THE MATTER OF PREHISTORY: PAPERS IN HONOR OF ANTONIO GILMAN GUILLÉN

BIBLIOTHECA PRAEHISTORICA HISPANA, XXXVI

THE MATTER OF PREHISTORY: PAPERS IN HONOR OF ANTONIO GILMAN GUILLÉN

Edited by
Pedro Díaz-del-Río
Katina Lillios
Inés Sastre

CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS
Madrid, 2020

Catálogo de publicaciones de la Administración General del Estado:
https://cpage.mpr.gob.es

Editorial CSIC: *http://editorial.csic.es* (correo: *publ@csic.es*)

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN
CSIC CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS
EDITORIAL CSIC

FSC MIXTO Papel FSC® C016626

ISBN: 978-84-00-10721-5
e-ISBN: 978-84-00-10722-2
NIPO: 833-20-189-7
e-NIPO: 833-20-190-X
Depósito Legal: M-30504-2020

Maquetación, impresión y encuadernación: Estudios Gráficos Europeos S.A.
Impreso en España. *Printed in Spain*

En esta edición se ha utilizado papel ecológico sometido a un proceso de blanqueado ECF, cuya fibra procede de bosques gestionados de forma sostenible.

ÍNDICE

List of Contributors 11

I. The Power of Reason, the Matter of Prehistory. Honoring Antonio Gilman, Pedro Díaz-del-Río, Katina Lillios, Inés Sastre 17

II. Modes of Production Revisited, Timothy Earle, Kristian Kristiansen 29

III. Towards Archaeological Theory: A History, Margarita Díaz-Andreu 43

IV. Resistencia política e identidad relacional. Los casos de los awá (Brasil) y gumuz y dats'in (Etiopía), Almudena Hernando 57

V. Perspectives on the Biogeographic and Cultural Adaptations of Early Humans during the First Intercontinental Dispersals, Ignacio de la Torre, Alfonso Benito-Calvo, Faysal Bibi, Jackson Njau, Shuwen Pei, Florent Rivals, Haowen Tong, Kevin Uno, Sara Varela, Xiujie Wu 73

VI. The Middle Paleolithic Revolution, the Origins of Art, and the Epistemology of Paleoanthropology, João Zilhão 85

VII. Explorando los sesgos en las cronologías radiocarbónicas. La transición Mesolítico-Neolítico a la luz de la base de datos de radiocarbono de la prehistoria reciente ibérica de Antonio Gilman, Juan M. Vicent García, Antonio Uriarte González, Carlos Fernández Freire, Pedro Díaz-del-Río Español 105

VIII. Los caminos de la desigualdad. Releyendo la prehistoria reciente del noroeste ibérico, César Parcero-Oubiña, Xosé-Lois Armada, Felipe Criado-Boado 123

IX. Where Is the State in Portuguese Later Prehistory? Katina T. Lillios 145

X. The Human Position: The Potential of Bioarchaeology for Studies of Inequality in Iberian Late Prehistory, Jess Beck 153

XI. Implantación y desarrollo de las estrategias agropecuarias en el sureste: la depresión de Vera (Almería), María Dolores Camalich Massieu, Francisco Javier Rodríguez Santos, Jonathan Santana Cabrera, José Luis Caro Herrero, Juan Antonio Martos Romero, Carmen Cacho Quesada, Dimas Martín Socas 173

XII. The Chronology of the Structural Changes between the Copper and Bronze Ages in Iberia, Vicente Lull, Rafael Micó, Cristina Rihuete Herrada, Roberto Risch 193

XIII. Cultural Resistance to Social Fragmentation: The Continuity and Reuse of Megalithic Monuments during the Argaric Bronze Age in Southeastern Iberia, Gonzalo Aranda Jiménez, Margarita Sánchez Romero, Marta Díaz-Zorita Bonilla, Águeda Lozano Medina, Javier Escudero Carrillo, Lara Milesi 213

XIV. Reciclado o reutilización del metal en la producción metalúrgica argárica, Ignacio Montero-Ruiz, Mercedes Murillo-Barroso, Salvador Rovira-Llorens 235

XV. The Origins of Social Inequality in Prehistoric Europe: Rituals and Monuments to Control Wealth in the Bronze Age of La Mancha, Luis Benítez de Lugo Enrich, Miguel Mejías Moreno, José Antonio López-Sáez, César Esteban 249

XVI. Excepcionalidad espacial, actividad metalúrgica y molinos de granito en Carricastro (Tordesillas, Valladolid). Una lectura sobre los grandes yacimientos 'encumbrados' Cogotas I del valle medio del Duero, Marcos García García, Germán Delibes de Castro, José Antonio Rodríguez Marcos 261

XVII. Project Au: The Archaeology of Gold, Alicia Perea 281

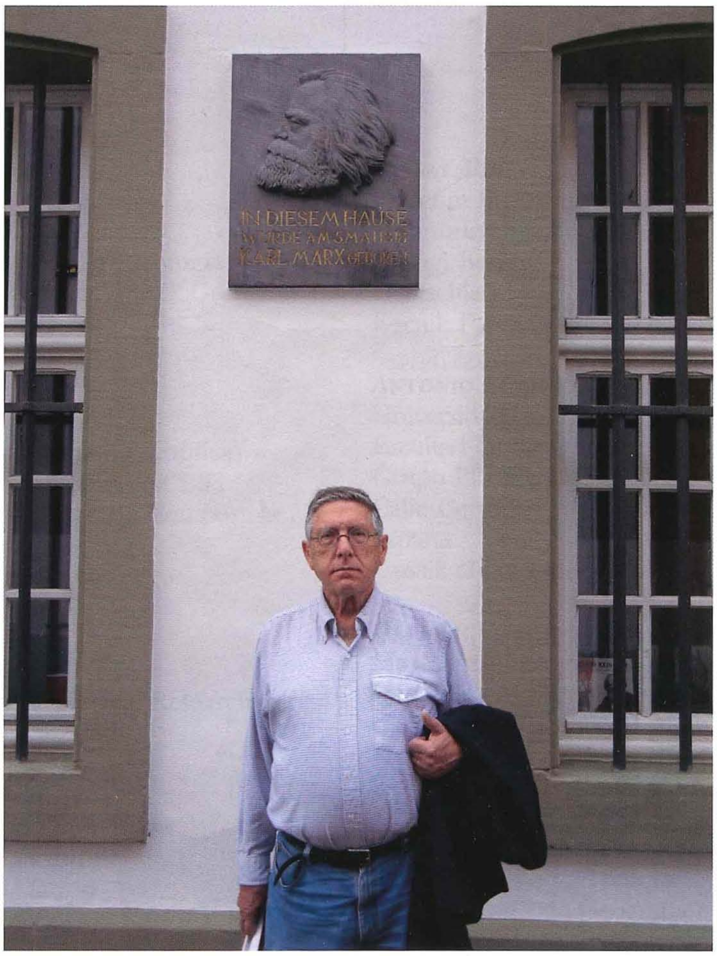
XVIII. De la complejidad del registro de superficie hacia una historia agraria del paisaje. El entorno de Cancho Roano como estudio de caso, Victorino Mayoral Herrera, Sebastián Celestino Pérez, Sabah Walid Sbeinati 291

XIX. Sociedades 'germánicas'. El Bajo Ebro en la primera Edad del Hierro, Antonio Blanco González 307

XX. La escultura ibérica y sus implicaciones territoriales, Teresa Chapa Brunet, María Isabel Martínez Navarrete 323

XXI. Costes de sumisión frente a costes de rebelión. Por qué no hay jerarquización social en el Noroeste de la Península Ibérica hasta la dominación romana, Inés Sastre, Brais X. Currás, F. Javier Sánchez-Palencia, Almudena Orejas 337

XXII. Dinámicas internas e implicaciones para los estudios austronesios. Aproximación preliminar a la secuencia arqueológica taiwanesa a través del análisis geoespacial de los yacimientos prehistóricos, María Cruz-Berrocal, Antonio Uriarte González, María Sebastián López, Elena Serrano Herrero, Chenghwa Tsang 345



Antonio Gilman Guillén
photographed by Benedicte Gilman
at the Karl Marx House museum, Trier (Germany),
5 august 2012

LIST OF CONTRIBUTORS

Gonzalo Aranda Jiménez
Universidad de Granada
Facultad de Filosofía y Letras
Departamento de Prehistoria y Arqueología
Campus Universitario de Cartuja, 18071 Granada, España
E-mail: garanda@ugr.es

Xosé-Lois Armada
Consejo Superior de Investigaciones Científicas
Instituto de Ciencias del Patrimonio, INCIPIT
Avda. de Vigo s/n, 15705 Santiago de Compostela
España
E-mail: xose-lois.armada@incipit.csic.es

Jess Beck
University of Cambridge
McDonald Institute for Archaeological Research
Downing Street Cambridge CB2 3ER
UK
E-mail: jessicabeck@vassar.edu

Luis Benítez de Lugo Enrich
Universidad Autónoma de Madrid
Facultad de Filosofía y Letras
Departamento de Prehistoria y Arqueología
Crta. Colmenar Viejo km. 15, 28049 Madrid
España
E-mail: luis.benitezdelugo@uam.es

Universidad Nacional de Educación a Distancia
Dpto. de Geografía e Historia
(Centro Asociado de Ciudad Real)
Calle Seis de Junio 55, 13300 Valdepeñas, Ciudad Real
España
E-mail: lbenitez@valdepenas.uned.es

Alfonso Benito-Calvo
Centro Nacional de Investigación sobre la Evolución Humana
Paseo Sierra de Atapuerca 3, 09002 Burgos
España
E-mail: alfonso.benito@cenieh.es

Faysal Bibi
Museum für Naturkunde
Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Berlin
Deutschland
E-mail: Faysal.Bibi@mfn.berlin

Antonio Blanco González
Universidad de Salamanca
Facultad de Geografía e Historia
Grupo PREHUSAL
Calle Cervantes s/n, 37002 Salamanca
España
E-mail: ablancoglez@usal.es

Carmen Cacho Quesada
Museo Arqueológico Nacional
Departamento Prehistoria
Calle Serrano 13, 28001 Madrid
España
E-mail: carmen.cacho@cultura.gob.es

María Dolores Camalich Massieu
Universidad de La Laguna
Departamento de Geografía e Historia,
UDI Prehistoria, Arqueología e Historia Antigua
Aptdo. 456, 38200 La Laguna, Tenerife
España
E-mail: dmassieu@ull.edu.es

José Luis Caro Herrero
Universidad de Málaga
Departamento de Lenguajes
y Ciencias de la Computación
Complejo Tecnológico, Campus de Teatinos, 29071 Málaga
España
E-mail: jlcaro@uma.es

Sebastián Celestino Pérez
Consejo Superior de Investigaciones Científicas
Instituto de Arqueología-Mérida
Plaza de España 15, 06800 Mérida
España
E-mail: scelestino@iam.csic.es

Teresa Chapa Brunet
Universidad Complutense de Madrid
Facultad de Geografía e Historia
Departamento de Prehistoria, Historia Antigua y Arqueología
Calle Profesor Aranguren 2, 28040 Madrid
España
E-mail: tchapa@ucm.es

Felipe Criado-Boado
Consejo Superior de Investigaciones Científicas
Instituto de Ciencias del Patrimonio, INCIPIT
Avda. de Vigo s/n, 15705 Santiago de Compostela
España
E-mail: felipe.criado-boado@incipit.csic.es

María Cruz-Berrocal
Universidad de Cantabria.
Instituto Internacional de Investigaciones Prehistóricas de Cantabria, IIIPC
Gobierno de Cantabria,
Universidad de Cantabria y Santander
Avenida de los Castros s/n, 39005 Santander
España
E-mail: Maria.cruzberrocal@unican.es

Brais X. Currás
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: brais.curras@cchs.csic.es

Germán Delibes de Castro
Universidad de Valladolid
Departamento de Prehistoria, Arqueología, Antropología Social y Ciencias y Técnicas Historiográficas
Plaza del Campus s/n, 47011Valladolid
España
E-mail: delibes@fyl.uva.es

Pedro Díaz-del-Río Español
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: pedro.diazdelrio@cchs.csic.es

Margarita Díaz-Andreu
Institució Catalana de Recerca i Estudis Avançats, ICREA
Pg. Lluís Companys 23, 08010 Barcelona
Espanya

Universitat de Barcelona
Departament de Història i Arqueologia
Calle Montalegre 6, 08001 Barcelona
Espanya

Marta Díaz-Zorita Bonilla
Universität Tübingen
Institut für Ur- und Frühgeschichte und Archäologie des Mittelalters
Geschwister-Scholl-Platz, 72074 Tübingen
Deutschland
E-mail: marta.diaz-zorita-bonilla@uni-tuebingen.de

Timothy Earle
Department of Anthropology
Northwestern University
1810 Hinman Ave
Evanston, Illinois 60206.
USA
E-mail: tke299@northwestern.edu

Javièr Escudero Carrillo
Universität Tübingen
Institut für Ur- und Frühgeschichte und Archäologie des Mittelalters
Geschwister-Scholl-Platz, 72074 Tübingen
Deutschland
E-mail: javier.escudero-carrillo@uni-tuebingen.de

César Esteban
Instituto de Astrofísica de Canarias
Calle Vía Láctea s/n. 38200 La Laguna.
Santa Cruz de Tenerife
España
E-mail: cel@iac.es

Universidad de La Laguna
Facultad de Ciencias
Departamento de Astrofísica
Avda. Astrofísico Francisco Sánchez s/n, 38206 La Laguna, Santa Cruz de Tenerife
España

Carlos Fernández Freire
Consejo Superior de Investigaciones Científicas
Centro de Ciencias Humanas y Sociales
Unidad SIGyHD
Calle Albasanz 26-28, 28037 Madrid
España

Marcos García García
Servicio Español para la Internacionalización de la Educación
Ministerio de Universidades
Calle General Oraa 55, 28006 Madrid
España
E-mail: marcggarc@gmail.com

Almudena Hernando
Universidad Complutense
Facultad de Geografía e Historia
Departamento de Prehistoria, Historia Antigua y Arqueología
Calle Profesor Aranguren s/n, 28040 Madrid
España
E-mail: hernando@ghis.ucm.es

Kristian Kristiansen
Institutionen för Historiska Studier
Göteborgs universitet
Box 200, 40530 Göteborg
Svenska
E-mail: kristian.kristiansen@archaeology.gu.se

Katina Lillios
The University of Iowa
Department of Anthropology
114 Macbride Hall, Iowa City, Iowa 52242
USA
E-mail: katina-lillios@uiowa.edu

José Antonio López-Sáez
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: joseantonio.lopez@cchs.csic.es

Águeda Lozano Medina
Universidad de Granada
Facultad de Filosofía y Letras
Departamento de Prehistoria y Arqueología
Campus Universitario de Cartuja, 18071 Granada
España
E-mail: aguedalozanomed@gmail.com

Vicente Lull
Universitat Autònoma de Barcelona
Facultat de Filosofia i Lletres
Departament de Prehistòria
Edifici B, 08193 Bellaterra, Barcelona
Espanya
E-mail: Vicenc.Lull@uab.cat

Dimas Martín Socas
Universidad de La Laguna
Departamento de Geografía e Historia,
UDI Prehistoria, Arqueología e Historia Antigua
Aptdo. 456, 38200 La Laguna, Tenerife
España
E-mail: dsocas@ull.edu.es

María Isabel Martínez Navarrete
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Departamento de Arqueología y Procesos Sociales
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: isabel.martinez@cchs.csic.es

Juan Antonio Martos Romero
Museo Arqueológico Nacional
Departamento Prehistoria
Calle Serrano 13, 28001 Madrid
España
E-mail: juanantonio.martos@cultura.gob.es

Victorino Mayoral Herrera
Consejo Superior de Investigaciones Científicas
Instituto de Arqueología-Mérida
Plaza de España 15, 06800 Mérida
España
E-mail: vmayoral@iam.csic.es

Miguel Mejías Moreno
Instituto Geológico y Minero de España
Calle Ríos Rosas 23, 28003 Madrid
España
E-mail: m.mejias@igme.es

Rafael Micó
Universitat Autònoma de Barcelona
Facultat de Filosofia i Lletres
Departament de Prehistòria
Edifici B, 08193 Bellaterra, Barcelona
Espanya
E-mails: Rafael.Mico@uab.cat

Lara Milesi
Universidad de Granada
Facultad de Filosofía y Letras
Departamento de Prehistoria y Arqueología
Campus Universitario de Cartuja, 18071 Granada
España
E-mail: lmilesigarcia@gmail.com

Ignacio Montero-Ruiz
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: ignacio.montero@cchs.csic.es

Mercedes Murillo-Barroso
Universidad de Granada
Facultad de Filosofía y Letras
Departamento de Prehistoria y Arqueología
Campus Universitario de Cartuja, 18071 Granada
España
E-mail: murillobarroso@ugr.es

Jackson Njau
Indiana University
Department of Earth and Atmospheric Sciences
1001 E Tenth Street, Bloomington, IN 47405
USA
E-mail: jknjau@indiana.edu

Almudena Orejas
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: almudena.orejas@cchs.csic.es

César Parcero-Oubiña
Consejo Superior de Investigaciones Científicas
Instituto de Ciencias del Patrimonio, INCIPIT
Avda. de Vigo s/n, 15705 Santiago de Compostela
España
E-mail: cesar.parcero-oubina@incipit.csic.es

Shuwen Pei
Chinese Academy of Sciences
Institute of Vertebrate Paleontology
and Paleoanthropology
Key Laboratory of Vertebrate Evolution
and Human Origins
Beijing 100044
China
E-mail: peishuwen@ivpp.ac.cn

Alicia Perea
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mails: alicia.perea@cchs.csic.es; aliciaperea.auproj-ect@gmail.com

Cristina Rihuete Herrada
Universitat Autònoma de Barcelona
Facultat de Filosofia i Lletres
Departament de Prehistòria
Edifici B, 08193 Bellaterra, Barcelona
Espanya
E-mail: Cristina.Rihuete@uab.cat

Roberto Risch
Universitat Autònoma de Barcelona
Facultat de Filosofia i Lletres
Departament de Prehistòria
Edifici B, 08193 Bellaterra, Barcelona
Espanya
E-mail: Robert.Risch@uab.cat

Florent Rivals
Institució Catalana de Recerca i Estudis Avançats, ICREA
Passeig Lluís Companys 23, 08010 Barcelona
Espanya
E-mail: frivals@iphes.cat

Institut Català de Paleoecologia Humana i Evolució Social, IPHES
Zona Educacional 4, Campus Sescelades URV
(Edifici W3), 43007 Tarragona
Espanya

Universitat Rovira i Virgili
Àrea de Prehistòria
Avinguda de Catalunya 35, 43002 Tarragona
Espanya

José Antonio Rodríguez Marcos
Universidad de Burgos
Departamento de Historia, Geografía y Comunicación
Calle Paseo de Comendadores, 09001 Burgos
E-mail: jrmarcos@ubu.es

Francisco Javier Rodríguez Santos
Universidad de Cantabria / Gobierno de Cantabria
Banco Santander Instituto Internacional
de Investigaciones Prehistóricas de Cantabria
Avenida Los Castros 52, 39005 Santander
España
E-mail: javirosantos@gmail.com

Salvador Rovira-Llorens
(jubilado)
Museo Arqueológico Nacional
Departamento Prehistoria
Calle Serrano 13, 28001 Madrid
España
E-mail: S_rovirallorens@hotmail.com

F. Javier Sánchez-Palencia
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: javier.spalencia@cchs.csic.es

Margarita Sánchez Romero
Universidad de Granada
Facultad de Filosofía y Letras
Departamento de Prehistoria y Arqueología
Campus Universitario de Cartuja, 18071 Granada
España
E-mail: marsanch@ugr.es

Jonathan Santana Cabrera
Durham University
Department of Archeology
South Rd. DH1 3LE Durham
United Kingdom
E-mail: jonathan.a.santana-cabrera@durham.ac.uk

Inés Sastre
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: ines.sastre@cchs.csic.es

María Sebastián López
Universidad de Zaragoza
Calle Pedro Cerbuna 12, 50009 Zaragoza
España
E-mail: msebas@unizar.es

Elena Serrano Herrero
Universidad de Cantabria
Instituto Internacional de Investigaciones Prehistóricas de Cantabria, IIIPC
Gobierno de Cantabria, Universidad de Cantabria y Santander
Avenida de los Castros, s/n. Santander 39005
España
E-mail: elena.serrano@unican.es

Haowen Tong
Chinese Academy of Sciences
Institute of Vertebrate Paleontology
and Paleoanthropology
Key Laboratory of Vertebrate Evolution and Human Origins
Beijing 100044
China
E-mail: tonghaowen@ivpp.ac.cn

Ignacio de la Torre
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Departamento de Arqueología y Procesos Sociales
Calle Albasanz 26-28, 28037 Madrid
España

Chenghwa Tsang
National Tsing Hua University
No. 101, Section 2, Kuang-Fu Road, Hsinchu, Taiwan 30013
R.O.C.
E-mail: chtsang@gate.sinica.edu.tw

Kevin Uno
Columbia University
Lamont-Doherty Earth Observatory
Division of Biology and Paleo Environment
USA
E-mail: kevinuno1@gmail.com

Antonio Uriarte González
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: antonio.uriarte@cchs.csic.es

Sara Varela
Museum für Naturkunde
Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Berlin
Deutschland
E-mail: Sara.Varela@mfn.berlin

Juan M. Vicent García
Consejo Superior de Investigaciones Científicas
Instituto de Historia
Calle Albasanz 26-28, 28037 Madrid
España
E-mail: juan.vicent@cchs.csic.es

Sabah Walid Sbeinati
Underground Arqueología
España
E-mail: sabah@underground-arqueologia.com

Xiujie Wu
Chinese Academy of Sciences
Institute of Vertebrate Paleontology
and Paleoanthropology
Key Laboratory of Vertebrate Evolution
and Human Origins
Beijing 100044
China
E-mail: wuxiujie@ivpp.ac.cn

João Zilhão
Universitat de Barcelona
Facultat de Geografia i Història
Departament de Prehistòria,
Història Antiga i Arqueologia
Seminari d'Estudis i Recerques Prehistòriques
(SGR2017-00011)
Espanya
E-mail: joao.zilhao@ub.edu

Centro de Arqueologia da Universidade de Lisboa, UNIARQ
Faculdade de Letras 1600, 214 Lisboa
Portugal

Institució Catalana de Recerca i Estudis Avançats, ICREA
Passeig Lluís Companys 23, 08010 Barcelona
Espanya

XV.

THE ORIGINS OF SOCIAL INEQUALITY IN PREHISTORIC EUROPE: RITUALS AND MONUMENTS TO CONTROL WEALTH IN THE BRONZE AGE OF LA MANCHA

Luis Benítez de Lugo Enrich / Miguel Mejías Moreno
José Antonio López-Sáez / César Esteban

Abstract

The studies of Professor A. Gilman and his team, carried out since the eighties on the settlement of eastern La Mancha, have served to interpret the landscape and society of this geographical area during recent prehistory. His work has allowed us to advance knowledge about the role that the control of territory, water and capital played throughout the process of the emergence of social inequality in prehistoric Europe.

With this work as a foundation, recent contributions from the fields of paleohydrogeology, paleoecology and archaeoastronomy provide insights into the solutions that Chalcolithic communities adopted with the arrival of the environmental crisis caused by the 4.2 ka cal BP climate event. The resilient society of the Bronze Age of La Mancha sought groundwater to create, for the first time in Europe, a regional network of large supply wells in a region where a cattle ranch was developed mainly sheep. As a means of legitimizing, controlling, and protecting their access to these wells, they monumentalized the landscape and created a solar cult linked to ancestral rites. Complex ceremonial centers with burial mounds and sun-oriented corridors were built on strategic locations and were used for at least a millennium, as in the case of Castillejo del Bonete (Terrinches, Ciudad Real).

This work presents the current state of knowledge about the Bronze Age of La Mancha, an exceptional culture that Professor A. Gilman helped to define.

Keywords: prehistoric archaeology, paleohydrogeology, paleoclimate, archaeoastronomy.

Resumen

Los estudios del profesor A. Gilman y su equipo, desarrollados desde los años ochenta sobre el poblamiento de La Mancha Oriental, han servido para interpretar el paisaje y la sociedad de esta zona geográfica durante la prehistoria reciente. Su trabajo ha permitido avanzar en el conocimiento acerca del papel desempeñó el control del territorio, del agua y del capital a lo largo del proceso de aparición de la desigualdad social en la Europa prehistórica.

Sobre esta base, las recientes contribuciones de los campos de paleohidrogeología, paleoecología y arqueoastronomía aportan información sobre las soluciones que las comunidades calcolíticas tuvieron que adoptar con la llegada de la crisis ambiental causada por el evento climático del 4.2 ka cal BP. La resiliente sociedad de la Edad del Bronce de La Mancha buscó agua subterránea para crear una red regional de grandes pozos de suministro en una región en la que se desarrollaba una ganadería principalmente ovina, por primera vez en Europa. Para controlar y proteger sus recursos, utilizaron como argumentos la monumentalización del paisaje, un culto solar y la legitimación que proporciona el rito a los antepasados. Los complejos centros ceremoniales con túmulos funerarios y corredores orientados al sol se construyeron en lugares estratégicos y se utilizaron durante un milenio al menos, como es el caso de Castillejo del Bonete (Terrinches, Ciudad Real).

Este trabajo presenta el estado actual del conocimiento sobre la Edad de Bronce de La Mancha, una cultura excepcional que el profesor A. Gilman ayudó a definir.

Palabras clave: arqueología prehistórica, paleohidrogeología, paleoclima, arqueoastronomía.

15.1. INTRODUCTION

Motillas are a type of archaeological site present only in the region of La Mancha (Spain). They were characteristic of the oldest culture that was able to tap groundwater in the Iberian Peninsula: the Culture of the *motillas* (Martín Morales et al. 1993; Fernández-Posse, Gilman and Martín 1996, 2008; Aranda et al. 2008; Mejías et al. 2015; Benítez de Lugo and Mejías 2016, 2017). The inventory that is most accepted by the scientific community can be consulted in Benítez de Lugo (2011) or in Mejías et al. (2015). Increasingly new *motillas* have been cataloged (Lenguazco 2015). An updated inventory of the motillas is presented in this work (fig. 15.1). At present, 45 sites are known. A remarkable concentration of *motillas* exists in the environment of Las Tablas de Daimiel National Park and Lagunas de Ruidera Natural Park (fig. 15.1).

It was assumed for many years that the *motillas* were surrounded by water at the time they were in use, and that they were fortified villages where people from similar social classes lived and controlled strategic resources, such as cereal and water (Molina et al. 2005).

In this chapter, it will be argued that, in fact, the *motillas* were built in a dry environment in order to access groundwater at a time of arid climate when surface water had dried up. Some paleopalynological studies in areas of the Central Plateau of the Iberian Peninsula indicate that there was an especially prolonged dry and arid period, interspersed with some wetter subphases, in the second half of the third millennium cal BC (López Sáez et al. 2009). Thus, the beginning of the Bronze Age in La Mancha coincides with that abrupt climate event, known as the 4.2 ka cal BP event (Bond et al. 1997; Blanco-González et al. 2018), dated to between 2350 and 1850 cal BC, approximately. This climatic event was considered one of the most severe aridification events of the Holocene period in the Iberian Peninsula and has been related to the origin of the *motillas*

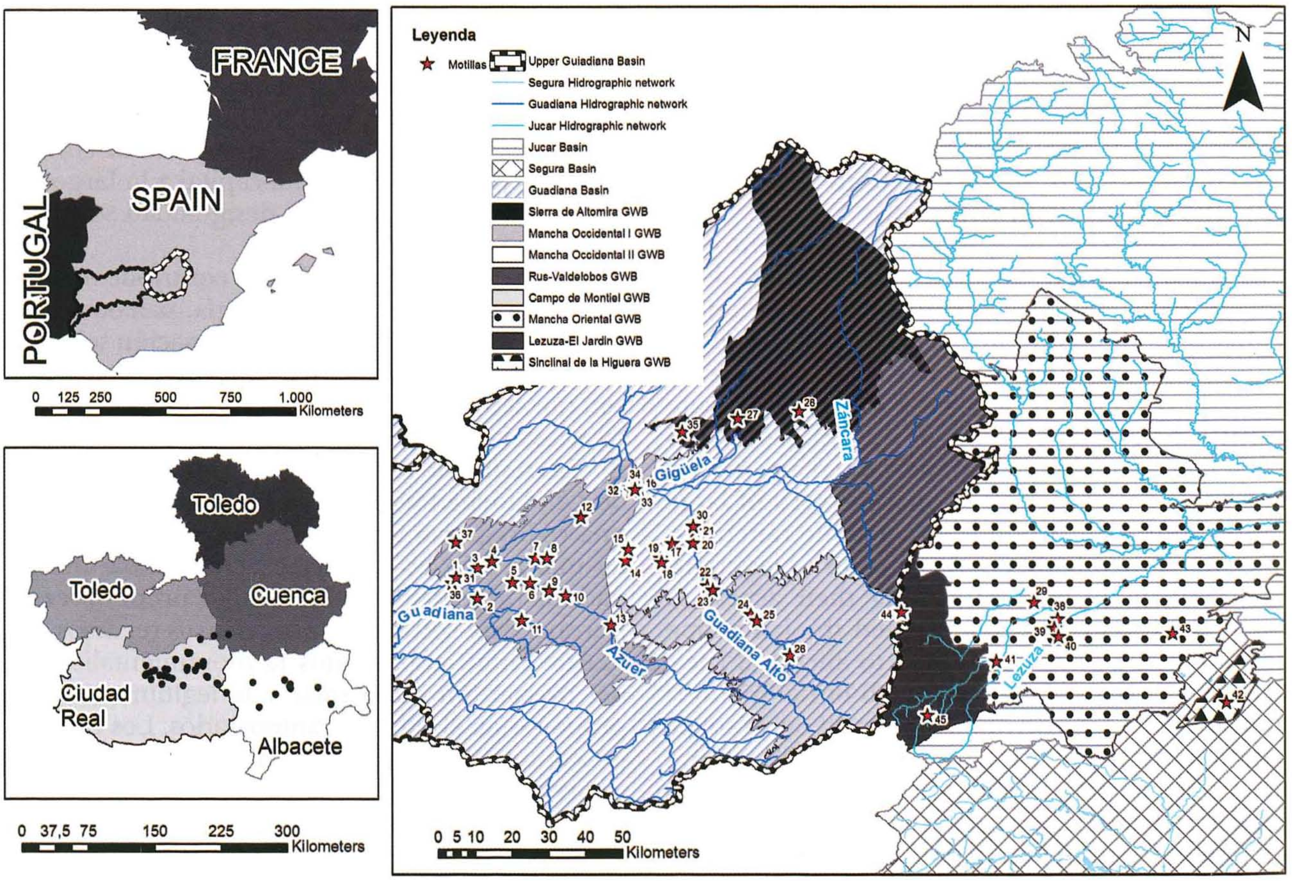


FIGURE 15.1. *Major river system in the plain of La Mancha and location of* motillas. *Distribution of the* motillas: *El Quintillo (1), Torralba (2), El Cura (3), Las Cañas (4), La Albuera (5), Daimiel (6), La Máquina (7), Zuacorta (8), La Vega Media (9), El Azuer (10), Los Palacios (11), La Vega (12), El Espino (13), Pedro Alonso (14), Los Romeros (15), Brocheros (16), Casa de Mancha (17), Barrios (18), Perales (19), La Membrilleja (20), El Juez (21), Santa María (22), El Retamar (23), La Moraleja (24), Laguna de Cueva Morenilla (25), La Jacidra (26), El Morrión (27), El Pedernoso (28), El Acequión (29), El Cuervo (30), Malvecinos (31), Pedregosas (32), Camino de Herradero I (33), Camino de Herradero II (34), Huerta de Triviño (35), Antonino (36) Malagón (37) Ojo de San Jorge (38), Hoya Vacas (39), Gorrineras (40), Balazote (41) Hoya Rasa (42), Prado Viejo (43), Chavillo (44), Arquillo (45).*

FIGURE 15.2. *Aereal view of the* motilla *of El Azuer (Daimiel, Ciudad Real, Spain).*

(Benítez de Lugo and Mejías 2014, 2016, 2017). Most likely, the most intensive construction of the *motillas* coincides with the periods of most severe drought and aridity, while the collapse of this culture can be dated to around 1400 cal BC, after the gradual return and consolidation of more humid and warmer ambient conditions. The *motilla* of El Azuer (Daimiel, Ciudad Real-Spain) is the most thoroughly studied from the archaeological point of view, although its relation with the local hydrogeology had not been considered in depth until recent years (Mejías et al. 2014, 2015). It has been established that it was occupied for almost a millennium. The well of the *motilla* (fig. 15.2) reaches the limestones of the Pliocene regional aquifer at about 20 m deep (fig. 15.3).

On the other hand, recent studies indicate that the *Motillas* culture used ceremonial places located in strategic locations of great visibility and territorial control. These enclaves were monumentalized by large burial mounds, in which solar rituals related to the death/resurrection cycle of the sun and the ancestors are detected. The archaeological site of Castillejo del Bonete (Terrinches, Ciudad Real-Spain) has burial bar-

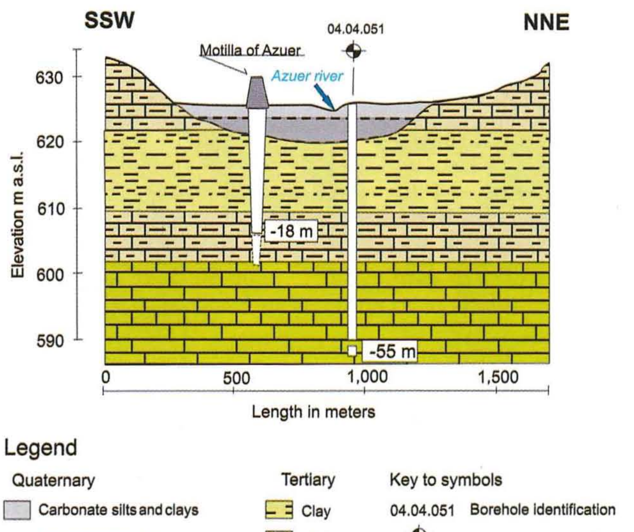


FIGURE 15.3. *Transverse geologic cross section of the river Azuer and its homonymous* motilla.

FIGURE 15.4. *Castillejo del Bonete.*

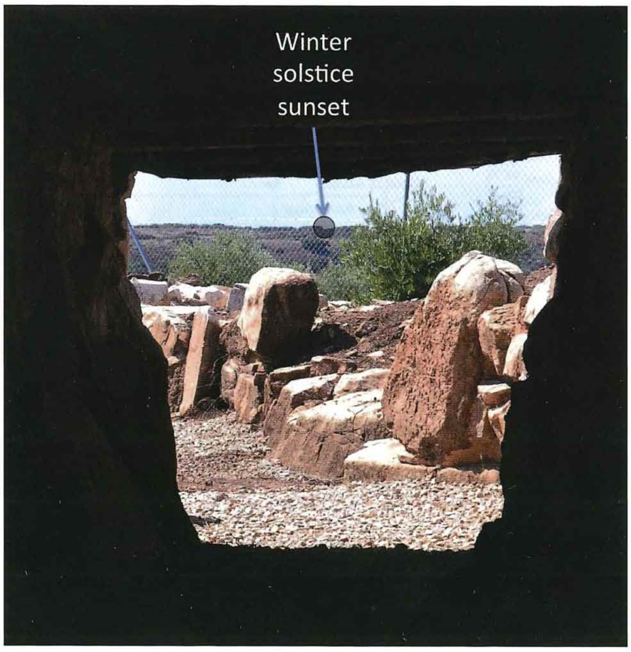


FIGURE 15.5. *Castillejo del Bonete, corridor 1. Photo taken from the initial part of corridor no. 1 and looking to the southwest horizon. The circle represents the position and size of the solar disc at the winter solstice sunset of 2000 BCE. The end of the corridor is no longer aligned with this astronomical event, twisting to bind to a nearby mound.*

rows, the largest of which was located on a natural cave that contains stone structures and rock art (fig. 15.4). The mounds are connected by corridors, some with astronomical orientations to the winter solstice (fig. 15.5). Corridor 1 is over 20 m long.

15.2. GEOLOGICAL AND HYDROLOGICAL FRAMEWORK

From a geological point of view, the *motillas* rest on Quaternary deposits of various kinds. The geological setting in which most *motillas* are located is the southwestern margin of the plain of La Mancha. Here are found detrital sediments (silts, clays, sands and conglomerates) and carbonate sediments (limestones and marls), which form the Miocene-Quaternary filling of a pit of, basically, upper and middle Tertiary Age.

The plain of La Mancha occupies the central sectors of the basins of Júcar and Guadiana rivers. The vast majority of the *motillas* are situated in the Guadiana river basin and its tributaries, but some are located over lagoons. All these rivers share the common feature of their flows being conditioned by seasonal and climatic factors, alternating long dry weather periods with shorter wet periods. In a natural flow regime, rivers contribute water to the aquifers and other aquifers contribute flow to the rivers. This situation of delicate balance becomes easily alterable due to two main factors: changes in precipitation and the intensive use of groundwater resources in modern times. Beginning in the 1970s, and especially in the 80s and 90s, the rate of withdrawal caused significant declines in the regional piezometric head, up to 30 m in 25 years (Mejías, López-Gutiérrez and Martínez-Cortina 2012). The transfers of water from the surrounding groundwater basins, the predominantly flat topography, as well as the existence of regional aquifers near the topographic surface, assure the presence of the piezometric head being, in natural conditions, relatively near the surface.

The research methodology of this study involved the production of detailed hydrogeological cartography; the compilation, analysis and correlation of the lithostratigraphic columns from the aquifer points and the elaboration of hydrogeological profiles based on these data. In addition, we applied two geophysical techniques: ground-penetrating radar and Electrical Resistivity Tomography (ERT) (Ibarra 2015), which have allowed us to contrast the distribution of the lithologies and to determine the possible existence of wells. In fig. 15.5 dashed lines represent the probable zone where wells could be located.

The geological and hydrogeological characterization of the surroundings of each of the four *motillas* studied in detail yields the following results (fig. 15.6) (Mejías et al. 2015).

15.2.1. *Motilla* of El Cura

The *motilla* of El Cura is approximately 35 m in diameter, 4.91 m in height and 907 m^2 in area. It is located in the Guadiana river basin in the municipality of Daimiel (Ciudad Real, Spain). There are no related studies on this site to date drilled to a depth of 14 m. The water level in the borehole is detected at 4.88 m depth (January 24, 2015). The geological profile reveals that the *motilla* lies on Quaternary deposits linked to the bed of the Guadiana river that overlie the Pliocene limestones aquifer.

The existence of a hypothetical supply well within the *motilla* is entirely feasible, since it is located in a settlement where the water resource is abundant and relatively close to the surface. This well could reach the alluvial aquifer formed

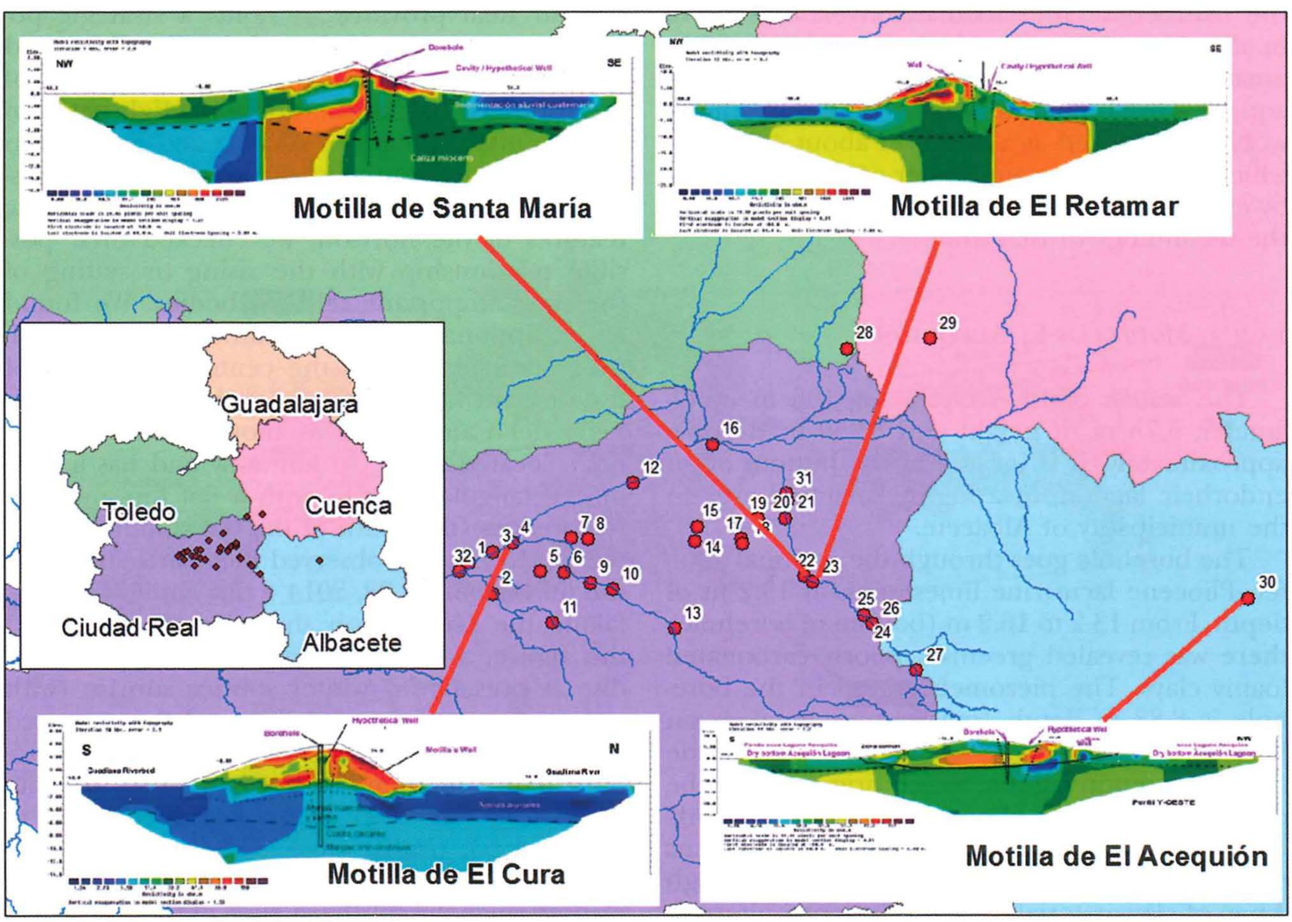


Figure 15.6. *ERT profiles.*

by the Quaternary deposits of the valley floor of the Guadiana basin and is connected to the underlying Pliocene carbonated aquifer, located at a depth between 8 and 10 m from the base of the *motilla*. This well depth, about 10 m, would be easily reachable with the drilling techniques of that time.

15.2.2. *Motillas* of Santa María and El Retamar

The *motilla* of Santa María is 40 m in diameter, 3.61 m in height and 1,460 m² in area, approximately. It is located in the bed of the Guadiana river in the municipality of Argamasilla de Alba (Ciudad Real, Spain). There are no available studies of this site, except those presented below.

A 15.7 m deep borehole was drilled in order to evaluate the possibility of withdrawing groundwater. From 13.2 to 15.4 m there are red limestones from the Cretaceous, which lie at the top of the Mesozoic carbonate series. The piezometric level is 15.43 m deep (January 23, 2015), consistent with the piezometric level of the Mesozoic regional aquifer. Therefore, the regional aquifer would be reached at about 15 m, which was absolutely possible with Bronze Age technology.

The *motilla* of El Retamar is located very near the *motilla* of Santa María, upstream and also near the riverbed of the Guadiana river. It is 58 m in diameter, 5.7 m in height and 2,990 m² in area, approximately. In this *motilla,* the regional aquifer – the Jurassic limestones and dolomites – would be reached at a depth of about 4 or 5 m, which means that groundwater could be reached by excavating a shallow well, easy to achieve with the technology of that time.

15.2.3. *Motilla* of El Acequión

The *motilla* of El Acequión is 106 m in diameter, 5.75 m in height and 8,950 m² in area, approximately. It is located at the bottom of an endorheic lagoon, in a highly karstified area in the municipality of Albacete.

The borehole goes through the regional aquifer, Pliocene lacustrine limestones, at 13.2 m of depth. From 13.2 to 16.2 m (bottom of borehole) there was revealed greenish, poorly carbonated loamy clays. The piezometric level in the borehole is 8.88 m depth (measurements taken on January 23, 2015). The *motilla* is located inside the El Acequión lagoon, which originated in the depression resulting after the formation of a sinkhole. The use of water would be made by means of a well that would have to be drilled through 4.6 m of clay materials. From this depth, alternating levels of marl limestones and clay form the Pliocene upper aquifer, with sufficient resources to supply water to the *motilla*.

15.3. CASTILLEJO DEL BONETE, A SACRED PLACE IN A MOMENT OF CLIMATE AND SOCIAL CHANGE

This impressive monument dates from the second half of the 3rd millennium cal BC to the half of the 2nd millennium cal BC. Several radiocarbon dates have been obtained on human and non-human material, all yielding dates between 2465–1565 cal BC, a moment of climate and social change in Iberian Peninsula (Benítez de Lugo et al. 2014, 2020; Benítez de Lugo and Esteban 2018). Rites performed at this site were related to death and the resurrection of the Sun, human death, and veneration of ancestors. Some examples are feasting rites, offerings to the dead, and architecture oriented towards the winter solstice. A natural cave was monumentalized and used as funerary chamber, and cave art can be found within it. Above this cave was built a large tumulus with megalithic corridors connected radially and tumuli associated with funerary remains and votive deposits. The largest tumulus was about 20 m of diameter.

Castillejo del Bonete is located at the southern edge of the Castilian Meseta with great visibility controlling a natural pass along the southeast of Ciudad Real province. It holds a strategic position between the basins of the Guadiana and Guadalquivir rivers and has a dramatic view of the southern half of the horizon. High peaks of the mountain ranges of Alcaraz and Segura can be seen to the southeast of the site. After measuring the coordinates of different topographic features of the horizon, we checked their possible relationship with the rising or setting of the most important celestial bodies. We found an exceptional event: the sunrise at winter solstice takes place over the centre of the top of the most striking mountain visible from the site: Peña del Cambrón. This mountain is 1,550 m high, located about 30 km away and has a curious rectangular profile, with a flat top and very steep edges (the width of the flat summit is 1.8°, see fig. 15.7A). We observed the sunrise from the site on December 22, 2014 – the winter solstice – taking the photograph shown in fig. 15.7A. In this figure, are seeing the position of the solar disc at present-day winter solstice sunrise (with a declination of $\delta = -23.45°$) and the expected position at 2000 BCE ($\delta = -23.45°$). The position at the moment of occupation of the site ($\delta = -23.9°$ at 2000 BCE) would coincide to the southern (right) edge of the mountain top. Our calculations indicate that the time interval elapsed since the southern edge of the sun touches the northern edge of the Peña del Cambrón

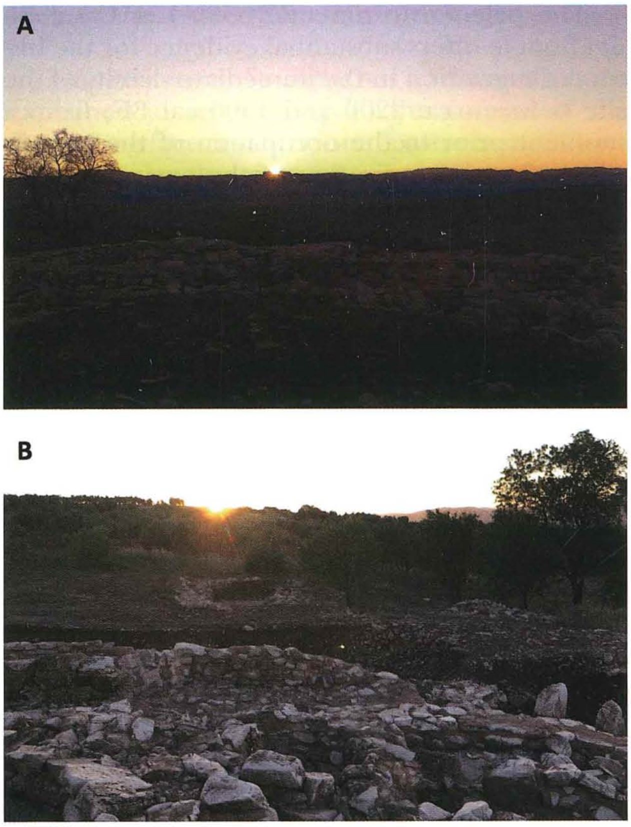


FIGURE 15.7. *A: Winter solstice sunrise of 2014 (December 22nd) from the tumular tomb of Castillejo del Bonete. The solar disc appears on the central part of Peña del Cambrón. B: Summer solstice sunrise of 2018 (June 21st) from the tumular tomb of Castillejo del Bonete. The solar disc appears aligned with the Enclosure 4.*

until the winter solstice is about 18 days. That is, the sun travels for 18 days along the flat summit of the mountain, moving slower southward as it approaches the winter solstice. During the last days before the solstice, the sun almost stops, moving only 0.1° in that period and finally touching the southern edge of the mountain. After winter solstice, the sun reverses its movement on the summit, taking another 18 days to abandon completely the flat summit of the mountain. We believe that an experienced observer counting the days that elapsed between the successive transits of the sun between the edges of the Peña del Cambrón might have been able to estimate the exact day of the winter solstice. Therefore, this striking coincidence may have been used as a calendrical marker and/or an indicator of a winter solstice funerary ritual.

Besides the analysis of the horizon that surrounds Castillejo del Bonete, we also took bearings of the longest and more linear corridors and tumuli walls, which connect from the centre of the main tumulus outward. The results are of great interest and suggest an astronomical planning of the monument (fig. 15.8).

Corridor no. 1, the longest excavated corridor, has a long rectilinear initial structure that curves, linking tumulus no. 2. The straight part of the corridor seems to point (with an uncertainty of 2°–3°) to the point in the horizon where the winter solstice sunset occurs (see fig. 15.4).

The north and south walls of Enclosure no. 4 are parallel and oriented similarly to corridor no.

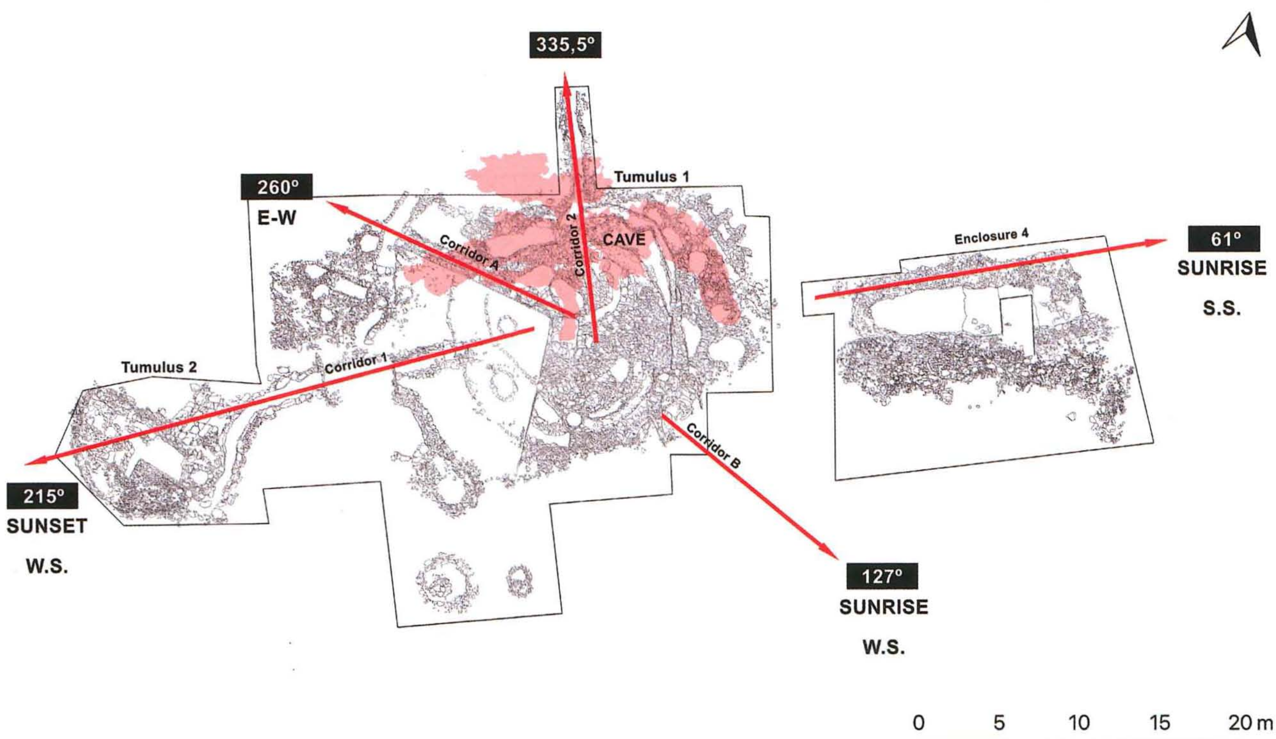


FIGURE 15.8. *Plan of the tumular tomb of Castillejo del Bonete with the azimuth of the orientations of some of its structures (José Luis Fuentes Sánchez).*

1 but are about 6° apart. The north wall – the best-preserved one – faces the summer solstice sunrise with great precision (uncertainty between 1°–2°) (see fig. 15.7B).

The walls of corridor A are not parallel; the south wall – the longer and best preserved one – is highly rectilinear and is oriented in an east-west line (within an uncertainty of between 1°–2°). Therefore, it could be related to the sunset at the equinoxes or dates close to them. Corridor B is rather badly preserved, but its few standing elements are oriented towards the Peña del Cambrón, the point on the horizon where the winter solstice takes place (see fig. 15.5). Corridor no. 2 is oriented northerly, about 25° from true north (uncertainty between 1°–2°), and cannot be related to any solar position. However, a possible orientation to the rising points of bright stars of the southern hemisphere has been speculated (Benítez de Lugo and Esteban 2018).

The detailed palynological studies carried out in Castillejo del Bonete, together with those made in the Tablas of Daimiel and in the *motilla* of El Azuer, allow us to reconstruct the history of vegetation in La Mancha during the Bronze Age and to correlate it both with anthropic dynamics and with paleoclimatic variability (fig. 15.9). This information helps to establish a general framework of plant evolution and climate during the Bronze Age in the immediate surroundings of the *Motillas* culture. A phase of extreme aridity is verified between ca. 1950-1800 cal BCE, this climatic contingency can be found in direct relation to the existence of the *motillas* and the use of Castillejo del Bonete.

The paleoenvironmental record of Castillejo del Bonete offers substantial evidence for the history of vegetation in the immediate vicinity of the site between ca. 2200 and 1500 cal BC, from a moment prior to the occupation of the cave in which the anthropization of the environment is null, to a later one in which the tree cover gradually decreases and the pastoral pressure manifests itself. This occurred in a paleoclimatic framework typical of the Chalcolithic-Bronze Age transition and corresponds to the so-called abrupt climate change of 4200 cal BP. In our study area this is manifested by an exceptionally arid period between 2200–1800 cal BC, which continues with another of progressive increase in rainfall in the three subsequent centuries.

Recently genetic studies have determined that Castillejo del Bonete provides some evidence for the rapid disappearance of Iberian men in Recent Prehistory due to the arrival of settlers from the eastern steppes of Europe with Y chromosome R1b. One of these individuals is buried in tomb 4 together with a woman genetically compatible with the Iberian populations of the Copper Age, without ancestry from the steppes. This woman had a diet of marine resources (thus, she did not come from La Mancha, but from the coast). She wore buttons and personal objects of ivory. This tomb included objects of everyday life as trousseau: a carinated bowl, a globular bowl containing an awl and a small very worn knife, both made of arsenic copper, two ivory buttons on the woman's body and, on the man, a copper knife with a rivet on his waist and an archer's bracelet on his forearm (Benítez de Lugo et al. 2014a, 2014b; Olalde et al. 2019).

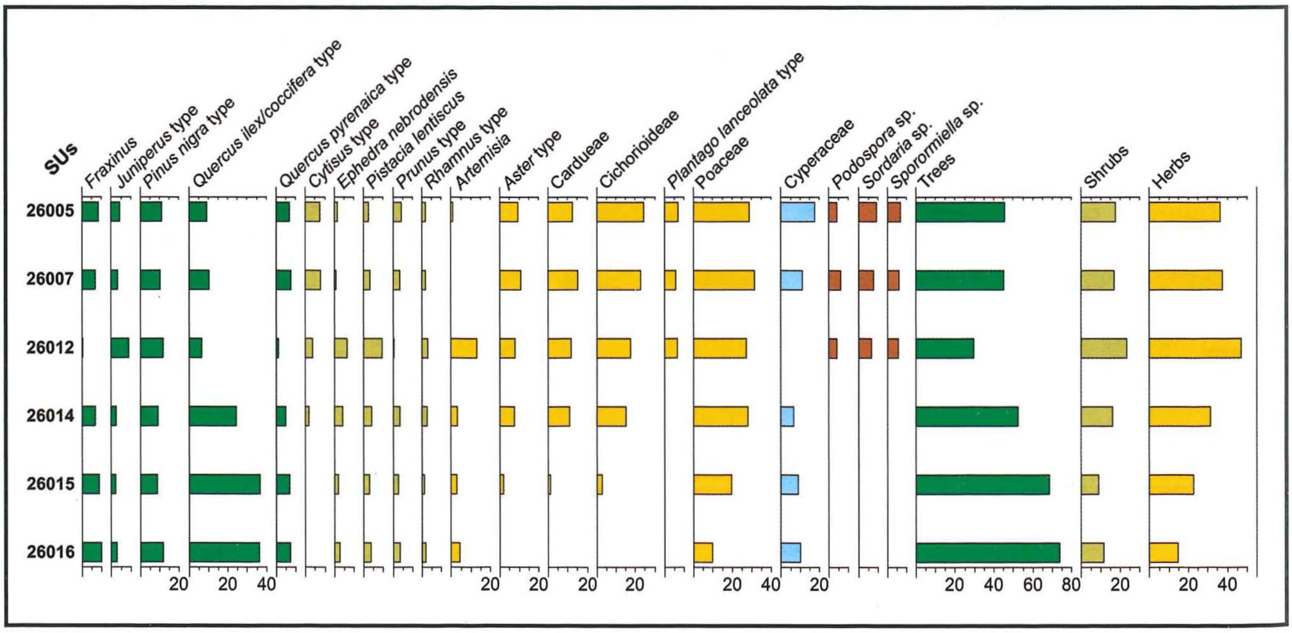


FIGURE 15.9. *Pollinic histogram of Castillejo del Bonete.*

15.4. CONCLUSIONS

The existence of *motillas* has traditionally been explained in relationship to the control of the flow of surface water, winter pastures and drovers' roads, or the existence of a ruling class that dwelt in villages in higher locations and dominated those who inhabited the motillas. This model viewed them as fortified villages built on the plain to defend strategic resources.

Current evidence indicates that there is a close relationship between the motillas location and the geological and hydrogeological substratum, probably derived from an environmental crisis characterized by a severe drought that lasted for centuries. It has been shown that the Bronze Age society of La Mancha had gained enough knowledge to dig relatively deep wells and determine empirically the location of aquifers in a period of great aridity. The stress generated by this event required a group response. The resilient society of the Bronze Age of La Mancha sought groundwater to create a regional network of large supply wells in a region where sheep were primarily raised. Around the wells were erected *motillas*, which protected—physically and symbolically—the resources that guaranteed the survival of the community.

Motillas were primarily constructed in the floodplains of rivers, where groundwater stays underground on the alluvium or other underlying formations. The groundwater could be withdrawn by means of wells of shallow depth (less than 20 m). We suggest that the ultimate goal of the wells was to reach the upper part of the Pliocene or Mesozoic limestones that constituted the regional aquifers. The survival of the animal domestics, which were primarily sheep, must have been related to this hydraulic network that was strategically arranged in places of passage.

Although the outer form of Castillejo del Bonete might look like a *motilla* or a *morra*, in this case it has been demonstrated that it is not a settlement and there is no possible access to the water table with the technology available at that time. The repertoire of materials found at Castillejo del Bonete is similar to that found in the *motillas* (Mejías et al. 2015; Esteban and Benítez de Lugo 2016; Benítez de Lugo 2018). With the data available, it can be said that Castillejo del Bonete was a sacred place endowed with a deep symbolic, ritual and monumental significance. Documented architectural spaces show no evidence of having been dwelt, but they do show the usual features in prehistoric burial mounds. The place is clearly a monumental and symbolic space, which also has immense archaeoastronomical interest. It presents a very striking and precise marker of winter solstice sunrise on the most conspicuous topographical feature in the horizon surrounding the site, Peña del Cambrón (Cambrón crag). The orientations of several passages of this solar monument seem to have an astronomical and/or landscape meaning.

Castillejo del Bonete is an archaeological site of great importance toward understanding the *Motillas* culture. It is a place where ritual activities were practiced repeatedly during the Chalcolithic and the Bronze Age, whose purposes were related to the death-resurrection cycle of the Sun as well as the management of the ancestors and death. All this was carried out in an ideological context in which the ancestors were conferred importance, at a time of increasing social hierarchy and the replacement of the ancestral lineage of Iberian males.

The construction and management of hydraulic buildings has been understood for decades as an important factor in the origin of the first complex societies (Wittfogel 1957). The intensification of agricultural and livestock production around the motillas due to the hydraulic practices associated with them must have changed relationships not only within the community but also between these groups and their neighbors. More water means more wealth, and the goods produced with this water must be defended against the greed of other groups.

The farmers' efforts to increase their vital security through the construction of hydraulic systems, such as *motillas*, may also have reduced their social security, by promoting the emergence of a system of violence for the appropriation of goods (Gilman 1987).

ACKNOWLEDGEMENTS

This research is funded by the Regional Government of Castilla-La Mancha (JCCM), the Geological Survey of Spain (IGME), E2IN2 and the project REDISCO-HAR2017-88035-P (Plan Nacional I+D+I, Spanish Ministry of Economy and Competitiveness).

REFERENCES

Aranda, G.; Fernández, S.; Haro, M.; Molina, F.; Nájera, T., and Sánchez-Romero, M. (2008): "Water Control and Cereal Management on the Bronze Age Iberian Peninsula: La Motilla del Azuer", *Oxford Journal of Archaeology*, 27 (3): 241–59.

Benítez de Lugo, L. (2011): "Las motillas del Bronce de La Mancha: treinta años de investigación arqueológica", in P. Bueno, A. Gilman, C. Martín y F. J. Sánchez-Palencia (eds.), *Arqueología, sociedad, territorio y paisaje. Estudios sobre Prehistoria Reciente, Protohistoria y transición al mundo romano en homenaje a M.ª Dolores Fernández Posse.* Bibliotheca Praehistorica Hispana XXVIII. CSIC, Madrid: 141–62.

— (2018): "Rituales funerarios neolíticos, calcolíticos y de la Edad del Bronce en la provincia de Ciudad Real: Cerro Ortega (Villanueva de la Fuente) y Castillejo del Bonete (Terrinches)", *Anejos a Cuadernos de Prehistoria y Arqueología de la Universidad Autónoma de Madrid* 3: 153–68. Available at: http://dx.doi.org/10.15366/ane3.rubio2018.011.

Benítez de Lugo Enrich, L.; Álvarez, H. J.; Fernández, S.; Mata, E.; Moraleda, J.; Morgado, A.;... and Salazar-García, D. C. (2014b): "Castillejo del Bonete (Terrinches, Ciudad Real): complejo tumular prehistórico de la Cultura de las Motillas en el Alto Guadalquivir", *Menga. Revista de Prehistoria de Andalucía,* 5: 151–74.

Benítez de Lugo Enrich, L.; Baeza Chico, E.; Vene, G. del; Gutiérrez Sáez, C.; Márquez Mora, B.; Menchén Herreros, G.;... and Odriozola Lloret, C. (2020): "Nuevos análisis traceológicos, arqueométricos y petrológicos de material metálico y lítico recuperado en un lugar sagrado de la Cultura de las Motillas: Castillejo del Bonete (Terrinches, Ciudad Real)", *Anejos del Cuaderno de Prehistoria y Arqueología de la Universidad Autónoma de Madrid,* 4: 71-81. Available at: http://dx.doi.org/10.15366/ane4.ochoa2020.003.

Benítez de Lugo Enrich, L., and Esteban, C. (2018): "Arquitecturas simbólicas orientadas astronómicamente durante el Neolítico final, Calcolítico y la Edad del Bronce en el sur de la Meseta", *Spal,* 27.1: 61-87. Available at: http://dx.doi.org/10.12795/spal.2018i27.03

Benítez de Lugo, L., and Mejías M. (2014): "Los primeros poblados prehistóricos en el entorno de Daimiel. Las motillas de la Mancha", in M. Mejías (ed.), *Las Tablas y los Ojos del Guadiana: agua, paisaje y gente.* IGME-OAPN, Madrid: 65-104.

— (2016): "Hidrogeología y captación de aguas subterráneas en La Mancha durante la Prehistoria Reciente: la gestión de los recursos hídricos en la Cultura de las Motillas", *Archivo de Prehistoria Levantina,* 31: 137–68.

— (2017): "The Hydrogeological and Paleoclimatic Factors in Bronze Age Motillas Culture of La Mancha: The First Hydraulic Culture in Europe", *Hydrogeology Journal,* 25 (7): 1931–50. Available at: https://doi.org/10.1007/s10040-017-1607-z.

Benítez de Lugo Enrich, L.; Mejías Moreno, M.; López Gutiérrez, J.; Álvarez García, H. J.; Palomares Zumajo, N.; Mata Trujillo, E.;... and López Sáez, J. A. (2014a): "Aportaciones hidrogeológicas al estudio arqueológico de los orígenes del Bronce de La Mancha: la cueva monumentalizada de Castillejo del Bonete (Terrinches, Ciudad Real-España)", *Trabajos de Prehistoria,* 71 (1): 76–94. Available at: https://doi.org/10.3989/tp.2014.12125.

Blanco-González, A.; Lillios, K. T.; López-Sáez, J. A., and Drake, B. L. (2018): "Cultural, Demographic and Environmental Dynamics of the Copper and Early Bronze Age in Iberia (3300–1500 BC): Towards an Interregional Multiproxy Comparison at the Time of the 4.2 Ky BP Event", *Journal of World Prehistory,* 31 (1): 1–79.

Bond, G.; Showers, W.; Cheseby, M.; Lotti, R.; Almasi, P.; Demenecoal, P.;... and Bonani, G. (1997): "A Pervasive Millennial-Scale Cycle in North Atlantic Holocene and Glacial Climates", *Science,* 278: 1257–66.

Esteban, C., and Benítez de Lugo Enrich, L. (2016): "Archaeoastronomy in Bronze Age sites of La Mancha (Spain)", *Mediterranean Archaeology and Archaeometry,* 16 (4): 283–9. Available at: https//doi.org/10.5281/zenodo.220948.

Fernández-Posse, M.ª D.; Gilman, A., and Martín, C. (1996): "Consideraciones cronológicas sobre la Edad del Bronce en La Mancha", in *Homenaje al Profesor Manuel Fernández Miranda.* Complutum Extra, 6 (I): 111-138.

Fernández-Posse, Mª.D.; Gilman, A.; Martín, C., and Brodsky, M. (2008): *Las comunidades agrarias de la Edad del Bronce en La Mancha Oriental (Albacete).* Biblioteca Praehistorica Hispana, XXV. CSIC/Instituto de Estudios Albacentenses, Madrid.

GILMAN, A. (1987): "Regadío y conflicto en las sociedades acéfalas", *Boletín del Seminario de Estudios de Arte y Arqueología,* 53: 59–72.

IBARRA, P. (2015): "Prospección geofísica aplicada al estudio de las motillas de la Edad del Bronce de La Mancha", in M. Mejías, L. Benítez de Lugo, J. A. López Sáez and C. Esteban (eds.), *Arqueología, hidrogeología y medio ambiente en la Edad del Bronce de La Mancha. La Cultura de las Motillas.* Instituto Geológico y Minero de España, Madrid: 45–50.

LENGUAZCO GONZÁLEZ, R. (2015): "Ocupación del territorio y aprovechamiento de recursos en el Bronce de La Mancha: Las Motillas y su territorio de explotación directa". PHD thesis, Universidad Autónoma de Madrid.

LÓPEZ SÁEZ, J.A.; BLANCO GONZÁLEZ, A.; LÓPEZ MERINO, L.; RUIZ ZAPATA, M. B.; DORADO VALIÑO, M.; PÉREZ DÍAZ, S.;... and BURJACHS, F. (2009): "Landscape and Climatic Changes during the End of the Late Prehistory in the Amblés Valley (Ávila, Central Spain), from 1200 to 400 Cal BC", *Quaternary International,* 200: 90–101.

MARTÍN MORALES, C.; FERNÁNDEZ-MIRANDA, M.; FERNÁNDEZ-POSSE, M.ª D., and GILMAN, A. (1993): "The Bronze Age of La Mancha", *Antiquity,* 67: 23–45.

MEJÍAS, M.; LÓPEZ-GUTIÉRREZ, J, and MARTÍNEZ-CORTINA, L. (2012): "Características hidrogeológicas y evolución piezométrica de la Mancha Occidental. Influencia del periodo húmedo 2009-2011", *Boletín Geológico y Minero,* 123 (2): 91–108.

MEJÍAS, M.; BENÍTEZ DE LUGO, L.; POZO, J. DEL, and MORALEDA, J. (2014): "Los primeros aprovechamientos de aguas subterráneas en la Península Ibérica. Las motillas de Daimiel en la Edad del Bronce de La Mancha", *Boletín Geológico y Minero,* 125 (4): 455–74.

MEJÍAS, M.; BENÍTEZ DE LUGO, L.; LÓPEZ SÁEZ, J. A., and ESTEBAN, C. (eds.) (2015): *Arqueología, hidrogeología y medio ambiente en la Edad del Bronce de La Mancha. La Cultura de las Motillas.* Instituto Geológico y Minero, Madrid.

MOLINA, F.; NÁJERA, T.; ARANDA, G.; SÁNCHEZ, M., and HARO, M. (2005): "Recent Fieldwork at the Bronze Age Fortified Site of Motilla del Azuer (Daimiel, Spain)", *Antiquity,* 79 (306): 223–35.

OLALDE, I.; MALLICK, S.; PATTERSON, N.; ROHLAND, N.; VILLALBA-MOUCO, V.; DULIAS, K.;... and REICH, D. (2019): "The Genetic History of the Iberian Peninsula over the Last 8000 Years", *Science,* 363: 1230–4. Available at: https://doi.org/10.1126/science.aav1444.

WITTFOGEL, K. (1957): *Oriental Despotism.* Yale University, New Haven.