Quaternary International 295 (2013) 1–4

Contents lists available at SciVerse ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

Guest Editorial

East meets West: First settlements and human evolution in Eurasia

1. Introduction

In recent decades, several European and Asian research institutions have been conducting scientific work on early Eurasian sites. This situation has been possible due to fossil discoveries in Europe, Caucasus, and the Far East, and the state of diverse hypothesis concerning human dispersal (see among others, Carbonell et al., 1995, 2005, 2008; Gabunia and Vekua, 1995; Bermúdez de Castro et al., 1997; Hou et al., 2000; Zhu et al., 2001; Lordkipanidze et al., 2005; Hou and Zhao, 2010). The increasing development by the new discoveries, data, and the multidisciplinary approach developed by the Atapuerca Research Team (EIA) has allowed the possibility to lead research on human evolution (see Carbonell et al., 1995, 1999, 2005, 2008; Bermúdez de Castro et al., 1997; Martinón-Torres et al., 2007). Other teams and researchers from different institutions in Europe and Asia have also stated diverse hypothesis concerning human dispersal (see among others, Gabunia and Vekua, 1995; Hou et al., 2000; Zhu et al., 2001; Dennell and Roebroeks, 2005; Lordkipanidze et al., 2005; Hou, 2005; Hou and Zhao, 2010).

The earliest human settlements and expansions in Eurasia has been a controversial and hotly debated matter for decades. The limiting and favoring factors in the hominin migrations and the relationships between Europe and Asia human occupation have been evoked in recent studies (Moncel, 2010). Now, the research gap between these two limits of Eurasia is decreasing.

The Expo 2010 Shanghai China and the relevant presence of the Spanish pavilion, organized by the SEEI (State Society for International Exhibitions), provided the appropriate circumstance to accomplish the scientific event, sustained on October 2010 and entitled “First human settlements in Eurasia”. The main objective of the workshop was the discussion between scientists from both sides of Europe and Asia about the main issues on first human occupations of Eurasia from different research perspectives. The current special issue volume represents a selection of the papers that were presented in the international meeting. The workshop structure was performed on three major topics that were discussed during the conference:

1) Geological context, chronology, paleontology and paleoecology
2) Biological evolution and human paleobiology
3) Technological evolution and paleoeconomy

These questions concern the role of climatic and environmental conditions on human adaptations, movements and occupations, the chronological lags and intervals, the migratory paths, and the technical traditions and subsistence modalities, highlighted by the biological evolution of the hominins, main protagonists of these new Pleistocene scenarios.

2. Geological context, chronology, paleontology, and paleoecology

The causes explaining the dispersals and occupations of hominins into Eurasia from Africa more than 2 Ma are linked probably with the restriction and lack of archaeological sites discovered until now. The geographical distribution in southern Europe, Caucasus and some mid-far East locations indicates some chronological and paleoecological gaps between Western Europe and Eastern Asia. The population waves were likely conditioned by landscape and ecosystem dynamics and not only by the climate (Palombo, 2010; Palombo, 2013; Van der Made and Mateos, 2010). Most of the known sites would have been inhabited periodically during favourable and temperate periods.

Despite the growing amount of data of the new archaeological and anthropological discoveries, the limited refinement of the chronological framework is a huge difficulty in the understanding of the dispersal and setting of human populations. However, Parés et al. (2013) analyse and update the current evidence of the chronology of the early sites in the Circum-Mediterranean region, especially the sites with remains in problematic stratigraphic context between 0.9 and 1.8 Ma.

A broad debate devoted to understanding the ecological and climatic settings in the context of hominin evolution focuses on discussion of the relationships between the migratory scenario pursued by humans and mammals. Several works from the paleontological approach deal with the geographical and biochronological framework. The huge analysis of faunal assemblages, paleoecological, geographical, anthropological and archeological data by Palombo (2013) provides new insights to the timing of dispersal routes between Africa and Eurasia and the environmental conditions of the human movements and occupations. Palombo concludes that the migratory scenario is more complex than the climatic and ecosystem dynamic. The more integrated research agenda is recommended by the author in order to define the mode, time and behaviours of human dispersals.

Cuenca-Bescós et al. (2013) present the evidence of *Allophayomis* ssp. in Sima del Elefante (Sierra de Atapuerca, Spain), which suggests early dates between 1.5 and 1.2 Ma for this assemblage, and therefore for early human occupation in western European localities. Moreover, the large mammals from the locality of Penal (Sierra de Atapuerca, Spain) are described by Van der Made

1040-6182/$ – see front matter
http://dx.doi.org/10.1016/j.quaint.2013.01.024

(2013). This author updates the faunal lists of ungulates and cercopithecids in Galería, Gran Dolina and Sima del Elefante sites. In the context of human evolution, the arrival of genus *Homo* in Europe probably coincided with that of species adapted to open environments, such as *Equus altidens* and early West European *Bison*. This may suggest a temporal extension of such environments towards the West of Eurasia, triggering the dispersal routes of these hominins.

All things considered, a new paleoecological approach is conducted by Rodríguez et al. (2013), developing an ecogeographical model of faunal distribution during the early Pleistocene. Their results suggest the existence of a bio-geographic and climatic frontier around 45°N. The ecological differences in distribution of mammalian species pools in Mediterranean and northern regions of Europe were at maximum during 1.6–1.2 Ma, the time when *Homo* arrived in the continent but remained restricted to the southern region. However, during the Galerian (1.2–0.8 Ma), the structure of mammalian paleocommunities were homogenised, together with the expansion of human groups to northern Europe.

The Guadix-Baza Basin, in Spain, provides an outstanding amount of sites to understand the first human settlement in Europe. Agustí et al. (2013) analyse the vertebrate record of Barranco de los Conejos early Pleistocene site, which is chronologically placed at the base of the Matuyama chron, directly after the Olduvai subchron, being coeval or slightly younger than the Georgian site of Dmanisi. Barranco de los Conejos indicates that the lowermost levels in the upper Matuyama chron are characterized by a trend towards drier and, possibly, colder conditions than the preceding lower Matuyama levels. The authors conclude that the reason for the absence of hominin presence at this chronology is because climatic conditions did not enhance north-south exchanges, but rather east-west communication. The human settlement in Europe is related with the ameliorated environmental conditions achieved later and documented in the Fuente Nueva 3 and Barranco León sites, also in the Guadix-Baza Basin.

The competition between humans and hyenids for access to scavengable resources is the focus of Espigares et al. (2013), presenting the analysis of one archaeological level from the Fuente Nueva 3 early Pleistocene site (Orce, Spain). Those authors argue that the association of an incomplete elephant carcass, *Pachycrocuta* coprolites, and tools indicate that both humans and hyenas scavenged this megaherbivore. In their sequence reconstruction of access, humans arrived first, dismembered and carried out parts of the proboscidean, and later the hyenas consumed the rest.

Dong et al. (2013) show that the earliest human settlements in Eurasia could be around 1.9–2.0 Ma, through comparative analyses on large mammals of the Tuozidong cave in eastern China. Based on the capability of good mammal migrators, the earliest toolmakers of 2.6 Ma in East Africa should have been able to expand or migrate to Eurasia within 600 ky. The environmental barriers to mammal migrations between Eurasian continents were not unconquerable in the early Pleistocene.

3. Biological evolution and human paleobiology

Although the first signs of human occupation in Eurasia are scarce, during the last decades the discoveries of new human fossils have raised some answers and, also, new questions about the first migration out of Africa and subsequent evolution: Why and when did they leave Africa? What route did they take? Were there several migration events? Which species led the process? The former scarcity of Early Pleistocene sites in Europe in comparison to the record for Asia is become more balanced in recent years. New human species have been proposed (*Homo georgicus* and *Homo antecessor*) joining the previously recognized species (*Homo erectus*, *Homo heidelbergensis*, *Homo neanderthalensis* and *Homo sapiens*), exemplifying the complexity of the last two million years of human evolution. The contributions at the Shanghai workshop included paleoanthropological studies from throughout Eurasia, from western Europe to eastern Asia. The human fossils from the Atapuerca sites were protagonists of several studies presented in the volume.

The human remains from the Sima de los Huesos middle Pleistocene site (Atapuerca, Spain) are analysed in two contributions. Gracia-Téllez et al. (2013) present a palaeopathological study of one of the individuals from this site represented by Skull 5. This individual had severe orofacial lesions (periodontal disease, tooth wear and fracture, periapical abscesses and maxillary osteitis) that could be the cause of death. Martínez et al. (2013) study the communicative capacities of *H. heidelbergensis* from reconstruction of the outer and middle ears in five individuals from the Sima de los Huesos. In these individuals, the sound power transmission and the occupied bandwidth, a variable related with communicative capacities, were more similar to modern humans. Their results indicate that *H. heidelbergensis* were capable of understanding and producing the full range of sounds emitted during modern human spoken language.

Bermúdez de Castro and Martinón-Torres (2013) proposed a model for the first occupation of Europe that could be the result of several hominin migrations originating from a central area of dispersals of Eurasia. Their scenario tries to explain the pattern of human settlement of Western Eurasia where the main influences in Europe during the early and middle Pleistocene were derived from southwest Asia rather than Africa. Probably, several pulses of hominins from the Levantine corridor would have migrated into Europe at different times, but these dispersals were probably restricted by climatic and environmental conditions.

Different hypotheses have been proposed to explain the Quaternary Megafaunal extinction, and also several explanations have been suggested for the Neandertal extinction. Following Hortolà and Martínez-Navarro (2013), the extinction of the Neandertals is due to direct competition with anatomically modern humans, and should be seen as being a mere branch of the Quaternary Megafaunal Extinction.

Finally, the studies of Neandertal mitochondrial DNA are raised in Wang et al. (2013) to analyse the continuity or substitution models from Neandertals to modern humans. The conclusion is that the available data are still too poor to understand genetic flows.

4. Technological evolution and paleoeconomy

Cultural aspects concerning first human occupation involve especially lithic technological evolution and food provisioning regarding hunting or scavenging practices (see among others Sharon, 2008; Mgeladze et al., 2011; Patole-Edoumba et al., 2011; Pontzer et al., 2011; Rabinovich and Biton, 2011; Sharon et al., 2011; Verna and d'Errico, 2011). Other aspects of hominin behavior related to diet, technical processing, fire technology, cannibalism, and use of diverse raw materials are scarce and provide only isolated but crucial data to complete the understanding of early hunter-gatherer behavior (see among others Weiner et al., 1998; Goren-Inbar et al., 2002; Carbonell et al., 2010). Lithic technology evolution and the spread of technological modes along Eurasia is considered to be an especially interesting tool for the knowledge of first settlements due to the importance of comparable new finds throughout the territory. Although some regions are still unexplored, evidence for Mode 1 and Mode 2 and their distributions seem to complete the puzzle of human dispersal (see among

others Carbonell et al., 1999; Hou et al., 2000; Jian and Shannon, 2000; Bar-Yosef and Belfer-Cohen, 2001; Carbonell and Rodríguez, 2006; Petraglia and Shipton, 2008; Boëda and Hou, 2011; Ollé et al., 2013).

From this perspective, Mosquera et al. (2013) raise a hypothesis on the development of technical modes from Atapuerca to Europe affected by a chronological gap involving technical development and hominin species. Ollé et al. (2013) present lithic assemblages from Sierra de Atapuerca that have yielded materials from the 3 technical modes associated with *H. antecessor* and *H. heidelbergensis* from the early and middle Pleistocene. The continuous sequences allow the authors to characterize the features of the lithic assemblages and to propose an evolutionary model.

In the face of the statement that early Pleistocene hominin settlements were marginal and discontinuous, a cause of their underdeveloped subsistence strategies, Huguet et al. (2013) demonstrate successful paleoeconomy in Sierra de Atapuerca sites. The analysis of faunal remains in the Gran Dolina and Sima del Elefante localities confirms that these human groups had an efficient subsistence, allowing continuous occupation in western Europe during thousands of years.

From the Asian perspective, new Middle Paleolithic evidence presented by Hou et al. (2013) shows the significance of new late Pleistocene information from northern China. These settlements, showing a time span between 100 and 10 ka, provide information on human and technological evolution. Boëda et al. (2013) present the lithic assemblage from Shuidonggou (Ordos) in Inner Mongolia, providing an overview of the levallois and non-levallois techniques for blades and flake production. The diversity of production techniques allows the authors to suggest aspects concerning the spread of ideas among early humans, which probably was ahead of human evolution.

Liu et al. (2013a,b) present a synthetic overview of the Nihewan basin materials from a technological and paleoecological point of view including technical modes and raw materials outline from the early to the late Pleistocene. These studies show the existence of different technical modes, cultural traditions, and cognitive abilities, showing good human adaptation to the environments. From an opposite perspective, Dennell (in this volume) considers that settlements at the Nihewan basin were occupied only during summer seasons. Likewise the author argues the same for the other early settlements in Eurasia such as Dmanisi, considering that the hominins were short term visitors during cold periods.

Pei et al. (2013) present new studies on the Three Gorges region of the Yangtze River, and conclude that archaic *H. sapiens* and modern *H. sapiens* were the hominins who produced Mode 1 core and flake technologies under subtropical forest environments during the middle to late Pleistocene. Finally, Chen et al. (2013) provide some good evidence from analyses of lithic technologies of four Upper Paleolithic sites in north of China, and discuss the different behavior of toolmakers corresponding to respective ecosystems of the terminal Pleistocene on a regional scale.

5. Conclusions

A new step has been put forward for the flourishing of research networks which will permit the development of the research on different aspects using a multidisciplinary point of view. Chronology, paleoecology, hominin characterization, and cultural behavior are the evidence of the framework of knowledge on first human settlements. The data update and the discussion of controversial points of view of the human dispersals along Eurasia will help us to propose innovative hypotheses. However, further work is needed on the present discoveries using new techniques and focusing on holistic approaches. Coming discoveries will provide better insights and knowledge of Eurasia human peopling.

Acknowledgments

We are grateful to Norm R. Catto for his very efficient and helpful handling of the editing process. We would like to thank the SEEI, Fudan University and Fundación Atapuerca and also we are very grateful to Eva Zuazua (SEEI), Sonia Sagrista (Fudan University), Susana Sarmiento (Fundación Atapuerca) and Vanessa Altés (IPHES) for their contribution in the Organizing Committee of the Workshop.

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Available online 30 January 2013