

THE MOSAIC EVOLUTION OF HUMANKIND IN CHINA

Wu Xinzhi

Institute of Vertebrate Palaeontology and Palaeoanthropology, Academia Sinica, Beijing, China

ABSTRACT

Human remains from more than sixty sites in China have been dated by a variety of methods. The results show a slight chronological overlap between remains classified as Homo erectus and Homo sapiens. When several metrical attributes of the skulls are considered it is also found that there is no clear cut morphological division between the two species.

More than sixty sites yielding human fossils have so far been found in China. According to the total morphological pattern and chronological data these fossils are classified into two categories: *Homo erectus* and *Homo sapiens*. In the past two decades various new dating techniques have been applied to sites yielding human remains in China. The results so far are shown in Table 1. The fossils from Zhoukoudian and Hexian are attributed to *Homo erectus*; those from Dali, Jinniushan and Xujiayao to early *Homo sapiens*.

Detailed measurements and observations on some morphological features show a mosaic pattern in human evolution in China. The thickness of cranial bones is the first item to be mentioned in this regard. The data on this are shown in Table 2, which indicates that the thickness of cranial bone shows a tendency to decrease from *Homo erectus* to *Homo sapiens*, but there is no clear cut border line dividing these two species. The thickness at the centre of the frontal squama of the Dali *sapiens* skull is thicker than that of the Hexian *erectus* one, and thicker than four out of nine specimens of *erectus* from Zhoukoudian. The Dali skull is thicker at the parietal tuberosity than that of one specimen from Hexian and four out of seven from Zhoukoudian. Two out of six Zhoukoudian specimens are thinner at the cerebellar fossa than the

Dali and Jinniushan specimens. The Dali skull is thicker than, or equal to, three out of seven specimens from Zhoukoudian at the centre of the temporal squama. The average thickness of four specimens from Xujiayao at the parietal tuberosity (10.7 mm) is almost equal to that of seven specimens from Zhoukoudian (10.8 mm), even though the Xujiayao specimens are at least 100,000 years younger than the latter.

The mid-sagittal ridge, the angular turn between the occipital and the nuchal planes of the occipital bone, the angular torus and the much constricted post-orbital part of the cranium have been suggested as autapomorphies of *Homo erectus*. They are found in *Homo erectus* specimens in China and can be seen also in *Homo sapiens* skulls of China and neighbouring areas.

All of the three skulls of early *Homo sapiens* of China (namely those from Dali, Jinniushan and Maba) definitely possess a mid-sagittal ridge, although the ridges in these specimens are shorter than in the Zhoukoudian skulls. The Dali and Jinniushan skulls are the only two specimens of early *Homo sapiens* of China which possess the hind part of the skull. The occipital plane transfers to the nuchal plane with an angular turn in both. The angular torus at the postero-inferior corner of the parietal bone is not only present in *Homo erectus*, but also in the *Homo sapiens* skulls from Dali, Chuandong and Ziyang; the latter two specimens being late *Homo sapiens*. The post-orbital constriction is an interesting feature which is typical in almost all *Homo erectus* remains, but it is much constricted in the Maba *Homo sapiens*. The degree of constriction in Hexian is even weaker than in Dali. The late *Homo sapiens* skulls from Minatogawa also show a postorbital constriction, as in *Homo erectus*.

It has been also suggested that lowness and a straight-shaped upper border of the temporal squama are among the autapomorphies of *Homo erectus*. But these features

Table 1: Chronometric data for some human fossil sites in China, in thousands of years BP.

Abbreviations of dating methods: C = Radiocarbon, FT = Fission track, PM = Paleomagnetism, TL = Thermoluminescence, = U: Uranium series.

SPECIMENS	DATE BP [METHOD]	REFERENCES
Zhoukoudian: fossils from Locality 1, representing about 40 individuals:		
Layer 1-3	230+30/-23 [U] 256+62/-40 [U] 420+11/-5 [U]	Zhao <i>et al.</i> (1985) Zhao <i>et al.</i> (1985) Shen and Jin (1991)
Layer 3-4	282 [ESR]	Huang <i>et al.</i> (1991)
Layer 4	292±26 [TL] 299±55[FT]	Pei (1985) Guo <i>et al.</i> (1991)
Layer 7	370-400 [PM]	Qian <i>et al.</i> (1985)
Layer 8-9	> 300 [U] 418[ESR]	Zhao <i>et al.</i> (1985) Huang <i>et al.</i> (1991)
Layer 10	462±45 [FT] 417-592 [TL]	Liu <i>et al.</i> (1985) Pei (1985)
Layer 11	578 [ESR]	Hang <i>et al.</i> (1991)
Hexian: skull-cap etc:		
Upper layer	184±15 [TL]	Li and Mei (1983)
Lower layer	195±16 [TL] 150-270 [U]	Li and Mei (1983) Chen <i>et al.</i> (1987)
Jinniushan: skull etc:		
	164-314 [U]	Chen and Yuan (1988)
Dali: skull:	209±33 [U]	Chen <i>et al.</i> (1984)
Maba: skull-cap:	>168±16 [U] 129±10 [U]	Yuan <i>et al.</i> (1986) Yuan <i>et al.</i> (1986)
Xujiayao: 19 cranial bones and 7 teeth:	104-125 [U]	Chen <i>et al.</i> (1984)
Ziyang: skull-cap and hard palate:	37.4±3 [C]	Li <i>et al.</i> (1984)

are absent in the *erectus* skull from Hexian in which the temporal squama is high and with a curved upper margin. The length-height index of the temporal squama for five Zhoukoudian *erectus* skulls averages 49.7 with a range from 45.3 to 57.3, while that of the Hexian *erectus* skull is 60, which is concordant with that the average *sapiens* index. The length-height index of the temporal squama of

the Hexian skull is close to that of Skull XI from Zhoukoudian. The curved upper margin of the temporal squama is typical of *Homo sapiens* and can be seen, not only on the Hexian specimen, but also on Skull V from Zhoukoudian. Skull XI of Zhoukoudian is about 200,000-300,000 years earlier than that from Hexian, while Skull V of Zhoukoudian is only slightly earlier than the Hexian skull.

Therefore some *erectus* features which are predominant in *Homo erectus* also exist in *Homo sapiens* in China. On the other hand, some *sapiens* features can be found in some *Homo erectus* skulls in China as well. The morphological mosaic in human evolution of China indicates that there is no morphologically clear-cut border line separating *Homo erectus* from *Homo sapiens* in this area; the latter was derived from the former species. The overlapping of these important morphological features probably implies that the separation of *Homo erectus* from *Homo sapiens* in China is not natural, but artificial.

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Table 2 Thickness of Cranial Bones, in mm

	Center of frontal squama	Parietal tuberosity	Cerebellar fossa	Center of temp. squama
Zhoukoudian (Weidenreich 1943):				
I	13.0	5.0?	--	--
II	10.0	11.0	--	10.0
III	10.0	11.0	6.8	9.3
V (Qiu <i>et al.</i> 1973)	6.0	--	4.5	10.0
VI	(9.5)	11.2	--	7.7
VIII	--	--	3.8	--
IX	(7.1)	--	--	--
X	7.0	12.5	(5.0)	(5.2)
XI	11.0	16.0	2.8	6.0
XII	7.0	9.0	2.5	7.0
Hexian (Wu and Dong 1983; Wu 1982):				
PA 830	7.0	13.5	6.0	10.0
PA 840	--	11.0	--	--
Dali (Wu 1981):				
	9.0	11.2	3.9	7.0
Jinniushan (Lu 1989):				
	5.0	6.0	3.0	4.0
Xujiayao (Jia <i>et al.</i> 1979; Wu 1980):				
No.3	--	12.4	--	--
No.4	--	10.8	--	--
No.6	--	7.0	--	--
No.10	--	12.6	--	--

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