



Contents lists available at ScienceDirect

# Quaternary International

journal homepage: [www.elsevier.com/locate/quaint](http://www.elsevier.com/locate/quaint)

## Paleoenvironmental conditions at Madigou (MDG), a newly discovered Early Paleolithic site in the Nihewan Basin, North China



Xiaoli Li <sup>a,\*</sup>, Shuwen Pei <sup>b,\*\*</sup>, Zhenxiu Jia <sup>b,c</sup>, Ying Guan <sup>b</sup>, Dongwei Niu <sup>d</sup>, Hong Ao <sup>e</sup>

<sup>a</sup> Beijing Museum of Natural History, Beijing 100050, China

<sup>b</sup> Key Laboratory of Vertebrate Evolution and Human Origins, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China

<sup>c</sup> University of Chinese Academy of Sciences, Beijing 100049, China

<sup>d</sup> School of History and Culture, Hebei Normal University, Shijiazhuang 050024, China

<sup>e</sup> State Key Laboratory of Loess and Quaternary Geology, Institute of Earth Environment, Chinese Academy of Sciences, Xi'an 710075, China

### ARTICLE INFO

#### Article history:

Available online 19 September 2015

#### Keywords:

Paleoenvironmental reconstruction  
Early Pleistocene  
Hominin adaptation  
Madigou (MDG) site  
Nihewan Basin  
North China

### ABSTRACT

Paleoenvironmental reconstructions provide the context for human evolution and behavior. However, it is difficult to resolve relative proportions of specific habitats at a given place and time, how these may have changed over time, and the explicit nature of particular habitats for human adaptation. This paper examines the paleoenvironmental context of Early Pleistocene archaeological occurrences at Madigou (Hebei Province, North China), but with particular emphasis on the setting for early stone tool makers.

Madigou (MDG) is one of several Early Pleistocene Paleolithic sites in the east part of the Nihewan Basin, North China. Sedimentological features of the excavated section indicate that the site was formed near the margin of a lake. Paleomagnetic results suggest that hominins occupied the site ca. 1.2 Ma. Based on well-constructed pollen, sediment grain size, magnetic susceptibility, isotopic (<sup>13</sup>C and <sup>18</sup>O), and iron oxide analysis of the section excavated in 2011 and 2012, five stages of environmental change in the Nihewan Beds are identified. In the earliest phase, the environment and climate changed from 1) cool and semi-humid with open grassland to 2) cold and dry with open sparse steppe (usually temperate herbaceous, not just grass) and then 3) warm and humid climate with lightly wooded grassland, followed by 4) cold and dry climate with sparse steppe and finally 5) temperate and semi-humid with open grassland. This evidence suggests that hominins occupied the site from stages 2–4 in an open habitat varying from lightly-wooded grassland to an ecosystem dominated by sparse steppe.

© 2015 Elsevier Ltd and INQUA. All rights reserved.

### 1. Introduction

Paleoanthropologists have long been interested in climate and environment as critical factors in contextualizing past human behavior and as an aid to archaeological interpretation (Butzer, 1964; Waters, 1992; Sikes, 1994; Vrba et al., 1995; Dincauze, 2000; Lepre et al., 2007; Sandweiss and Kelley, 2012). It is generally accepted that hominin bearing sequences from fluvio-lacustrine settings can provide comprehensive data on environmental changes that can be related to changes in hominin behavior (Blumenshine and Peters, 1998; Plummer et al., 1999; de Heinzelin et al., 1999; Levin et al., 2004; Quade et al., 2004; Deino et al., 2006;

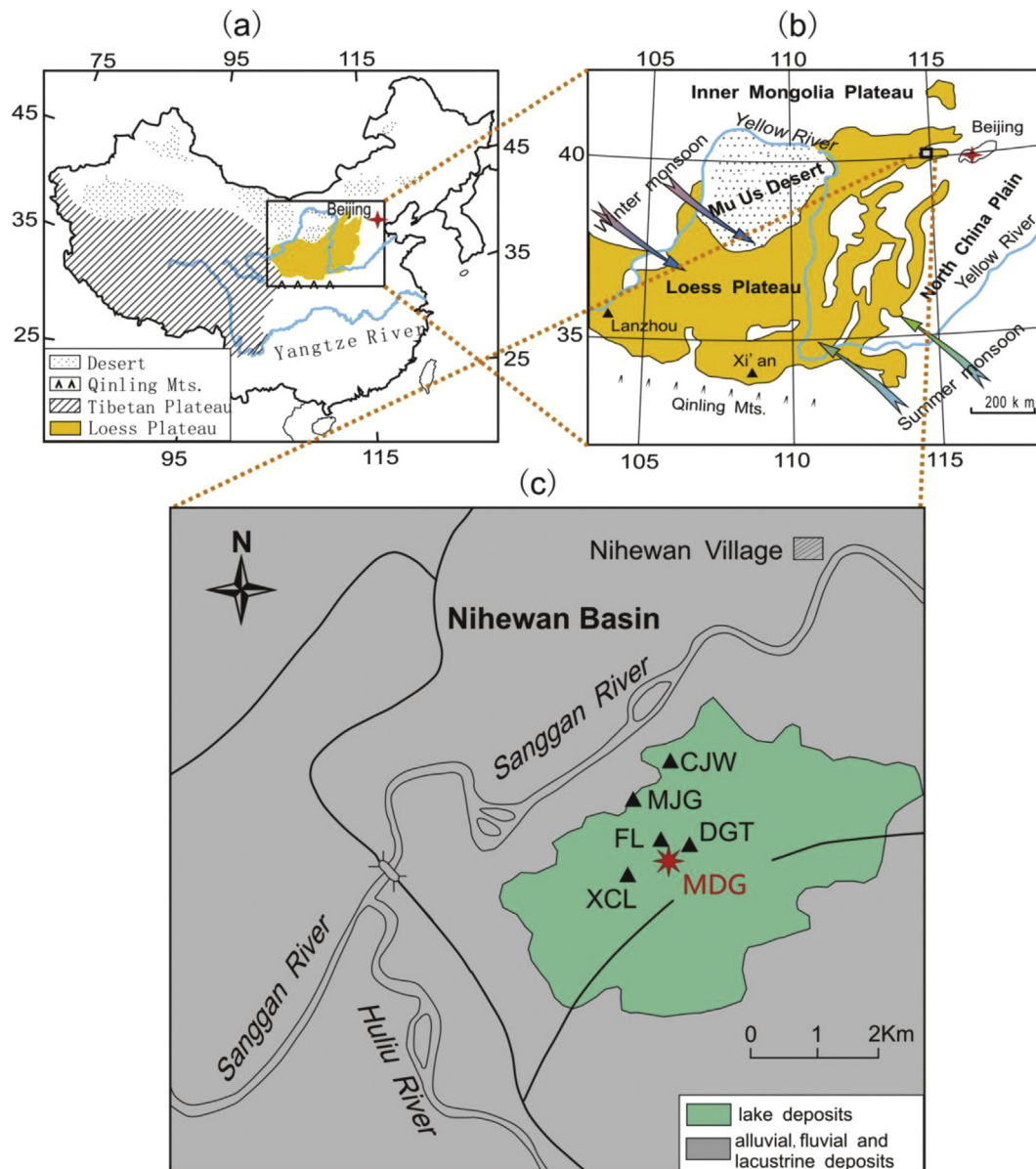
Plummer et al., 2009a,b; Joordens et al., 2011; Potts, 2013; Magill et al., 2013a,b).

The Nihewan Basin, in Hebei Province and ~150 km west of Beijing, is located in the transition zone between the North China Plain and the Inner Mongolian Plateau (Fig. 1a,b), and is filled with lacustrine and fluvial deposits dated from the Pliocene to the Holocene. This fluvio-lacustrine sequence, capped by Late Pleistocene wind-blown sediments, was named the Nihewan Beds ninety years ago (Barbour, 1924) and renamed the Nihewan Formation in recent years (Min and Chi, 2003). In the early 1920s, paleontologists E. Licent and P. Teilhard de Chardin, and geologist G. B. Barbour conducted a series of geological surveys and discovered vertebrate and non-vertebrate fossils near Nihewan village (Barbour, 1924, 1925; Licent, 1924; Barbour et al., 1927). Furthermore, the fauna (collected from the lower and middle parts of the Nihewan Beds) was named the Nihewan Fauna and assigned to the Villafranchian which traditionally corresponded to the Villafranchian fauna in

\* Corresponding author.

\*\* Corresponding author.

E-mail addresses: [lixiaoli2002@sohu.com](mailto:lixiaoli2002@sohu.com) (X. Li), [peishuwen@ivpp.ac.cn](mailto:peishuwen@ivpp.ac.cn) (S. Pei).



**Fig. 1.** Schematic map showing the Chinese Loess Plateau, Nihewan basin, and the Early Paleolithic sites mentioned in the paper (modified from Zhu et al., 2001 and Ao et al., 2013b). The Yellow River is the major river in North China. There is an outlet at Shixia in the northeastern Nihewan Basin, through which the Sanggan River transported water out of the Nihewan Paleolake. MJG, Majuangou; XCL, Xiaochangliang; DGT, Donggutuo; CJW, Cenjiawan; FL, Feiliang; MDG, Madigou.

Europe (Barbour, 1925; Barbour et al., 1927; Teilhard de Chardin and Piveteau, 1930; Qiu, 2000). Since the discovery of the first Lower Pleistocene site from the Nihewan Beds at Xiaochangliang (XCL) in 1978 (You et al., 1980), more than 40 additional Lower Pleistocene Paleolithic sites were discovered in the Cenjiawan (Cheng-Chia-Wan) Platform in the eastern margin of the Nihewan Basin (Fig. 1c) (Xie, 2006; Xie et al., 2006; Wei et al., 2009; Pei et al., 2010). As a result, the Nihewan Basin offers a rare opportunity to explore early human evolution in a temperate setting in North China during the time-span of Out of Africa I (Zhu et al., 2001, 2004, 2007; Dennell and Roebroeks, 2005; Klein, 2008, 2009; Dennell, 2010, 2013; Potts and Teague, 2010).

In recent decades, a series of sedimentological, paleogeographical, geochemical, paleontological, and palynological studies (Chen, 1988; Zhou et al., 1991; Tang et al., 1995; Yuan et al., 1996; Wei, 1997; Qiu, 2000; Ao et al., 2009; Pei et al., 2009; Li et al., 2010, 2014), as well as paleomagnetic dating of several Early

Paleolithic sites such as MJG (Majuangou), CJW (Cenjiawan), XCL (Xiaochangliang), DGT (Donggutuo), FL (Feiliang), DCL (Dachangliang), HJD (Huojiadi), and SSZ (Sahngshazui) (Zhu et al., 2001, 2004; Wang et al., 2005, 2006; Deng et al., 2006b, 2007; Liu et al., 2010; Ao et al., 2012, 2013a) have contributed significantly to our understanding of the complex stratigraphy, depositional systems, and environmental background to human adaptations in the Nihewan Basin. Although this is a major achievement, few of these paleoenvironmental data were acquired directly from the archaeological sites, and only a few studies used pollen to reconstruct the environment inhabited by early hominins (Li et al., 1996; Xu et al., 1998; Deng et al., 2006b; Pei et al., 2009). Here, we report on the paleoenvironmental setting of the newly discovered Lower Pleistocene archaeological site of Madigou (hereafter MDG), Nihewan Basin, with an emphasis on reconstructing the vegetation and the climatic conditions under which early hominins lived.

Download English Version:

<https://daneshyari.com/en/article/1040219>

Download Persian Version:

<https://daneshyari.com/article/1040219>

[Daneshyari.com](https://daneshyari.com)