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山东山旺首次发现祖熊牙齿化石

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关键词　山东山旺　中新世　祖熊

内　容　提　要

本文记述了山东山旺东方祖熊（*Ursavus orientalis* sp. n.）骨架的牙齿部分。它是 *Ursavus* 属目前已知个体最小的一个种，它的 M^2 的跟座还没有明显地扩大。这表明该种还处在相当低的进化水平上。另一方面它的下裂齿的跟座极宽，M_2 跟座长而向舌侧歪曲，前臼齿也相对更小。这些特征又表明这个种已有若干特化。与欧洲已知种相比，它大约与 *U. elmensis* 在进化水平上最接近或稍进步些。它和在 Steinheim 发现的 *U.* cf. *intermedius* 在某些特化特征上有些相似，这可能表明它们之间有较近的系统关系。

根据东方祖熊的进化水平，我们推断山旺组的地质时代，大体应相当于欧洲的 MN4。

祖熊（*Ursavus*）是欧洲中新世一类较常见的动物。它对确定地层年代很有用处，在欧洲的二十多个地点中均有发现。遗憾的是，到目前为止，所有已发现的祖熊化石都很破碎，从来没有发现过完整的骨架。亚洲和北美只有极零星的材料报道（Ch. Frick, 1926; J. E. Storer, 1975; N. Schmidt-Kittler, 1976）。我国到了 1984 年才首次报道了这一属化石的发现（祁国琴，1984）。

山旺的这件标本是 1981 年发现的，本来是一具保存完整的骨架，可惜在取出时被分成了两半，而且若干颅后骨骼后来又脱落而散失了。由于头骨严重挤压，当时仅可见到几枚前臼齿，无法确切鉴定其种属。直到 1984 年底，才发现了挤压在头骨内的上、下齿列。它的臼齿的祖熊的特征十分明显，归入该属毫无疑问。山旺的祖熊是目前已知最小的一个种。除了某些原始性质外，同时也具有一些特化的性状。这些性状和欧洲的 *Ursavus intermedius*，特别是 Steinheim 的材料，较为接近，它们可能代表了 *Ursavus* 属中一个单独的支系。

这件标本之归入祖熊属，是原先未曾料到的。它的颅后骨骼显示出，这是一类颇为灵巧的动物：腰部形成较大的弧度，尾较长，四肢纤细，后肢比前肢长等。这和我们对熊的形象的理解差得太远。事实上，由于从未发现过祖熊的骨架，我们对祖熊的体态几乎一无所知。所以这个骨架的发现，对于我们对祖熊的了解，特别是它在肢骨上和熊科动物的关系，是有很重要的意义的。不过，这将是另一篇文章的内容。本文将首先介绍和讨论它的牙齿及其与本属相近种的关系。

Ursavus orientalis sp. nov.

正型　820846（临朐古生物博物馆临时编号）；保存在两块硅藻土页岩上的同一骨架。

特征　个体最小的 *Ursavus*；前臼齿相对更小，裂齿及其后颊齿齿冠低，各尖分化弱，M^1 外侧后根在前部近端有一纵沟，M^2 小于 M^1，跟座小，M_1 根座特别宽，M_2 跟座较长，比三角座更偏向舌侧。

描述　从骨架上取下的，带有 P^4-M^2 的一段左上颌；左下颌水平枝（具 P_3-M_3）（无垂直枝）以及从右下颌中脱落下来的 P_3 及 M_2。

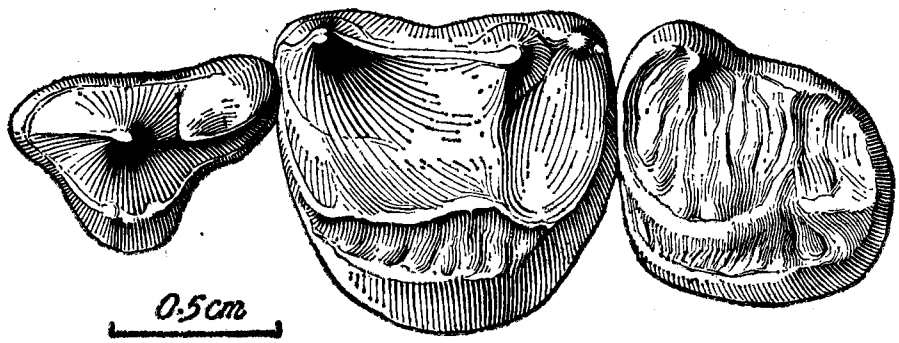

图 1　*Ursavus orientalis* sp.n. 左上 P^4—M^2 顶面观

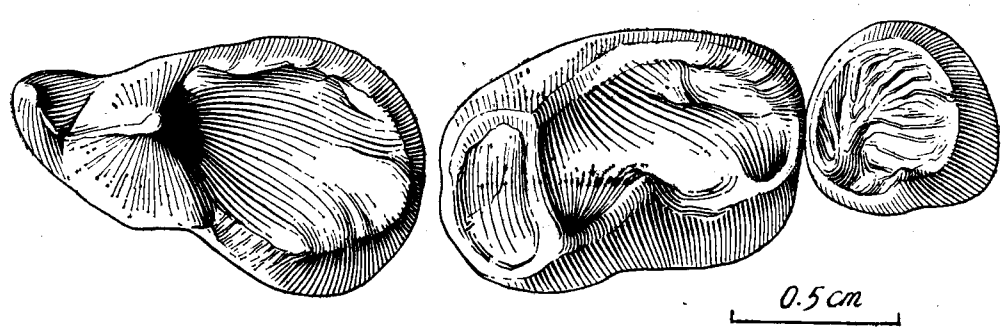

图 2　*Ursavus orientalis* sp. n. 左下 M_1—M_3 顶面观

P^4：牙齿由前尖和后附尖组成，原尖只是齿带在内侧的膨大。前尖为齿的主尖，其尖顶几乎位于牙齿外脊的中央，前嵴伸至齿带处，后嵴短；后附尖内面平，外面为鞍形面，斜向外伸。它和前尖的后脊以一凹槽相分，并共同组成明显的裂叶。齿带很发育，仅在外侧接近后端处消失，齿带在内面特别强壮，它在前尖的内侧升高形成“原尖”，“原尖”之前有一微弱的沟，与其前的齿带稍稍分开。裂叶已开始磨蚀，但磨蚀不深。在其它地方未见磨蚀痕迹。牙齿共有三个根，外后根最粗壮，向上斜向前方，内根最细，位于外侧两根之中。

M^1：外壁接近平直，前缘斜向内后方，内缘和后缘组成圆弧形。冠面上的四个主尖都很低，前尖和后尖分离较远，前尖位置很靠前，其外壁圆隆，而内壁较平缓，在其基部有一自前齿带斜向后内方的细沟，将前尖和牙齿的其它部分分开。后尖比前尖低，它和前尖之

间以一纵嵴相连，此嵴从外侧面看，为一宽浅的U形，后尖向内方伸出一弱嵴，与次尖相连，此嵴把跟座与牙齿的其它部分分开。原尖和次尖都几乎分辨不出来，但它们的内面形成陡壁，而显现出它们的尖形。四个主尖所围绕的面为一微凹的光滑面，仅在后尖的前内方还保留不很清楚的细纹饰，前附尖很小，为齿带、稍稍膨大形成；后附尖比较显著，与后尖的分离也明显。牙齿的前缘和后缘都没有齿带前附尖和后附尖向内与齿冠面融合而显现不出齿带来。内齿带特别发育，形成颇宽的台面。它的唇侧面布满细纹饰，至原尖一次尖陡坎之基部皱纹最深。跟座面面向后上方，与牙齿冠面的主要部分形成一两面角。此面大部分光滑，其外端的纹饰较发育。牙齿有外齿带，但显然较弱，在外侧中央处消失。牙齿共三根，内根最宽大，前外根最细小，后外根的外侧面在接近齿冠附近有一个相当深的沟，向上逐渐消失。这可能代表 M^1 原先还有一细小的单独的外中根（许多肉食类还有此根），尔后逐渐与外后根愈合为一。

M^2：外壁短，中央稍凹，并斜向后内方；其它三面，前、内和后缘，特别是后缘都为圆弧形。整个牙齿形态和 M^1 接近，但牙齿较小，后半变窄，跟座稍长，四个主尖更不明显，内齿带更长，而且整个冠面布满细的纹饰。只有三根，二外一内。

P_1—P_4 间都有小的齿隙，齿隙长在 1—1.5mm 之间。

P_1：仅在右侧保存。为单根，齿冠很低小。

P_2：仅在右侧保存。双根，比 P_1 明显较大。

P_3：双根，已有一小的前附尖，它稍偏向内侧，而不在前方正中。后附尖不显著。主尖后嵴比前嵴稍长。内齿带发育，特别是在后半部。外侧齿带不显。

P_4：和 P_3 大体一致，只是后附尖已隐约分出。

M_1：下原尖为三角锥形，下前尖稍向内弯曲，下前尖脊只有下原尖前脊的长度的一半，两者组成裂叶。下后尖顶端约与下前尖等高，但它与下原尖的分离程度不如下前尖者深。向后，下后尖和下跟座之间也没有很明显的分界。跟座特别宽大，下次尖并不位于外侧的最后缘，所以形成一个圆弧形的外侧缘。跟座内缘上的下内尖也不明显地分为二尖。跟座的盆面光滑。齿带不发育，仅在齿外缘前方微弱可见。次尖的外壁上也有一些垂直方向的皱纹。

M_2：整个牙齿近一扁豆状。冠面周围围以几乎连续的弱嵴。下原尖和下后尖的锥形都表现得不清楚。下后尖为齿中最高的尖，它和下原尖形成一横向的嵴，将冠面分为前小后大的两个面，下前尖分辨不出来。下后尖向后方伸出一嵴，此嵴斜向内后方，然后与跟座内缘的嵴相连；下原尖向后也伸出一斜向内后方的嵴，但此嵴不直接和跟座外缘的嵴相连，中间留有一间隙。自下原尖和下后尖斜向内后方的后嵴使跟座（与三角座相比）更歪向舌侧。次尖向内侧有放射状细纹饰；跟座内缘嵴之外侧也有细的纹饰。齿带仅在外侧中部发育。

M_3：基本为圆形，仅外侧弧形较弱。外缘的前 1/4 处有一小瘤状隆起，可能代表原尖。自此向内后方呈放射状散发出细的沟纹。齿的周围为稍稍隆起的嵴形，将齿冠面封闭。没有齿带。M_3 显然只有一个齿根。

下颌仅保留左侧 P_3 以后的一段。水平枝较低，在 P_4 之后为 14.5mm，而在 M_2 之后为 14.6mm。下颌下缘自 M_2 后半开始斜向后上方。

表 1　*Ursavus* 的牙齿测量表（Measurements of teeth of *Ursavus*）

（单位：毫米）

		U. orientalis (Qiu & al., 1985)	*U. elmensis* (Crusafont & Kurtén, 1976)	*U. intermedius* (Koenigswald, 1925)	*U.* cf. *intermedius* (Heizmann, 1973)	*U. brevirhinus* (Hofmann, 1887)
P^4	L	8.5	9.5—11.5		11.4	12.0
	W	5.3	6.3—7.4		8.0	8.0
	H	4.5	5.7—6.4			6.0
M^1	L	9.9	9.9—12.3		12.5	12.0
	W	9.2	8.8—11.5		11.2	10.2
	H	3.5	4.5—5.2			
M^2	L	9.0	9.2—10.0		13.3	11.5
	W	8.1	8.3—8.8		9.9	10.0
	H	2.8	3.4—3.8			
P_1	L	3.5				
	W					
	H	1.4				
P_2	L	5.0				
	W					
	H	2.5				
P_3	L	5.3	6.5(After Stehlin)			6.6*
	W	2.2				3.6*
	H	3.3				
P_4	L	6.4	8.0—8.6			8.0*
	W	2.8	3.5—4.0			3.9*
	H	4.5	4.5—5.1			
M_1	L	12.2	12.6—14.3	14.5	14.9	16.2*
	W	7.2(Tal.)	5.3—6.7	6.9	8.2	7.2*
	H	5.5 (Prot.)	5.7—6.6			
M_2	L	9.6	9.7—11.2	11.2	12.4	11.8*
	W	6.1	5.9—6.7	6.9	~7.5	7.4*
	H	3.1 (Metac.)	3.5—4.0			
M_3	L	5.0	5.3—6.9			
	W	4.7	4.2—5.4			
	H					

* After Thenius

比 较 与 讨 论

山旺这件标本应该归入 *Ursavus* 属，这一点是毋容置疑的。*Ursavus* 这个属在整个熊类中是很容易区分的(见 Schlosser,1899 和祁国琴 1984 的特征记述)。它的个体是熊类中最小的，前臼齿原始：除 P_1 外，都是双根，齿冠扁长，和熊属退化的前臼齿相比，差别明

表 2 $M_1(L)$ 与 M_2 (L) 和 $M_1(L)$ 与 $M_1(W)$ 比较表 (%)

(单位：毫米)

	U. elmensis	*U. orientalis*	*U. intermedius*	*U.* cf. *intermedius*	*U. brevirhinus*	*U. depereti*
$M_1(L)/M_2(L)$	137	127	129	120	130—150	136
$M_1(L)/M_1(W)$	219 (Wintershofwest) 233 (Elm)	169	210	182	193—216	188

显，这个属的裂齿后的臼齿在相对大小和形态上已开始接近现生熊类，但也仍保留若干原始性质，如齿带发育等。其裂齿还大体处在 *Hemicyon* 的水平，只是"原尖"还更小些。在所有这些特征上，山旺的标本都与 *Ursavus* 属完全一致。

Ursavus 属共包括七个种。其中出现时代最早、个体最小和构造最原始的是 *U. elmensis*。山旺的标本，在个体上比 *U. elmensis* 还小，在构造上，除了个别的特化性状外，在总的进化水平上大体与它相当，而比其它种要原始，个体也小。所以和其它的种也是易于区分的。下面我们主要把山旺标本与欧洲最原始的 *U. elmensis* 进行对比。

U. elmensis 是 H. G. Stehlin 1917 年所定。他所依据的是三件标本：一带有 P_3—M_2 (有 M_3 的齿槽)的左下牙床；一左下犬齿及一右 M^1 的内半部。这些材料是 1913 年前普鲁士皇家地质所的 E. von Seyfried 在修建法兰克福至 Fulda 铁路开凿山洞时，在 Elm (法兰克福东北约 60 公里) 的黑色含云母砂层中发现的。Stehlin 建立新种的理由有二：1. 个体比当时已知的两个种 (*U. brevirhinus*, Hofmann, 1887 和 *U. primaevus*, Gaillard, 1898) 都小[1]；2. M_1 和 M_2 比例上都更窄一些，它们冠面上的嵴和尖的分化都较清楚，齿冠表面光滑。

1937 年 R. Dehm 在 Eichstätt 附近的 Wintershof-West(慕尼黑北偏西约 110 公里)的裂隙堆积中又发现了相当多的零散材料：包括八个破碎的下颌和 50 多颗牙齿。Dehm 当时就把它订作了 *U. elmensis*。但是详细的记述只是在第二次世界大战之后，于 1950 年才正式发表。Dehm 认为，Elm 的材料在大小上是在 Wintershof-West 的变异范围之内，属于其中的大个体者，形态上没有什么重要差异。和上述的材料相比山旺的标本有以下几点不同：

1. 从整个个体讲，山旺标本比 *U. elmensis* 已知的材料还要小，在所有的长度测量项目中，除了少数几项与 Wintershof-West 的最小的一致外，其余的都小于后者。根据 Dehm 的测量数据，山旺标本中只有 M^1，M^2 和 M_3 的长度是落在后者变异范围之内(属于最小者)。根据 Kurten 后来(1976)对 Wintershof-West 材料的重新测量，山旺标本中的 M^2 的长也小于后者的最小者。在宽度上，除了 M_1 的宽度 (这是山旺标本的重要特点之一)，只有 M^1，M_2 和 M_3 相当于后者的最小者；而在齿冠的高度上，毫无例外，山旺的标本都低。

1) 当时已定了第三个种 *U. depereti* Schlosser, 1902。这个种比上述两个种还大，所以并不影响 Stehlin 的论证。

2. 山旺标本的前臼齿，无论从相对于臼齿的大小，还是它本身的绝对大小来看，都特别小而薄。这方面可供对比的测量数字较少，但至少从 P_4 的测量可以清楚的看出(表1)。这表明，山旺标本的前臼齿，与本属的其它标本相比，是退化得较强的。

3. 山旺标本臼齿上各尖的分化都很弱，所以从侧面看，各尖的锥形形态(除 M_1 的三角座外)都极不明显。

4. P^4 的"原尖"大概是本属所有已知材料中最不发达的。它向内侧伸展弱，使 P^4 宽度比其它种小。

5. M_1 跟座特别宽，形成一个相当大的"盆"。

6. M_2 下原尖和下后尖的后嵴斜向内后方，使跟座的冠面向内侧歪斜。

7. M^1 的外后齿根，还保留外侧中央齿根的愈合痕迹。这一点是否是本种的特点，还不能肯定。但在我们所对比过的本属各种的标本上都没有这一特征。

鉴于以上这些明显的区别，我们建议定立一个新种：东方祖熊 *Ursavus orientalis*。

关于这个种和本属其它种之间的系统关系，由于已知的材料太少，还很难做出较肯定的推断。但是很有趣的一个现象是，山旺标本在某些形态特征上和德国 Steinheim 发现的材料反而有些接近，虽然后者显然已是一个很进步的种 (M^2 已有很发育的跟座)了。

关于 Steinheim 的材料的归属，原来就有过争议。首先描述 Steinheim 材料的是 R. v. Koenigswald。他于 1925 年记述了一件带 P^4—M^2 的上颌。这件标本是 1900 年采集到的，1908 年 T. Engel 在化石名单中曾提及，但并未详细研究。v. Koenigswald 把它定作 *U. brevirhinus*。1928 年，C. Viret 和 G. Lleuca 又记载了 Steinheim 的一件带有犬齿和 M_1—M_2 的下颌骨。这是 Lyon 大学的一件标本。该作者认为它的 M_1 比 *U. brevirhinus* 者稍更退化，而 M_2 则相反，相对更长，亦即更向现代熊类方向进化。但这一标本的个体大小仅和 *U. brevirhinus* 差不多，所以就把它定作 *U. premaevus* mut. *steinheimensis*。1973 年 Heizmann 在研究这一地点的肉食类时，把这两件标本合在一起，定为 *U.* cf. *intermedius*。

U. intermedius 本来是 R. von Koenigswald, 1925 年根据采自 Engelswies (Tübingen 南约八十公里)的属于同一个体的两枚牙齿，M_1 和 M_2，建立的。它们的大小恰恰介于最原始的 *U. elmensis* (当时只有 Elm 的材料)和 *U. brevirhinus* 之间，所以定了此名。1952 年 E. Thenius 把这个种合并到 *U. brevirhinus* 中去了。不过Heizmann (1973) 还认为这个种应该存在。Heizmann 认为 Steinheim 这两件标本和 von Koenigswald 的 *U. intermedius* 有下列相近之处：1. M_1 的下前尖较短；2. M_2 的跟座相对较长和 3. M_1 与 M_2 相比较短(见表 2)。但 Steinheim 的标本 M_1 的下前尖更短，跟座更宽，M_2 的跟座更长，而和 *U. intermedius* 的正型有别。所以 Heizmann 把它定为 *U.* cf. *intermedius*。

恰恰在后两点上，山旺的标本和 Steinheim 的材料更为接近：M_1 的长宽比在山旺的标本中为 169%，同一比例在 Steinheim 中则为 182%，而在其余标本中一般 M_1 的长总是等于其本身宽的两倍或更多。M_1 长 / M_2 长在山旺标本中为 127%，在 Steinheim 标本中为 120% (在 *U. intermedius* 中为 129%)，而在其余标本中，一般都不小于 135%。

还可以指出的一点是，Steinheim 标本中的 M_2 在构造上也和山旺的标本更接近：它的跟座也是向内侧歪斜的，下原尖的后嵴也是斜向内后方，而且三角座的前半圆形嵴的形

态也相当接近。此外，个体特别小也可能是山旺和 Steinheim 标本的共同点。前者是本属中已知最小的种，而后者，虽然比 *U. elmensis* 稍大，但和与它进化程度相近的种如：*U. primaevus*, *U. depereti* 等比较（因为 Steinheim 标本 M^2 的跟座已经很大了），它的个体是出奇的小。如果这两者真有比较接近的系统关系的话，那么 Steinheim 的标本应该是山旺种的后代。

关于 *Ursavus orintalis* 的地质时代，我们可以根据欧洲上述这些种的地史分布作一些推测。*U. elmensis* 主要是 Burdigalian 期的（MN 2—4）。Wintershof-West 现在被放在 MN 3，这已是没有多少争论的了。Elm 地点，Stehlin 根据在同一涵洞内相距约 3.5 公里发现的 *Anchitherium* 判断，应该也是 Burdigalian 期的（Stehlin, 1917, p. 204）。

U. elmensis 也可能延续至 MN 5。Thenius 1950 (p. 53) 指出，在 Pitten 附近的 Leiding 的褐炭层中也发现过一枚个体极小的 M^2。它的大小和形态和 *U. elmensis* 的一致。这个地点的时代是早 Helvetian（MN 4b 或 MN 5）最近 Heizmann 也提到（1973, p. 45），*U. elmensis* 可以延续到 Vieux Collonges (MN 4b)。如上所述，山旺的标本在个体上比 *U. elmensis* 还小，而且 M^2 也很小，但它也显示了若干特化特征：下臼齿相对加长，M_1 跟座变宽等。综合起来考虑，*U. orientalis* 在进化水平上，可能与 *U. elmensis* 大体相当，或稍更进步一些。Thenius 还指出过（1950, p. 53），欧洲的 *Ursavus* 很可能是在以森林为主的地区个体大些（La Grive, Oppeln, Neudorf Spalte），而在以沼泽地为主的地带则个体较小（如 Engelswies, Thenius 认为 v. Koenigswald 的 *U. intermedius* 乃是小个体的 *U. brevirhinus*）。如果确实如此，那山旺个体特别小的标本，也是可以理解的了。这样，*U. orientalis* 的时代，就很可能是 MN 4，但也不能排除早些或晚些的可能。

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DENTITION OF THE *URSAVUS* SKELETON FROM SHANWANG, SHANDONG PROVINCE

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Key words　Shanwang, Shandong; Miocene *Ursavus*

Summary

Ursavus fossils have been known from over 20 Miocene localities in Europe. However, the records from other continents are very scanty and the materials are all very fragmentary (Ch. Frick, 1926, J. E. Storer, 1975 for North America and N. Schmidt-Kittler, 1976 for Turkey). The presence of the genus in China was first reported recently when Qi Guoqin (1984) described some teeth referred to *Ursavus depereti* from the famous *Ramapithecus* site of Lufeng, Yunnan Province.

The Shanwang specimen was discovered in 1981. Originally it was a well-preserved, complete skeleton. When removed from the outcrop it split into two unequal halves, each of which stuck to one slao of diatomite. At first only several premolars could be observed and no exact determination of its systematic position was possible. The preparation carried out under the supervision of the present authors resulted in finding the embedded molars, which revealed unexpectedly that the skeleton belonged undoubtedly to *Ursavus*. It is interesting to note that almost every one who saw the skeleton without knowing its diagnostic cheek teeth thought that it must be of some kind of viverrid because of its flexible vertebral column, long tail, and long feet. The first discovery of a skeleton of *Ursavus* is of great signiificance to our knowledge of the mode of life of the genus and of the relationships of the genus with the true bears. The anatomy of the posteranial skeleton will be the subject of another paper. We will first describe the dentition and determine its relationships with other species of the genus.

Ursavus orientalis sp. nov.

Holotype 820846. A skeleton, preserved on two counterpart slabs.

Diagnosis The smallest species of the genus. Premorlars very small and low. The molars all very low-crowned, with weakly individualized cusps. The posteroexternal root of the M^1 has a deep groove on its external wall, indicating the former presence of a separate small central root labially. The M^2 is smaller than M^1, with an incipiently enlarged talon. The talonid of M_1 is exceptionally wide. The talonid of M_2 is comparatively long and skewed postero-lingnally.

Description The detached teeth are left P^4—M^2, P_3—M_3 and right P_3 and M_2.

P^4 consists of a paracone, a metastyle and a protocone. The paracone is the principal cusp of the tooth and situated in the center of the labial side. A marked anterior ridge stretches to the base of the tooth and connects with the anterior cingulum. Its posterior ridge is short and together with the metastyle forms the carnassial blade. The outer wall of metastyle is concave, with a centrally situated groove. The cingulum is developed around almost the whole tooth, except for the posterior angle of the outer wall. The protocone takes the form of a small cusp, with a small groove in front of it, which separates it from the anterior cingulum. There are three roots: the posteroexternal is the most robust one, the anteroexternal stretches obliquely, namely upward and anteriorly, while the inner one is the smallest.

The M^1 has an almost straight outer wall, its anterior side is directed posterolingually, while the inner and posterior sides together form a common curve. The four principal cusps are all very low. The Paracone is situated far anteriorly, and thus well separated from the metacone. The metacone is still lower than the paracone. The ridge which connects the para- and metacones is also very low. Seen from the outside it has a wide U-form. The ridge the metacone sends to hypocone is hardly discernible, but it separates the talon from the other part of the tooth. The protocone is even less individualized. The surface limited by the four main cusps is concave and smooth. The protocone and hypocone form a steep wall lingually, the base of which is covered with strong crenulations and tubercles. The parastyle is small; the metastyle markedly larger than the parastyle. The cingulum is weakly developed on the outer wall, with a small interruption at the midpoint. The inner cingulum is well developed, forming a wide shelf. There are three roots: the inner is the largest one. Among the two labial roots the anterior one is much smaller, while the posterior one is not only much larger, but also has an evident groove on its labial wall indicating that the posterior root may be coalesced with a small central root.

The M^2 is smaller than M^1. The outer wall is short, a little concave at its midpoint, but in general it stretches posterointernally. The other three borders of the tooth together form a semicircle. Structurally it resembles M^1, but the talon is proportionally larger. The inner cingulum is accordingly longer. The whole surface is covered with fine striae and tubercles. The roots are three in number; two external and one internal.

A diastema is present between neighbouring lower premolars, but its length is very small: 1.0—1.5 mm.

The P_1, preserved only on the right side, is very small, single-cusped and low-crowned, with only one root. The P_2, also only preserved on the right side, is evidently larger than P_1, with two roots. the P_3 has two roots. There is a small anterior cuspule, which is situated a little lingually. There is also a posterior cusplule, even less markedly expressed than the anterior one. The primary cone sends two longitudinal ridges: the posterior of which is longer than the anterior. The cingulum is developed only on the inner side, especially in the posterior half. The P_4 resembles P_3 in structure, but a little larger in size.

The M_1 has a robust protoconid, which takes the form of a triangular pyramid. The paraconid bends lingually. The metaconid is as high as the paraconid, but not so deeply separated from the protoconid as the paraconid. Its separation from the talonid is unclear. The talonid is extremely wide. The hypoconid is not situated at the posterior angle, but in front of the posterior extremity of the tooth. This makes the labial wall considerably convex. The entoconid is not further divided into cuspules. The surface of the talonid basin is smooth. The cingulum is not very well developed. It is traceable only on the labial side of the trigonid. On the labial wall of hypoconid there are some fine vertical striae.

The M_2 is, roughly speaking, bean-shaped. The upper surface of the crown is encircled by a continuous weak rim. The metaconid is the highest point of the tooth. A transverse ridge links it with protoconid. The paraconid is practically undifferentiated. Both the metaconid and protoconid have posterior ridges, which stretch not only posteriorly, but also a little lingually. The ridge from the metaconid is continuous with the rim of the talonid, while that from the protoconid does not contact the rim of the talonid, but leaves a small gap between them. On the lingual side of the hypoconid one can observe fine striae, which radiate from the top of the hypoconid. Similar striae can be observed on the labial wall of the lingual rim of the talonid as well. A cingulum can be seen only in the center of the labial side.

The M_3 is basically rounded in shape. There is a tiny tubercle at the place where the protoconid should be. From there fine striae and crenulations radiate. Like the M_2, the crown surface is encircled by a rim. No cingulum can be observed. There is only one root. The height of the mandible posterior to P_4 is 14.5 mm, while that posterior to M_2 is only 14.6 mm.

Discussion The assignment of the described specimen to the genus *Ursavus* is not in doubt. The genus was well defined by M. Schlosser in 1899, and there is no need to repeat once more the diagnosis of the genus. The above described specimen conforms in most respects to those listed by Schlosser for *Ursavus*. So far seven species have been described, among which *U. elmensis* is the smallest, the most primitive and the earliest in geological age. According to the general evolutionary level and the size, our specimen is closest to *U. elmensis*.

Ursavus elmensis is based on a left mandible with P_3—M_2, a left lower canine and left inner half of a M^1 from a tunnel near Elm (Stehlin, 1917); The richest material of the species came from Wintershof-West, which consists of eight lower jaw fragments and more than 50 isolated teeth (Dehm, 1950). In fact, this is the only material of the species other than the type specimens. In comparison with these materials our specimen differs in the following points:

1. Taken as a whole, our specimen is even smaller than *U. elmensis*. In most respects all the measurements taken from the Shanwang specimen are smaller than those of *U. elmensis*. The few exceptions are also among the smallest in the range of variation of the measurements for *U. elmensis*. They are lengths of M^1, M^2 and M^3, the widths of M^1 and the lower malars (see table 1).

2. All the premolars of our specimens are proportionally more reduced in comparison with the molars.

3. The differentiation, or the individualization of the main cusps and cuspids is weaker in our specimen than in *U. elmensis*.

4. The protocone of P^4 in our specimen may be the smallest among all the materials of the genus.

5. Contrary to the other measurements, the breadth of the talonid of M_1 is exceptionally increased in our specimen. The talonid has a well-formed basin.

6. The posterior ridges of the protoconid and metaconid of M_2 are directed a little lingually, and thus "push" the talonid lingually relative to the trigonid.

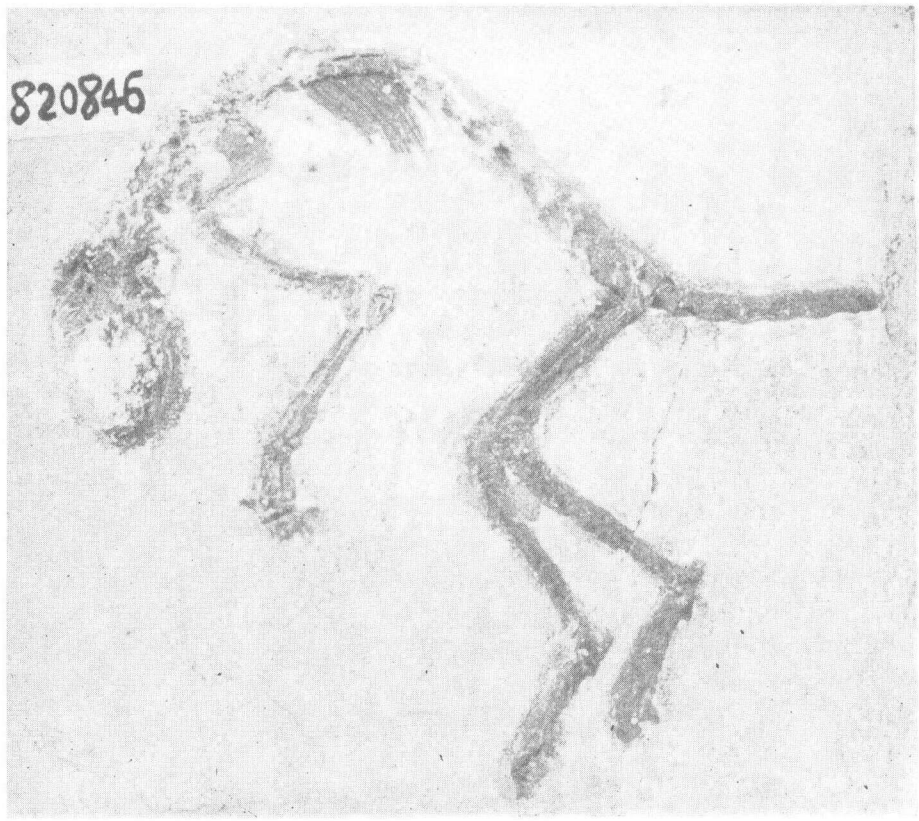
7. The presence of a coalesced central root on the labial wall of M^1 may be a character of our species. So far we have not seen a similar structure in other specimens of this genus. However, whether it is constant in our new species must be verified. Based on these listed differences from *U. elmensis* we propose to erect a new species for the Shanwang specimen: *Ursavus orientalis* sp. nov.

Compared with other, later and advanced species, we discern some similarities between ours and the Steinheim specimens, which were first attributed to *U. brevirhinus* by von Koenigswald (1925) and then to *U.* cf. *intermedius* by Heizmann in 1973. Irrespective of its systematic position, the Steinheim material represents a much advanced form in comparison with ours, as evidenced by its much enlarged talon of M^2. Nevertheless, they are alike in the following features: a). The M_1 is proportionally short in comparison with M_2, but the talonid of M_2 is proportionally longer in comparison with its trigonid, as is clearly shown in table II. b). Both forms have very wide talonid on M_1, as clearly demonstrated by the indices of length of M_1/breadth of M_1 in table II. c). The configuration of M_2 of both forms are much alike as well. The talonid is shifted rather lingually relative to the trigonid and the posterior ridge of the protocone is disconnected from the labial rim of the talonid. It is interesting to note also that the Steinheim form is also small in size, especially for such an advanced form and from so high a level (MN 7). It is not excluded that its size may also serve to indicate a close relationships between our species and that from Steinheim. If so, the latter could be consider as the descendent of our Asian species.

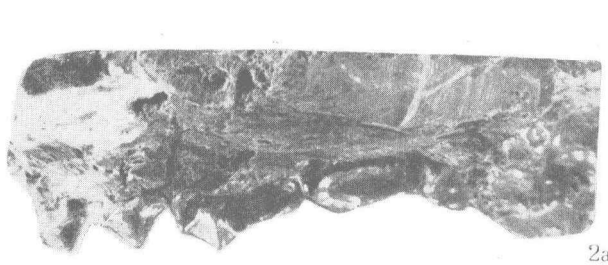
With regard to the geological age, some suggestions may be made. *U. elmensis* is generally considered to be confined to the Orleanian mammal age in Europe. Thenius once pointed out (1950) the possibility that this spocies survived up to early Helvetian (MN 5). His conclusion was based on a M^2 discovered from the locality Leiding, near Pitten. According to him the size and the form of the tooth resemble very much those of *U. elmensis*. The age of the locality was estimated as "early Helvetian" (now MN 5). Recently Heizmann also mentioned (1973) that some material was found in Vieux-Collonges (MN 4b). Taken as a whole, our species *Ursavus orientalis* probably stands at the same evolutionary level as *Ursavus elmensis*, or a little later. Thus it is appropria-

te to assign *Ursavus orientalis* an age comparable to MN 4. In case *Ursavus orientalis* represents an independent branch from the European lineage, its age could be earlier or later than that.

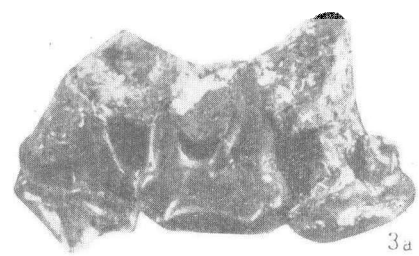
In 1950 Thenius discussed the relationships between the size of the individuals and their environment. According to him, the *Ursavus species,* dwelling in a forest environment, seem to be larger (for example, La Grive, Oppeln, Neudorf-Spalten...) than those dwelling in marshland (as for Engelswies, Steinheim...). If Thenius' view is reasonable, it may probably serve to explain why our *Ursavus orientalis* is so small in size.



1

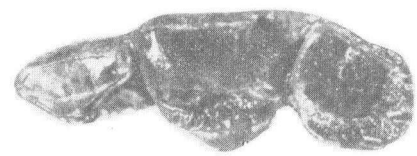


2a



3a

2



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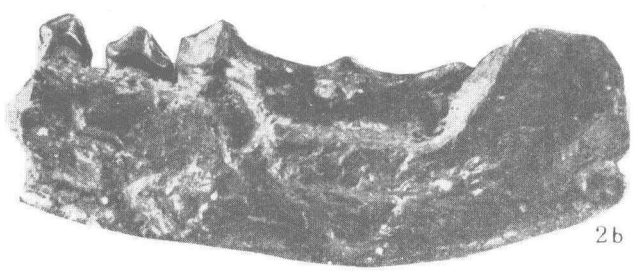

2b

3b

***Ursavus orientalis* sp. nov.**

1.完整骨架、2.左下颌(P_3--M_3) 顶面观×2，2a.舌侧观，2b. 唇侧观；3.左上颌(P^4 -M^2) 顶面观×$\frac{5}{3}$，3a. 舌侧观，3b. 唇侧观