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陕西府谷发现的晚中新世维氏大唇犀(奇蹄目,犀科)新材料[1)]

邓 涛

(中国科学院古脊椎动物与古人类研究所 北京 100044)

摘要 新材料有丰富的头骨和下颌骨标本,因而对维氏大唇犀有了更加深入的了解。观察结果显示维氏大唇犀在大唇犀属中的地位相当特别,它具有极窄的顶嵴间平面、马鞍形的头骨顶面、发育的眶上结节和较高的枕面,这些特征显示出它是所有已知大唇犀中最原始的一个种。

关键词 陕西府谷,晚中新世,犀科,大唇犀

中图法分类号 Q915.877

陕西省府谷县老高川产丰富的晚中新世三趾马动物群(Xue et al., 1995),犀科化石是最重要的组成部分,邓涛(2000)已记述了其中的一个新种 *Acerorhinus fuguensis*。而动物群中数量最多的是另一种犀牛,即维氏大唇犀(*Ch. wimani*)。本文描述的化石产于剖面的下、中段地层,时代为晚中新世晚期。维氏大唇犀是 Ringstrom(1924)所定的一个种,材料也来自府谷,Ringstrom 当时就指出这个种与大唇犀属的其他种相比很独特,是一个相当原始的种。但由于他的标本较少,也很破碎,所以他的描述过于简单,图版也缺乏代表性,以致造成 Heissig(1975)将这个种并入哈氏大唇犀(*Ch. habereri*)中。此次府谷发现的一大批维氏大唇犀新材料证实了这个种的独特性状和原始地位,它与哈氏大唇犀并不相同。

Family Rhinocerotidae Owen, 1845
Subfamily Aceratheriinae Dollo, 1885
Tribe Chilotheriini Qiu, Xie et Yan, 1987
Genus *Chilotherium* Ringstrom, 1924
***Chilotherium wimani* Ringstrom, 1924**

(图版 I～II; 表 1～4)

选型 无编号, Ringstrom(1924)未指定正型标本,本文提议以其图版 7 图 1 的老年头骨为选型。选型采集于府谷五兰沟背后沟(Lok. 51),现保存于瑞典乌普萨拉大学古生物博物馆。

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本文记述标本 V 12500，成年头骨，吻部和鼻骨断失，顶面和枕面左侧残破；V 12501，成年头骨，鼻骨前半部断失；V 12502，老年头骨，吻部断失；V 12503，老年头骨，鼻骨和吻部断失；V 12504，成年头骨，吻部、左颧弓后部和枕面上部破损；V 12505，成年下颌骨，完整；V 12506，老年下颌骨，完整；V 12507，成年下颌骨，右侧自 m2 后断失；V 12508，成年下颌骨，左门齿、左上升枝上部和右上升枝断失；V 12509，成年下颌骨，左上升枝和右上升枝上部断失。全部标本采自府谷老高川，保存于中国科学院古脊椎动物与古人类研究所。

地质时代 晚中新世保德晚期。

地理分布 陕西府谷和甘肃临夏。

修订种征 体型中等。枕面梯形，枕嵴中沟宽阔。眼眶大，位置较低，眶上结节发育，额骨和颧骨的眶后突都微弱，眶下孔不规则。头骨顶面呈窄长的菱形，马鞍状凹陷强烈，顶嵴在头骨后部接近，脑颅外壁陡峻。鼻骨宽阔，鼻切迹深。关节后突粗壮，鼓后突与关节后突愈合。下颌联合部强烈横向扩展，背面和腹面都凹陷。i2 巨大，内刃上翻。颏孔位于 p3 水平。上颊齿的前附尖褶和前尖肋发育，前臼齿原尖和次尖收缩微弱，但臼齿的原尖和次尖收缩强烈。

对比与讨论 Ringstrom(1924)描述的维氏大唇犀材料中包括 6 个头骨，其中 3 个与下颌骨相连，1 个为带乳齿的幼年头骨，还有一个下颌骨和几枚孤立的颊齿。应该说他的材料并不算少，然而标本的保存情况却很差，只有 1 件与下颌骨相连的头骨相当完整，但又在修理中破损。他的描述也过于简单，图版较少，惟一的一张头骨的照片还是一件相当老年标本的腹面，测量数据由于标本的挤压变形和破碎也不准确。根据他的描述，维氏大唇犀的主要特征与其他大唇犀一致，这些特征包括额部的形态、无齿的前颌骨和强烈横向扩展的下颌联合部等。区别于其他大唇犀的特征是宽阔的头骨和牙齿、高度大于宽度的枕面、粗壮的颧弓、短的鼻切迹—眼眶距离、强壮的关节后突、锥形的副枕突、厚重粗笨的头骨、长的下颌联合部、直而中部弯曲的下颌骨下缘，以及强烈发散的 i2。DP1 存在，双根，强壮，原尖弱小甚至孤立。上颊齿的内齿带发育，但臼齿的内齿带在厚度和长度上变化较大，通常在中谷口发育齿柱。前刺细长，与小刺相连形成圆形的中凹，有时向前伸达并连接外脊。臼齿的原尖收缩稍弱，小刺弱。反前刺长，向下更发达，伸达中谷口的部分宽大。M3 的跟座相当高。i2 非常强大，齿冠的横切面三角形，齿根圆形，基部强烈弯曲，向外侧呈 45°倾斜。i1 和 dp1 缺失。

Ringstrom(1924)已经认识到维氏大唇犀无疑是一个相当特别的种，它的多数特征显现出原始性。然而，尽管是少数，它的一些特征却反映出典型大唇犀的高度特化性，如强烈侧向扩展的下颌联合部、巨大的 i2，以及 i1 和 dp1 的恒定退化。而它的原始性状包括：非常发育的内齿带，并在中谷口形成齿柱；缺乏白垩质；原尖收缩弱或不收缩；P2 和 P3 中谷封闭。

维氏大唇犀头骨的一些原始特性与 *Acerorhinus* 属非常相似，它们的共同特征包括枕面高度大于宽度，两侧上角圆润；副枕突相对纤细，关节后突粗壮；枕嵴间距离狭窄，头骨顶面呈显著的马鞍形凹陷，枕部高耸；眶后突微弱，眶上结节发育，此处为头骨顶面最宽处，眶上缘厚实；鼻骨宽大强壮，横切面弯曲，两侧缘下垂；颊齿齿冠相对较低，上颊齿外壁不平，前附尖褶和前尖肋发育，反前刺小，前刺弱，P2 相对较大。

当然,维氏大唇犀的许多特征,尤其是下颌骨的特征与大唇犀属的属征完全一致,如厚实的鼓后突、位于鼓后突之后的副枕突、低的顶嵴、具突出后上角的狭窄颧弓、头骨顶面在眼眶前的逐渐收缩、强烈横向扩展的下颌联合部、发育的颊齿次级结构、相当小的 P2,以及上翻的 i2 内刃等。

最近在甘肃临夏盆地发现的大量晚中新世维氏大唇犀化石具有与府谷材料相同的特征。计宏祥等(1980)描述的产自西藏吉隆盆地晚中新世的西藏大唇犀(*Ch. xizangensis*)与维氏大唇犀很相似。西藏大唇犀的正型标本 V 5197具有相距很近的顶嵴、马鞍形的头骨顶面、突出的眶前缘和厚实的眶上缘、微弱的眶后突、深的鼻切迹、下垂的鼻骨侧缘、较低的齿冠、显著的前附尖褶和发育的颊齿次级构造、强烈扩展的下颌联合部、相对较大的 p2 等。上述这些特征与维氏大唇犀完全一致而不同于大唇犀属的其他种。另一方面,这个种也有一些特征可以区别于维氏大唇犀,如较小的尺寸、平坦的鼻骨顶面、更发育的前刺和反前刺,以及 M1 宽阔的齿桥等。汤英俊等(1974)、童永生等(1975)、邱铸鼎(1979)、郑绍华(1982)和邱占祥等(1982)也记述了中国一些新的大唇犀化石,但它们都与维氏大唇犀差别较大。

Heissig(1975)在一篇讨论土耳其阿纳托里亚犀科化石的短文中将维氏大唇犀并入哈氏大唇犀(*Ch. habereri*),这主要是 Ringstrom(1924)的描述过于简单和图版缺乏代表性造成的。事实上这两个种相差甚远,尤其是头骨特征,哈氏大唇犀平坦的头骨顶面、宽阔的顶嵴间距离、薄的眼眶上缘、方形的枕面、细弱的鼻骨、高的颊齿齿冠和平的颊齿外壁都比维氏大唇犀进步。根据府谷新发现的这一大批材料,维氏大唇犀应该是一个有效的种。

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NEW MATERIALS OF *CHILOTHERIUM WIMANI* (PERRISODACTYLA, RHINOCEROTIDAE) FROM THE LATE MIOCENE OF FUGU, SHAANXI

DENG Tao

(*Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences* Beijing 100044)

Abstract　The new materials in the present paper have abundant skull and mandible specimens, and they improve a deeper recognition to *Ch. wimani* for us. These new specimens show that *Ch. wimani* has a relatively particular position in the genus *Chilotherium*. It has very little separated parietal crests, a strongly concave cranial dorsal profile, well-developed supraorbital tubercles, and a high occipital surface, which indicate that *Ch. wimani* is the most primitive one in the known species of the genus *Chilotherium*.

Key words　Fugu, Shaanxi, Late Miocene, Rhinocerotidae, chilothere

Some new materials of *Chilotherium wimani* are discovered from the Late

Miocene locality of Laogaochuan in Fugu County, Shaanxi Province of northwestern China. This species has narrow parietal crests, large supraorbital tubercles, wide mandibular symphysis and huge second lower incisors. It has a close relationship with *Acerorhinus*. Laogaochuan is situated about 60 km to the northwest of Fugu county seat. These new materials are collected from the late Late Miocene strata in the lower and middle parts of the Laogaochuan section. The rhinocerotid fossils from Laogaochuan can be divided into two groups, one of which was described as a new species, *Acerorhinus fuguensis* (Deng, 2000), whose materials are rare. The other dominant rhinoceros in this locality is *Ch. wimani*.

1 Systematics

Family Rhinocerotidae Owen, 1845
Subfamily Aceratheriinae Dollo, 1885
Tribe Chilotheriini Qiu, Xie et Yan, 1987
Genus *Chilotherium* Ringstrom, 1924
***Chilotherium wimani* Ringstrom, 1924**
(pls. I～II, Tables 1～4)

Lectotype The old skull on Fig.1, Pl. VII of Ringstrom (1924).

Described specimens V 12500～12504, five skulls; V 12505～12509, five mandibles. All of them are collected from Laogaochuan, Fugu.

Age Late Baodean (late Late Miocene).

Distribution Fugu, Shaanxi and Linxia, Gansu in northwestern China.

Revised diagnosis Median sized. Trapezoid occipital surface. Occipital crest with wide middle groove. Large orbits in comparatively low positions, strong supraorbital tubercles, weak postorbital processes on frontal and zygomatic bones, and irregular infraorbital foramina. Narrow and long rhombic cranial dorsal surface, strongly concave cranial dorsal profile, very little separated parietal crests, and steep outer walls of the braincase. Wide nasals, and deep nasal notch. Relatively steep zygomatic arches. Robust postglenoid processes, and thick posttympanic processes fused with them. Particularly wide mandibular symphysis with concave dorsal and ventral surface, huge i2 with an upturned medial flange, and mental foramina located under p3. Well-developed parastyle folds and paracone ribs, and weakly constricted protocones and hypocones on premolars but strong constriction on molars.

2 Description

Skull The occipital surface is a high trapezoid. The foramen magnum is bell-shaped, and its top point is much higher than the upper margin of the occipital condyle. The surface of the mastoid process is rough. The lateral occipital crest is

weak. The lateral exterior crest is distinct, on both sides of which form steep walls much higher than the surface of the mastoid process. The paroccipital process is slender with three edges.

The posttympanic process is thick, and it fuses with the upper part of the postglenoid process so that they form a false external auditory meatus. The posttympanic process clearly declines forward, and it is situated in front of the paroccipital process. The postglenoid process is robust. The temporal condyle is wide. The notch between occipital condyles is broad. In the posterior part of the basioccipital bone, there is a triangular depression. There is a fine middle crest on the constricted basioccipital bone. The pterygoid bone is very high and the vomerine thin. There is a fine crest along the palatal middle suture, and it becomes a tubercle on the U-shaped palatal posterior margin. The maxillary tubercle is well-developed.

The slightly curved parietal crests are very little separated. The occipital crest is deeply middle-grooved, and its two lateral corners are round. The zygomatic arch is comparatively narrow, its anterior end reaches the M2 level, its upper margin is flat, and its posterior margin is vertical, without a projection of posteriodorsal angle. The zygomatic arch is thin and inclines outwards.

The orbital position is comparatively low and the orbital upper margin is very thick. Before and behind the large supraorbital tubercle, there is a notch respectively. The lacrimal tubercle and fossa are very small. The postorbital process on the frontal and zygomatic bones are weak. The preorbital fossa is shallow. There are three infraorbital foramina with a front groove near the maxillary upper margin and one on this margin. But the position and numbers of the infraorbital foramina in different specimens are irregular. The nasal notch is deep and the distance between the notch and orbit is short. The premaxilla is reduced, without upper incisors.

The nasals are flat and wide, with obviously drooping sides, and its cross section is lenticular. The nasals become narrow gradually before the orbits, without any rugosty on their surface. The cranial dorsal profile is distinctly saddle-shaped. The occipital elevation is high. The braincase is narrow so that its outer walls are steep. The lateral parts of the occcipital crest incline forwards. The cranial dorsal surface is a narrow and long rhomb.

Mandible The shallow vascular impression is situated behind the m3 level. The mental foramen is located under p3 and near the ventral border of the horizontal ramus. There is a long distance between m3 and ascending ramus. The mandibular angle is wide, with obvious rough surface, and its posterior margin is thin and gradually becomes thick upwards. There is a big tubercle and a wide groove behind the condyle. The coronoid process is high and thin. In the dorsal view, the mandibular symphysis becomes a particularly broad shovel and its posterior border is at the p3 level. The interalveolar border is a crest, which slightly constricts inwards before p2, then

Table 1 Measurements of skulls of *Chilotherium wimani* (mm)

measures	V 12500	V 12501	V 12502	V 12503	V 12504
1 distance between occipital condyle and premaxillary bone	—	545	—	—	—
2 distance between nasal and occipital condyle	—	—	550	—	510
3 distance between nasal and occipital crest	—	—	500	—	—
4 distance between nasal and nasal notch	—	—	152	—	134
5 minimal width of braincase	89	74	83	87	91.5
6 distance between occipital crest and postorbital process	256	262	267	246.5	—
7 distance between occipital crest and supraorbital tubercle	287	288	289.5	274	—
8 distance between occipital crest and lacrimal tubercle	326.5	323	332	299.5	—
9 distance between nasal notch and orbit	75	60	73	61.6	61
13 distance between occipital condyle and M3	270	280	300	275	264
14 distance between nasal and orbit	—	—	223	—	198.5
15 width of occipital crest	—	153	147	140.2	—
16 width between mastoid processes	193.5	186	188	192.2	219
17 minimal width between parietal crests	35	33.5	29	34	—
18 width between postorbital processes	—	133.3	146	148	134
19 width between supraorbital tubercle	—	147	163.5	164.3	156
20 width between lacrimal tubercles	—	152	175	159.5	154
21 maximal width between zygomatic arches	265	248	260	265	—
22 width of nasal base	—	87	92	81.7	88
23 height of occipital face	122	129	158	132	—
25 height of skull in front of P2	—	—	145	—	138
26 height of skull in front of M1	—	181.5	166	165	171.5
27 height of skull in front of M3	175	183	189	167	171.3
28 width of palate in front of P2	46	37.5	55.5	—	45
29 width of palate in front of M1	57	30	34.5	27	52
30 width of palate in front of M3	57	48.3	64	45	58
31 width of foramen magnum	37.5	38	—	46	43.5
32 width between occipital condyles	109	108.5	111	113.5	120.5

Note: The measurement numbers according to Guerin (1980).

stretches outwards to the exterior margin of i2. The middle groove on the dorsal surface of the symphysis is deep and wide. In the front view, the incisor alveolar margin is thin and sharp. The ventral surface of the symphysis is a wider depression between two i2s, on which there are three pairs of or scattered nutrient foramina.

The i2 is huge, and its cross section is a narrow and round triangle. There are a big angle and a long distance between two i2s. The i2 extends outward, upward, and then forward.

Upper Cheek teeth The P2 has round parastyle, weak parastyle fold and paracone rib, well-developed and continuous congulum; its protocone and hypocone are expanded but do not constrict; protoloph and metaloph are narrow; crochet and crista

Table 2　Measurements of mandibles of *Chilotherium wimani*　　(mm)

measures	V 12505	V 12506	V 12507	V 12508	V 12509
1 length	458	475	455	485	485
2 distance betwen symphysis and angular process	365	370	363	382	371
3 height of lower jaw in front of p3	53	62	60.5	63.5	75
4 height of lower jaw in front of p4	64	72	63.3	69.5	75
5 height of lower jaw in front of m1	73.5	76.5	71	73	80
6 height of lower jaw in front of m2	75	75.5	76	78	81.5
7 height of lower jaw in front of m3	81.5	84.5	73.5	81.8	79
8 height of lower jaw posterior to m3	90	92	81	82	90
9 distance between ramuses in front of m1	69	54	63.3	67.7	56
10 distance between ramuses in front of m3	84	72	—	88.3	65
11 length of symphysis	117	122	110	112.5	126
13 anterior-posterior diameter of ascending ramus	141	141.5	138.5	153	146
14 transverse diameter of condyle	89	92	—	—	—
15 height of jaw in condyle	240	230	240	—	—
16 height of jaw in coronoid process	285	—	—	—	—

Note: The measurement numbers according to Guerin(1980).

connect each other to become a median sinus, and medial and posterior valleys are close. The P3 is similar to the P2 but much larger; its wide and large parastyle is projecting slightly; sizes of protocone and hypocone are similar, and outer wall is flat. The P4 has strongly projecting parastyle, distinct parastyle fold and paracone rib, slightly constricted protocone, round hypocone, close median sinus, and open medial valley. The M1 has a projecting parastyle, and well-developed parastyle fold and paracone rib; its anterior and posterior cingula are well-developed, but lingual one becomes small pillars on the entrance of the medial fossete; its strongly constricted protocone has a flat lingual margin, oval hypocone is weakly constricted near the root, medial valley is narrow, and sharp end of fine antecrochet extends to the entrance of the medial valley; it has a median sinus, nearly close triangular posterior valley, and shallow depression on the outer wall of its metacone. Besides a narrow and long parastyle, and well-developed parastyle fold and paracone rib, the M2 also has unexpanded protocone, even width of the protoloph, weakly constricted protocone, well-developed anterior and poterior cingula, weak lingual cingulum, small hypocone without constriction, median sinus, very open entrance of the medial valley, V-shaped posterior valley, relatively narrow and long metastyle, and deep depression on the outer wall of the metacone. The worn surface of M3 is triangular; it has well-developed anterior and posterior cingula, pillar-like lingual cingulum, short and sharp parastyle, narrow protoloph, median sinus, fine and weak metaloph; there is a vertical edge on the exterior end of its posterior cingulum, which represents the boundary between its ectoloph and metaloph.

Table 3 Measurements of upper cheek teeth of *Chilotherium wimani* (mm)

measures	V 12500	V 12501	V 12502	V 12503	V 12504
DP1	—	—	—	—	15×18×5
P2	28×36×23	26.5×33×20	25×33×0	25×38×10	25×32.5×9
P3	34×48×29	30×50×18	32.5×49×0	30×51.5×10	29.5×49×16.5
P4	39.6×51×40.3	35×56×16.5	32.5×60.5×0	31×56.6×6	34×56×17
M1	40.5×56.2×35.2	38×56.5×15	37.5×64×0	37×63.2×6.5	39×57.4×27.2
M2	51×57.3×48	52×58.5×28	44.5×64×8	44×63×12	52.2×62×41.5
M3	52×53×49	48.3×55.5×41	49×59.5×19	47×58×18	47.3×58×48

Note: Length × Width × Height.

Lower cheek teeth There is no dp1. The p2 is small; it has well-developed trigonid and small talonid, short and wide paralophid extended straight forwards, deep paraectoflexid, and well-developed protoconid; the size of its metaconid is similar to that of its protoconid so that both of them are very symmetric. The p3 has short and narrow paralophid, V-shaped ectoflexid, shallow trigonid basin with round bottom, and deep talonid basin with sharp bottom. The p4 is similar to the p3 but larger. The m1 has small and shallow trigonid, U-shaped talonid basin, and sharp V-shaped ectoflexid. The m2 has right-angular trigonid basin, rectangular talonid basin, and deep and sharp V-shaped ectoflexid. The m3 has short and sharp paralophid, wide trigonid and talonid basin, and wide and deep V-shaped ectoflexid.

Table 4 Measurements of lower cheek teeth of *Chilotherium wimani* (mm)

measures	V 12505	V 12506	V 12507	V 12508	V 12509
p2	22×15.5×12.5	25.1×19×17	25.3×17.7×14	21×16.7×16	26×18×17
p3	27×20×16	31×26×19	31×25×18	26.4×23.2×18	31×22.5×21
p4	34.3×22.2×20	37×30×18	38×27×20.4	33.3×23.6×19	36×26×21
m1	38.3×24×14	40×31×15	43×30×23	38.3×27×17	38.5×26.5×21
m2	47×27.5×21	47×30.3×21	49.5×29.5×33	42×26.5×22	46.5×28.3×30
m3	44.5×23.5×31	50.5×29×26.5	47.8×27×42.5	44×23.7×27.2	47.5×26.5×28

Note: Length × Width × Height.

3 Discussion

Ringstrom (1924) described the main characters of *Ch. wimani*. Some important characters of this species were neglected because his specimens were rare and fragmentary. But he has correctly indicated the primitive position of *Ch. wimani* in the genus *Chilotherium*.

Indeed, some cranial characters of *Ch. wimani* are very similar to those of the more primitive genus *Acerorhinus*. Their shared characters include: occipital surface has larger height than width, with two round upper corners; paroccipital process comparatively slender; postglenoid process strong; parietal crests very little separated; cranial dorsal profile distinctly concave; occipital elevation high; postorbital process

weak; supraorbital tubercle big, at which the cranial dorsal surface being widest; orbital upper margin very thick; nasal wide and strong, with curved cross section and drooping side margins; cheek tooth crown comparatively low; outer walls of upper cheek teeth undulate; parastyle fold and paracone rib well-developed; antecrochets small; crochets weak; and P2 comparatively large.

On the other hand, many characters of *Ch. wimani*, especially its mandible, are completely identical with those of the genus *Chilotherium*, such as thick posttympanic process, paroccipital processes situated behind posttympanic ones, low parietal crests, narrow zygomatic arches without a projection of posterodorsal angle, gradually narrowing cranial dorsal surface before orbits, strong broadening of mandibular symphysis, well-developed secondary structures on cheek teeth, relatively small P2, and upturned medial flanges of i2. In fact, the skull of *Ch. wimani* has some important characters different from *Acerorhinus*. Size of *Ch. wimani* is obviously smaller than that of *Acerorhinus*, the former is of middle size but the latter large. *Ch. wimani* has trapezoidal occipital surface instead of the bell-shaped one for *Acerorhinus*. The posttympanic process of *Ch. wimani* is thick and not projecting outwards, and fuses postglenoid process so that its false exterior auditory meatus is close. On the contrary, the two processes of *Acerorhinus* are slightly or not fused. The cranial dorsal surface of *Ch. wimani* becomes gradually narrow before its orbits, but that of *Acerorhinus* suddenly constricts. The preorbital fossa of *Ch. wimani* is shallow and unclear, but that of *Acerorhinus* well-developed. The zygomatic arch of *Ch. wimani* does not have projecting posterodorsal angle, with straight posterior margin, but that of *Acerorhinus* has a strong projecting posterodorsal angle, with inclined down-forward posterior margin. Comparing their mandibles, *Ch. wimani* has particularly broad symphysis, but *Acerorhinus* has a narrow one whose width is not larger than the distance between the two p2s. *Ch. wimani* has upturned medial flanges of i2, but *Acerorhinus* has nearly level ones.

The many fossils of *Ch. wimani*, collected from Linxia Basin in Gansu recently, have the similar characters to those from Fugu. *Chilotherium xizangensis*, described by Ji et al. (1980) from the Late Miocene of Gyirong Basin in Tibet, is similar to *Ch. wimani*. The holotype V 5197 of *Ch. xizangensis* has little separated parietal crests, saddle-backed cranial dorsal profile, projecting anterior and thick upper margins of orbits, weak postorbital processes, deep nasal notch, drooping sides of nasals, low crown, marked parastyle folds and well-developed secondary structures of cheek teeth, strongly broadening mandibular symphysis, and comparatively large p2. These characters of this species are identical with those of *Ch. wimani* but different from other species of *Chilotherium*. On the other hand, this species has some characters distinguished from *Ch. wimani*, such as smaller size, flat dorsal surface of nasals, more developed crochets and antecrochets, and wide bridge of M1.

Hessig(1975) referred *Ch. wimani* to *Ch. habereri*, which is caused by the simple description and unrepresentative plates of Ringstrom (1924). In fact, these two species are much different. *Ch. habereri* has flat cranial dorsal profile, widely separated parietal crests, thin upper orbital margin, square occipital surface, narrow nasals, high crowns and flat outer walls of cheek teeth. These characters of *Ch. habereri* are obviously more advanced than those of *Ch. wimani*. The new materials from Laogaochuan in Fugu prove that *Ch. wimani* is a valid species.

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图版说明(Explanations of plates)

图版 I(Plate I)

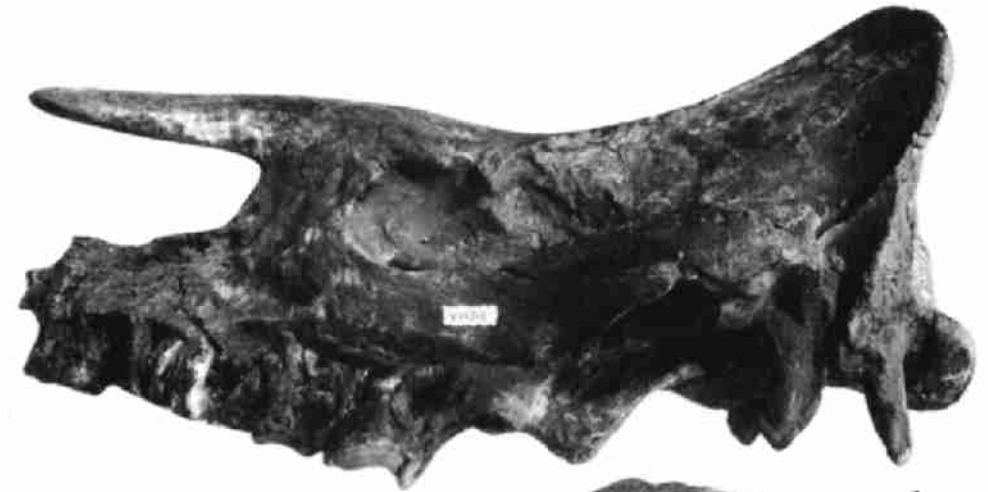
Chilotherium wimani 头骨(skull), ×1/4, 保德晚期(Late Baodean), 府谷老高川(Laogaochuan, Fugu)

1. V 12502, 侧视(side view); 2. V 12502, 背视(dorsal view); 3. V 12500, 腹视(ventral view)

图版 II (Plate II)

Chilotherium wimani, 保德晚期(Late Baodean), 府谷老高川(Laogaochuan, Fugu)

1. V 12505, 下颌骨(mandible), 冠视(crown view), ×1/4; 2. V 12503, 头骨(skull), 后视(occipital view), ×1/3; 3. V 12505, 下颌骨 (mandible), 侧视 (side view), ×1/4



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