



<https://publications.dainst.org>

iDAI.publications

DIGITALE PUBLIKATIONEN DES
DEUTSCHEN ARCHÄOLOGISCHEN INSTITUTS

Das ist eine digitale Ausgabe von / This is a digital edition of

Schuhmacher, Thomas X.

Ivory exchange in the Chalcolithic of the Western Mediterranean

in: Kunst, Michael – Steiniger, Daniel (Hrsg.), Settlement Structures and Metallurgy. The Relations between Italy and the Iberian Peninsula in the Early Chalcolithic. Papers of an International Conference Held in Rome, Museo Nazionale Romano – Palazzo Massimo, 6–7 October 2011, Palilia 33 (Wiesbaden 2021) 289-304.

DOI: <https://doi.org/10.34780/3959-b366>

Herausgebende Institution / Publisher:
Deutsches Archäologisches Institut

Copyright (Digital Edition) © 2023 Deutsches Archäologisches Institut
Deutsches Archäologisches Institut, Zentrale, Podbielskiallee 69–71, 14195 Berlin, Tel: +49 30 187711-0
Email: info@dainst.de | Web: <https://www.dainst.org>

Nutzungsbedingungen: Mit dem Herunterladen erkennen Sie die Nutzungsbedingungen (<https://publications.dainst.org/terms-of-use>) von iDAI.publications an. Sofern in dem Dokument nichts anderes ausdrücklich vermerkt ist, gelten folgende Nutzungsbedingungen: Die Nutzung der Inhalte ist ausschließlich privaten Nutzerinnen / Nutzern für den eigenen wissenschaftlichen und sonstigen privaten Gebrauch gestattet. Sämtliche Texte, Bilder und sonstige Inhalte in diesem Dokument unterliegen dem Schutz des Urheberrechts gemäß dem Urheberrechtsgesetz der Bundesrepublik Deutschland. Die Inhalte können von Ihnen nur dann genutzt und vervielfältigt werden, wenn Ihnen dies im Einzelfall durch den Rechteinhaber oder die Schrankenregelungen des Urheberrechts gestattet ist. Jede Art der Nutzung zu gewerblichen Zwecken ist untersagt. Zu den Möglichkeiten einer Lizenzierung von Nutzungsrechten wenden Sie sich bitte direkt an die verantwortlichen Herausgeberinnen/Herausgeber der entsprechenden Publikationsorgane oder an die Online-Redaktion des Deutschen Archäologischen Instituts (info@dainst.de). Etwaige davon abweichende Lizenzbedingungen sind im Abbildungsnachweis vermerkt.

Terms of use: By downloading you accept the terms of use (<https://publications.dainst.org/terms-of-use>) of iDAI.publications. Unless otherwise stated in the document, the following terms of use are applicable: All materials including texts, articles, images and other content contained in this document are subject to the German copyright. The contents are for personal use only and may only be reproduced or made accessible to third parties if you have gained permission from the copyright owner. Any form of commercial use is expressly prohibited. When seeking the granting of licenses of use or permission to reproduce any kind of material please contact the responsible editors of the publications or contact the Deutsches Archäologisches Institut (info@dainst.de). Any deviating terms of use are indicated in the credits.



PALILIA 33



Michael Kunst | Daniel Steiniger (eds.)

SETTLEMENT STRUCTURES AND METALLURGY

The Relations between Italy and the Iberian
Peninsula in the Early Chalcolithic

Papers of an International Conference Held in Rome,
Museo Nazionale Romano – Palazzo Massimo,
6–7 October 2011

For some considerable time right up to the present, almost all specialists have been dealing at various different regional levels with the topics of the conference published here. The expansion of the source material in the last decades has led to a comprehensive understanding of early metallurgy and its role in social, economic and settlement-structure terms. Despite this far-reaching progress, concrete questions are emerging more and more clearly that can only be answered at international and interdisciplinary levels. It is precisely this international communication that the conference on which the present volume is based has attempted to set in motion so as to address these complex questions. This publication pulls together and sets out the state of research on the topic at the beginning of the 21st century for the entire Central and Western Mediterranean regions.

ISBN 978-3-447-11579-7



www.harrassowitz-verlag.de

Michael Kunst | Daniel Steiniger (eds.)
SETTLEMENT STRUCTURES
AND METALLURGY

Palilia 33

DEUTSCHES ARCHÄOLOGISCHES INSTITUT

PALILIA 33

Herausgegeben im Auftrag des Instituts von
Ortwin Dally und Norbert Zimmermann

DEUTSCHES ARCHÄOLOGISCHES INSTITUT

Michael Kunst | Daniel Steiniger (eds.)

SETTLEMENT STRUCTURES AND METALLURGY

The Relations between Italy and the Iberian
Peninsula in the Early Chalcolithic

Papers of an International Conference Held in Rome,
Museo Nazionale Romano – Palazzo Massimo, 6–7 October 2011

HARRASSOWITZ VERLAG • WIESBADEN

X, 320 Seiten mit 122 Abbildungen

Library of Congress Cataloging-in-Publication Data

A CIP catalog record for this book has been applied for at the Library of Congress.

Bibliografische Information der Deutschen Nationalbibliothek

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über <https://dnb.de> abrufbar.

Verantwortliche Redaktion: Redaktion des Deutschen Archäologischen Instituts, Rom

Redaktionelle Bearbeitung: Luisa Bierstedt und Julia Böttcher

Umschlagfoto: Zambujal, Portugal; Credit: Michael Kunst; Libiola Mine, Italien; Credit: Mark Pearce

Buchgestaltung und Coverkonzeption: hawemannundmosch, Berlin

Prepress: le-tex publishing services GmbH, Leipzig

© 2021 Deutsches Archäologisches Institut

Otto Harrassowitz GmbH & Co. KG, Wiesbaden · <https://www.harrassowitz-verlag.de>

ISBN 978-3-447-11579-7

Gedruckt auf säurefreiem und alterungsbeständigem Papier

Printed in Germany

Das Werk einschließlich aller seiner Teile ist urheberrechtlich geschützt.

Jede Verwertung außerhalb der engen Grenzen des Urheberrechtsgesetzes ist ohne Zustimmung des Deutschen Archäologischen Instituts und des Verlags unzulässig und strafbar.

Das gilt auch für Vervielfältigungen, Übersetzungen, Mikroverfilmungen und die Speicherung und Verarbeitung in elektronischen Systemen.

Inhaltsverzeichnis

Vorwort	IX
<i>von Henner von Hesberg und Dirce Marzoli</i>	
Einleitung	1
Internationale Tagung „Siedlungsstrategien und Metallurgie. Die Beziehungen zwischen Italien und Südwesteuropa im frühen Chalkolithikum“	
<i>von Michael Kunst und Daniel Steiniger</i>	
L'Eneolitico in Italia	5
Stato della ricerca, problematiche e prospettive	
<i>di Daniela Cocchi Genick</i>	
Settlement Patterns and Metallurgy in Central and Southern Italy in the Copper Age	27
<i>by Alberto Cazzella</i>	
L'origine della metallurgia nel Mediterraneo centrale	37
Un nuovo modello interpretativo	
<i>di Andrea Dolfini</i>	
Settlement and Metallurgic Activity	59
The Case of Sesto Fiorentino (Florence) in the Context of Central Italy	
<i>by Lucia Sarti, Nicoletta Volante, Gianna Giachi and Pasquino Pallecchi</i>	
Perceiving Mining Landscapes	77
Metallurgical Origins and the Perception of Resources in the Landscape	
<i>by Mark Pearce and Roberto Maggi</i>	
Distribution Patterns Relating to Mining and Metallurgy in Chalcolithic Central Italy	87
<i>by Daniel Steiniger</i>	
Materiali per una storia degli studi sull'Eneolitico in Italia	101
<i>di Alessandro Giudi</i>	

Entre Italie et Ibérie	107
Les appareils métallurgiques du district minier de Cabrières-Péret (Hérault) et du sud de la France	
<i>par Paul Ambert (†), Marie Laroche, Valentina Figueroa-Larre, Jean-Louis Guendon, Salvador Rovira et Noël Houllès</i>	
The Chalcolithic of the Iberian Peninsula	121
Investigation without Cultures? Fortifications, Complexity, Social Evolution and the State. Some Notes on the History and the Current State of Research	
<i>by Michael Kunst</i>	
Early Metallurgy on the Iberian Peninsula	169
<i>by Salvador Rovira</i>	
Evidence of Chalcolithic Copper Ore Mining in Southern Portugal	181
Searching for a Needle in a Haystack	
<i>by Gert Goldenberg, Erica Hanning and Roland Gauß</i>	
Social Inequality, Fortified Settlements and Enclosures in the Southern Iberian Chalcolithic (3 rd Millennium BC)	193
An Open Discussion	
<i>by José E. Márquez-Romero and Víctor Jiménez-Jáimez</i>	
Metal, Metallurgy, Walls and Ditches in the Portuguese Guadiana Basin	209
An Overview	
<i>by António Carlos Valera</i>	
Asentamientos calcolíticos en el extremo Sur de Portugal	221
<i>de Elena Morán y Rui Parreira</i>	
The West Mediterranean Metallurgical Drift (WMD)	239
<i>by Christian Strahm</i>	
The Beginnings of Metallurgy in the Central Mediterranean	255
An Italian Perspective	
<i>by Claudio Giardino</i>	
Few and Far Between – Early Halberds in Europe	273
<i>by Christian Horn</i>	

Chalcolithic Ivory Exchange in the Western Mediterranean	289
--	-----

by Thomas X. Schuhmacher

Le Chalcolithique de la Méditerranée occidentale	305
--	-----

Quelques commentaires sur les interactions culturelles

par Jean Guilaine

Vorwort

von *Henner von Hesberg* und *Dirce Marzoli*

Ein offener Dialog, eine einsichtige Darstellung der jeweiligen Arbeitsweisen und die Bereitschaft, den anderen Forschern in die Archive Zugang und in die Ergebnisse eigener Arbeiten Einblick zu gewähren, sind Voraussetzungen eines fruchtbaren Austauschs. Sie führen zu einer vertieften Kenntnis der jeweiligen Erforschung einer archäologischen Epoche, ihrer lokalen Besonderheiten und überregionalen Verbindungen. Ausdruck einer solchen Art von Austausch, der selbst in Zeiten problemloser Kommunikation nicht immer selbstverständlich ist, bilden diese Tagung sowie deren jetzt vorliegende Publikation. Sie erfolgt bedauerlicherweise mit großer Verspätung, aber ihre grundlegende Botschaft ist nicht überholt: nur gemeinsam und länderübergreifend lässt sich das Thema angehen.

Der hier behandelten Kupferzeit Südwesteuropas widmen sich methodisch innovative und interdisziplinär angelegte Projekte, zu denen Ausgrabungen von Siedlungen, Nekropolen, Bergbauarealen ebenso zählen wie Material- und Umweltstudien. Immer komplexer werden dabei auch Einblicke in Gesellschaftsstrukturen, Wirtschaftsweisen, Handelswege und Technologien, zunehmend deutlicher lassen sich zudem die Wege der Übertragung von Fertigkeiten und Produktionsformen nachzeichnen. Einige Ergebnisse liegen schon in internationalen Referenzwerken vor, gleichwohl werden sie im Kontext der Tagung ergänzt und vertieft und um die Forschungsergebnisse aus nicht immer leicht zugänglichen lokalen Publikationen erweitert, welche zudem häufiger lediglich Vorberichte darstellen. Abgesehen davon aber bieten die Beiträge neue Resultate und Interpretationsansätze.

Gerade auf den Gebieten der Siedlungsarchäologie und ihrer Verbindung mit der Montanarchäologie und der Archäometallurgie sind nämlich sowohl auf der Pyrenäen- wie auch auf der Apenninhalbinsel in den letzten Jahrzehnten bahnbrechende Ergebnisse erzielt worden, die nach weiterem Austausch über die Beziehungen zwischen Italien und Südwesteuropa im Chalkolithikum verlangen. Für diese Thematik haben die beiden Abteilungen des Deutschen Archäologischen Instituts – Rom und Madrid –, deren Aktivitäten diesem geographischen Raum vorwiegend gelten, als Veranstalter der Tagung und als Herausgeber der Publikation ein Forum geboten. Mit der Veröffentlichung der Tagung suchen sie der Diskussion im Bereich der Kupferzeitforschung weitere Impulse zu geben.

Die Tagung wurde zwar von den beiden Abteilungen organisiert, aber sie versteht sich als Projekt von Prähistorikerinnen und Prähistorikern aus vielen europäischen Ländern mit dem gemeinsamen Ziel, einen Beitrag zur Kenntnis der westlichen Hemisphäre der europäischen Kupferzeit zu leisten und Anstöße zu weiteren Zusammenarbeiten zu geben. Dabei ging es darum, die sehr unterschiedliche Situation der iberischen mit jener der Apenninhalbinsel zu vergleichen und zu prüfen, ob hier nur der Erkenntnisstand voneinander abweicht oder wir grundsätzlich zwei unterschiedliche Ausprägungen in einem historischen Horizont vor uns haben.

Die Veranstaltung dieser Tagung gewinnt über die fachwissenschaftliche Bedeutung auch eine forschungspolitische. Die Prähistorische Archäologie, die in den Abteilungen des Deutschen Archäologischen Instituts anfangs nur sporadisch und seit den sechziger Jahren in zunehmendem Maße an Bedeutung erlangte, präsentiert sich hier mit einem eigenen Projekt, dessen Anfänge bis in die Zeit der 1954 gegründeten Madrider Abteilung zurückreichen. Zu den Mitarbeitern der ersten Stunde zählte ein Prähistoriker, zu dessen Schwerpunkten die Kupferzeit gehörte: Edward Sangmeister. Ab 1959 war Hermanfrid Schubart als Prähistoriker an der Madrider Abteilung tätig, die er von 1980 bis 1994 leitete. Ihre Forschungen auf diesem Gebiet, vor allem die von ihnen gemeinsam geleitete Ausgrabung in Zambujal bei Torres Vedras in Portugal sind bis heute wichtige Referenzen für die Kupferzeitforschung geblieben. Ihre Namen und der mit ihnen verbundene Grabungsplatz wurden zum Synonym für den Erfolg internationaler Zusammenarbeit, aus der immer weitere Netzwerke hervorgingen. 1994 übernahm Michael Kunst als Referent die prähistorische Forschung der Madrider Abteilung und führte vor allem auch die Grabungen in Zambujal fort.

Das seit 1829 aktive Instituto di Corrispondenza Archeologica war am Anfang ganz den wissenschaftlichen Zielen Johann Joachim Winckelmanns verpflichtet, die in vieler Hinsicht aus einer philologischen Tradition hervorgegangen waren. Deswegen blieben die Zeiträume ohne Schriftzeugnisse zunächst außerhalb der Überlegungen. Erst später, unter dem Einfluss der Entwicklungen in den skandinavischen und angelsächsischen Ländern, kamen einzelne Aspekte der Prähistorie hinzu, konnten aber nie größere Bedeutung erlangen. Immerhin hat Wolfgang Helbig mit seiner 1879 erschienenen

Schrift über „Die Italiker in der Poebene“ sich in diese Bereiche der archäologischen Wissenschaft vorgewagt und damit auch Luigi Pigorini beeinflusst, der seinerseits oft in den Adunanzien des Instituts in jenen Jahren vortrug. Ein gegenseitiger Austausch war vorhanden, aber die Prähistorie in Italien ging bald eigene Wege und das Germanico blieb in der Folgezeit auf die klassische Antike konzentriert, wenn man einmal von der Zeit des Nationalsozialismus absieht, in der aber stärker die Zeit der Völkerwanderung und damit als Wissenschaft die Frühgeschichte an Bedeutung gewann. Spätere Studien von Seiten der Prähistorie, die innerhalb der Abteilung Rom des DAI entstanden, widmeten sich meist der Eisenzeit und ergänzten somit methodisch die Versuche der Klassischen Archäologie, die Frühphasen der späteren Kulturen Italiens zu erschließen. Zu nennen sind hier etwa die 1959 und 1962 erschienenen Werke Hermann Müller-Karpes zu den Anfängen Roms. Später hat Kerstin Hoffmann als Forschungsstipendiatin der Abteilung im Rahmen des von der Gerda-Henkel-Stiftung geförderten Projekts zu den einheimischen Kulturen in Italien sehr intensiv den internen Dialog gefördert. Aber erst mit Daniel Steininger 2006 startete dann ein eigenständiges Projekt, das mit den traditionellen Forschungsfeldern der Abteilung Rom nichts mehr zu tun hatte und ganz im Chalkolithikum angesiedelt war.

Darin kommt ein umfassender Wandel in den Methoden und der Organisation von Forschung innerhalb des Deutschen Archäologischen Instituts zum Ausdruck, der jüngst zu vielen Veränderungen geführt hat, etwa in der sogenannten Bildung von Clustern, also die Abteilungen übergreifenden Forschungsverbünden. Damit die unterschiedlichen Abteilungen des Instituts in den verschiedenen Kulturregionen Europas und der ganzen Welt untereinander weiterhin einen fruchtbaren Austausch pflegen können, zugleich aber auch für ihre Partner an den diversen Universitäten und übrigen Forschungsstätten anschlussfähig bleiben, muss die Konzentration auf einzelne archäologische Disziplinen zu-

gunsten einer breiteren Fächerung erweitert werden. Dadurch ist es möglich, verschiedene historische Horizonte und Epochen etwa im Bereich des Mittelmeeres, aber auch darüber hinaus, in ihren Gemeinsamkeiten und Unterschieden in den Blick zu bekommen. Zugleich profitieren die Disziplinen voneinander durch ihre methodische Vielfalt.

In einer solchen engen Verschränkung kann die Arbeit des Instituts eine wirkungsvolle Ergänzung zu dem Studien- und Forschungsbetrieb der Universitäten bilden, in denen bei aller Interdisziplinarität durch die Studienerfordernisse und Fächerdefinitionen die Grenzen stärker bewahrt werden müssen.

Die Tagung mit ihrer Thematik stellt einen weiteren Schritt in diese Richtung dar und bezeugt zugleich Öffnung und neue Verbindungen, die dadurch möglich sind. Ihr Konzept haben Daniel Steininger und Michael Kunst gemeinsam entworfen. Beide beschäftigen sich vorrangig mit der Kupferzeit und beide stammen von der Universität Freiburg, wo der eine 2007 und der andere 1982 promoviert hat, womit sie wiederum in der mittelbaren Tradition Sangmeisters stehen.

Ihnen gilt unser besonderer Dank. Danken möchten wir auch Patrizia Petitti und Christian Strahm für die Mitarbeit zur Vorbereitung der Tagung im wissenschaftlichen Komitee sowie allen jenen Kolleginnen und Kollegen, die durch Vortrag, Diskussion und schriftlichen Bericht zum Erfolg des Unternehmens beigetragen haben. Auch an alle anderen, die sich an der Betreuung der Tagung und an der Redaktion beteiligt haben, richtet sich unser Dank. Für die finanzielle Förderung gilt der Fritz Thyssen Stiftung unser besonderer Dank. Hervorheben möchten wir schließlich die Gastfreundschaft von Rita Paris und Anna Maria Moretti, die für die Tagung am 6. und 7. Oktober 2011 ihren schönen Vortragsaal im Palazzo Massimo in Rom zur Verfügung stellten.

Henner von Hesberg, Rom, und Dirce Marzoli, Madrid, Januar 2013

Chalcolithic Ivory Exchange in the Western Mediterranean¹

by *Thomas X. Schuhmacher*

Introduction

Being exotic to the Iberian Peninsula, ivory was of special interest from the beginning of archaeological investigation, because it was supposed to give clear hints with respect to prehistoric overseas contacts and exchange. As early as the late 19th century, S. P. M. Estácio da Veiga defended the idea that finished ivory objects as well as the raw material were imported from northern Africa². L. Siret already differentiated between pieces made of elephant and others from hippopotamus ivory³ and wondered whether both groups may have been imported from Egypt as finished objects. J. C. Serra Ráfols pointed out that, on the contrary, there was really no evidence for an Egyptian origin, and that Northwest Africa should be considered to be the source⁴. At the same time, A. Götze argued that local fossilized ivory was too fragile and brittle to have been used⁵. Finally, A. Jodin and G. Camps related the finds of ivory on the Iberian Peninsula to the appearance of Bell Beakers in Northwest Africa⁶. Since then, a Northwest African origin has been widely accepted⁷. In fact, however, this was only an assumption due to the geographic proximity, but it was never confirmed by scientific analysis.

In their monumental work on the megalithic tombs of the Iberian Peninsula, the Leisners included a list of ivory objects from the southern part of the peninsula⁸.

Later, A. Gilman and R. Harrison produced an updated inventory list for ivory objects known from bibliographic sources⁹. Subsequently, there were specific studies of the relations between the Iberian Peninsula and Northwest Africa during the Bell-Beaker period¹⁰. After that, only a few regional works have been published by K. Spindler for Portugal and J. L. Pascual Benito for the País Valenciano¹¹.

Therefore, in a broader research project financed by the Deutsche Forschungsgemeinschaft (DFG, Bonn) and settled at the German Archaeological Institute (Madrid) we attempted to compile a new catalogue, as complete as possible, of all ivory objects from the Iberian Peninsula dated from the beginning of the Chalcolithic at about 3000 BC until the end of the Early Bronze Age about 1650 BC in the Southeast¹². Our preliminary work has revealed that the aggregate number of prehistoric ivory objects known, and thus the scale of ivory exchange, is much larger than previously thought. In fact, we have recognised approximately 2000 ivory objects. The detailed study of the pieces and their contexts as well as the scientific analysis may provide new data on the chronologic and geographic distribution, their social importance and the origin and exchange of raw material.

1 This article was submitted shortly after the congress for publication and represents the state of investigation of 2012. It was only slightly changed and some recent information added. In the meantime we published other articles about this topic: García Sanjuán et al. 2013; Lucíañez Triviño et al. 2013; Valera et al. 2015; Schuhmacher 2016a; Schuhmacher 2016b; Schuhmacher 2017; Schuhmacher (in press).

2 Veiga 1886–1891, vol. 1: 268–270; vol. 2: 212.

3 Siret 1913, 33.

4 Serra Ráfols 1925, 87.

5 Götze 1925, 87.

6 Jodin 1957; Camps 1960.

7 Harrison – Gilman 1977; Spindler 1981. For an opposing view, see Poyato Holgado – Hernando Grande 1988.

8 Leisner – Leisner 1943.

9 Harrison – Gilman 1977.

10 Poyato Holgado – Hernando Grande 1988.

11 Spindler 1981; Pascual Benito 1995.

12 DFG-project: SCHU 1539/3–1 and SCHU 1539/3–2 under the direction of the author and A. Banerjee (University of Mainz). The research group is integrated by W. Dindorf, F. Enzmann (both University of Mainz), Th. Reischmann (Mainz), Ch. Sastri (Proteosys AG Mainz) and A. Mikdad (INSAP, Rabat); Schuhmacher 2012.

Analytical results

When talking about ivory, we usually think about elephant tusks, but in fact we have to take into account that there are other types of ivory with similar characteristics, which can be employed for the same purposes¹³: the teeth or tusks of hippopotamus, sperm whale, walrus and narwhale, to name just a few. For an accurate analysis of the origin and exchange routes of ivory we will, of course, have to differentiate between the tusks of extinct elephants, like *Elephas antiquus* and mammoths, and the various living species, Asian elephant (*Elephas maximus*), African savanna elephant (*Loxodonta africana africana*) and African Forest Elephant (*Loxodonta africana cyclotis*).

In the margin of the project mentioned above, A. Banerjee and his team successfully analysed 125 ivory objects from the Iberian Peninsula at Mainz University in order to determine the raw material used¹⁴ (Table 1), 25 of which probably belong to the younger Early Bronze Age (first half of the 2nd millennium BC) and are therefore not included in the present article.

Diverse methods, including measurement of the Schreger angle by optical microscopy, Fourier Transformed Infrared (FTIR)-Spectroscopy, elemental analysis and Isotopic Ratio Mass Spectrometry have been applied¹⁵.

	<i>Elephas antiquus</i>	Asian elephant	African savanna elephant	Hippopotamus	Sperm whale	Sum
Final Neolithic (2 nd half of 4 th millennium BC)	0	0	6 (100%)	0	0	6
Early and Middle Chalcolithic (first half of 3 rd millennium BC)	2 (7.4%)	9 (33.3%)	14 (51.9%)	0	2 (7.4%)	27
Final Chalcolithic/ Older Early Bronze Age (2 nd half of 3 rd millennium BC)	17 (34.7%)	8 (16.3%)	9 (18.4%)	0	15 (30.6%)	49
„Chalcolithic“	0	0	18 (100%)	0	0	18
Younger Early Bronze Age (first half of 2 nd millennium BC)	2 (10.5%)	0	15 (79%)	2 (10.5%)	0	19
„Early Bronze Age“	2 (33.3%)	0	4 (66,7%)	0	0	6
Total	23 (18.4%)	17 (13.6%)	66 (52.8%)	2 (1.6%)	17 (13.6%)	125 (100%)

Table 1 Iberian Peninsula. Origins of raw material due to results of scientific analyses, differentiated by time-period

The Beginnings of Ivory Use

We can confirm that the utilization of ivory on the Iberian Peninsula began in the second half of the 4th millennium BC. At least, we know several very thin bracelets and one comb of ivory found in two hypogea in Sobreira de Cima (Alentejo, Portugal)¹⁶. Three of the published

radiocarbon dates place the burials from these rock-cut tombs in the period of 3357–3099 calBC¹⁷. One date, slightly earlier, might be compatible with this range; another one, the only one from Tomb 5, dates already into the first half of the 3rd millennium BC. Also, six

¹³ Bortolaso 2008; Schuhmacher et al. 2009.

¹⁴ Five more ivory objects from Valencina de la Concepción are currently under study at the Mainz University. These results have been published in the meantime: García Sanjuán et al. 2013; Luciani et al. 2013; Schuhmacher 2017.

¹⁵ Banerjee et al. 2011; Banerjee – Huth 2012.

¹⁶ Excavation by ERA Arqueologia S. A., Lisbon; Valera et al. 2008; Schuhmacher 2013.

¹⁷ Valera et al. 2008. All radiocarbon dates are from human bones: Beta-231071 (AMS): 4670 ± 50 BP = 3517–3371 calBC (Tomb 3); Sac-2260: 4530 ± 50 BP = 3357–3111 calBC (Tomb 1); Sac-2261: 4500 ± 70 BP = 3344–3099 calBC (Tomb 1); Sac-2256: 4520 ± 35 BP = 3350–3114 calBC (Tomb 4); Beta-232637 (AMS): 4080 ± 40 = 2839–2500 calBP (Tomb 5). All dates in this text are calibrated by OxCal 4.1 and are given with a probability of 68.2% (1 sigma) (Bronk Ramsey 2009).

OSL-dates have been taken for Tombs 1 and 2. These situate the tombs also in the second half of the 4th millennium BC¹⁸.

Here we have to remind two AMS-dates made on ivory pins from a rock-cut tomb in Praia das Maças (Sintara, Portugal), which delivered a similar result with 3312–2916 calBC¹⁹. It is therefore clear that the use of ivory

appeared quite suddenly at the end of the 4th millennium BC in a burial context of a Late Neolithic or Early Chalcolithic.

A. Banerjee and his team analysed five fragments of bracelets and the comb from Sobreira de Cima at the University of Mainz with the result that in all six cases the ivory stems from the African savanna elephant.

Early and Middle Chalcolithic (3000–2500 AC)

Distribution of Ivory Objects

For the first half of the 3rd millennium BC we registered 234 ivory objects (fig. 1); to these must at least be added some of the approximately 500 ivory objects found in two megalithic tombs in Perdigões (Alentejo) and other objects from tombs in Valencina de la Concepción (Seville)²⁰. All these pieces are actually under study and their absolute chronology within the Chalcolithic period is still not clear. Among the ivory objects from this period are, in the first place, idols of different type, cylindrical boxes, beads, combs, pins and collars, and occasionally also buttons, bracelets and plaques (fig. 2).

The major part of these objects, 62 % in Spain and 51 % in Portugal, were found in collective burials. When regarding the geographical distribution, two clear centres can be distinguished: the peninsula of Lisbon and the Spanish Southeast. In the end, however, two other regions have also emerged: the Portuguese Alentejo together with the Spanish Middle Guadiana Valley and the Guadalquivir Valley. Thus, we can observe a clear connection between the distribution of ivory objects and the coast and the river system.

Social Importance of Ivory

The social importance of ivory in this period can be demonstrated on the example of the necropolis of Los Millares (Santa Fe de Mondújar, Almería)²¹, where the 85 burial monuments extend over a surface of 13 ha in front of the

outer fortification wall of this settlement. The majority of monuments are tombs with false domes (*tholos*). These tombs, excavated for the most part by L. Siret, delivered 48 ivory objects. R. Chapman could demonstrate that only part of the population was buried in these tombs. While these *tholoi* do not differ much in the effort invested in their construction, they do in the richness of their offerings. Chapman identified a group of eight tombs (5, 7, 8, 9, 12, 16, 40 and 63) called “prestige tombs”, clearly highlighted by the quantity and diversity of their offerings. Among these are all tombs with ivory, except Tomb 71.

Almagro and Arribas could relate the majority of tombs excavated by Siret and the Leisners with the tombs they documented in Los Millares, thereby locating six of nine tombs with ivory offerings in a plan. Following the classification of Molina and Cámara, two of the buried individuals were of highest social rank (Tombs 7 and 40), two belong to the second highest category (Tombs 5 and 12), one to Category 3 (Tomb 8) and one, doubtfully related, to Category 4 (Tomb 71).

Especially interesting is Tomb 40, one of the richest in the necropolis of Los Millares²², as it not only contains the highest number of ivory objects, among these cylindrical idols, boxes and combs, but also numerous metal objects and flint arrowheads. Exceptional offerings like containers and idols of stone, painted and symbolic pottery have also been found.

Only recently, a compilation of available information with reference to Valencina de la Concepción has been started, which will enable us to do a similar study in the future²³. However, we can already say that there are some outstanding tombs, extremely rich in their offerings and

18 SBC-3: 5231,4 ± 369,6 BP for Tomb 1 and 4897 ± 259,8 BP for Tomb 2 (Dias et al. 2008).

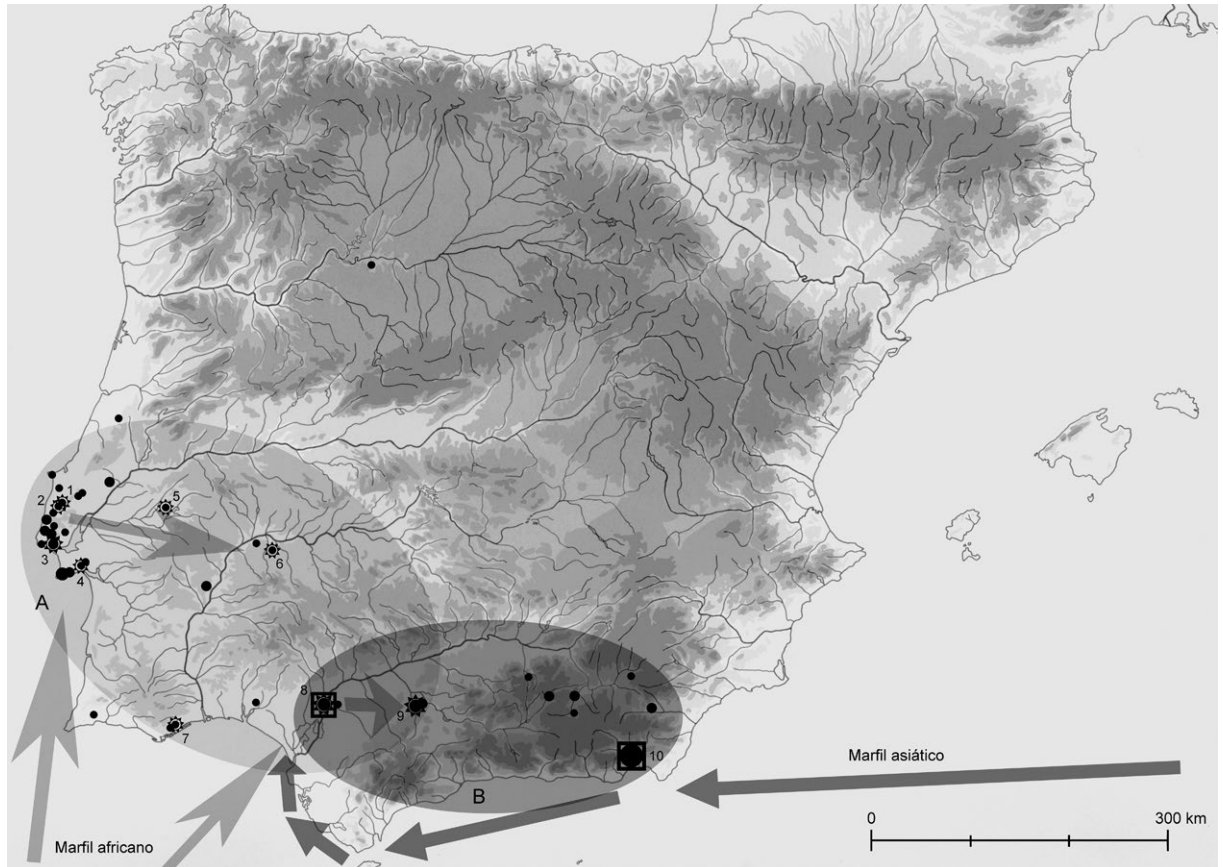
19 OxA-5509 (AMS): 4410 ± 75 BP = 3312–2916 calBC and OxA-5510 (AMS): 4395 ± 60 BP = 3096–2916 calBC (Soares 2003, table 5).

20 In the meantime published, see there: García Sanjuán et al. 2013; Lucíañez et al. 2013; Valera et al. 2015; Schuhmacher 2017.

21 Siret – Siret 1890; Almagro – Arribas 1963; Chapman 1981; Molina – Cámara 2005.

22 Leisner – Leisner 1943, 21–24 pls. 9. 10.

23 Cruz-Auñón et al. 2010.



1 Early and Middle Chalcolithic (first half of the 3rd millennium BC); distribution of ivory objects, results of scientific analyses and reconstruction of exchange networks. 1. Cova da Moura; 2. Zambujal; 3. Leceia; 4. Palmela; 5. Anta da Herdade da Capela; 6. La Pijotilla; 7. Nora; 8. Valencina de la Concepción; 9. Cueva Antoniana (Gileña); 10. Los Millares. * ivory from African savanna elephant; □ ivory from Asian elephant • 1–2; ● 3–10; ● 11–20; ● 21–30; ● 31–40; ● 41–50; ● > more than 50 ivory objects



2 Cabeço da Arruda, Grab 1

outstanding in the combination of persons buried there. Another example is the so-called dolmen of Montelirio, which also delivered a higher amount of unique ivory objects, like combs, animal figurines and plaques²⁴.

Scientific Analysis

From the analysed ivory objects a total of 27 can be assigned to the Early and Middle Chalcolithic. For South-Eastern Spain only five pieces, all of them belonging to the necropolis of Los Millares (Tombs 5, 7, 12 and 40), have been analysed until now. This number is, however, not yet statistically significant, so that we have to treat these results with caution. In four of these cases we are talking about ivory from the Asian elephant (*Elephas maximus*) and in one piece from Tomb 7 of *Elephas (Palaeoloxodon) antiquus*. Five more pieces made of waste-material from an ivory workshop in the settlement of Valencina de la Concepción (Seville) also yielded Asian elephant ivory²⁵.

Another analysis from South-Western Spain, however, provided a different result: African savanna elephant ivory (*Loxodonta africana africana*) for two pieces from the dolmen of Montelirio, two objects from the Cueva Antoniana (Gileña, Seville) and two decorated plaques from La Pijotilla (Badajoz).

Recently, however, we analysed a sample from an entire tusk deposited above the head of a man in Tomb 10.049 in Valencina²⁶. This piece, which is crucial for understanding the functioning of ivory exchange, was made of African elephant ivory. The same is true for two objects from the tomb of Cueva Antoniana in Gileña (Seville).

Ten of the analysed objects from Portugal probably belong to this period²⁷. In seven cases it is African savanna elephant ivory from Zambujal, Cova da Moura, Leceia, Palmela, Anta da Herdade da Capela and Nora, in one from Leceia it is *Elephas antiquus* and in two from Praia das Maças sperm whale ivory. All 15 samples from the tombs of Perdígões, from which a part might belong to this period, also delivered African ivory²⁸.

Final Chalcolithic and Beginning of the Older Early Bronze Age (2500–1900 AC)

Distribution of Ivory Objects

355 ivory objects can be dated into the second half of the 3rd millennium BC, without taking into account the ones from Perdígões (fig. 3). An increase in the total number and almost the same gross weight of ivory objects (1139,9 g) with respect to the Early and Middle Chalcolithic (1004,6 g) is observed²⁹. These are predominantly small buttons with a V-perforation (29 %), followed by beads and pendants. At the same time, we register raw material and half-finished objects.

To this period also belong the anthropomorphic idols with folded arms³⁰. From these at least the ones from Marroquíes Altos, Torre del Campo (both in Jaén),

and one from La Pijotilla (Badajoz) are made of ivory. A similar type is represented by the one from El Malagón (Granada). And recently, dozens of these idols made of ivory appeared in the settlement of Perdígões³¹.

Belonging also to this period, 63 % of ivory objects were retrieved from collective burials, but the first individual interments already appear. In accordance with the diffusion of the Bell Beaker phenomenon, the distribution of ivory objects also changes with respect to the Older Chalcolithic. Now apart from Portugal, the Spanish Southwest and Southeast, which are still the areas with the most numerous occurrences, we assist to an expansion to the Levant, Centre and even the North of the Peninsula.

²⁴ Fernández – Aycar 2013. I thank the authors for letting me read their manuscript before publication.

²⁵ Vargas et al. 2012.

²⁶ See now García Sanjuán et al. 2013; Lucíañez et al. 2013; Schuhmacher 2017.

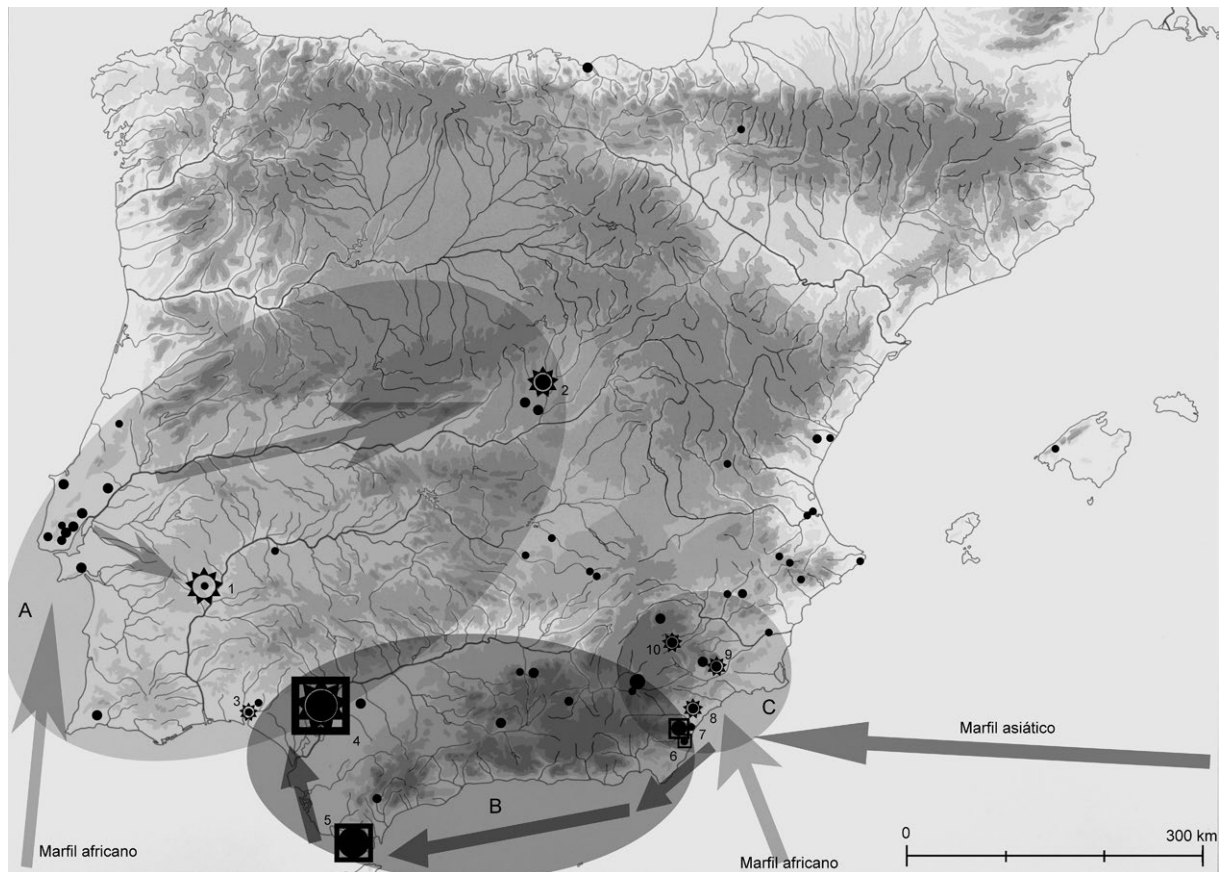
²⁷ Schuhmacher et al. 2009; Banerjee et al. 2011; Schuhmacher – Banerjee 2011.

²⁸ See now Valera et al. 2015; Schuhmacher 2017.

²⁹ This statement has changed with the incorporation of new findings, see Schuhmacher 2017; Schuhmacher (in press).

³⁰ Schuhmacher 2004; Blanco Freijeiro 1962, fig. 1; pls. 1. 2. 5; Fernández-Gómez – Oliva 1980; Arribas 1977; Moreno 1994, 382 no. 46.

³¹ Friendly personal information: A. Valera, ERA Arqueologia, Lisbon.



3 Final Chalcolithic/Older Early Bronze Age (second half of the 3rd millennium BC); distribution of ivory objects, results of scientific analyses and reconstruction of exchange networks. 1. Perdigoes; 2. Camino de Yeseras; 3. La Orden; 4. Matarrubilla, Señorío de Guzmán; 5. Los Algarbes; 6. Gatas; 7. El Argar; 8. Fuente Álamo; 9. La Bastida; 10. Molinos de Papel. ★ ivory from African savanna elephant; □ ivory from Asian elephant • 1–2; ● 3–10; ● 11–20; ● 21–30; ● 31–40; ● 41–50; ● > more than 50 ivory objects

Social Importance of Ivory

For this period, especially the hypogeum from Funeral Area 2 at Camino de Yeseras (Madrid)³² must be mentioned, as well as Tomb 5 in Los Algarbes (Cádiz) and the tomb of Matarrubilla (Seville) with their combination of a large number of ivory objects, mostly exceptional pieces, and extraordinary gold objects.

Tomb 5 in the small necropolis with rock-cut tombs of Los Algarbes³³ included four ceramic containers, two silex arrowheads, one spiral ring and two decorated sheets of gold (spherically bended), 52 shell disk beads and more than 100 ivory objects, mostly small beads belonging to a collier. At the same time, we find ivory attachments, most of them showing bore holes. These could possibly have formed part of a wooden box, from which no other vestige is preserved and which would be a unique piece on the Iberian Peninsula. We would date

Tomb 5, just as the entire prehistoric necropolis of Los Algarbes, into the Younger Chalcolithic (second half of the 3rd millennium BC), although some finds, especially Tomb 8, could date already to the beginning of the 2nd millennium BC. This corresponds with the results of the new interventions at the site³⁴.

The diversity, forms and quality of the more than 100 g of ivory objects from Tomb 5 are spectacular. Rivero refers to five inhumations for this tomb³⁵. Thus, we are clearly not talking about a closed singular context, but have to take into account a longer-lasting use of the tomb. At the same time, the material is quite homogeneous, and even if we had to divide the offerings among five corpses, though there are no clear attributions to these offerings, the quantity of offerings per individual would still be memorable.

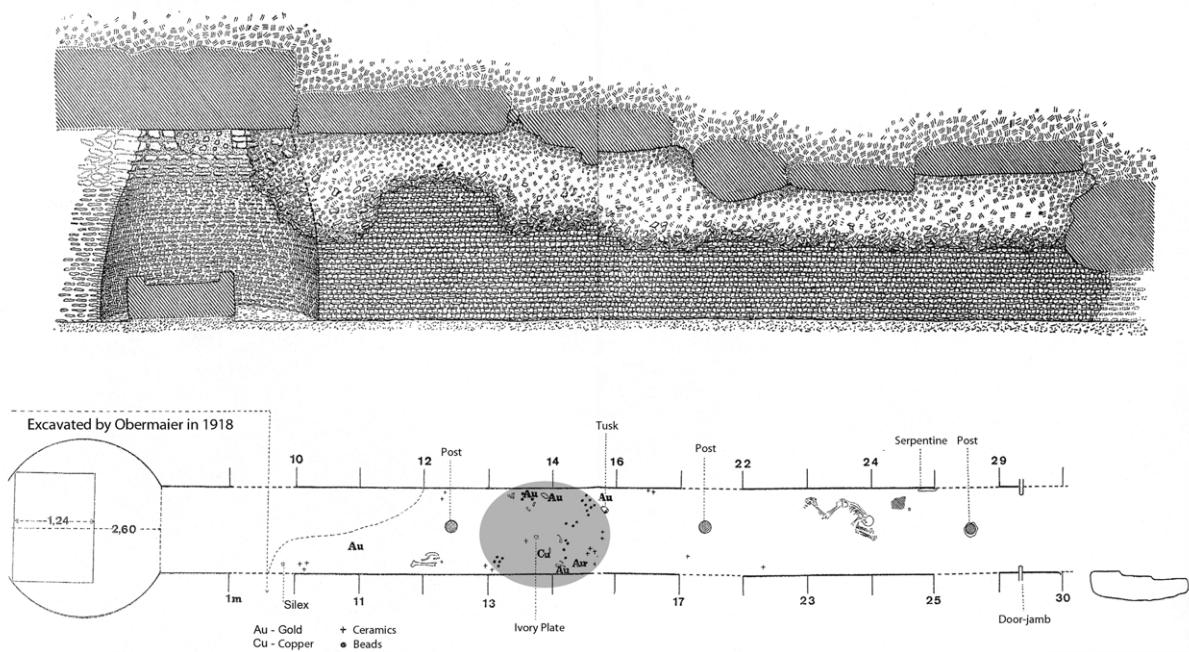
The huge burial monument of Matarrubilla belongs to the Chalcolithic settlement of Valencina de la Concepción

³² Liesau et al. 2011.

³³ Posac 1975.

³⁴ Mata 1991; García Jiménez et al. 2011.

³⁵ Rivero 1988, 82 f.



4 Tomb of Matarrubilla (Valencina de la Concepción); plan of the tomb with indication of the zone where the ivory objects were found (grey shade)

(Seville) (fig. 4)³⁶. It consists of a circular chamber with false dome and a corridor with a length of 30 m. The chamber and the adjacent 10 meters of the corridor were excavated in 1918 by Hugo Obermaier. In 1955, the rest of the corridor was excavated and rich offerings discovered especially in the zone between 13 m and 16 m distance from the chamber. Besides ceramics, a metal awl, polished axes, flint objects, beads of green stone and several hundred small fragments of sheet gold, more than 100 ivory objects were found there with a total weight of 300 g, if we do not take into account a big fragment of a fossilized elephant tusk³⁷. Among the ivory objects are simple and articulated arm rings, so-called idols in sandal form, pendants, knife handles, and about 40 multiple channel beads perforated in a complicated manner (fig. 5). Nothing comparable to these beads that have probably formed an intricate collier is known throughout the Western Mediterranean.

The tomb of La Matarrubilla is among the largest monuments of Valencina, however with a quite small chamber with a diameter of only 2.8 m. During his excavation Obermaier could only detect a large marble cuboid of 1.7 m x 1.25 m inside the chamber, which covered almost the entire surface of the chamber (fig. 4). He also found the chamber empty and only made finds

in two spots of the corridor. Obermaier thought the chamber and the part of the corridor he excavated to be completely looted, as he had also found ceramic containers from the Iberian period. It is, however, strange that he did not find a single human bone in the chamber, it is therefore possible that the chamber was never used to house a burial³⁸. On the other side appeared different fragments of human bones at two spots in the corridor, where he could also find some objects. In 1955, Collantes detected one complete skeleton together with some offerings at 23–24 m and remains of a second one at about 12 m distance from the opening of the chamber. Collantes points out that the offerings and human remains found in the section from 10 m to 30 m distance from the opening of the chamber were covered with a conglomerate of pebble stones and earth, protecting these. So, although we have to keep in mind that the first 10 meters of the corridor from the opening of the chamber, excavated by Obermaier could have been looted and surely disturbed, it is possible that there were originally no more than four burials in the entire monument. Moreover, all offerings found between 13–16 m, including all ivory and almost all gold objects, appear to belong to only one (maybe two) burials of high prestige.

³⁶ Obermaier 1919; Collantes 1969.

³⁷ The optical analysis of this piece by A. Banerjee makes it plausible that we are talking about a tusk of *Elephas antiquus*, but

this piece of raw material (326 g) is so fragile – and we think it already was 4000 years ago – that it was never thought to be worked.

³⁸ Compare Cruz-Auñón et al. 2010, 53.



5 Tomb of Matarrubilla, perforated multiple channel beads, front and back side

We can resume that in the second part of the 3rd millennium BC the total number and weight of ivory objects in circulation increased. At the same time, they were distributed over a larger territory, as the exchange networks became more extensive, at least on the Iberian Peninsula, a phenomenon that can also be observed for the distribution of Bell-Beaker items³⁹. Simultaneously, the ivory objects themselves tended to get smaller, if we exclude the anthropomorphic idols, so that more objects

were in the hand of more people, although some exceptional persons retained a large quantity of this material and other exotic or valuable objects, as can be observed in Los Algarbes, Camino de Yeseras, Matarrubilla. Among the objects in question we can find predominantly pieces of jewellery or, maybe more precisely, pieces of ceremonial or ritual regalia to robe a few personalities belonging to an elite in formation. These and other tombs must be studied more thoroughly in order to understand the grade of hierarchization and complexity of the society. It seems also most likely that these persons organized the exchange of prestige objects like ivory over middle or long distances, and should therefore be designated as "big men" or "chiefs"⁴⁰.

Scientific Analysis

49 items from the second half of the 3rd millennium, Final Chalcolithic and beginning of the Older Bronze Age, were analysed⁴¹. Besides 15 objects from the region of the Tejo estuary, which resulted to be sperm whale ivory, most items are made of ivory from *Elephas antiquus* (34.7%), followed by ivory from the Asian (16.3%) and the African savanna elephant (18.4%). The composition of ivory, however, seems to differ geographically.

From the tomb of Matarrubilla, six out of twelve analysed objects are from Asian elephant ivory, the rest from *Elephas antiquus*. In Tomb 5 at Los Algarbes also one item made of Asian ivory and another one from *Elephas antiquus* were found, as well as one piece in the tomb of Señorío de Guzmán (Valencina de la Concepción). Among the objects from the tombs in Perdigões one button was clearly datable to the Bell-Beaker period and was made of African savanna elephant ivory, just as an idol from La Orden (Seminario de Huelva). And in one tomb in Camino de Yeseras (Madrid) we analysed ten pieces, nine from ivory of *Elephas antiquus* and one from African ivory.

The analysed contexts of the El-Argar Bronze Age, like Molinos de Papel, La Bastida, Gatas, Fuente Álamo and El Argar should be placed already at the beginning of the Early Bronze Age, between 2250 and 1900 BC; there we obtained six times African savanna elephant, and in two cases Asian elephant ivory.

³⁹ Compare Harrison 1977, fig. 24. 40.

⁴⁰ Compare Strahm 2002.

⁴¹ Schuhmacher et al. 2009; Banerjee et al. 2011; Schuhmacher – Banerjee 2011.

Exchange of Asian Ivory in the Chalcolithic

As we have seen for the Early and Middle Chalcolithic in Los Millares, Asian-elephant ivory has been found in 80 % of the samples, although we have to admit that the number of analyses is still small; the rest is from *Elephas antiquus*. In Valencina de la Concepción (Seville), including the tomb of Montelirio, 62,5 % of the analysed samples are from Asian elephant ivory, the rest is African. In the Final Chalcolithic in South-Western Spain we are talking about a 43.8 % of Asian ivory, including the analysis from Matarrubilla, Señorío de Guzmán, La Orden-Seminario de Huelva y Los Algarbes. In the beginning of the Early Bronze Age in South-Eastern Spain this percentage reduced to a 25 % and later completely disappeared.

But where exactly did this Asian ivory come from and how did it reach the Iberian Peninsula? From literal, figurative and archaeological sources we know about the existence of the so-called Syrian elephant, in fact a variant of the Asian elephant⁴². Following these sources, already in the Older Holocene a more or less continuous population of elephants covered the entire region from Oriental Asia through India and Mesopotamia to the Mediterranean coast⁴³. Later, however, a process of reduction of their living space set in and finally, in the 8th century BC, these elephants disappeared completely from Syria and Mesopotamia.

A supply of Asian elephant ivory to the Iberian Peninsula from or via Syria seems therefore possible. Yet, the problem is, that the few studies made until now suggest that until the beginning of the Final Bronze Age in the Levant, as well as in Egypt, Crete and Greece, most part of the ivory used stemmed from hippopotamus. Some recent investigations about the Final Bronze Age of Ugarit⁴⁴ demonstrate, in contrast, that although 60 % of the ivory is hippopotamus ivory, the percentage of elephant ivory increases up to 85 % in contexts of the Royal Palace. This could indicate a mayor appreciation of elephant ivory and its connection with the highest spheres of society. Hence a preference of elephant ivory in an exchange of prestige goods between elites would not be strange. And we should also not forget that the use of ivory and its manufacture was an innovation on the Iberian Peninsula beginning at the end of the 4th millennium BC, whereas for Orient ivory manufacture starts at the end of the 5th or the beginning of the 4th mil-

lennium BC. It seems therefore reasonable to suppose that not only the raw material but also the know-how related to ivory reached the Iberian Peninsula by sea and, in the last instance, from the East.

Problematical, however, are not only the geographic origin of the raw material but also the routes and the mode of exchange. Unfortunately, a detailed study of the ivory objects coming from Italy, Southern France, Corsica and Sardinia and, of course, scientific analysis of the type and origin of the ivory are still missing until now for almost the entire Mediterranean outside the Iberian Peninsula. Therefore, this Chalcolithic exchange of Asian ivory over the Mediterranean seems impossible to reconstruct with accuracy.

Nevertheless, this Asian ivory obviously reached South-Eastern and also South-Western Spain by sea, and big enclosures like Los Millares and Valencina de la Concepción surely played a crucial role in the reception of Asian ivory. Whether the ivory was transported directly to the Guadalquivir Estuary by sea, along the Strait of Gibraltar, or maybe overland from the Southeast, is an open question. If we take into account the African ivory dating to the Early and Middle Chalcolithic found in the Gilena zone, probably imported via Valencina, and consider the lack of Asian ivory in this zone, we might suppose the first, though the number of our analyses is still too small to confirm this. In the same light we have to interpret the finds from Los Algarbes. The situation of this necropolis close to the Strait of Gibraltar seems only stringent when supposing that this site played an important role in the sea traffic along the Strait of Gibraltar.

What seems clear is, as the ivory workshop from Valencina de la Concepción demonstrates, that the majority of Asian ivory must have arrived in form of raw material to be worked locally⁴⁵. Thus in Valencina, at the southern margin of a metallurgic quarter, excavated between 2001 and 2005 and situated in the South-Western periphery of the settlement, a pit (402) shaped like an eight was discovered. The pit contained a concentration of ivory together with bone tools, mostly awls and spatulas, flint blades, a crucible, fragments of rock crystal and ceramic fragments. The ivory consisted of raw material, half-finished objects and production waste. Inside the same pit and next to a concentration of ivory lay a copper saw. The pit belongs to a period of the settlement

42 Zeuner 1963; 275-279; Sukumar 2003, 44 f. 403 f. fig. A1.1.

43 Becker 1994. We have to add to her list the recent finds of elephant bones from Bronze-Age Emar (Syria) and from the

Middle- to Late-Bronze-Age Royal Palace of Qatna (Syria) (Gündem – Uerpman 2003; Pfälzner 2008).

44 Gachet-Bizollon 2007, 15 f. 240.

45 Vargas et al. 2012.

dated to the first quarter of the 3rd millennium BC and thus represents the to-date oldest known ivory work-

shop on the Iberian Peninsula, or at least waste from such a workshop.

Exchange of African Ivory in the Chalcolithic

Interesting, at the same time, is the fact that we have been able to recognize two different Chalcolithic exchange networks. On the Iberian Peninsula during the Early and Middle Chalcolithic Asian ivory dominated in the Southeast and African savanna elephant ivory in present-day Portugal and the Spanish Extremadura. Due to the results of the latest analysis the Guadalquivir Valley possesses both.

In the Final Chalcolithic we find Asian ivory in the Guadalquivir Valley and the southernmost part of the Iberian Peninsula (Cádiz), whereas in Portugal, the Centre of Spain and the Huelva region we have African ivory. In the South-Eastern Argar culture we can find both, Asian and African ivory. However, the number of analyses needs to be increased to corroborate this observation.

With regard to African savanna elephant ivory we detected a large quantity of figurative representations of elephants in North African rock art, for example in Morocco south of the Atlas Mountains⁴⁶, and we have literal sources and figurative representations from Punic and Roman times talking about their presence until the 8th century AD. While the majority of investigators identified North African elephants with the species *Loxodonta africana cyclotis* or the African forest elephant, today only present in Equatorial Western Africa, this species does not appear in any of our analyses.

Finally, we analysed several raw ivory fragments from the excavations in the cave of Kehf-el-Baroud, situated between Rabat and Casablanca (Morocco)⁴⁷. In this case it seemed clear that the material came from elephants living in the surroundings of the cave. The analysis done by A. Banerjee at the University of Mainz and the dating by AMS of the same pieces confirmed that African savanna elephants lived near the cave in the 5th and 4th millennium BC, so we could confirm that the extinguished North African elephant was, in fact, an African savanna elephant.

During the Early and Middle Chalcolithic the major part of ivory objects from the Portuguese Estremadura, Alentejo, Algarve and Middle Guadiana were made of

ivory from *Loxodonta africana*, and, as evidenced by their geographic distribution, were probably imported by sea from the Atlantic coast of Morocco. At the moment we still ignore what was exported in exchange, because we still lack objects of proven Iberian origin in Northern Africa, although we suspect that painted pottery and copper axes could have figured among them.

In relation with this ivory supply, whether African or Asian, the settlements with stone fortifications and large ditched enclosures doubtlessly played an important role on the Iberian Peninsula, because we observe a clear relationship between these sites or the tombs belonging to them and the distribution of ivory objects.

African ivory probably reached the sites near the Tejo estuary and was further distributed from there towards the inland of Portugal, the Alentejo and the Middle Guadiana Valley. The arguments sustaining this assumption are various:

- a) African elephant ivory was used in the Alentejo as well as on the Peninsula of Lisbon and Setúbal, whereas in the Guadalquivir estuary we have mostly Asian ivory, although the latest analysis demonstrated a certain amount of African ivory in Valencina as well as in Gilena (Seville).
- b) Additional arguments result from other investigation projects: R. Müller could demonstrate that the copper used in the Tejo estuary came from the Alentejo region, just as J. L. Cardoso has demonstrated for amphibolite, so both could have served as gifts in return for ivory⁴⁸.
- c) In the Portuguese Extremadura we find only some schist plaques, whereas these objects do have their major distribution in the Alentejo region. With objects made of limestone it is the other way round, they are abundant in the Portuguese Extremadura and only scarce in the Alentejo region.
- d) First results of strontium isotope analysis on human bones revealed that at the settlement of Perdigões situated in the Alentejo region part of the population

⁴⁶ Banerjee et al. 2011.

⁴⁷ Mikdad 1998; Banerjee et al. 2011.

⁴⁸ Müller – Monge Soares 2008; Müller – Cardoso 2008; Cardoso – Carvalhosa 1995; Cardoso 2004.

buried in two tombs came originally from the Lisbon peninsula⁴⁹.

So we have to add ivory to the materials exchanged via the river system between the Tejo estuary and the Alentejo region⁵⁰. In Perdigões (Alentejo) big quantities of ivory were found in two tombs⁵¹, among them also raw material and production waste, so that probably not only finished objects but also raw material was exchanged in order to be worked locally.

In the second half of the 3rd millennium BC we are facing a growth of consumption of local ivory like that of *Elephas antiquus* and of sperm whale. However, we consider the hypothesis of Harrison and Gilman⁵² of an exchange of North African ivory for objects from the Bell-Beaker complex to be valid, as demonstrated by the proper distribution of ivory objects on the one hand and the Bell-Beaker objects in Northern African on the other. In fact, a major part of North African Bell-Beaker decorations and forms find parallels in the Bell-Beaker complexes of Palmela (Portugal) and the Guadalquivir Valley. Yet, we have to admit that at the moment the results of our analyses can only partially corroborate this hypothesis, as we still lack proof for a utilization of African ivory in the Bell-Beaker period in the Portuguese Estremadura. Nevertheless, we could detect it in Per-

digões and in the settlement of La Orden – Seminario de Huelva.

We suppose that the process was similar as before, an exchange of ivory from the Tejo estuary to the Alentejo region, among others because of the presence of Asian ivory in the Guadalquivir estuary and a simultaneous lack of African ivory. However, African ivory was then also transported upstream and reached the sites of Central Spain like Camino de Yeseras (San Fernando de Henares, Madrid) and probably Humanejos (Parla, Madrid)⁵³. So, in Yeseras we find, besides an utilization of local *Elephas antiquus* ivory, at least one sample of ivory from *Loxodonta africana africana*. Among others, the presence of two buttons with double appendices in Humanejos underlines the connection, as this is a form typical for the Tejo estuary and only rarely present outside this region⁵⁴. In Humanejos also a Carrapatos-type halberd appeared, a form of clear Atlantic origin⁵⁵. We must also ask ourselves whether this concentration of ivory artefacts in the South of Madrid, Camino de Yeseras, Humanejos and Ciempozuelos could not be related to the resources of flint and salt available and exploited there⁵⁶.

So, on the whole, we need to continue to investigate and analyse more finds and, above all, extend analyses to other regions of the Mediterranean in order to better understand ivory exchange networks in the Chalcolithic.

Bibliography

Almagro – Arribas 1963 M. Almagro Basch – A. Arribas, El poblado y la necrópolis megalíticas de Los Millares (Santa Fé de Mondújar, Almería), Bibliotheca Praehistorica Hispana 3 (Madrid 1963)

Arribas 1977 A. Arribas, El idolo de 'El Malagón' (Cullar-Baza, Granada), CuadGranada 2, 1977, 63–82

Banerjee – Huth 2012 A. Banerjee – J. Huth, Investigation of Archaeological Ivory, in: A. Banerjee – J. A. López Padilla – Th. X. Schuhmacher (eds.), Marfil y Elefantes en la Península Ibérica y el Mediterráneo. International Conference Museo Arqueológico de Alicante, 26–27 November 2008, IA 16/1 (Darmstadt 2012) 15–28

Banerjee et al. 2011 A. Banerjee – W. Dindorf – A. Mikdad – Th. Reischmann – Th. X. Schuhmacher,

Die Elfenbeinfunde aus Khef-el-Baroud (Ziaïda, Ben Slimane, Marokko) und die Frage des Nordafrikanischen Elefanten, MM 52, 2011, 113–138

Becker 1994 C. Becker, Elfenbein aus den syrischen Steppen? Gedanken zum Vorkommen von Elefanten in Nordostsyrien im Spätholozän, in: M. Kokabi – J. Wahl (eds.), Beiträge zur Archäozoologie und Prähistorischen Anthropologie 8. Arbeitstreffen der Osteologen, Konstanz 1993, im Andenken an Joachim Boessneck, FuBerBadWür 53, 1994, 169–181

Blanco 1962 A. Blanco Freijeiro, Die ältesten plastischen Menschendarstellungen der Iberischen Halbinsel, MM 3, 1962, 11–20

Boaventura 2011 R. Boaventura, Bodies in Motion. Implications of Gender in Long-Distance Exchange

49 Hillier et al. 2010.

50 Boaventura 2011.

51 Lago et al. 1998.

52 Harrison – Gilman 1977; Souville 1984, 241–245; Bokbot 2005, 167.

53 Ríos – Liesau 2011, 365–367 figs. 4. 5; Liesau et al. 2011.

54 Uscatescu 1992, 83–86 fig. 35. Now Schuhmacher 2017; Schuhmacher (in press).

55 Pardo et al. 2011, figs. 3. 7; Schuhmacher 2002.

56 Ríos 2011, 47–51 figs. 17. 19.

- between the Lisbon and Alentejo Regions of Portugal in the Late Neolithic, in: K. T. Lillios (ed.), *Comparative Archaeologies. The American Southwest (900–1600 AD) and the Iberian Peninsula (3000–1500 BC)* (Oxford 2011) 207–219
- Bokbot 2005** Y. Bokbot, La civilización del vaso Campaniforme en Marruecos y la cuestión del sustrato Calcolítico precampaniforme, in: M. Rojo-Guerra – R. Garrido-Pena – I. García-Martínez de Lagrán (eds.), *El campaniforme en la Península Ibérica y su contexto europeo* (Valladolid 2005) 137–173
- Bortolaso 2008** G. Bortolaso, Imitations and Substitutes for Ivory. A Short History, in: *Elfenbein und Artenschutz – Ivory and Species Conservation, INCENTIVS-Tagungsbeiträge (2004–2007)*, BfN-Skripten 228 (Bonn 2008) 27–35
- Bronk Ramsey 2009** C. Bronk Ramsey, Bayesian Analysis of Radiocarbon Dates, *Radiocarbon* 51/1, 2009, 337–360
- Camps 1960** G. Camps, Les traces d'un Age du Bronze en Afrique du Nord, *Revue Africaine* 104, 1960, 31–55
- Cardoso 2004** J. L. Cardoso, Polished Stone Artefacts at the Prehistoric Settlement of Leceia (Oeiras), *MM* 45, 2004, 1–32
- Cardoso – Carvalhosa 1995** J. L. Cardoso – A. B. Carvalhosa, *Estudos Arqueológicos de Oeiras* 5, 1995, 123–151
- Chapman 1981** R. Chapman, Archaeological Theory and Communal Burial in Prehistoric Europe, in: N. Hammond – I. Hodder – G. Isaac (eds.), *Pattern of the Past* (Cambridge 1981) 387–412
- Collantes 1969** F. Collantes de Terán, El dolmen de Matarubilla, in: *V Symposium Internacional de Prehistoria Peninsular, Jerez de la Frontera 1969* (Barcelona 1969) 47–61
- Cruz-Auñón et al. 2010** R. Cruz-Auñón – F. Nocete – J. C. Mejías, Ciertos aspectos funerarios en la necrópolis de Valencina-Castilleja (Sevilla), in: D. Calado – M. Baldia – M. Boulanger (eds.), *Monumental Questions. Prehistoric Megaliths, Mounds and Enclosures, BARIntSer 211* (Oxford 2010) 51–56
- Dias et al. 2008** M. I. Dias – M. I. Prudêncio – J. Sanjurjo Sánchez – G. O. Cardoso – D. Franco, Datação por luminescência de sedimentos de sepulcros artificiais da necrópole pré-histórica da Sobreira de Cima (Vidigueira). Resultados preliminares, *Aponentamentos de Arqueologia e Património* 2, 2008, 31–40
- Fernández – Aycaar 2013** A. Fernández Flores – V. Aycaar Luengo, El dolmen de Montelirio. Un sepulcro clave para la comprensión de los grandes monumentos funerarios de Valencina-Castilleja, in: L. García Sanjuán – J. M. Vargas Jiménez – V. Hurtado Pérez – T. Ruiz Moreno – R. Cruz-Auñón Briones, (eds.), *El Asentamiento Prehistórico de Valencina de la Concepción (Sevilla). Investigación y Tutela en el 150 Aniversario del Descubrimiento de La Pastora* (Sevilla 2013) 223–260
- Fernández-Gómez – Oliva 1980** F. Fernández-Gómez – D. Oliva Alonso, Valencina de la Concepción (Sevilla). Excavaciones de urgencia, *RAMadrid* 58, 1986, 19–33
- Gachet-Bizollon 2007** J. Gachet-Bizollon, Les ivoires d'Ougarit et l'art des ivoires du Levant au Bronze Récent, *Ras Shamra-Ougarit* 16 (Paris 2007)
- García Jiménez et al. 2011** I. García Jiménez – V. Castañeda Fernández – F. Prados Martínez, La necrópolis de cuevas artificiales de Los Algarbes, Tarifa (Cadiz). Nuevas explicaciones históricas a raíz de las actuales investigaciones, in: *Memorial Luis Siret. I Congreso de Prehistoria de Andalucía, La tutela del patrimonio prehistórico* (Sevilla 2011) 583–586
- García Sanjuán et al. 2013** L. García Sanjuán – M. Lucíañez Triviño – Th. X. Schuhmacher – D. Wheatley – A. Banerjee, Ivory craftsmanship, trade and social significance in the southern Iberian Copper Age: the evidence from the PP4-Montelirio sector of Valencina de la Concepción (Seville, Spain), *European Journal of Archaeology* 16/4 2013, 610–635.
- Götze 1925** A. Götze, Elfenbein, Europa, in: M. Ebert (ed.), *Reallexikon der Vorgeschichte* 3 (Berlin 1925) 87
- Gündem – Uerpmann 2003** C. Y. Gündem – H.-P. Uerpmann, Erste Beobachtungen an den Tierknochenfunden aus Emar (Syrien). Grabungen bis 2002, *BaM* 34, 2003, 119–128
- Harrison 1977** R. J. Harrison, *The Bell Beaker Cultures of Spain and Portugal* (Cambridge 1977)
- Harrison – Gilman 1977** R. J. Harrison – A. Gilman, Trade in the Second and Third Millennium B.C. between the Maghreb and Iberia, in: V. Markotic (ed.), *Ancient Europe and the Mediterranean. Studies in Honour of Hugh Hencken* (Warminster 1977) 90–104
- Hillier et al. 2010** M. Hillier – R. Boaventura – V. Grimes, Moving around? Testing Mobility with Strontium Isotopes ($^{86}\text{Sr}/^{87}\text{Sr}$) in the Late Neolithic of South-Central Portugal, Poster Presented at the 8º Encontro de Arqueologia do Algarve. A Arqueologia e as outras Ciências, Silves, October 2010 (unpublished)
- Jodin 1957** A. Jodin, Les problèmes de la civilisation du vase campaniforme au Maroc, *Hespéris* 44, 1957, 353–360
- Lago et al. 1998** M. Lago – C. Duarte – A. Valera – J. Albergaria – F. Almeida – A. F. Carvalho, Povoado

- dos Perdigos (Reguengos de Monsaraz). Dados preliminares dos trabalhos arqueológicos realizados em 1997, RPortA 1, 1998, 45–152
- Leisner – Leisner 1943** G. Leisner – V. Leisner, Die Megalithgräber der Iberischen Halbinsel. Der Süden, RGF 17 (Berlin 1943)
- Liesau et al. 2011** C. Liesau – A. Banerjee – J.-O. Schwarz, Camino de las Yeseras' Ivory Collection. Advances in Analysis Technology Used in Identifying Raw Material, in: C. Blasco – C. Liesau – P. Ríos (eds.), Yacimientos calcolíticos con campaniforme de la región de Madrid. Nuevos estudios, Patrimonio Arqueológico de Madrid 6 (Madrid 2011) 381–386
- Luciañez Triviño et al. 2013** M. Luciañez Triviño – L. García Sanján – Th. X. Schuhmacher, Restaurierung von archäologischem Elfenbein am Beispiel von vier chalkolithischen Elfenbeinobjekten aus der Siedlung von Valencina de la Concepción (Sevilla), Restaurierung und Archäologie 6, 2013, 71–87
- Mata 1991** E. Mata Almonte, Informe sobre la intervención en el yacimiento de Los Algarbes, Tarifa (Cadiz). Campaña 1990, Anuario Arqueológico de Andalucía 1991 (1993), III. Actividades de urgencia, 583–593
- Molina – Cámara 2005** F. Molina – J. A. Cámara, Los Millares. Guía del yacimiento arqueológico (Sevilla 2005)
- Moreno 1994** A. Moreno Onorato, El Malagón. Un asentamiento de la Edad del Cobre en el altiplano de Cullar Chirivel, Dissertation Granada, Microfiche-Edition (Granada 1994)
- Müller – Cardoso 2008** R. Müller – J. L. Cardoso, The Origin and Use of Copper at the Chalcolithic Fortification of Leceia (Oeiras, Portugal), MM 49, 2008, 64–93
- Müller – Monge Soares 2008** R. Müller – A. M. Monge Soares, Traces of Early Copper Production at the Chalcolithic Fortification of Vila Nova de São Pedro (Zambuja, Portugal), MM 49, 2008, 94–114
- Obermaier 1919** H. Obermaier, El dolmen de Matarubilla (Madrid 1919)
- Pardo et al. 2011** A. I. Pardo – J. Barrio – L. Gutiérrez, Arqueología, restauración y arqueometría: principios básicos para una colaboración eficaz, in: C. Blasco – C. Liesau – P. Ríos (eds.), Yacimientos calcolíticos con campaniforme de la región de Madrid: nuevos estudios, Patrimonio Arqueológico de Madrid 6 (Madrid 2011) 87–98
- Pfälzner 2008** P. Pfälzner, Syrische Elefanten wiederentdeckt im Königspalast von Qatna, AiD 6, 2008, 4
- Posac 1975** C. Posac Mon, Los Algarbes (Tarifa). Una necrópolis de la Edad del Bronce, NotAHispPrehistoria 4, 1975, 87–119
- Poyato – Hernando 1988** C. Poyato Holgado – A. Hernando Grande, Relaciones entre la Península Ibérica y el Norte de África. »Marfil y campaniforme«, in: Actas del Congreso Internacional »El Estrecho de Gibraltar« 1, Ceuta 1987 (Madrid 1988) 317–329
- Ríos 2011** P. Ríos, El medio físico. Análisis preliminar de los recursos naturales del III milenio en la región de Madrid, in: C. Blasco – C. Liesau – P. Ríos (eds.), Yacimientos calcolíticos con campaniforme de la región de Madrid. Nuevos estudios, Patrimonio Arqueológico de Madrid 6 (Madrid 2011) 29–69
- Ríos – Liesau 2011** P. Ríos – C. Liesau, Elementos de adorno simbólicos y colorantes en contextos funerarios y singulares, in: C. Blasco – C. Liesau – P. Ríos (eds.), Yacimientos calcolíticos con campaniforme de la región de Madrid: nuevos estudios, Patrimonio Arqueológico de Madrid 6 (Madrid 2011) 357–370
- Rivero 1988** E. Rivero Galán, Análisis de las Cuevas Artificiales en Andalucía y Portugal (Sevilla 1988)
- Schuhmacher 2002** Th. X. Schuhmacher, Some Remarks on the Origin and Chronology of Halberds in Europe, OxfJA 21, 2002, 263–288
- Schuhmacher 2004** Th. X. Schuhmacher, Frühbronzezeitliche Kontakte im westlichen und zentralen Mittelmeerraum und die Rolle der Iberischen Halbinsel, MM 45, 2004, 147–180
- Schuhmacher 2012** Th. X. Schuhmacher, Die Elfenbeinobjekte des Chalkolithikums und der Frühen Bronzezeit auf der Iberischen Halbinsel. Interdisziplinäre Studien zu Herkunft, Austausch, Verarbeitung und sozialer Bedeutung von Elfenbein, IA 16/2 (Darmstadt/Mainz 2012)
- Schuhmacher 2013** Th. X. Schuhmacher, Ivory from Sobreira de Cima (Vidigueira, Beja), in: A. C. Valeira (ed.), Sobreira de Cima. Necrópole de hipogeus do Neolítico (Vidigueira, Beja), ERA Monográfica 1 (Lissabon 2013) 95–97
- Schuhmacher 2016a** Th. X. Schuhmacher, Elefanten und Elfenbein auf der Iberischen Halbinsel und in Nordwest-Afrika. Interdisziplinäre Studien zu Austauschsystemen im 3. und der ersten Hälfte des 2. Jts. v. Chr., IA 16/3 (Tübingen 2016)
- Schuhmacher 2016b** Th. X. Schuhmacher, Elfenbein des Chalkolithikums und der Frühen Bronzezeit auf der Iberischen Halbinsel und im Maghreb. Die Ergebnisse eines interdisziplinären Forschungsprojekts, MM 57, 2016, 1–58
- Schuhmacher 2017** Th. X. Schuhmacher, Ivory Exchange Networks in the Chalcolithic of the Western Mediterranean, in: M. Bartelheim – P. Bueno Ramírez – M. Kunst (eds.), Key Resources and Socio-Cultural Developments in the Iberian Chalcolithic, RessourcenKulturen Band 6 (Tübingen 2017) 291–312.
- Schuhmacher (in press)** Th. X. Schuhmacher, Ivory in the Early Bronze Age of Southeastern Iberian Peninsula, in: Landscapes as Resource Assemblages in

- the Bronze Age of Southern Spain, Interdisciplinary and international Workshop, 26.-28.09.2019 Linares (Spain) (in press)
- Schuhmacher – Banerjee 2011** Th. X. Schuhmacher – A. Banerjee, Pottwalelfenbein im chalkolithischen Portugal, *Restaurierung und Archäologie* 4, 2011, 107–119
- Schuhmacher et al. 2009** Th. X. Schuhmacher – J. L. Cardoso – A. Banerjee, Sourcing African Ivory in Chalcolithic Portugal, *Antiquity* 83, 2009, 983–997
- Serra-Ràfols 1925** J. de C. Serra-Ràfols, cf. Elfenbein, Pyrenäenhalbinsel, in: M. Ebert (ed.), *Reallexikon der Vorgeschichte* 3 (Berlin 1925) 87 f.
- Siret 1913** L. Siret, *Questions de chronologie et d'éthnographie ibériques* (Paris 1913)
- Siret – Siret 1890** H. Siret – L. Siret, *Las primeras edades del metal en el Sudeste de España* (Barcelona 1890)
- Soares 2003** J. Soares, Os hipogeus pré-históricos da Quinta do Anjo (Palmela) e as economias do simbólico (Setúbal 2003)
- Souville 1984** G. Souville, Decouverte recente de vases campaniformes au Maroc, in: J. Guilaine (ed.), *L'Âge du cuivre européen* (Paris 1984) 241–245
- Spindler 1981** K. Spindler, Cova da Moura. Die Besiedlung des Atlantischen Küstengebietes Portugals vom Neolithikum bis an das Ende der Bronzezeit, MB 7 (Mainz 1981)
- Strahm 2002** Ch. Strahm, Tradition und Wandel der sozialen Strukturen vom 3. zum 2. vorchristlichen Jahrtausend, in: J. Müller (ed.), *Vom Endneolithikum zur Frühbronzezeit. Muster sozialen Wandels?*, Tagung Bamberg 14.–16. Juni 2001, UPA 90 (Bonn 2002) 175–194
- Sukumar 2003** R. Sukumar, *The Living Elephants. Evolutionary Ecology, Behaviour and Conservation* (Oxford 2003)
- Uscatescu 1992** A. Uscatescu, Los botones de perforación en ›V‹ en la Península Ibérica y las Baleares durante la Edad de los Metales (Madrid 1992)
- Valera et al. 2008** A. C. Valera – A. Monge Soares – M. Coelho, Primeiras datas de radiocarbono para a necrópole de hipogeus da Sobreira de Cima (Vidigueira, Beja), *Apontamentos de Arqueologia e Património* 2, 2008, 27–30
- Valera et al. 2015** A. C. Valera – Th. X. Schuhmacher – A. Banerjee, Ivory in the Chalcolithic Enclosure of Perdígões (South Portugal). The Social Role of an Exotic Raw material, *World Archaeology*, 47/3 2015, 390–413 (Online-Version: DOI: 10.1080/00438243.2015.1014571)
- Vargas et al. 2012** M. Vargas – F. Nocete – Th. X. Schuhmacher, Contextos de producción de marfil en Valencina de la Concepción (Sevilla), in: A. Banerjee – J. A. López Padilla – Th. X. Schuhmacher (eds.), *Marfil y Elefantes en la Península Ibérica y el Mediterráneo*, Internationale Tagung Museo Arqueológico de Alicante, 26–27 November 2008, IA 16/1 (Darmstadt 2012) 69–81
- Veiga 1886–1891** S. P. Martins Estácio da Veiga, *Palaeoethnologia. Antiguidades monumentaes do Algarve 1–4* (Lisboa 1886–1891)
- Zeuner 1963** F. E. Zeuner, *A History of Domesticated Animals* (London 1963)

Acknowledgement

The author would like to thank the German Science Foundation (DFG, Bonn) (SCHU 1539/3–1 and SCHU 1539/3–2) for its support and the German Archaeological Institute

and all team members for their work as well as all the institutions and persons implicated for their friendly help and the permission to study and analyse these objects.

Illustration Credits

Fig. 1 Author; base map: German Archaeological Institute Madrid

Fig. 2 Museu Municipal Leonel Trindade, Torres Vedras, Inv. N°. CM/480; photo: D-DAI-MAD-PAT-D-23-06-013; photographer: J. Patterson, German Archaeological Institute Madrid

Fig. 3 Author; base map: German Archaeological Institute Madrid

Fig. 4 Based on Collantes 1969, fig. 1; modified

Fig. 5 Museo Arqueológico Sevilla, Inv. N°. R.E. 11830; photographer Th. X. Schuhmacher

Address

Thomas X. Schuhmacher (PhD)
German Archaeological Institute
Serrano 159
E-28002 Madrid
e-mail: thomas.schuhmacher@dainst.de

Resumen

En el marco de un proyecto de investigación del Instituto Arqueológico Alemán de Madrid financiado por la Deutsche Forschungsgemeinschaft (DFG, Bonn) elaboramos un inventario completo de los objetos de marfil de toda la Península Ibérica y las Islas Baleares desde el Calcolítico Antiguo hasta el final del Bronce Antiguo (ca. 3000-1650 BC), verificando el material directamente en los museos. De esta manera pudimos registrar un total de aprox. 2000 objetos de marfil seguros o probables. El estudio detallado de las piezas y sus contextos ha suministrado nuevos datos acerca de la distribución cronológica y geográfica de las mismas, así como de su importancia social.

Mediante nuevas técnicas de análisis, como la espectroscopía infrarroja por transformada Fourier (FTIR) y el análisis de isótopos estables de carbono y nitrógeno, efectuados en la Universidad de Maguncia (Alemania), se ha podido aclarar que la procedencia de los marfiles es amplia, experimentando variaciones a lo largo de la historia. La combinación de estos resultados con los métodos arqueológicos ha propiciado la elaboración de unas hipótesis acerca de la procedencia del marfil, las rutas y la forma de intercambio, así como sobre su redistribución y la fabricación de objetos de este material.

El uso del marfil comienza en la Península Ibérica en la segunda mitad del 4º milenio AC en contextos del Neolítico final o Calcolítico antiguo, como ponen de

manifiesto los hallazgos de dos tumbas excavados en la roca en Sobreira de Cima (Alentejo, Portugal). Al comienzo del 3º milenio, según los análisis efectuados hasta el momento, en la necrópolis de Los Millares el 80 %, y en Valencina de la Concepción (Sevilla) el 71 %, de las muestras proviene de marfil del elefante asiático (*Elephas maximus*). El resto es de marfil de elefante africano de estepa (*Loxodonta africana africana*) o de *Elephas antiquus*. Y en el Calcolítico reciente del Suroeste (segunda mitad del 3º milenio) todavía en un 44 % de los casos se trata de marfil asiático, mientras este porcentaje baja al 25 % en el Bronce Antiguo del Sudeste (2250-1950 BC) para poco después desaparecer por completo.

Teniendo en cuenta la existencia de poblaciones de elefante asiático en toda la franja desde Asia oriental a través de la India y Mesopotamia hasta la costa mediterránea levantina hasta el siglo octavo AC, un suministro de marfil asiático hacia la Península Ibérica, desde o vía Siria, parece posible. Pero el problema no es solamente la procedencia exacta de este tipo de marfil, sino las rutas y el modo en el que se llevaba a cabo el intercambio. En este sentido nos enfrentamos a dos problemas, por un lado que los pocos estudios de los que disponemos hasta ahora, sugieren que en el Levante al igual que en Egipto, Creta y Grecia, hasta el comienzo del Bronce final se utilizó, sobre todo, marfil de hipopótamo y no de elefante.

Por otro lado hasta ahora falta todavía un estudio pormenorizado de los objetos de marfil para el territorio italiano, el Sur de Francia, Cerdeña y Cerdeña y, por supuesto, análisis científicos sobre el tipo y la procedencia del marfil, prácticamente para todo el Mediterráneo fuera de la Península Ibérica. Por eso de momento no parece posible reconstruir con exactitud este intercambio de marfil asiático por el Mediterráneo en el Calcolítico.

Pero parece obvio que poblados como Los Millares y Valencina de la Concepción jugaran un papel importante en la recepción de estos materiales. El hallazgo de un taller de marfil subraya además el rol de Valencina en la transformación de la materia prima.

Igualmente parece interesante, que estamos empezando a apreciar la existencia de dos redes de intercambio diferenciadas en el Calcolítico, aunque todavía tenemos que aumentar la cantidad de análisis para corroborar este dato. Así, mientras que en el Sudeste en el Calcolítico antiguo domina el marfil asiático, en Portugal y el valle medio del Guadiana, se trata de marfil de elefante africano de estepa. En el valle del Guadalquivir en cambio encontramos los dos tipos. Y en el Calcolítico reciente (2ª mitad del 3er milenio AC) está presente marfil asiático en el valle del Guadalquivir y el extremo sur de la Península, mientras que en Portugal, el Centro y la región de Huelva se trata de marfil africano. Efectivamente disponemos de una gran cantidad de representaciones de elefantes en los grabados rupestres en el Norte de África y de fuentes literarias y de imágenes de tiempos púnicos y romanos, que nos hablan de su presencia hasta el siglo VIII AD. Un análisis de varios fragmentos de marfil en bruto procedentes de las excavaciones en la cueva de Kehf-el-Baroud, situada entre Rabat y Casablanca (Marruecos), confirmó además que se trataba de elefantes africanos de estepa, y no de bosque (*Loxodonta africana cyclotis*), como afirmaba la mayoría de los autores. Así que parece más que probable que la materia prima fuera importada por vía marítima probablemente desde la costa atlántica de Marruecos. Contamos como evidencia de ello con la propia distribución geográfica

de los mismos. De momento desconocemos qué se exportó a cambio hacia el Norte de África en el Calcolítico antiguo, ya que de esta época no tenemos objetos de procedencia ibérica comprobada en el Norte de África.

En este suministro de marfil jugaban un papel importante, sin duda, los asentamientos amurallados y los grandes recintos de la Península Ibérica, ya que existe una relación bastante clara entre estos o las tumbas pertenecientes a aquellos y los hallazgos de marfil. Creemos probable que el marfil africano llegara a estos yacimientos cerca de la desembocadura del Tago desde el Norte de África y, desde allí, era redistribuido al interior, seguramente al Alentejo portugués y al Guadiana medio. Hay varios argumentos procedentes no sólo del estudio del propio marfil sino también de la metalurgia, del estudio de los recursos líticos y de unos primeros análisis de isótopos de estroncio efectuados sobre esqueletos humanos.

Para la segunda mitad del 3er milenio AC asistimos por un lado a un aumento del empleo de marfil local como puede ser marfil fósil de *Elephas antiquus* y de cachalote. Por otro lado, la hipótesis de Harrison y Gilman plantea un intercambio de marfil norteafricano por objetos del complejo campaniforme peninsular, como lo resaltan la propia distribución geográfica de los objetos de marfil y de los productos campaniformes en el Norte de África, respectivamente. A pesar de que de momento los resultados de nuestros análisis sólo son capaces de corroborar parcialmente esta hipótesis, la consideramos válida. Aunque nos faltan todavía indicios de un empleo de marfil africano en el Campaniforme de la Extremadura portuguesa, si lo detectamos en Perdigões y en el poblado de La Orden- Seminario de Huelva. Suponemos que el procedimiento fue parecido al de la época anterior con un intercambio de marfil del estuario del Tejo hacia el Alentejo, entre otras razones por la presencia de marfil asiático en el estuario del Guadalquivir. Pero este marfil también llegaba Tajo arriba hasta los yacimientos de la Meseta central, Camino de Yeseras y Humanejos (ambos en Madrid).