

Discovery of a Pliocene stone tool at Yuxian, Hebei Province

TANG Yingjun¹, CHEN Wanyong¹ & CHEN Chun²

1. Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China.

2. Fudan University, Shanghai 200433, China

Correspondence should be addressed to Tang Yingjun

Abstract The stone tool discovered at Danangou valley of Dongyaozitou village, Yuxian, is the earliest stone tool, the specimen is powerful evidence about the origin of the human culture and the historical age from the ancient ape to the human being. According to the comprehensive studies about the strata, the age was considered to be of Pliocene (about 3 million years) and therefore, the discovery possessed great scientific and theoretical significance.

Keywords: Yuxian, Pliocene, Palaeolith.

The Nihewan Basin at the Yangyuan County, Hebei Province is known world wide for its yielding Pleistocene mammalian fossils. Along with the progress of field work conducted in the area, an increasing number of primitive cultural sites have been found. Especially, the Xiaochangliang Paleolithic site discovered in 1978 has attracted broad attention both in China and abroad^[1] The site contains abundant and concentrated stone artifacts with clear stratification and associated mammalian faunas^[2] This site has provided us with a scientific background to search for more ancient cultural and human remains.

Based on this clue, we have engaged a broad field survey in the Nihewan Basin and found a Pliocene mammalian fauna from a fluviatile and lacustrine sediment on the eastern cliff at the Dongyaozitou village, Yuxian County^[3,4] Below this sediment, Chen Wanyong found on June 30, 1990 a stone tool with clear chipping trace, which was made of a fine granulous quartzite nodule with light brown color (see the cover). This is the earliest stone tool discovered so far in China, and the strong evidence indicating the occurrence of human evolution in the region. This note gives a brief report on this significant discovery.

1 Brief outline of the stratigraphy

The location of the site is situated at the Danangou, eastern side of the Xuan-Yu Highway, about 1-km southeast to the Dongyaozitou Village, northeastern Yuxian County (fig. 1).

The stratigraphic profile from top to bottom is as shown in fig. 2.

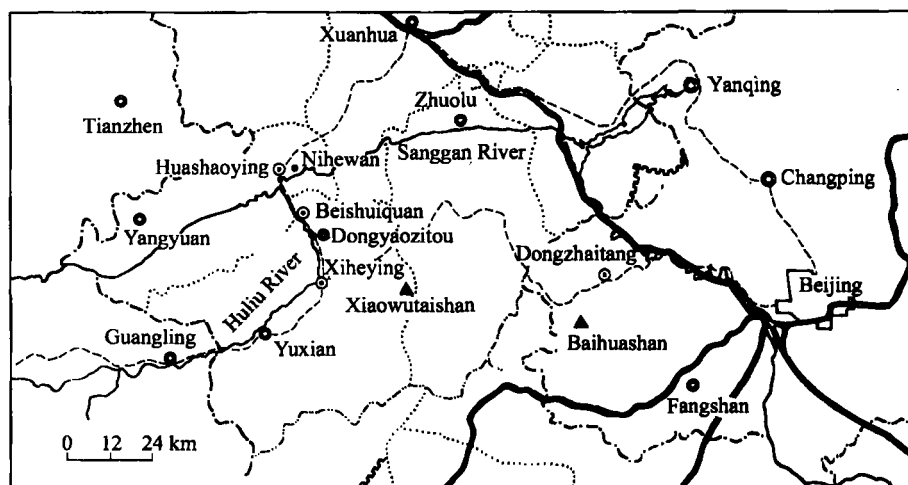


Fig. 1 Location of Danangou Palaeolithic site at Yuxian, Hebei Province.

The Early Pleistocene:

6. Light yellowish sandy clay with fine sands and gravels underneath.

~~~~unconformity~~~~

The Upper Pliocene:  
Dongyaozitou Formation:

5. Grayish white, grayish sand, gravel layer with cross stratification, mixed with light yellowish green sandy clay and thin calcareous slates and bone fragments.

4.0 m

4. Light white, grayish yellow sandy clay and small gravels, horizontal stratification clear. 2.0 m

3. Light grayish coarse grain sands and small gravels with bevelled cross stratification, tightly cemented, a calcareous slate formed above, containing bone fragments and fish teeth fossils. 1.5 m

2. Light yellowish, greenish sandy clay, massive, with calcareous nodules, shells, sometimes small rocks, yielding an earliest stone artifact. 2.5 m

~~~~unconformity~~~~

The Yuxian Formation:

1. Light brownish red sandy clay. Bottom unseen

2 Description of stone artifact

The specimen is a core tool made of a light brownish fine granulous quartzite with partial cortex intact (see fig. 3). It is fairly large in size, measuring 113 mm long, 106 mm wide, and 77 mm thick,

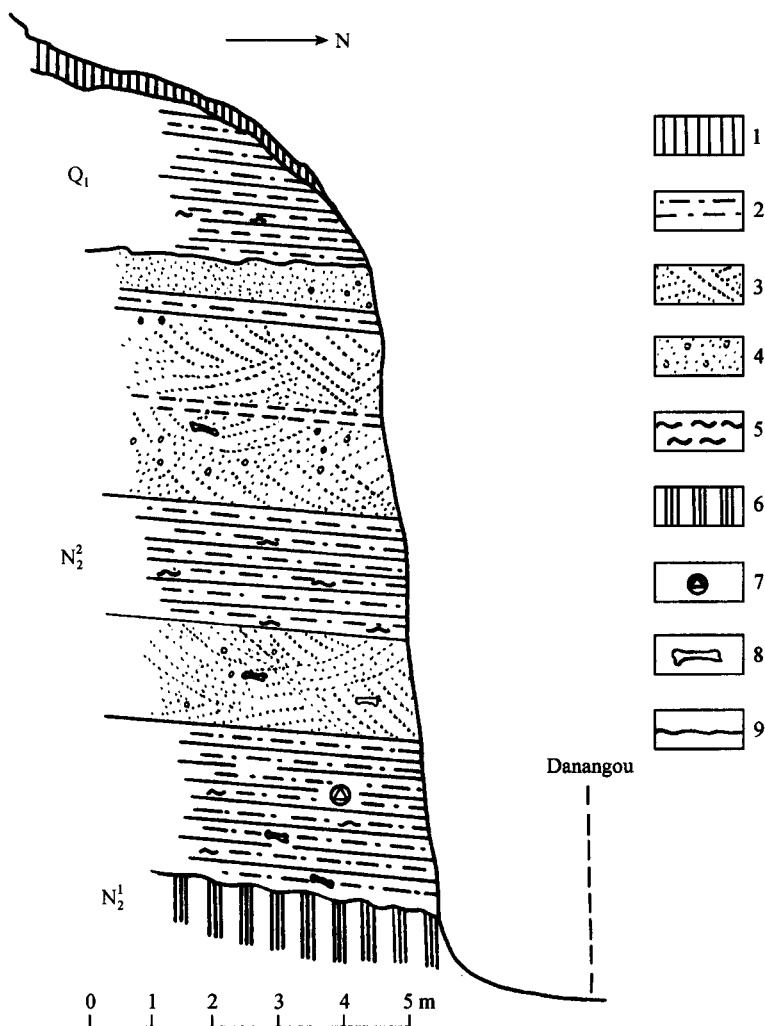


Fig. 2. A cross-section of Danangou Palaeolithic site. 1, Loess; 2, sandy clay; 3, sand; 4, sand gravel; 5, concretion; 6, Hipparion red clay; 7, Paleolith; 8, fossil; 9, unconformity.

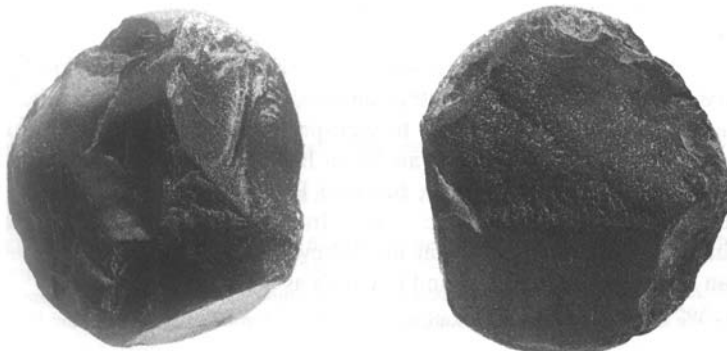


Fig. 3. Photo of the core (x1/2).

NOTES

1 019 g in weight. The edge angles of the striking platform vary from 88° to 105° . The artifact contains chipping scars in three directions, apparent striking points, and clear radial fissures. The flake scars are quite shallow, showing rectangular, oval, and triangular contours (fig. 4). One-edge displays battered trace probably caused by using as a hammer.

3 The age of stone artifact

The stone artifact was uncovered from the bottom of the Dongyaozitou Formation. The mammalian fauna unearthed from the Formation and nearby deposit of the same formation include the following:

? *Dipoides* sp.
Nyctereutes cf. *sinensis*
Lynx variabilis
Zygalophodon sp.
Coelodonta sp.
Proboscidea sinense
Hipparion cf. *houfenense*
Paracamelus sp.
Palaeotragus proessus
Antilopira yuxianensis
Gazella sinensis
Axis shansius

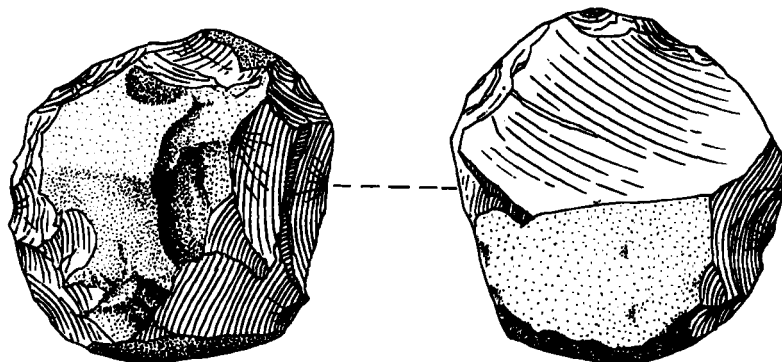


Fig. 4. Core ($\times 1/2$).

Based on the above faunal list, we can see that this fauna differs from Pleistocene faunas, indicating more primitive feature. For example, *Hipparion* cf. *houfenense*, *Zygalophodon* sp., *Palaeotragus*, *Antilopira* and ? *Dipoides* sp. were all species living during the Pliocene. Although *Paracamelus* sp. survived to the Pleistocene, the specimens from the Dongyaozitou differed in size and appearance from those in North China and resembled *Paracamelus alexejevi* from the cave near Odessa in Ukraine. The skull and teeth of *Lynx variabilis* displayed more primitive feature in comparison with those found previously.

This fauna shared several same genera in comparison with Etouaires in the Early Villafranch in Europe, such as *Lynx*, *Nyctereutes*, *Zygalophodon*, *Hipparion*, etc. The absolute age of Etouaires is 3.3 Ma. The age of the stratification yielding the stone artifact at Dongyaozitou is probably the same to Etouaires, i.e. Pliocene.

According to the Nihewan Basin analytical result by using stratigraphy, the upper boundary of the Dongyaozitou Formation and the lower boundary of the Nihewan Formation should be located on the dividing line of Matuyama/Gauss, i.e. 2.48 Ma, same to the boundary of the middle and the lower Villafranchian. According to the magnetic stratigraphy, the boundary between the bottom of the Dongyaozitou Formation and the Yuxian Formation was the bottom boundary of Kaena, i.e. 3.01 Ma, probably same to the boundary of Ruseinian/Villanian^[5]. The stone artifact was found in the deposit of the Dongyaozitou Formation dated between 2.48 and 3.01 Ma. As the artifact was located at the bottom of the Dongyaozitou Formation, its age could be dated around 3.00 Ma.

The discovery of the stone artifacts dated to the Pliocene at Yuxian County provided a piece of scientific evidence for the study of Paleolithic culture, human origin, and the evolution from early hominid to *Homo erectus* in China. Thanks to well-preserved fluvial and lacustrine sediments and profiles, and mammalian faunas, the Nihewan Basin has become a promising region not only for the study of the lower boundary of Quaternary, but also Paleolithic cultures from early to more recent periods. The discoveries of Paleolithic sites from Dongyaozitou-Xiaochangliang-Donggutuo-Xujiayao-Hutouliang were the evidence that the Nihewan Basin is a treasury for studying Paleolithic culture and human evolution in the world and in China as well.

Acknowledgements We thank Academician Jia Lanpo, Profs. Zhang Senshui, Li Yanxian, and Huang Weiwen, and associate
(To be continued on page 383)

Prof. Li Chaorong for their helpful comments, and Yang Mingwan for her illustration. And Zhang Jie had photographs taken. This work was supported by Ministry of Science & Technology, P. R. China (Grant No. [1994]83) and the National Natural Science Foundation of China (Grant No. 49772137).

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(Received June 2, 1999)