deep, sealed layer includes thermally-altered, lustreless chert, with pot-lid fractures and conjoined splitting of long-bone spalling typical of circumferential shrinkage after thermal volatilization of organic materials. Taphonomical analysis and electron microprobe analysis of bone fragments attribute discolouration to burning, not to post-depositional mineral staining. Sediment geochemistry and thin-section micromorphology suggest thermal alteration; Fourier Transform infrared spectroscopy and electron spin resonance analysis of chert and bone imply firing temperatures >400ºC <700/800ºC. Fire ~0.8 Ma supported by thermal shock; charred burnt bone, and white calcined fragments showing conjoined lengthwise long-bone spalling typical of circumferential shrinkage.

Cueva Negra has both the earliest evidence of fire known in Europe and the oldest Neanderthal cognitive versatility, techno-manual dexterity, and palaeoeconomic extractive behaviour in long-vanished Western European palaeoecological and palaeobiogeographical contexts showing noteworthy biodiversity. Cueva Negra shows how the earliest evidence of fire known in Europe and the oldest Neanderthal presence in Western Mediterranean Europe correspond.
**Evolution of procedural memory in Pleistocene humans**


**Publications:**


In preparation for publication (symposium): M.J.Walker (Editor) *Evolution del Cerebro Humano y la Arqueología Cognitiva* (Proceedings of meeting held at Real Casino de Murcia, Murcia, Sept. 30-Oct. 1, 2017): contributors E. Aguirre Enríquez (Introductory Address); M. Caparros “Evolución del endocraneo en el género Homo - enfoque filogenético”; H.M. Manrique “¿Es la capacidad de imaginar lo que nos hace sapiens?”, A. Gomila “Singularidades del cerebro humano desde hace dos millones de años”; M.J. Walker (a) “Stone Tools and the origins of human technology: affordances and constraints”; M.J. Walker (b) “Observation learning and evolution of the human brain; aspects of neurophysiology and neuroanatomy; mirror-neuron circuitry and shared attention; the relation between working memory and longterm procedural memory; prospective memory and multi-tasking”; M.J. Walker (c) “On wishful thinking: Did Palaeolithic humans customarily engage in symbolic behaviour before 40,000 years ago?"


Publication: In preparation; see also C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc

M.J. Walker (presenter), M. López-Martínez, M. Haber-Urriate, A. López-Jiménez, J. Ortega-Rodríguez (poster) "Evidence of fire at the late Early Pleistocene Palaeolithic and hominin site of Cueva Negra del Estrecho del Río Quípar, Caravaca, Murcia, SE Spain", in XVII Congress of the International Union of Prehistoric and Protohistoric Sciences, Burgos, September 7-17, 2014, at Burgos University, Spain, invited talk in Session B53-The Archaeology of Early Fire Use (September 2nd).

Publication: In preparation; see also C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc

M.J. Walker (presenter), M.V. López-Martínez, M. Haber-Urriate, J. Ortega-Rodríguez (poster) "Neanderthal attention to the dead at Sima de las Palomas del Cabezo Gordo (Murcia, Spain)" XVII Congress of the International Union of Prehistoric and Protohistoric Sciences, Burgos, September 7-17, 2014, at Burgos University, Spain, invited poster in Session A21a-Neandertal On Their Own Terms: New Perspectives For The Study Of Middle Palaeolithic Behaviour (September 5th).

Publication: In preparation; see also C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc


M.J. Walker, as Benjamín Meaker Visiting Professor of Bristol University gave the following invited presentations in the Bristol University, Archaeology and Anthropology Research Seminar Series: "Archaeological excavations at Sima de las Palomas del Cabezo Gordo (Murcia, SE Spain) and palaeoanthropological research into its 50,000 year-old Neanderthal remains", Public Lecture, Fruit Lecture Theatre, School of Geography, Bristol University, June 6th 2014 and in University of Bristol University Institute of Advanced Studies Research Student Seminar on "Cognitive evolutionary in Pleistocene Homo: Biological and palaeoanthropological perspectives on the role of 'haptic' working memory in the evolution of long-term procedural memory", Department of Archaeology, Bristol University June 4th 2014.

M.J. Walker gave the talk "Pre-Neandertals and Neandertals: 25 years of research at Cueva Negra del Estrecho del Río Quípar and Sima de las Palomas del Cabezo Gordo (Murcia, Spain)" at the invitation of Reading University Archaeology Department on June 9th 2014, at the invitation of York University Archaeology Department on June 11th 2014, at the invitation of University College Institute of Archaeology on June 12th 2014, at the invitation of Oxford University Institute of Archaeology "Quaternary Studies Seminar Series" on June 19th 2014.

M.J. Walker gave the lecture, at the invitation of the Exc&M. Aty. de Torre Pacheco at its Centro de Artes Escénicas CAES: "¿Cómo era la familia neandertal de la Sísim de las Palomas?" on June 22nd 2014.


J.Gibert Clols: "La Sima de las Palomas del Cabezo Gordo (Dolores de Pacheco, Torre Pacheco, Murcia): campaña del 2001" en XIII Jornadas de Patrimonio Histórico y Arqueología Regional, May 22-25 2001 at Centro Cultural "Las Claras" de CajaMurcia, Murcia. Publication: (FT) see C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc. (2002)


"Excavations at the early Middle Pleistocene site of Cueva Negra del Estrecho del Río Quípar and the early Upper Pleistocene site of Sima de las Palomas del Cabezo Gordo" in XV Jornadas de Patrimonio Histórico y Arqueología Regional de la Región de Murcia November 24-28 2004, Museo Arqueológico de Murcia, Murcia Publication: (FT) see C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc (2004)

J.I.Serrano Izquierdo: "La Cueva Negra del Estrecho del Quípar (La Encarnación, Caravaca de la Cruz, Murcia): campaña del 2000" in XII Jornadas de Arqueología Regional, September 19-21 2001, at the Universidad de Murcia, Murcia, NP

J.Gibert Clols: "Two Neanderthal Man sites from Murcia, S.E. Spain" in XIV Congress of the International Union of Prehistoric and Protohistoric Sciences September 2-8 2001, at the Université de Liège, Liège. Publication: (FT) see C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc. (2001)
M.J. Walker, J.Gibert Clols: "Dos yacimientos murcianos con restos neandertalenes: La Sima de las Palomas del Cabezo Gordo y la Cueva Negra del Estrecho del Quijar de La Encarnación" in XXIX Congreso Nacional de Arqueología, Cartagena, Octubre 28-31 1997 held at the Museo Arqueológico Municipal, Cartagena and Universidad Politécnica de Cartagena. Publication: (FT) see C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc. (1999)


M.J. Walker: "La Cueva Negra del Estrecho de La Encarnación, Caravaca de la Cruz, Murcia); Campaña de 1.996" in VIII Jornadas de Arqueología Regional May 13-16 1997 held at the Museo Arqueológico Municipal "Emeterio Cuadrado", Mula, and Colegio Official de Arquitectos, Murcia. Publication: (FT) see B. ARTICLES: B-2. ARTICLES IN SPANISH-LANGUAGE JOURNALS, YEARBOOKS, ANNUALS, etc (2002)


M.J. Walker: "Two new Neanderthal sites in S.E. Spain: Sima de las Palomas and Cueva Negra de La Encarnación" in Oxford University "Donald Baden Powell" Quaternary Research Centre Seminar Series, November 20 1996, at Oxford University "Donald Baden Powell" Quaternary Research Centre NP

M.J. Walker: "El problema del Neandertal y del hombre moderno" in La Evolución Humana Y La Paleoantropología, September 23.-27 1996, Universidad del Mar de la Universidad de Murcia, held at Dolores de Pacheco, Murcia. NP

M.J. Walker: "El problema del Neandertal y del hombre moderno" in La Evolución Humana Y La Paleoantropología, September 23.-27 1996, Universidad del Mar de la Universidad de Murcia, held at Dolores de Pacheco, Murcia. NP

M.J. Walker: "Los homínidos del Pleistoceno Medio de Java" in La Evolución Humana Y La Paleoantropología, September 23.-27 1996, Universidad del Mar de la Universidad de Murcia, held at Dolores de Pacheco, Murcia. NP


M.J. Walker: "Ex Africa semper aliquid novum" in La Evolución Humana, Homenaje al Profesor Philip V. Tobias, F.R.S., May 6-8 1996, at the International Symposium held at the Universidad de las Islas Baleares, Palma de Mallorca, Spain. NP


M.J. Walker, J.Gibert Clols: "New finds of hominids and Mousterian tools at the Murcian sites of Sima de las Palomas del Cabezo Gordo and Cueva Negra de La Encarnación" in International Congress Of Human Palaeontology: Homínids And Their Environment In The European Middle Pleistocene, Orce, Granada, September 4-8 1995 held at the Palacio de los Seguras, Orce, Granada. Publications: (GT) see C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc. (1999); see also (A) C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc. (1995)


M.J. Walker, J.Gibert: "Fourier series harmonic descriptors of diaphyseal cross-sectional outlines" in International Congress Of Human Palaeontology: Hominids And Their Environment In The European Middle Pleistocene, Orce, Granada, September 4-8 1995 held at the Palacio de los Seguras, Orce, Granada. Publication: (FT) see C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc. (1999)

M.J. Walker, J.L.Santamaría, A.Bouquet, C.Aller, P.García-Prieto, J.Gibert: in "Las manídbulas del Cabezo Gordo (Murcia)" International Congress Of Human Palaeontology: Hominids And Their Environment In The European Middle Pleistocene, Orce, Granada, September 4-8 1995 held at the Palacio de los Seguras, Orce, Granada. Publication: (FT) see C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc. (1999)


1974 M.J. Walker: "Schematized' rock markings as archaeological evidence" in Australian Institute of Aboriginal Studies International Biennial Conference, April 1974, held at The Australian Institute of Aboriginal Studies, Canberra, ACT, Australia. Publication: (FT) see C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc. (1977)

1974 M.J. Walker: "The persistence of Upper Palaeolithic toolkits into the early south-east Spanish Neolithic" in Australian Institute of Aboriginal Studies International Biennial Conference, April 1974, held at The Australian Institute of Aboriginal Studies, Canberra, ACT, Australia. Publication: (FT) see C. CONTRIBUTIONS IN BOOKS, ACTS OF MEETINGS, etc. (1977)

1974 M.J. Walker: "Neolithic and chalcolithic pottery of S.E. Spain" in Symposium On Ceramics And Trade In Archaeology, 1974, held at the Department of Archaeology, University of Sydney, Sydney, New South Wales, Australia. Page proofs corrected and returned, but this symposium volume never saw the light of day because the Department of Archaeology never found the money to pay its printer!


1964 M.J. Walker: "The mechanism of muscular contraction" Annual Conference of the British Association for the Advancement of Science, August 1964, held at the University of Aberdeen, Aberdeen, U.K., received First Prize for the Endeavour Prize Essay. Publication: (FT) see B. ARTICLES: B-1. ARTICLES IN SIGNIFICANT JOURNALS (1965)