



LETTER TO THE EDITOR

ICArEHB – Interdisciplinary Center for Archaeology and Evolution of Human Behavior. A new center for research in Portugal

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ABSTRACT

Interdisciplinary Center for Archaeology and Evolution of Human Behavior – ICArEHB, was created in 2013 at the University of Algarve and associates prehistorians, archaeologists, anthropologists, primatologists, geologists and quaternarians. Through the employment of a transdisciplinary and interdisciplinary perspective and grounded in a solid theoretical background, ICArEHB is dedicated to the study of three main research lines: *African Archaeology and Human Evolution*, *Prehistoric Coastal Adaptations* and *Development of Complex Societies*. Within this research lines, several projects are being developed both in Iberia and in Africa in which several researchers from different national and foreign institutions (from Europe, America and Africa) participate.

ICArEHB has also a solid commitment with post-graduate studies in Archaeology and Human Evolution since it is responsible through the Human and Social Sciences Faculty from the

University of Algarve for the doctoral program in Archaeology which includes a wide variety of optional courses.

Keywords: New research center; Prehistoric Archaeology; Human Evolution; Portugal.

RESUMO

No presente artigo, os autores apresentam as motivações e objetivos que levaram à criação de um novo centro de investigação em Portugal, dedicado exclusivamente à Arqueologia Pré-histórica e estudo da evolução do comportamento humano. Trata-se do Centro Interdisciplinar para a Arqueologia e Evolução do Comportamento Humano- ICArEHB, criado em 2013 na Universidade do Algarve, e que associa investigadores pré-historiadores, arqueólogos, antropólogos, primatólogos, geólogos e quaternaristas. Através da implementação de uma perspetiva trans e interdisciplinar e alicerçados num sólido quadro teórico, o ICArEHB dedica-se ao estudo de três principais linhas de investigação: *Arqueologia Africana e Evolução Humana, Adaptações Costeiras Pré-Históricas e Desenvolvimento das Sociedades Complexas*. Dentro destas linhas de investigação decorrem vários projetos de investigação quer na Península Ibérica quer no continente africano onde participam várias instituições de investigação e universidades nacionais e estrangeiras, europeias, americanas e africanas.

O ICArEHB tem também um sólido comprometimento com o ensino pós-graduado na área da Arqueologia e da Evolução Humana porquanto é responsável pelo programa doutoral em Arqueologia leccionado na Faculdade de Ciências Humanas e Sociais da Universidade do Algarve que inclui uma grande variedade de opções de seminários.

Palavras-chave: Novo centro de investigação; Arqueologia Pré-histórica; Evolução Humana; Portugal.

Introduction

The Interdisciplinary Centre for Archaeology and Evolution of Human Behavior – ICArEHB – was created in October 2013, at the Faculty of Human and Social Sciences from the University of Algarve (www.icarehb.com). It is composed of a group of researchers with diverse academic backgrounds, from

Archaeology to Biological Anthropology or Quaternary Geology.

This is the first Portuguese center with a high interdisciplinary focus on sciences that compose human evolutionary studies, particularly aiming to reconstruct Behavioral Evolution and with a strong focus on understanding the role of technology in shaping the human evolutionary path. Research groups within the center specialize

in different topics, chronologies and technological complexes, *e.g.*, we do research focusing on modern non-human primate technology – i.e., stone tool use by wild chimpanzees - and, simultaneously, looking at early hominids and their technologies – i.e., Pliocene Archaeology of East Africa and the *older than the Oldowan*, all the way to studies addressing the emergence of the genus *Homo* and the dispersion of Anatomic Modern Humans (AMH). Researchers of our center also address the emergence and development of complex societies, both at political and social levels.

This work is based on a transdisciplinary and interdisciplinary perspective, integrating Biological Anthropology, Geoarchaeology, Primatology, Archaeology, Ethnoarchaeology and Palaeoecology, including Palaeobotany, Zooarchaeology, and application of Geographical Information Systems. Aiming to contribute with complementary data to answer similar broad questions, the researchers are organized within three main groups: *African Archaeology and Human Evolution*; *Prehistoric Coastal Adaptations* and *Development of Complex Societies*.

Collaborations with research and higher education institutions are a significant characteristic of ICArEHB, especially via the associated members of ICArEHB, *e.g.*, Max Plank Institute (Germany), Consejo Superior de Investigaciones Científicas – Institución Milá y Fontanals (Spain), and Centro de Investigação em Antropologia e Saúde (Portugal), or Universities of Seville (Spain), Louisville, North Carolina Wilmington and Denver (EUA), Oxford (UK), Queensland

(Australia), Universidade Estadual de Campinas (Brazil) and Eduardo Mondlane (Mozambique). One of the priorities is to enlarge collaborations with Institutions located in areas where the research projects take place physically, especially if the country is underdeveloped in the areas of Archaeology and Anthropology.

Research

African archaeology and human evolution

Africa has a special place in our understanding of human origins as the continent where humans emerged. Current research indicates that both the appearance of AMH and the behavioral repertoire of our species are likely to have emerged in Africa during the last several million years. Africa continues to be a prime place to study the evolution of human behavior, from the Early Stone Age up to the Iron Age and Historical Archaeology. Thus, within ICArEHB, the African Archaeology and Human Evolution group aims to understand the emergence of uniquely human behaviors and uses an interdisciplinary approach across a diversity of time frames and geographic scales. This group is developing projects in a variety of African sites and within broad chronologies, which will allow us to combine information, for the first time, from Archaeology, Primatology, Ecology, Geology, Geomorphology, and Ethnoarchaeology. The use of multiple lines of evidence, theoretical backgrounds and methodologies provide pioneer insights concerning technology-

related behaviors, including evolutionary origins, political-economy and social factors.

One of the ongoing long-term projects of the center seeks the evolutionary origins of technology and has been providing a body of data resulting from a multidisciplinary approach to wild chimpanzees stone tool use in West Africa. In collaboration with the National Geographic Society and Kyoto University, the project is currently looking at one of the last distinctions to qualitatively differentiate technological behavior in early hominines (*circa* 3.4 Ma, [Harmand *et al.*, 2015](#)) and extant apes, focus on the hominine transportation of raw materials, or tools, during considerable long distances. This planning skill in early humans would contrast with the opportunism of living chimpanzees when transporting raw materials or tools during relatively short-distance episodes ([Boesch and Boesch, 1984](#); [Wynn and McGrew, 1989](#); [Carvalho *et al.*, 2008](#)). Despite this, recent data suggests that chimpanzee transport of items might relate with the availability and value of raw materials in their natural habitat, thus it could be a fluctuating variable, *e.g.*, if the chimpanzees have plenty of raw material to use as hammer stones, they will transport less, affording the bonus of having tool kits close by food sources ([Wynn *et al.*, 2011](#); [Carvalho and McGrew, 2012](#); [Carvalho *et al.*, 2012](#)). Moreover, current research focused on monitoring chimpanzee nut-cracking sites in a forest of Guinea, showed that chimpanzee transport behavior might be better described as a series of transport events that will eventually transport one tool from the original tool-use site to a much

further location, to be discarded ([Carvalho *et al.*, 2008](#); [Carvalho *et al.*, 2012](#)). However, up to now, and due to the extreme difficulty of following permanently the destiny of a chimpanzee tool, it remains to be tested how far these tools can travel, and in which forms. The main goal is to test the hypothesis that data concerning the transport of resources by early hominids might be the product of biased information due to the indirect nature of the archaeological data, and can be explained more parsimoniously, similarly to the current transport of objects carried by extant chimpanzees. The project is testing the hypothesis that transport distances in the Oldowan were the sum of many short bouts, which mislead archaeologists when accounting only for the raw material sources and sites where tools were manufactured and/or discarded. Evolutionarily, this is very relevant, as it remains one of the main arguments to claim the existence of cognitive enhancement in early humans vs. non-human primates. The principal investigator of this project conceived a pioneer method and is carrying out a pilot study in the wild: using small GPS tracking devices in chimpanzee stone tools to follow their paths in the forest, during one year. It is the first time that this technology is being adapted and applied to non-living beings. This will provide the first data on accurate distances, frequencies of transportation and of use of the stone tools by the chimpanzees of Bossou forest ([Figure 1](#)).

Also in Mozambique, ICAREHB researchers are leading a novel project in the Gorongosa National Park. This is one of the most ecologically diverse parks on the planet, with

habitats ranging from tropical rain forests to savanna grasslands. Humans are thought to have evolved in complex and diverse environments reminiscent of those found at Gorongosa. The park thus presents an unparalleled opportunity to study a modern ecosystem as a window into the environments of our distant evolutionary ancestors. Additionally, because of its location at the southernmost edge of the Rift Valley, and geographically proximate to the well-known South African hominine cave sites, the paleontological and archeological potential of the park is significant, and the project will also focus on the earliest periods of human technological evolution. This

project includes researchers from nine different institutions in six different countries (Gorongosa National Park, University of Oxford, Max Planck Institute, University of the Witwatersrand, George Washington University, Boise State University, California Academy of Sciences, University of Chile and Catholic University of Chile). We expect that new paleontological and archeological discoveries could have a profound impact in our understanding of human origins and evolution. This new research will also provide further impetus for conservation efforts in the park and for community outreach around Gorongosa and beyond, as it will include an International Field School to start in 2017.



Figure 1 - Nut-cracking by wild chimpanzees in Bossou forest, Guinea, West Africa.

Another current project focuses on a systematic archaeological survey of inland lacustrine and fluvial and coastal regions in Mozambique to study the evolution of modern human behavior in southern Africa. The main objective is to find new Middle Stone Age sites that will shed light on the origins of behavioral traits that are thought to be hallmarks of modernity, *e.g.*, use of pigments and beads for personal adornment and definition of individual and group identity, exploitation of coastal resources such as shellfish, fish and marine mammals, *etc.* The project includes testing and survey in the northern inland lacustrine areas of the Niassa lake, the inland area of the Limpopo and Elephant rivers and the coastal region of Vilanculos, both in southern Mozambique. This research is funded by the National Geographic Society, Wenner Gren Foundation and Fundação para a Ciência e Tecnologia (FCT).

Survey equipment includes high-precision GPS units as well as smartphones with a customized Android-based application installed, named ArcheoSurvey, developed by the team to meet the needs of ICAREHB's survey projects ([Casalheira et al., 2014](#)). The ArcheoSurvey app incorporates two main components: a geographic information component and a database component. The first includes a GPS recording capability, used to record the location of sites, and the Map Viewer, used to check location of the surveyor on Google Maps and to see (if available) the limits of survey areas and paths. The database component seeks to

replace the traditional paper forms since it includes a series of descriptive fields, as type of site, visibility, approximate chronology, *etc.* ([Bicho et al., in press](#)).

Prehistoric coastal adaptations

This research group focuses on the study of human coastal adaptations based on the premise that coastlines, riverine and lake environments have been a crucial focus for human settlement, population growth, dispersal and social complexity from the earliest periods of prehistory, and have functioned as dynamic zones of cultural interaction and social change. The goals of this research group are essentially the continuation and extension of ongoing projects in southwestern Iberia and southern Africa, as well as to initiate new working programs to respond to specific questions about the evolution of prehistoric cultural, social and economic adaptive systems in marine and estuarine landscape settings.

Thus, it is our aim to get a deeper knowledge on the impact of the use of marine resources and coastal ecology in the emergence of cognition complexity, traditionally associated to AMH. This is accomplished through survey and excavation of coastal Paleolithic sites both in Western Europe, mainly Southern and Western Iberia, and Mozambique. In the case of Iberia, fieldwork will also include the survey and excavation of shallow underwater limestone caves, where valuable sedimentary archives of long-term environmental and climatic

changes and, potentially, a high number of archaeological remains may exist, that will permit to document human response to the changing coastal environments. Presently, the main research includes the site of Vale Boi, Vila do Bispo. This site presents a long sequence with all of the Upper Paleolithic, Mesolithic and Early Neolithic. All phases, starting some 33000 years ago, present clear

evidence of the use of marine resources for both diet and body decoration ([Bicho and Stiner, 2006](#); [2013a](#); [2015](#); [Manne et al., 2012](#); [Tátá et al., 2014](#)). This project has been funded by the National Geographic Society, Wenner Gren Foundation, Archaeological Institute of America and Fundação para Ciência e Tecnologia (FCT) ([Figure 2](#)).



Figure 2 - Mira Nascente archaeological site (Alcobaça) (photo: J. Haws).

Another project undertaken by this research group is the investigation of the time and mode of the appearance of social complexity in the Mesolithic of Western Europe and its association with the

construction of a, *par excellence*, aquatic-related features such as shellmiddens.

The case of Portugal, and more specifically of the Tagus valley with the shellmidden of

Muge, seems to be one of the most interesting regions to study this transitional phase from hunter-gatherers to agriculturalists. It is clear that the Muge shellmiddens correspond to a new adaptation after the long-term Paleolithic economy that lasted well into the Holocene in Portuguese Estremadura. Estuarine resources seem to have played a very important role in the local diet, as a specific adaptation of new environmental conditions resulting from the Flandrian transgression. Increased marine and estuarine biomass during the Atlantic period may have been the result of the 8.2 K cold event ([Grafenstein et al., 1998](#); [Barber et al., 1999](#)), with the collapse of the Hudson Ice Dome causing a freshwater cold pulse that reached the coast of Portugal ([Soares, 2005](#)), and likely the Tagus and Sado estuaries ([Bicho et al., in press](#)). This highly productive environment made possible the consolidation of an economic and social system of Complex Hunter-Gatherers. This seems to be the situation of the Muge archaeological complex, with new data coming from a recent project and reanalysis of old data suggesting the presence of incipient social complexity based on interspatial site organization and inter- and intra-burial organization ([Bicho, 2009](#); [Gonçalves, 2009](#)). FCT funding supported excavation in the site of Cabeço da Amoreira (Muge), radiocarbon dating, isotopic and DNA analysis, material analysis (lithics and fauna, including raw material provenience), and analysis of human burial contexts and patterns, to examine the emergence of social complexity of the last hunter-gatherers of the Tagus valley ([Bicho et al., 2011, 2013b](#); [Gonçalves et al., 2014](#)).

Emergence of complex societies

Combining modern technical and methodological procedures with solid grounded theoretical approaches, this group aims to study, characterize, and interpret the socio-historical and anthropological dynamics of Complex Societies. Research takes place both in Iberia and Africa. Particular attention will be addressed to the emergence and development of domestication in a narrow sense (of animal and plants), but also in a broader one, relating to the “domestication” of space through architecture and landscape building, or through funerary practices and human mobility studies.

The group emphasizes the need for a holistic perspective in studies of the Complex Societies way of life. It aims to overcome some divisions on the discipline itself that lead to research programs of empirical nature that, based on different empirical data, produced a fragmentation of approaches and goals that generated difficulties to a global discourse on the post hunter-gatherer societies. If fragmentation is a natural consequence of specialization and of the need to go deeper in specific issues, re-combination of approaches is a requisite for a coherent and integrated perspective of the period.

This group is in charge of the study of Perdigões, an enclosure complex that has been excavated over the last 18 years (since 1997), near Reguengos de Monsaraz, Évora district, in the Portuguese province of Alentejo.

The archaeological complex is composed of a sequence of 13 ditches, excavated in the bedrock, in concentric shape to a central “point”. The work undertaken so far in some sections of some ditches, revealed different shapes, sizes and depths plus a very complex stratigraphy as well as chronological sequence of events spanning from Late Neolithic to late Calcolithic ([Valera *et al.*, 2014a](#)).

Funerary practices were not restricted to the so-called necropolis area. Inside the enclosures, there are several pits, in several areas, where human remains have been

identified both in primary and secondary burials, including cremations ([Silva *et al.*, 2015](#)).

The amount of archaeological material and faunal remains is huge and diverse, revealing a strong interaction with other regional peninsular areas. Apart from local materials, the presence of idols made of limestone and ivory, bell beaker pottery, copper and gold artifacts should be highlighted ([Valera, 2010](#); [Valera and Evangelista, 2014](#); [Valera *et al.*, 2014b](#); [2015](#)) ([Figure 3](#)).



Figure 3 - Ivory Idols from Perdigões (Valera *et al.*, 2015).

This main project from Perdigões Archaeological Complex has specific research lines. One of them is the study of the funerary practices, which began in 1998, aiming the anthropological characterization of the human remains, the study of body treatment after death, post-mortem manipulations, funerary artefactual assemblages and association between human and animal after death ([Cabaco, 2011](#); [Duarte et al., 2004](#); [Valera et al., 2000](#); [2007](#); [2014b](#); [Valera and Godinho, 2009](#)).

Another project, starting in 2016 and founded by FCT, is focused on the mobility and interactions in South Portugal Recent Prehistory and in the role played by aggregations centers in those processes. The project aims to appraise the intensity and the social, economic and ideological role of mobility and interaction in Late Neolithic and Chalcolithic societies in South Portugal expressed in the development of complex aggregations centers.

In addition to the main project within this research group, a secondary project in the Muge area is now starting. The basis is a recent discovered wet context in the Mesolithic site of Cabeço da Amoreira. Near the Muge river, the ICArEHB group located a long sequence starting at least in the Early Neolithic followed by a series of layers dating to Middle Neolithic, Chalcolithic, Bronze and Iron Ages. A new project to be submitted to the FCT is based on the Resilience theory and the Panarchy model and it is expected to take place between 2016 and 2020, also funded by the Câmara Municipal de Salvaterra de Magos and supported by Casa Cadaval, the

property where the archeological site is located.

Final Remarks

The University of Algarve, through ICArEHB, is available to promote graduate studies in Archaeology and Biological Anthropology within Prehistory and Evolution of the Human Behavior, since the origins of genus *Homo* until the development of complex societies in political, social and ideological aspects.

Thus, the Faculty of Human and Social Science offers a doctoral program in Archaeology with a variety of courses spanning from Theory and Methods of Archaeology until African Archaeology, but also Biologic Anthropology, Paleoecology, including Zooarchaeology and Paleobotany and raw material provenance, and Geoarchaeology. ICArEHB is also now preparing a special annual prize for the best Master thesis in Archaeology and Human Evolution in Portugal. The winner will have free full tuition in the Archaeology Ph.D. Program at the University of Algarve.

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ⁱ O autor optou por redigir o resumo e as palavras-chave sem acatar o Acordo Ortográfico de 1990.