



# 广西崇左缺缺洞早更新世猕猴 骨架化石初步报道<sup>1)</sup>

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**摘要:**初步报道了缺缺洞发现的猕猴化石。新材料为一具雄性老年猕猴个体的骨架,保存了几乎完整的下颌、全部7节颈椎、9节胸椎、两侧前肢肢骨、右侧后肢部分肢骨以及绝大部分的腕(跗)骨、掌(跖)骨和指(趾)骨。这是目前为止中国发现的最为完整的猕猴骨架化石。鉴于化石对比材料的缺乏,仅对下颌及牙齿形态进行了描述,并将之与中国已知各化石种进行了对比。由于中国猕猴属各化石种之间的系统关系尚不明确,暂将这批材料作未定种处理,更加深入的研究将另文发表。

**关键词:**广西崇左缺缺洞,早更新世,猕猴骨架

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## A PARTIAL SKELETON OF *MACACA* (MAMMALIA, PRIMATES) FROM THE EARLY PLEISTOCENE QUEQUE CAVE SITE, CHONGZUO, GUANGXI, SOUTH CHINA

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**Key words** Queque Cave, Chongzuo, Guangxi; Early Pleistocene; macaque skeleton

Queque Cave is located in the Chongzuo Eco-Park (Chongzuo Biodiversity Research Institute, Peking University), Jiangzhou District, Chongzuo City, Guangxi Zhuang Autonomous Region (22°16'22"N, 107°30'22"E). The cave occurs in Wuming Mountain, where the Sanhe Cave site is also located (Jin et al., 2009b). The altitude of the entrance is 202 m above sea level, about 7 meters lower than the entrance of the Sanhe Cave. The sediments in the Queque Cave, like those in the Sanhe Cave, accordingly fall into the 5<sup>th</sup> Early Pleistocene horizon previously revealed in the Chongzuo area (Jin et al., 2009a, b). Four field seasons of excavation at the Queque Cave site during 2007-2009 unearthed a large number and wide variety of fossils, representing both large and small mammals. Among the taxa that have been recovered are at least two great apes,

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*Gigantopithecus blacki* and *Pongo* sp., and at least three Old World monkey species. Nearly all of these primate remains from the Queque Cave are gnathodontal, including cranial and mandibular fragments but consisting mostly of isolated teeth. In December 2008, a partial macaque skeleton belonging to an aged male individual and preserving a nearly complete mandible, all 7 cervical vertebrae and 9 thoracic vertebrae, both forelimbs, a part of the right hindlimb, and most of the carpals, tarsals, metapodials and phalanges was unearthed from the sediments of the Queque Cave. This is the most complete skeleton of a fossil macaque so far discovered in China. In this paper, only the mandible is briefly described and compared with the known fossil macaque species in China, due to the scarcity of postcranial fossil material for comparison. A more detailed study of the postcranial macaque bones and the other fossils from the Queque Cave will be published elsewhere.

**Cercopithecidae Gray, 1821**  
**Cercopithecinae Gray, 1821**  
***Macaca* Lacépède, 1799**  
***Macaca* sp.**  
(Fig. 1)

**Material** See Table 1.

**Description of mandible and lower dentition** The mandible is nearly complete, with only the left coronoid process and mandibular condyle exhibiting damage. All of the teeth are in place except for the separately preserved right i2 and both central incisors, which are presumed to have fallen out of the alveoli prior to burial. The three vacant alveoli are filled with matrix. The mandible is robust in overall morphology, and the profile of the mandible is congruous with those of macaque monkeys. The symphysis is rounded in lateral view, and the dorsal surface of it slopes flatly at a shallow angle of approximately  $20^\circ$  to the occlusal plane. Its anterior surface is marked by a median mental foramen and well-developed mental ridges. The incisive alveolar process is slightly proclined. The alveoli for the lateral incisors are labiolingually shorter, as well as smaller in overall size, than those for the central incisors. The superior transverse torus extends posteriorly to the mesial lophid of p4 in superior view. The inferior transverse torus extends slightly further, reaching the distal basin of p4. No apparently developed fossa is shown on the lateral surface of the corpus. Three mental foramina occur on the lateral surface of each corpus of the mandible. They are located just within the lower third of the corpus' height, below p3 and p4. The corpus is thick and robust, but relatively shallow, being deepest approximately inferior to the mesial lophid of m2 and shallowing posteriorly until the distal end of m3. This gives the inferior margin of the corpus a gentle convex curvature. In superior view, the oblique line merges with the corpus at the level of the distal edge of m3 and is separated from the alveolar process by a wide extramolar sulcus. In lateral view, there is a retromolar gap. The gonial area is not expanded. On the medial side of the ramus, the mylohyoid line is poorly developed. The dental arcade is almost U-shaped, with the large canines projecting slightly laterally. There is a strong wear gradient on the molars: the molars from p4 to m3 are increasingly worn, and nearly all the cusps of the premolars and molars have been entirely worn away. The exceptions are the metaconid on the left m2, the entoconid and hypoconulid on the left m3, and the metaconid and entoconid on the right m3. The ramus is relatively short in height, and is nearly perpendicular to the corpus but slightly tilted backward. The coronoid process projects slightly above the mandibular condyle, and is separated from the condyle by a shallow, gently curved mandibular notch. A triangular masseteric fossa is strongly developed, and positioned directly beneath the coronoid process. The masseteric tuberosity is faint, and its area of attachment is not heavily scarred.

**Table 1 Elements present in the partial *Macaca* skeleton**

Element			Specimen no.	Preservation	Element	Specimen no.	Preservation			
Mandible	V 16888.1	nearly complete, with only left coronoid process and mandibular condyle damaged			Carpals	scaphoid	V 16888.39	complete		
						os centrale	V 16888.40			
trapezium	V 16888.41									
R trapezoid	V 16888.42									
capitate	V 16888.43									
hamate	V 16888.44									
triquetrum	V 16888.45									
Incisors	L i1	V 16888.2	crown above the cervix worn down			Metacarpals	Mc III		V 16888.46	complete
	R i1	V 16888.3								
	i2	V 16888.4								
Cervical vertebrae	C1 (atlas)	V 16888.5	C7 with damaged spinous process; all others complete		L Mc IV		V 16888.47			
	C2 (axis)	V 16888.6			Mc V		V 16888.48			
	C3–C7	V 16888.7–11								
Thoracic vertebrae	V 16888.12–20	T1 with damaged left transverse process; all others complete			R Mc I	V 16888.49	distal part			
ribs	V 16888.21	more than twenty rib fragments			R Mc II	V 16888.50	complete			
						Mc III		V 16888.51		
					Mc IV	V 16888.52				
					Mc V	V 16888.53				
					R femur	V 16888.54		complete		
Pectoral girdle	L	scapula	V 16888.22	acromion process, superior and inferior parts of the blade damaged	Hindlimb	R fibula	V 16888.55	proximal end damaged		
		clavicle	V 16888.24	sternal end (less than 2 cm)						
	R	scapula	V 16888.23	acromion process damaged		Tarsals	L calcaneus	V 16888.56	complete	
		clavicle	V 16888.25	sternal end (less than 2 cm)			talus	V 16888.57		
		clavicle	V 16888.26	acromial portion (about 2 cm)			L cuboid	V 16888.58		
							navicular	V 16888.59		
				cuneiform I			V 16888.60			
Forelimb	L	humerus	V 16888.27	complete		R talus	V 16888.63	complete		
		radius	V 16888.28							
		ulna	V 16888.29							
	R	humerus	V 16888.30	complete	Metatarsals	L Mt I	V 16888.64	complete		
		radius	V 16888.31	distal end (about 1 cm) damaged		Mt II	V 16888.65			
ulna	V 16888.32	complete	Mt IV	V 16888.66						
			Mt V	V 16888.67						
				R Mt I		V 16888.68	complete			
				Mt II	V 16888.69					
				Mt IV	V 16888.70					
				Mt V	V 16888.71					
Carpals	V 16888.33–38	scaphoid	V 16888.33	complete	Phalanges	proximal (15)	V 16888.72–86	all but V 16888.75 complete		
		lunate	V 16888.34			middle (10)	V 16888.87–96	complete		
		pisiform	V 16888.35			distal (7)	V 16888.97–103			
		trapezium	V 16888.36							
		hamate	V 16888.37							
		triquetrum	V 16888.38							

**Comparisons and discussion** The Queque Cave skeleton is undoubtedly referable to the genus *Macaca* based on its dental and mandibular morphology.

Five species of fossil macaques have been previously reported in China: *M. anderssoni*, *M. robustus*, *M. jiangchuanensis*, *M. peii* and *M. youngi*. These species were all established on the basis of craniodental material. However, comparisons of dental morphology are rather difficult because the dentition of the Queque Cave mandible is too worn to permit detailed morphological observations. Metrically, however, the Queque Cave individual is distinctly smaller than *M. peii*, while larger than *M. jiangchuanensis* and *M. robustus* in its dental dimensions



Fig. 1 Some specimens of the *Macaca* partial skeleton from the Queque Cave, Guangxi  
 A. mandible (IVPP V 16888. 1: A-1. occlusal view; A-2. right lateral view); B. cervical (C1–C7) and thoracic (T1–T9) vertebrae (left to right, V 16888. 5–20; dorsal view); C. left scapula (V 16888. 22; dorsal view); D. right scapula (V 16888. 23; dorsal view); E. left humerus (V 16888. 27; anterior view); F. right humerus (V 16888. 30; anterior view); G. left ulna (V 16888. 29; medial view); H. right ulna (V 16888. 32; medial view); I. left radius (V 16888. 28; anterior view); J. right radius (V 16888. 31; anterior view); K. right femur (V 16888. 54; anterior view); L. right fibula (V 16888. 55; medial view); M. left calcaneus (V 16888. 56; superior view); N. left talus (V 16888. 57; dorsal view); O. right talus (V 16888. 63; dorsal view); P. metacarpals (left to right, left Mc III–V, right Mc I–V, V 16888. 46–53; dorsal view); Q. metatarsals (left to right, left and right Mt I, II, IV, V, V 16888. 64–71; dorsal view); R. proximal phalanges (V 16888. 72–86; dorsal view); S. middle phalanges (V 16888. 87–96; dorsal view); T. distal phalanges (V 16888. 97–103; dorsal view); scale bar = 5 cm for the mandible, and 7.5 cm for all other elements

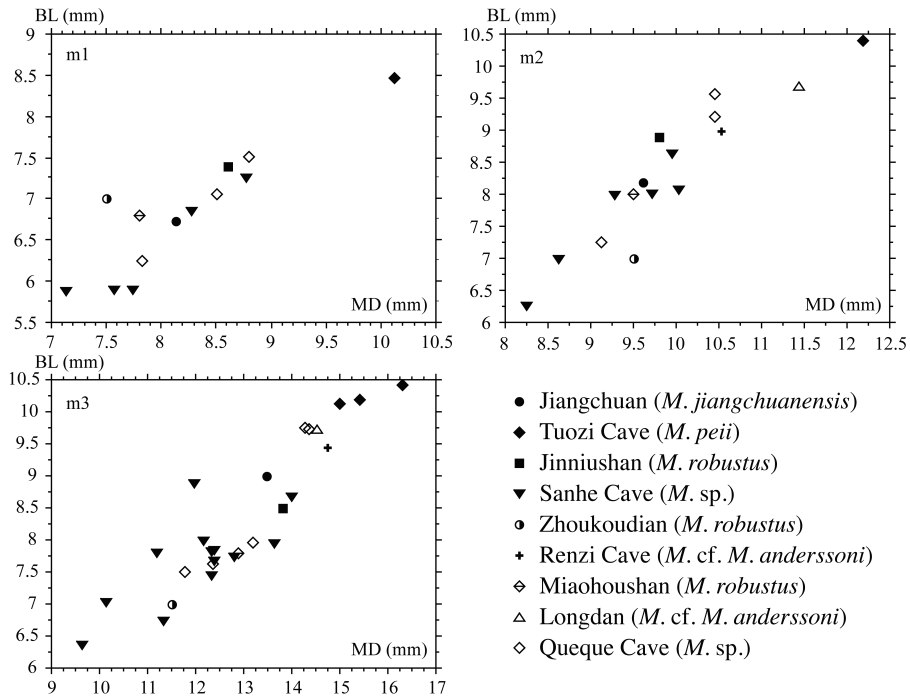


Fig. 2 Scatter diagrams showing the sizes of the lower molars of related fossil *Macaca* species  
BL. maximum bucco-lingual dimension; MD. maximum mesio-distal dimension

based on published data (Fang and Gu, 2007; Fang et al., 2002; Jablonski et al., 1994; Museum of Liaoning Province and Museum of Benxi City, 1986; Pan et al., 1992; Teilhard de Chardin and Pei, 1941; Young, 1934; Zhang et al., 1993) and our own measurements of the Queque Cave mandible and the cast of the type specimen of the Jiangchuan macaque (Fig. 2). The type specimen of *M. anderssoni* described by Schlosser (1924) is an incomplete skull from Henan Province, but Qiu et al. (2004) and Qiu and Zheng (2009) reported mandibular remains of *Macaca* cf. *M. anderssoni* from both Longdan, Dongxiang, Gansu Province and Renzidong, Fanchang, Anhui Province. Our measurements show that the Queque Cave mandible is similar in its dental dimensions to these specimens. Even though severely distorted, the Longdan female mandible of *Macaca* cf. *M. anderssoni* seemingly has a more posteriorly extensive superior transverse torus than the Queque Cave mandible, and lacks both a median mental foramen and mental ridges developed on the anterior surface of the symphysis. The Renzidong mandible of *Macaca* cf. *M. anderssoni* apparently has a more posteriorly inclined ramus. Judging by mandibular morphology, the Queque Cave mandible differs from *M. robustus* in lacking any swelling on the lateral sides of the corpora (compared with fig. 51:A, Young, 1934), in the shallowing of the corpus (compared with fig. 75, Teilhard de Chardin and Pei, 1941), and probably in having more posteriorly extensive transverse tori (compared with fig. 51:C, Young, 1934). In addition to greater mandibular height at the level of m2, *M. peii* also has much less posteriorly extensive transverse tori than the Queque Cave mandible (judged from the photo of the type specimen, fig. 2.1:a, Fang and Gu, 2007). Our observations of the cast of the type specimen of *M. jiangchuanensis* show that the backward shallowing of the mandibular corpus is not so distinct as in the Queque Cave mandible, and that the transverse tori are again less posteriorly extensive than in the Queque Cave mandible. There is a strong ridge developed near the

anterior border of the base of the ramus, which is not observed on the Queque Cave mandible. *M. youngi* is too poorly represented in the fossil record (only a left M1 or M2, Gu, 1980) for meaningful comparisons to be possible here.

Metrically, the Queque Cave macaque is most similar in dental size to *M. cf. M. anderssoni* from Longdan and Renzidong, and larger than other known fossil species discovered in China. However, there are obvious differences in mandibular morphology between the Queque Cave form and all other known fossil Chinese macaques, apart from the poorly represented *M. youngi*. Consequently, we tentatively regard the Queque Cave form as an unnamed species of the genus *Macaca*, taking into consideration the rarity of comparative fossil material and the uncertain phylogenetic relationships among known fossil macaque species in China.

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### References

- Fang Y S(房迎三), Gu Y M(顾玉珉), 2007. Primates. In: Nanjing Museum, Institute of Archaeology, Jiangsu Province eds. The Early Pleistocene Mammalian Fauna at Tuozi Cave, Nanjing, China. Beijing: Science Press. 20–24 (in Chinese with English summary)
- Fang Y S(房迎三), Gu Y M(顾玉珉), Jia W Y(贾维勇), 2002. A new species of fossil monkey from Tangshan, Nanjing. Longgupo Prehist Cult(龙骨坡史前文化志), **4**: 11–15 (in Chinese with English abstract)
- Gu Y M(顾玉珉), 1980. A Pliocene macaque's tooth from Hubei. Vert PalAsiat(古脊椎动物学报), **18**(4): 324–326 (in Chinese with English abstract)
- Jablonski N G, Pan Y R, Zhang X Y, 1994. New fossil cercopithecoid remains from Yunnan Province, People's Republic of China. In: Thierry B, Anderson J R, Roeder J J et al. eds. Current Primatology Volume I. Ecology & Evolution. Strasbourg: Universite Louis Pasteur. 303–311
- Jin C Z, Pan W S, Zhang Y Q et al., 2009a. The *Homo sapiens* Cave hominin site of Mulan Mountain, Jiangzhou District, Chongzuo, Guangxi with emphasis on its age. Chinese Sci Bull, **54**: 3848–3856
- Jin C Z, Qin D G, Pan W S et al., 2009b. A newly discovered *Gigantopithecus* fauna from Sanhe Cave, Chongzuo, Guangxi, South China. Chinese Sci Bull, **54**: 788–797
- Museum of Liaoning Province(辽宁省博物馆), Museum of Benxi City(本溪市博物馆), 1986. Miaohoushan — a site of Early Paleolithic in Benxi County, Liaoning. Beijing: Wenwu Press. 1–102 (in Chinese with English summary)
- Pan Y R(潘悦容), Peng Y Z(彭燕章), Zhang X Y(张兴永) et al., 1992. Cercopithecoid fossils discovered in Yunnan and its stratigraphical significance. Acta Anthropol Sin(人类学学报), **11**(4): 303–311 (in Chinese with English summary)
- Qiu Z X(邱占祥), Deng T(邓涛), Wang B Y(王伴月), 2004. Early Pleistocene mammalian fauna from Longdan, Dongxiang, Gansu, China. Palaeont Sin(中国古生物志), New Ser C, **27**: 1–198 (in Chinese with English summary)
- Qiu Z X(邱占祥), Zheng L T(郑龙亭), 2009. Primates. In: Jin C Z, Liu J Y eds. Paleolithic Site — the Renzidong Cave, Fanchang, Anhui Province. Beijing: Science Press. 156–162 (in Chinese with English summary)
- Schlosser M, 1924. Fossil Primates from China. Palaeont Sin, Ser C, **1**: 1–17
- Teilhard de Chardin P, Pei W C, 1941. The fossil mammals from Locality 13 of Choukoutien. Palaeont Sin, New Ser C, **11**: 1–103
- Young C C, 1934. On the Insectivora, Chiroptera, Rodentia and Primates other than *Sinanthropus* from Locality 1 at Choukoutien. Palaeont Sin, Ser C, **8**: 1–161
- Zhang S S(张森水) et al., 1993. Comprehensive study on the Jinniushan Paleolithic site. Mem Inst Vert Paleont Paleoanth, Acad Sin, **19**: 1–163 (in Chinese with English summary)