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## THE PORCUPINE *HYSTRIX BRACHYURA* LINNAEUS, 1758 IN THE CAVE DEPOSITS OF LONGGUPO, CHINA

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### ABSTRACT

One mandibular fragment and 10 isolated cheek teeth of a moderately sized porcupine from the well-known site Longgupo in China are described. These are the first fossil finds in China, which may be allocated to *Hystrix brachyura*. They have a late Pliocene to earliest Pleistocene age, representing the oldest fossil high-crowned porcupine species in China.

Key words: *Hystrix brachyura*, Longgupo, China, Late Pliocene, Early Nihewanian

### INTRODUCTION

In many publications and on labels in museum collections, fossil porcupine remains from China are mainly allocated to the presently in China occurring species. This species was described by Swinhoe (1870) from Foochow, Fokien, China, with the name *Hystrix subcristata*. It is now considered as a subspecies of *Hystrix brachyura* Linnaeus, 1758. This species is presently occurring from the Malay Peninsula (type locality Malacca) to Southern China, and from Sumatra and Borneo to East India (Van Weers, 1979). However, in contradiction to this common allocation, up to now most of the finds of fossil porcupine teeth from China show a size range, which does not fit in *H. brachyura*. Some of the fossil remains are smaller than *H. brachyura* and have to be allocated to *H. lagrelli* Lönnberg, 1924. The length of the

P4-M3 series of the type of the latter species is 22.1 mm against 26.6-31.3 mm (n = 9) in Chinese specimens of *H. brachyura subcristata*. Others are considerably larger. The type specimens of *H. kiangsenensis* Wang, 1931 show measurements of 29 mm and 36 mm of that tooth series, and in a specimen of *H. magna* Pei, 1987 that length is 39 mm (Van Weers & Zheng, 1998).

The porcupine material from Longgupo Cave (Fig. 1) in Sichuan Province, China, is another case. The site of the Longgupo Cave in the Damiao basin, Wushan County was excavated in 1985-1988 by the Institute of Vertebrate Paleontology and Paleoanthropology (Beijing) and the Chongqing National Museum (Sichuan Province). This site owes its reputation from the presence of among others *Homo*, stone artefacts and the coexistence of *Gigantopithecus*. A large, low-crowned porcupine tooth from that locality

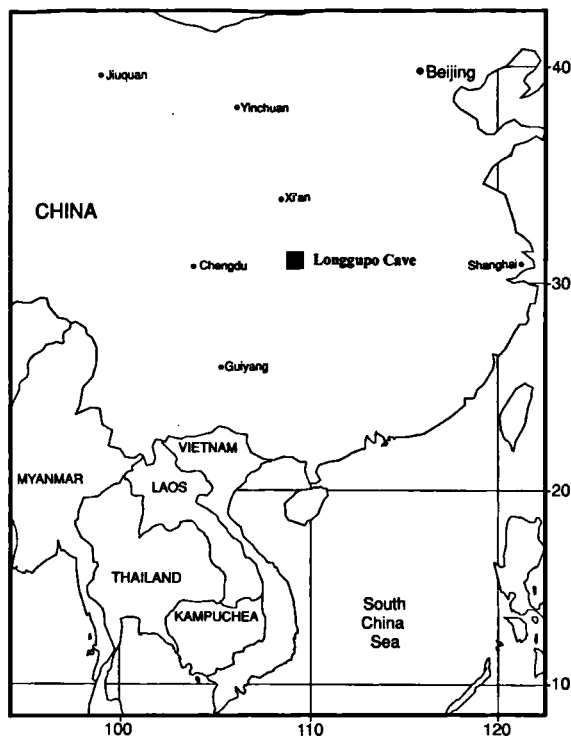


Fig. 1. Map showing the position of the Longgupo Cave in China.

was named *Hystrix magna* Pei, 1987 by Zheng (1993) and described as *H. zhengi* by Van Weers & Zhang (1999). Beside this specimen Zheng (1993) mentioned clearly smaller, high-crowned finds of '*H. subcristata*' from Longgupo. Tong et al. (1995) already mentioned the first occurrence of '*H. subcristata*' in the Dachai phase of the Early Nihewanian but they gave no measurements. The morphology and taxonomic allocation of Zheng's specimens are discussed here.

## MATERIALS AND METHODS

The material discussed here is housed in the collection of the Institute of Vertebrate Paleontology and Paleoanthropology, Beijing (IVPP). It consists of 10 isolated cheek teeth (Fig. 2) and a mandibular fragment with m1 and m2. A deciduous premolar (V9668.18, Figs. 2, 9A, B) is left out of the comparison. The tooth (V9668.143, Figs. 2, 3A, B) is probably an M1/2, but because of the doubt about its serial position its measurements are not included in Table 1.

For the definition of the wear classes, attributed to the occlusal patterns in the different stages of

wear of the cheek teeth, is referred to Van Weers (1990, 2002). Van Weers & Rook (2003) discussed the inadequate use of subjective terms like 'brachyodont', 'moderately hypsodont' and 'highly hypsodont' in the description of the tooth height and proposed to express the enamel height of cheek teeth as a percentage of the tooth length. Here tooth heights under 100% are considered low-crowned, above 150% are called high-crowned, and for intermediate values subjective terms are avoided.

## COMPARISON OF THE MATERIAL

The size and the relative enamel height of the moderately sized teeth from Longgupo are presented (Table 1). The length of nearly all teeth falls within the range of *H. brachyura* (Table 2). The only deviation is formed by the single available P4 (length 8.8 mm), which is a bit larger than the longest one in the range (5.3 - 8.5 mm) of the relatively large sample ( $n = 32$ ) of *H. brachyura*. This difference, although notable, is not enough for taxonomic distinction.

The five M1/2 (Figs. 2, 1A-5A) have relative heights of 141% to 228% (wear classes G1 to A1), the P4 shows 181%, and the m3 (Fig. 2, 10A) has a height of 148%. The isolated M3 (Fig. 2, 8A) from Longgupo with a relative height of 99% displays a lower value in comparison with the remaining teeth, but it has to be taken in account that this tooth is a nearly totally worn one with wear class H1. In comparison to that, the holotype P4 of *H. zhengi* from fissure zone 6 of Longgupo is clearly larger and has, moreover, a lower enamel height (for data see Van Weers & Zhang, 1999). The relative heights of the hypodigm of this species, consisting of four P4, vary from 90 to 100%. With the different wear classes taken into account it is concluded that the small sized Longgupo specimens do not differ from *H. brachyura* in relative enamel height (Table 3).

## DISCUSSION

The moderately sized, high-crowned specimens from Longgupo are clearly smaller than *H. kiangsenensis* and *H. magna*, (for comparison see data in Van Weers & Zheng, 1998) and have

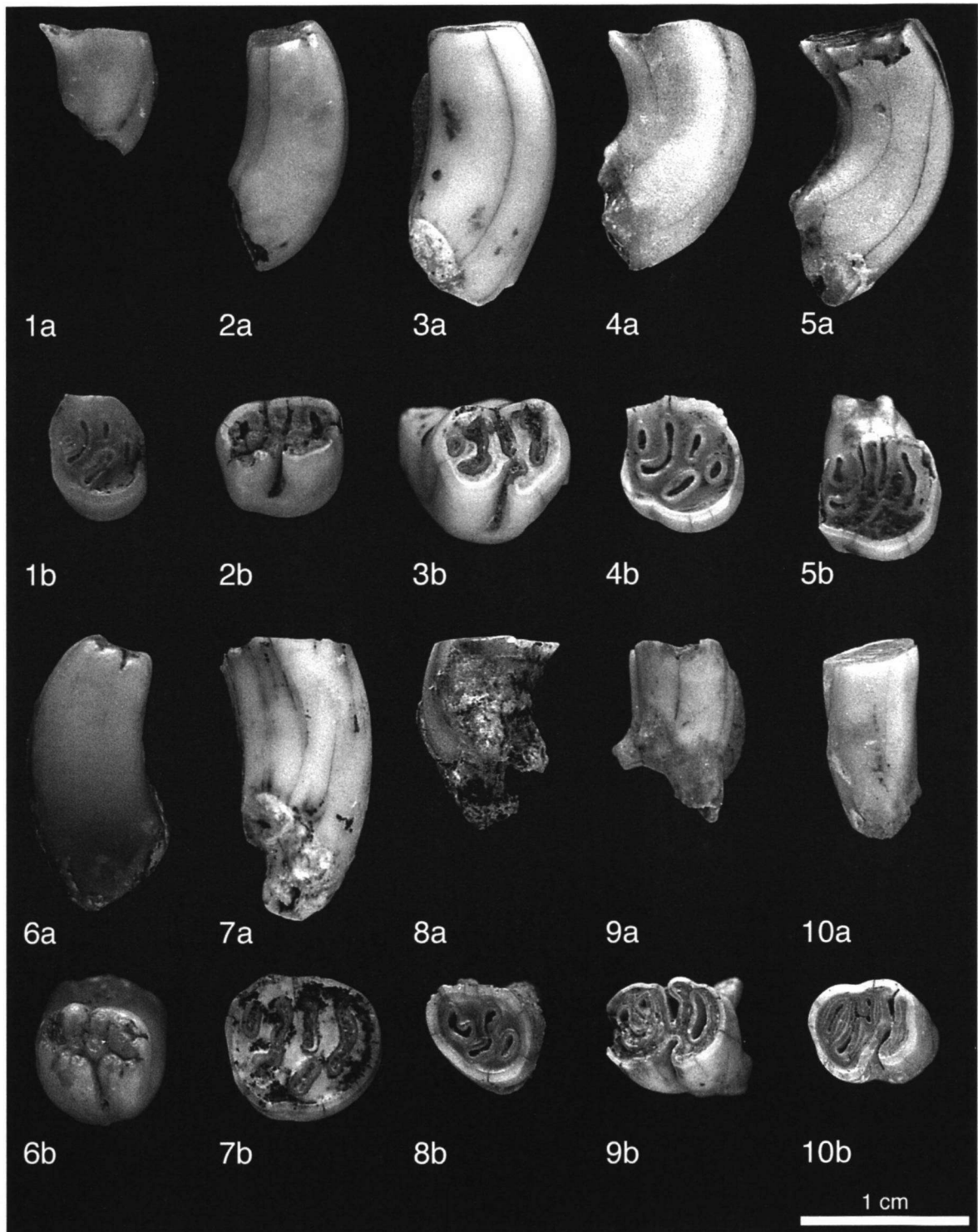


Fig. 2. 1A-5A, posterior, 1B-5B, occlusal views of right M1/2 (respectively nrs.V9668.180, -144, -143-, -67, -141). 6A, posterior, 6B, occlusal view of left M1/2 (V9668.142). 7A, posterior, 7B, occlusal view of right P4 (V9668.41). 8A, posterior, 8B, occlusal view of right M3 (1056.1). 9A, posterior, 9B, occlusal view of right DP4 (V9668.18). 10A, lingual, 10B, occlusal view of left m3 (V9668.346).

Table 1. Cheek teeth from Longgupo with indication of the particular part of the site (locus). Width, length and enamel height (E. Ht) are in mm. Wear class and relative enamel height (enamel height/length in %) after Van Weers (1990, 2002) and Van Weers & Rook (2003).

	Coll. no.	Locus	Width	Length	E. Ht.	Wear cl.	E.Ht/L
M1/2	V9668.180	C	6.3	5.4	7.6	G1	141
	V9668.144	C	6.4	7.2	15.4	B1	214
	V9668.67	E	7.4	6.7	14.0	G1	209
	V9668.141	E	6.9	7.2	16.4	E	228
	V9668.142	B	7.2	8.0	15.8	A1	198
	Mean		6.8	6.9	13.8		198
	Range		6.3-7.4	5.4-8.0	7.6-16.4		141-228
	n		5	5	5		5
P4	V9668.41	C	7.9	8.8	15.9	G1	181
M3	CV1056.1	5	5.7	6.7	6.6	H1	99
m1 + m2	V9668.4	E	7.1-7.2	6.3-7.4	-	T1-T3	-
m3	V9668.346	5	5.5	6.6	9.8	R	148

Table 2. Length measurements of some of the teeth of *Hystrix brachyura* from its total area of distribution.

	M1/2	P4	M3	m1/2	m3
Mean	6.6	7.4	6.2	7.1	6.7
Range	4.7-8.0	5.3-8.5	5.2-7.3	4.6-8.9	5.5-8.1
n	91	32	35	87	31

Table 3. Comparison of the relative enamel height of the teeth from Longgupo with those of *H. brachyura* in % (class of wear in brackets).

	M1/2	P4	M3	m3
Longgupo				
Mean	198			
Range	141-228	181	99	148
	(G1-E)	(G1)	(H1)	(R)
n	5	1	1	1
<i>H. brachyura</i>				
Mean	195	214		156
Range	105-247	190-239	182-202	123-186
	(G7-C5)	(G4-B1)	(C-?)	(S3-Q5)
n	34	3	2	16

moreover higher cheek teeth than *H. zhengi*. Size and hypsodonty degree of the middle-sized porcupine sample from Longgupo fully fit with the morphological traits observable in the extant species. At the present status of our knowledge this sample represents the oldest occurrence of *H. brachyura* in the fossil record. The subspecific dis-

tingtion of *Hystrix brachyura subcristata* is mainly based on skull and external characters and therefore cannot be discussed for these finds.

The detailed age of the *H. brachyura* bearing levels of Longgupo is not finally decided. The site was described by Zheng (1993) who recognises three fossil zones (the fluvio-lacustrine zone, the

fissure zone and the secondary fissure zone) with together 12 loci, indicated with A to E and 1 to 7 in his figure 7. The porcupine specimens from the localities C, E and 5 (Table 1) are from the fissure zone. Zheng (1993) referred their age to the Villanyian (MN 17, late Pliocene) basing among others on the presence of *Clethrionomys sebaldi* Heller, 1963. This mammal age correlates with the Dachaian of the Chinese small mammal subdivision (Zheng & Han, 1991; Tong et al., 1995). The specimens from locality B originate from the secondary fissure zone, which is considered to have a younger age.

In a later description of the site, Huang et al. (1995) suggested a late Pliocene age of the fauna from the 'middle zone, levels 2-12', based on the presence of *Sinomastodon*, *Nestoritherium*, *Equus yunnanensis*, *Ailuropoda microta*, a Cricetinae species and *Mimomys peii* Zheng & Li, 1986. Basing on the presence of the latter species, a stratigraphic marker, the fauna is again correlated with the Villanyian (Dachaian in the Chinese terminology) (Huang et al., 1995). Magneto-stratigraphic research in combination with biostratigraphy reveals an age of 1.96 to 1.78 Myr for the hominid bearing levels 7-8.

Unfortunately it is impossible to compare the 20 excavation levels of Huang et al. (1995) with the three zones of Zheng (1993). Since the secondary fissure zone (Locality B) is supposed to be younger than the Villanyian excavation points, the age range of the entire *H. brachyura* material from Longuppo must be considered as late Pliocene to early Pleistocene. It is thus far the oldest known porcupine species with high-crowned cheek teeth from China.

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