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简报

中国早更新世羚牛化石记述[1)]

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摘要:报道了发现于地处秦岭腹地的陕西镇安黄家湾早更新世地层中的1对羚牛角化石。标本与现生羚牛的角心很相似。角心粗壮,以110°的角向后向外侧弯曲。角心顶端背腹扁平,角尖略向上弯。秦岭可能是羚牛的起源中心。

关键词:中国,早更新世,羚牛

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EARLY PLEISTOCENE TAKIN FOSSIL FROM CHINA

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Key words China, Early Pleistocene, takin

1 Introduction

In 2001, a pair of almost complete horn-cores of the famous bovid takin was collected from a fluvial deposit in Huangjiawan, Zhen'an, Shaanxi, China (Li and Deng, 2003a, b; Li and Xue, 2004). This specimen represents the oldest known fossil record of takin *Budorcas taxicolor* (Artiodactyla, Mammalia).

The takin and muskox (*Ovibos moschatus*) were first ranked together in the subfamily Ovibovinae (Gill, 1872; Simpson, 1945) then the subfamily Caprinae, and Ovibovinae was now considered as a tribe in Caprinae (McKenna and Bell, 1997; Neas and Hoffmann, 1987).

Takins are interesting animal that shares characters of both sheep and ox. *B. taxicolor*, including a subfossil subspecies and four living subspecies, is the only extant species in the genus *Budorcas*. Both sexes of *B. taxicolor* have black, lunula-shaped horns that arise from the summit of a raised frontal crest between orbits and occipital plane. The horns start with a strong base and arise almost vertically, turn outwards and forwards horizontally, then horizontally backwards and slightly upwards at the tips. The contour of the cross-section at the bases of the horn-cores is trigonoovoid-like. The horns are longitudinally striated and irregularly ringed transversely near the base.

Hodgson (1850) collected takin specimens in the Mishmi Hills of Assam, India, on which he created the genus *Budorcas*, and a new species *B. taxicolor*. Up to now, there are four extant

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subspecies, *B. t. taxicolor*, *B. t. tibetana*, *B. t. whitei*, and *B. t. bedfordi*. Teilhard and Trassaert (1938) described a fossil takin ? *Budorcas* sp. from the late Pliocene of Yushe, Shanxi Province, and Young (1948) gave it the name *Budorcas teilhardi*. This fossil species was probably also recovered in Pliocene beds of Nihewan, Hebei Province (Teilhard and Piveteau, 1930). *B. teilhardi* differs from *B. taxicolor* mainly by more rounded horn-cores (Young, 1948). Gentry (1996) described a Late Pliocene takin *Budorcas churcheri* from Ethiopia. *B. churcheri* differs from *B. taxicolor* mainly by having more massive and more compressed horn-cores situated on more raised frontals. Young (1948) described *Budorcas taxicolor lichii* on the basis of Holocene deposits (about 3 000 year old) at the famous archaeological site of Anyang (Henan Province, P. R. China). So far, *Budorcas* contains three species, they are *B. churcheri*, *B. teilhardi*, and *B. taxicolor*, and the last species contains five subspecies.

2 Materials

A pair of almost complete horn-cores (No. SNU047) that belong to one adult individual, slightly damaged at the base and the tips, deeply fossilized. The specimen is preserved at Shaanxi Normal University, P. R. China.

3 Description

Both horn-cores are slightly damaged at the base. A little piece of frontal bone is connected to the base of the left horn core, and the right horn-core also bears a small piece of frontal bone at the base. The frontal bone is 5.0 mm thick. Frontal sinus is well-developed in the frontal bone and inside the bases of the horn-cores. The horn-cores start with a strong base and are directed laterally and very slightly anteriorly up to about 60.0 mm from the lateral bases of the horn-cores. They then bend sharply posteriorly and laterally at an angle of about 110 degrees (Table 1; Fig. 1). Consequently the tips of the horn-cores do not have the tendency to be directed medially. The bent part is relatively short. There is a prominent ridge starting from the anterior bases of the horn-cores, running anteriorly and laterally, and then ending near the tip. There is also a remarkable ridge running along the posterior and medial edge from the bases to the tips. The tips of the horn-cores bend slightly upwards. The cross section of the horn-cores

Table 1　Measurements of the horn core of the present specimen and other species/subspecies in genus *Budorcas*　(mm)

	Budorcas teilhardi [1)]	*B. taxicolor lichii* [1)]	*B. taxicolor bedfordi* [2)]	The present specimen[3)]
Maximum breadth of the horn core at the base (dorsal-anterior to ventral-posterior)	73.0	88.0	55.0, 76.6	57.0
Maximum breadth of the horn core at the base (anterior-internal to posterior-external)	53.0	59.0	32.5, 48.3	35.6
Circumference of the horn core at the base		240.0	145.0, 210.0	147.0
Anterior-posterior breadth at the middle		53.5	35.5, 51.0	46.8
Dorsal-ventral breadth at the middle			26.2, 30.0	24.0
Length along the anterior border of the horn core	345.0	300.0	223.0, 423.0	150.0[4)]
Degrees at which the horn core turns backwards	90°	105°	89°, 95°	110°
Thickness of the frontal bone		4.0	2.8, 3.0	5.0

1) Data from Young (1948);

2) Two adult individuals: the left column, female (Shaanxi Institute of Zoology specimen number 730005); the right column, male (730010);

3) Measurements from the left horn-core (SNU047);

4) Measurement is less than the actual value due to the broken tip of the horn-core.

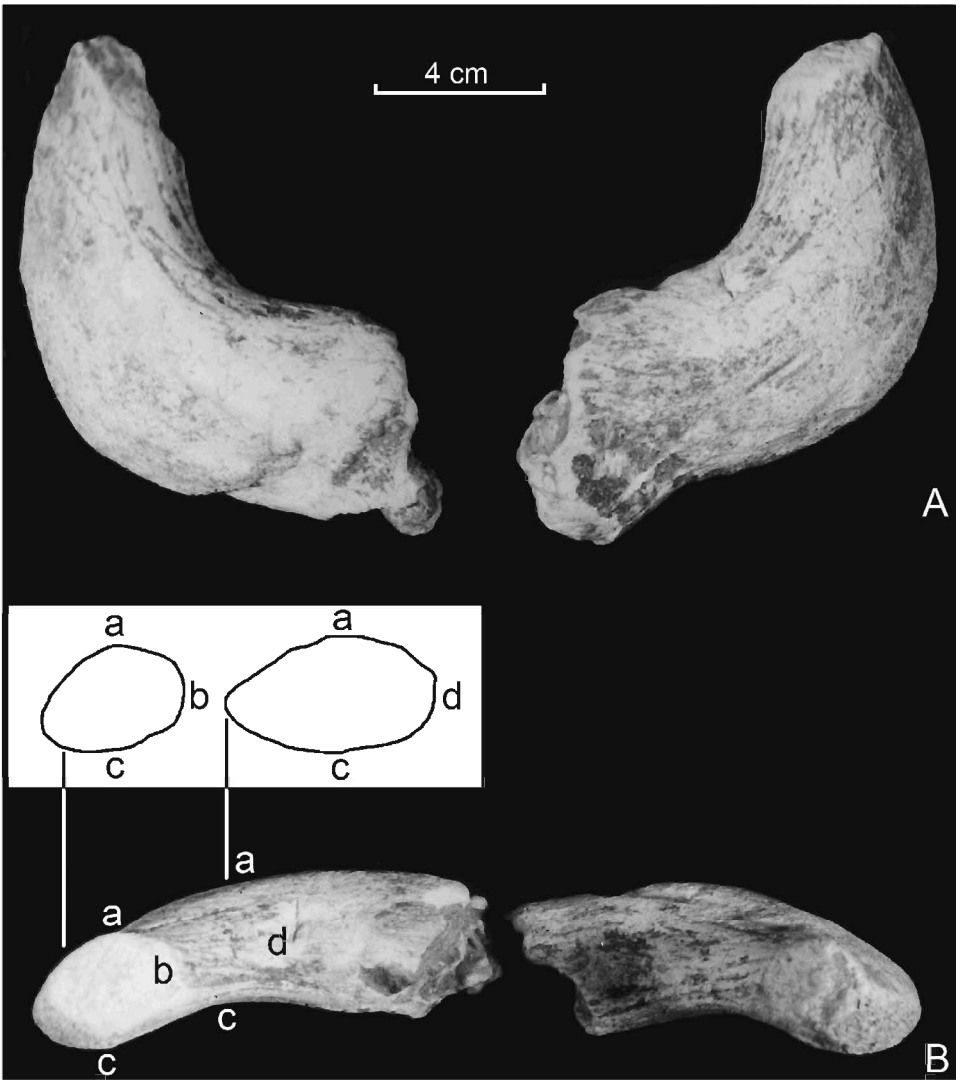

Fig. 1 Horn cores of the specimen SNU047
A. dorsal view; B. posterior view; the inset showing the cross sections of the horn core at different positions

forms an elongated oval in the basal part with the long diameter oriented dorsal-anteriorly to ventral-posteriorly, but the horn-cores have a twist and the orientation changes very quickly from dorsal-anterior to ventral-posterior; the cross section at the middle part of the horn-cores is also oval, but very dorsoventrally compressed; the cross section near the tips is approximately oval, and it doesn't become triangular as it does in *B. t. lichii* and the extant *B. taxicolor*. The dorsal surface of the whole horn-core is convex, while the ventral surface is relatively flat. The ventral surface and the posterior edge near the bases of the horn-cores are marked by many thin grooves, while the anterior and lateral edges of the horn-cores are densely dotted with small holes (Fig. 1).

4 Remarks

From the general structure of the horn cores, especially their sharp angle, it can be said with no doubt that the present specimen belongs to *Budorcas taxicolor*. The present specimen and the extant *B. taxicolor* bear the following common characters: the horn-cores start with a strong base and arise almost vertically, turn outwards and forwards horizontally, then horizontally backwards and slightly upwards; the bases of the horn-cores are trigonoovoid in cross-section, the middle part of the horn-cores are dorsoventrally compressed. The dimension of the present specimen falls within the range of individual variations in *B. taxicolor* (Table 1). The present specimen differs from *B. t. bedfordi* in having an oval outline of the cross section of the horn-core near the tip, and in having a larger angle between the proximal part and the bent part of the horn-core. In comparison with the subfossil subspecies *B. t. lichii*, the present specimen displays a number of obvious differences. The horn-cores of the present specimen turn backward in a more obtuse angle, which is larger than 105 degrees. Especially, the cross section near the tips is approximately oval in outline. Obviously, it is not felicitous to consider the present specimen as a new subspecies due to lacking the pelage based on which the four extant subspecies were classified.

The present specimen resembles Pliocene *B. teilhardi* in its smooth outline near the tip of the horn-core, resembles the young individuals of the living takin in both of its oval outline near the tip of the horn-core and the obtuse angle between the proximal part and the bent part of the horn-core. According to my observation and measurement, the horn-cores in young individuals of the living takins are straight and oval. As the individuals get older, the horn-cores turn backward gradually and end at an angle of about 90 degrees, and the outline of the cross section becomes triangular. Therefore, the present specimen may represent a more primitive or more generalized type.

As mentioned above, *B. taxicolor* contains four living subspecies and one fossil subspecies. *B. t. whitei* distributes the eastern part of the Brahmaputra; *B. t. taxicolor* occupies Hengduan Mountains; *B. t. bedfordi* inhabits the eastern part of Qinling Mountains; the distribution area of *B. t. tibetana* includes the western part of Qinling Mountains, Minshan Mountains, Qionglai Mountains, Daxue Mountains, and the southern part of Shaluli Mountains (Neas and Hoffmann, 1987; Wu, 1989, 1990). The discovery of Zhen'an takin indicated that Qinling Mountains is probably the center for the origination and evolution of *B. taxicolor*. Qinling Mountains is the northern limit of the distribution of *B. taxicolor*. Though there is a possibility that the genus *Budorcas* could have originated over quite a wide area of the Old World, the presence of Zhen'an takin indicates that the present takin *B. taxicolor* probably evolved in central China.

It is generally considered that the absolute age of Gongwangling fauna is over 1 Ma. If the conclusion that the age of Huangjiawan fauna is equal to that of Gongwangling fauna is correct (Li and Xue, 2004), *B. taxicolor* has existed for at least over 1 Ma. The general structure of the horn cores of the Zhen'an takin indicated that *B. taxicolor* has undergone a quite long history with few changes in the structure of the horn core, implying that it evolves very slowly over the past 1 Ma. The habitat of the living takin is restricted to the high, cold mountainous area. Qinling Mountains have risen to a quite high altitude in the early Early-Pleistocene (Ji, 1980), therefore, *B. taxicolor* originated in a mountainous habitat, and have evolved since then in the same habitat till now.

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