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华北更新世人类环境

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摘 要

三十年来古人类学及其密切相关学科的发展，特别是近十年来，在西藏、周口店、黄土高原及东部沿海平原多学科研究取得的丰硕成果，为进一步认识和研究我国原始人类的生活环境，提供了良好的基础。

文中所谓"华北"，指秦岭、淮河一线以北，包括西北、内蒙、东北、山西、河北、山东以及河南和江苏部分地区。

我国北方已发现含有人类化石的第四纪哺乳动物群大约有30个。通过分析各动物群的组成、所含各生活类型的比例以及南北过渡动物群地理位置变化等并参考其他学科的研究成果表明：在更新世期间，中国北方的原始人类是生活在青藏高原急剧隆起、西高东低的山川大势逐渐形成、气候总的趋于干冷而又具多旋回的自然环境中。

距今约110—100万年，中国北方最早出现的公王岭蓝田人，生活在温暖、近乎亚热带的森林环境中；距今70—50万年的陈家窝蓝田人，生活在一个全球性(距今90—70万年的贡兹)冰期之后的干凉气候下的草原环境；距今约50—30万年，对北方的原始人类来说，是一个温和适宜的生活时期。先后出现了北京人、庙后山人、骑子鞍山人、大荔人等。但是在他们生活的后期，华北的气候又趋于干冷；距今14—10万年，在华北又是一个温暖湿润的时期。距今10万年以后，华北的气候进一步趋向干冷。其间有两个冷峰(距今约6万年和1.5万年)和一个相对湿润(距今约5—3万年)的阶段。许家窑人、丁村人出现在第一个冷峰阶段。河套人、长武人、泾川人、小孤山人等生活在两个冷峰之间，峙峪人、安图人、阎家岗人、青山头人生活在第二个冷峰(也即更新世以来华北最寒冷的)阶段。距今约1万年，华北气候开始回暖，山顶洞人、扎赉诺尔人……相继出现。

THE PLEISTOCENE HUMAN ENVIRONMENT OF NORTH CHINA

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Key words Pleistocene; Human environment

Abstract

The analysis of main Quaternary mammalian faunas associated with human fossil and studies of

the other disciplines showed that the pleistocene humans of North China lived in the natural environment that Qinghai/Xizang plateau was rapidly rising, the three large stairs in the topography decreasing in height from west to east were gradually created, and the climate became colder and drier but there were multiple fluctuations in this general trend.

Thirty years ago, the discoverer of the first skull of Peking Man, the late famous professor Pei Wenzhong gave a lecture named "The living environment of the Chinese primitive men" at the memorial meeting of thirtieth anniversary of the discovery of the first skull of Peking Man (Pei, 1960). Now thirty years have past, Paleoanthropology and its two closely related fields, Quaternary Mammalogy and Paleolithic Archaeology as well as the other disciplines of Quaternary Geology have made great headway and have yielded valuable information in China. Especially, in the last decade much progress has been made in the multidisciplinary studies conducted in the Tibet region, the Zhoukoudian area, the Loess Plateau and on the East Coastal Plain. These studies have clarified our comprehension of the background of Geology and physical Geography of the important geological events which have occurred in such a vast territory since the end of Cenozoic. All of these have provided a better foundation for proceeding to understand and study the pleistocene human environment of China.

Here, so called "North China" means the area of north to the line of the Qinling Mountain and Huaihe River including Shanxi, Hebei, Shandong provinces, partial regions of Henan anl Jiangsu provinces and Northwest and Northeast of China and Inner Mongolia.

The uplift of the Qinghai/Xizang Plateau following the Himalayan orogeny was a significant influence on the form and development of natural environment of China since the Quaternary. In a few words, it changed the basic pattern of natural landscape which has established since the late Tertiary and created the three large stairs in the topography decreasing in altitude from west to east (Fig. 1).

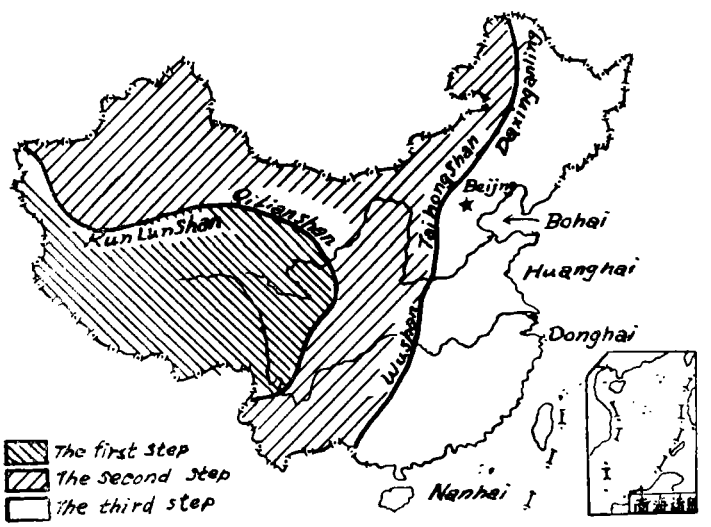

Fig. 1 Three large stairs in the topography decreasing in altitude from west to east

During the Pliocene/early Pleistocene, the altitude of the plateau was still not sufficient to create the stair-like topography, so that the distribution of natural zonation was still horizontal. In the middle Pleistocene, the creation of the three stails in the topography changed the horizon-

tal distribution of natural zonation. Up to the late Pleistocene, the uplift of the plateau caused the continental climate to become drier and colder and the horizontal natural zonation of the East China migrated southward (Liu et al., 1984).

Loess has been a widespread aeolian deposit in China since the Quaternary. In generally terms, it is a product of dry and cold climate. The deposition of loess began in the early Pleistocene, but it's distribution was limited to north of the Qinling Mountain. In the middle Pleistocene, it's distribution extended further south, reaching as far as the middle and lower reaches of the Changjiang River. From the late Pleistocene, loess became much more widespread, reaching latitude 25° to 30°N., indicating that a dry and cold climate prevailed (Liu et al., 1984).

The Luochuan loess profile in Shaanxi province has been studied by professor Liu Dongsheng and his colleagues since 1956, and now chosen as the type section based on the stuly of Biostratigraphy, Lithology and Paleomagnetics. The section is about 140 m. thick and can be divided into the lower-Pleistocene Wucheng loess, the middle-Pleistocene Lishi loess and the late-Pleistocene Malan loess from bottom to top (Liu et al., 1985). Such a change of loess type vertically also reflects the variation in climate and natural environment. Many loess and paleosoil layers can be seen in the Luocchuan section. Multidiciplinary studies have shown that the loess was a good indicator of dry and cold episodes, while the paleosoil was formed during temperate and humid episodes. The loess-paleosoil cycles repeatedly appear in the long section showing climate fluctuations since the Pleistocene.

In the last decade, the multidisciplinary analyses of more than a thousand drilling cores from the East Coastal Plain have been done by professor Wang Pinxian and others. The results of their study show that at least five marine transgressions have occurred on the East Coastal Plain since the Quaternary (Table 1).

Table 1. Quaternary transgression of East Plain in North China

Age 10^4 year B.P.	Zhao et al., 1985	Wang et al., 1981; Wang, 1984	Yang et al., 1979	Lin, 1977
	Marine facies	*Ammoria*	Cangdong transgression	Tianjin
	bed 1	transgression	Xianxian transgression	transgression
1				
	Marine facies bed 2	*Pseudorotalia* transgression	Cangxi transgression	Cangzhou transgression
3—4	Marine facies bed 3	*Asterorotolia* transgression	Qingxian transgression	Baiyangdian transgression
10				Huanghua transgression
20	Marine facies bed 4			
30	Marine facies bed 5	*Spirillina* transgression	Huanghua transgression	Haixing transgression
70				
100			Haixing transgression	Bohai transgression
		Paromalina transgression	Bohai transgression	

So far more than 20 mammalian faunas associated with human fossils have been found in North China. Their geographical distribution can be seen in Fig. 2. Most of them have been dated by one or several dating techniques (Table 2). They can be put in a geological framework

Table 2. Age of main mammalian faunas associated with human fossils in North China

Fauna	Age (10^4year B.P.)	Dating Technique
Gongwangling		
	>51 (Li et al., 1979)	Amino Acid Racemization
	78—80 (Ma et al., 1978)	Paleomagnetism
	69—75;100 (Cheng et al., 1978)	Paleomagnetism
	110—115 (Gao, 1987)	Paleomagnetism
Chenjiawo		
	53(Cheng et al., 1978)	Paleomagnetism
	65(Ma et al., 1978)	Paleomagnetism
	65(Gao, 1987)	Paleomagnetism
Zhoukoudian Loc. 1		
Layer 1—3	23—25 (Xia, 1982)	Uranium Series
Layer 4	29—31(Pei, 1985)	Thermoluminescence
Layer 7	37—40 (Qian et al., 1985)	Paleomagnetism
Layer 10	46(Guo et al., 1980)	Fission Track
Miaohoushan		
Layer 4—6	33;30;25;23;14 (Yuan et al., 1986)	Uranium Series
Layer 4	40(Pipa E) (Yuan et al., 1986)	Uranium Series
Jinniushan		
Layer 5	24(Lab. DAPU, 1985)	Uranium Series
Layer 5—6	27(Lab. DAPU, 1985)	Uranium Series
Layer 6	28(Lab. DAPU, 1985)	Uranium Series
Dali		
Layer 3	18—23 (Chen et al., 1984)	Uranium Series
Dingcun Loc.100		
	16—21 (Chen et al., 1984)	Uranium Series
Xindong		
Top	9.8 (Zhao et al., 1985)	Uranium Series
Layer 3—7	13.5—17.5 (Chen et al., 1984)	Uranium Series
Bottom	25(Pei, 1985)	Thermoluminescence
Xujiayao		
	10—12.5 (Chen et al., 1984)	Uranium Series
Salawusu		
	3.9—5 (Yuan et al., 1983)	Uranium Series
	3.5 (Li et al., 1984b)	C14
Xiaogushan		
	4(Huang et al., 1986)	Thermoluminescence
Antu		
	2.6 (Lab. IACASS, 1977)	C14
Shiyu		
	2.8 (Lab. IACASS, 1980)	C14
Dongdong		
	2.8 (Liu et al., 1986)	C14
Yanjiagang		
	2(You et al., 1986)	C14

续表 2

Fauna	Age(year B.P.)	Dating Technique
Qingshantou		
Layer 3	10940 (Jin et al., 1984)	C14
Upper Cave		
Layer 4	10470 (Lab. IACASS, 1980)	C14
Lower	18340 (Lab. IACASS, 1980)	C14
Zhalainur		
Layer 3	7070—11660 (Li et al., 1984a)	C14

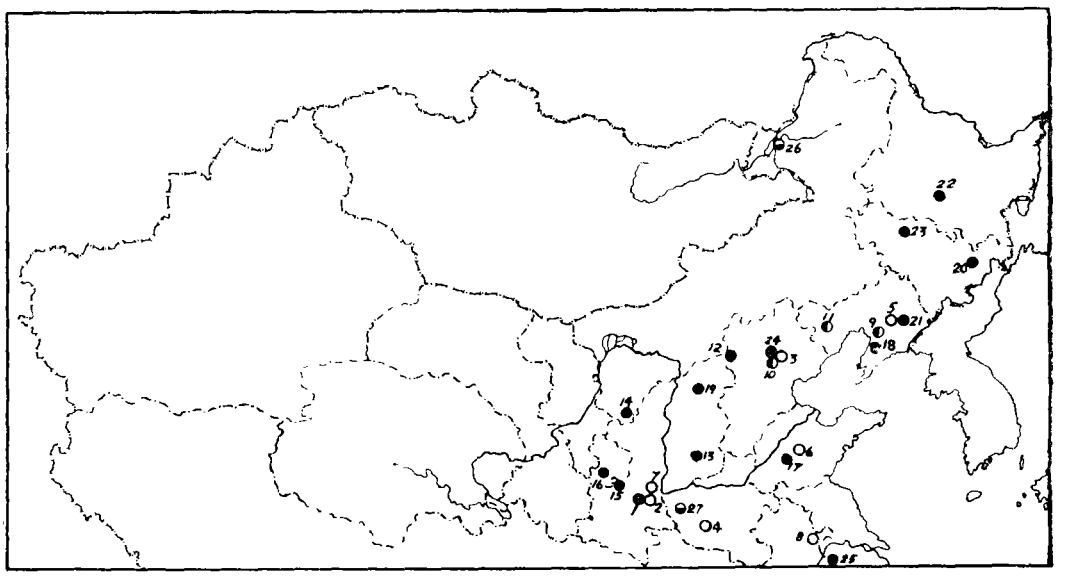

Fig.2 Geographical distribution of mammalian faunas associated with human fossils in North China

according to the above mentioned data and a related time order may be established in different genetic sediment (Fig. 3).

Gongwangling fauna emerged about more than one million years ago, is the earliest mammalian fauna associated with *Homo erectus* in North China. It contains a large variety of mammalian species. There are many typical members of *Ailuropoda-Stegodon* fauna of South China such as *Ailuropoda melanoleuca, Stegodon orientalis, Tapirus sinensis, Capricornis* etc. in it's composition (Hu et al., 1978). The whole fauna shows a strong character of the oriental realm. It is indicated that Gongwangling Lantian Man lived in a forest environment

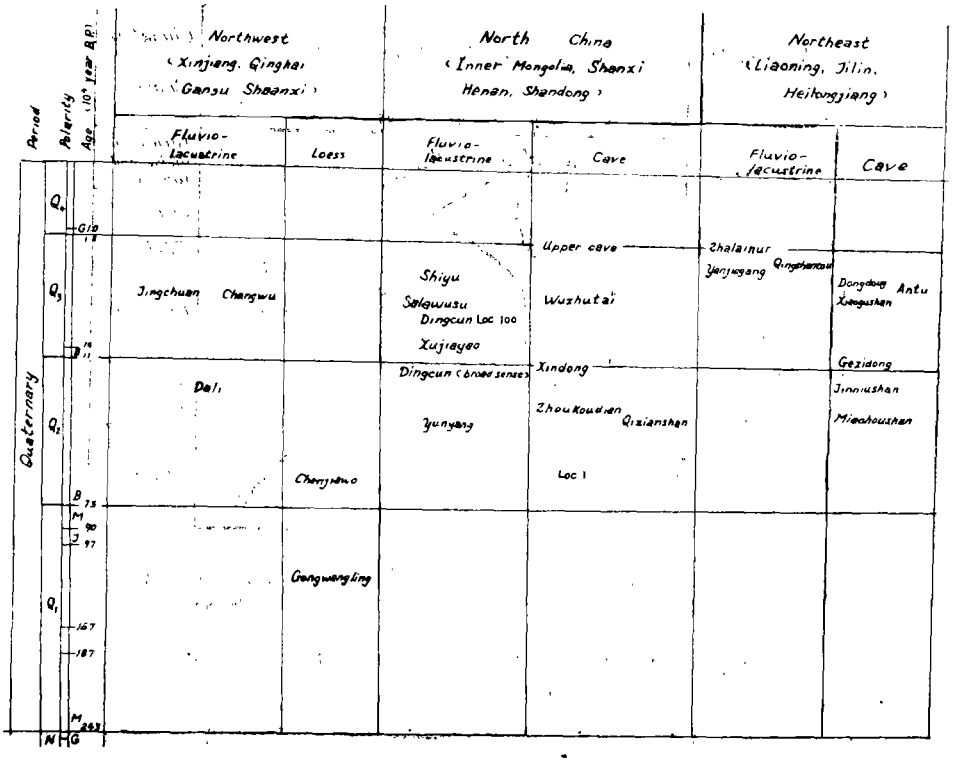

Fig.3 Mammalian faunas associated with human fossils from different genetic Sediments in North China

under warm subtropic climatic conditions (Zhou et al., 1965a).

Chenjiawo fauna appeared about 700,000—500,000 years ago. It no longer has typical members of the South China fauna. The proportion of Rodentia increased in the faunal assemblage. It represents a grassland environment under a temperate-cool climate (Zhou et al., 1965b).

From 500,000—200,000 years B. P., Zhoukoudian Loc. 1. Yunyan, Miaohoushan and Qizianshan faunas early and late appeared in North China.

Zhoukoudian Loc. 1 fauna consists of about 100 mammalian species. Most of them are very common forms of temperate or warm-temperate climatic zonation such as *Trogotherium cuvieri, Megaloceros pachysteus, Dicerorhinus choukoutienensis, Sus lydekkeri,* and *Cervus (P.) grayi.*

The natural environment of Peking Man has been studied by many scientists since 1930. The following figure indicates the variation in species number of cold-enduring and thermophilous micromammals and mammals in the different layer of the cave deposit. The curves show that there are two warm and cold periods at least during Peking Man times (Fig. 4) (Zheng, 1983).

Here, it must be mentioned that Yunyan fauna located in Nanzhao county, Henan province, like the Gongwangling fauna, also has some typical members of *Ailuropoda-Stegodon* fauna (Qiu et al., 1982). This illustrates that the transitional area of the animals of South and North China had moved southward (Fig. 5). About 200,000—100,000 years B.P., "Dali", "Dingcun" (in the broad sense), "Jinniushan", "Xindong" and "Gezidong" faunas arose one after another in North China. They are associated with the early *Homo sapiens*. It can be seen from the composition of Dali fauna that Dali Man lived in another climatic cycle from warm to cold follow-

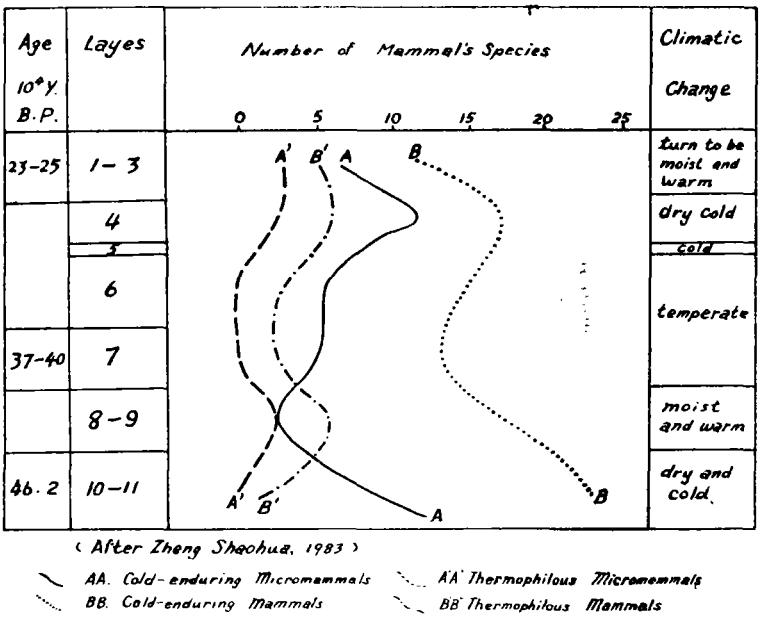

Fig. 4 Climatic variation during the Peking Man period
(From Zheng Shaohua, 1983)

ing the Zhoukoudian Loc. 1 fauna. Dingcun fauna (in the broad sense) contains several species of elephant fossil. There is sufficient evidence to prove that it lived in a quite warm and moist climate.

Hexian fauna located at the south of the Huaihe River and the north shore of the Changjiang River, like Gongwangling fauna, contains typical members of the South China fauna, showing that the transitional area of animals had moved further south (Fig. 5).

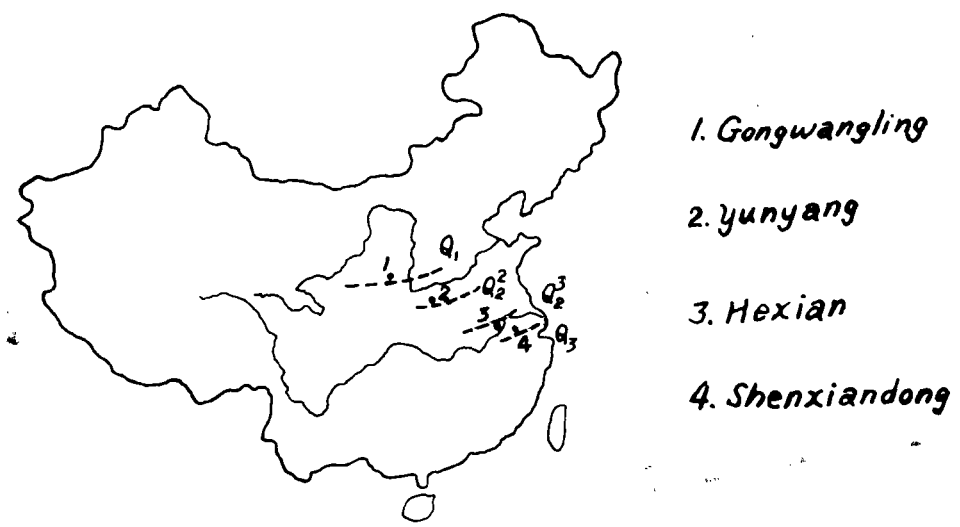

Fig. 5 Change of transitional area of animal province of South and North China

Xujiayao and Dingcun Loc. 100 faunas dated about 100,000—50,000 years B.P.lived in a grassland environment under cool and dry climatic condition. Most of their members are cold-enduring species like *Equus przewalskyi* and *Gazella* etc. (Jia et al., 1979).

From 50,000 to 30,000 years B.P., It was still cold, but moister in North China. The hominoids associated with Salawusu, Xiaogushan, Jingchuan, Changwu and Wuzhutai faunas had evolved into the late *Homo sapiens*.

About 30,000—10,000 years B.P. was the coldest period in North China since the Pleistocene. The typical *antiqutatis-primigenius* fauna appeared in the Northeast. The Antu, Yanjiagang and Qingshantou faunas all belong to this assemblage. At that time, mammothus was the most widespread in distribution as well as the most abundant. The shiyu and Dongdong fauna is not typical *antiquitatis-primigenius* fauna, but they contain more cold-enduring species than Salawusu fauna.

In addition, the sea level dropped to a position of 100 m. lower than that of the present sea level. In the meantime Japan, Taiwan anl China mainland were connected. The transitional area of animal distribution spanned the Changjiang River (Fig. 5).

After this cold interval the climate became warmer and Upper Cave fauna and Zhalainur fauna appeared in North China. A correlation of the climatic curve of the Luochuan loess sec-

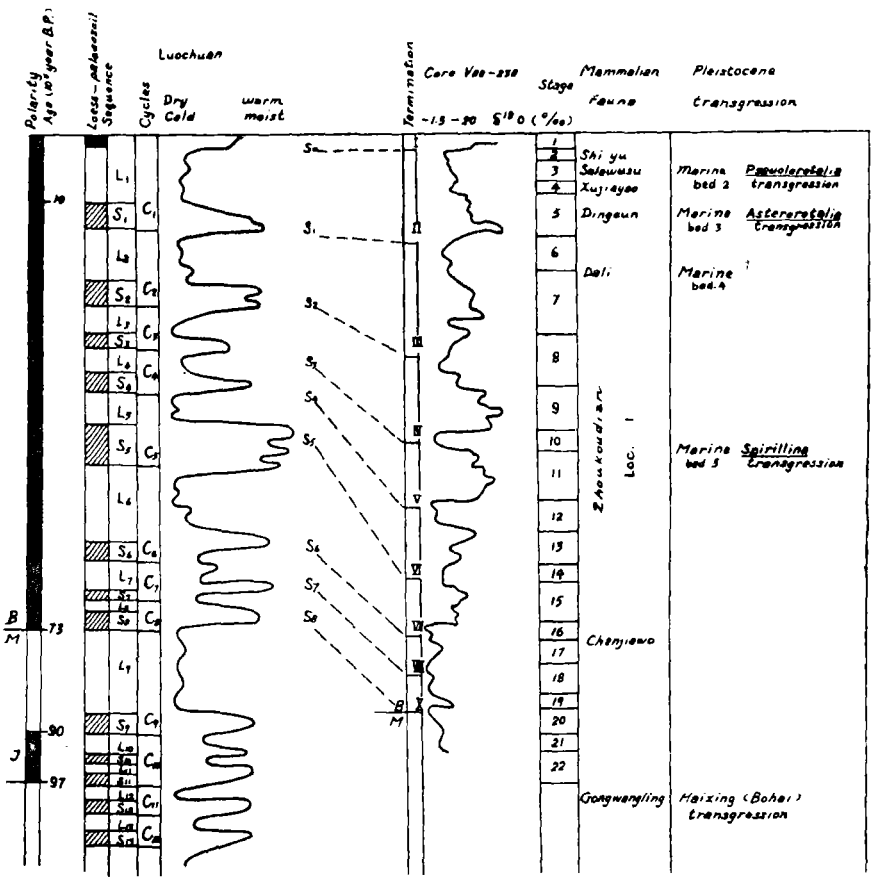

Fig.6 Long-term climatic fluctuation curves of Luochuan loess section compared with oxygen isotope records in core V28-238, Main mammalian faunas and transgressions

tion, records of oxygen isotope of deep sea core V28-V238 as well as main mammalian faunas which were associated with human fossils and marine transgressions which occurred in the East Plain is shown in Fig. 6 (Kukla, 1977; Kukla et al., 1977; Xu et al., 1982 and You et al., 1981).

Conclusions

1. The southern migration of natural zonation and transitional areas of animals, the extension of loess distribution and the change in its v rtical direction indicate that during the pleistocene, the general trend of climatic change was gradually toward drier and colder conditions in North China.

2. The repeated appearance of the loess-paleosoil cycle, the alternation of transgression and regression, and the change of mammalian faunas demonstrate that there were climatic fluctuations primarily toward dry and cold condition. In other words, there were many alternating periods of relatively cold and warm climatic circumstances.

To sum up, It is clear from the description above that the Pleistocene humans of North China lived in the natural environment that the Qinghai/Xizang Plateau was quickly rising, three large stairs in the topography decreasing in height from west to east were gradually created, and generally, the climate became colder and drier but there were multiple fluctuations in this general trend.

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