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云南禄丰古猿地点 Ursinae indet. 化石性质的再讨论

邱占祥 祁国琴
(中国科学院古脊椎动物与古人类研究所)

关键词 禄丰 晚中新世 祖熊

内 容 提 要

1984年和1985年本文后一作者曾将禄丰古猿化石地点的一种小型而冠面无强烈褶皱的熊类化石归入 Ursinae indet. 现经重新研究，认为它应属 *Ursavus*。鉴于它和 *Ursavus* 已知其他种的区别，订一新种 *U. sylvestris*。它与欧洲的 *U. ehrenbergi* 大体处在同一进化水平上。在原认为是 Ursinae indet. 的材料中，有两枚 M_1，其特点与 *U. sylvestris* 者不同，暂以 *Ursavus* sp. 记之。

1984年本文作者之一(祁)在 Ursinae indet. 名下共记述了15颗牙齿，其中 V6894.8 被认为可能属同一个体之左 P_3-M_1，其余的均作为单个牙齿处理。1985年又补充记述了五颗单个的牙齿[1]。祁曾指出，禄丰古猿地点的熊类化石，除体型明显大得多的印度熊外，还有两类体型很接近的小型熊类：一类冠面褶皱强烈，被归入 *Ursavus depereti*；另一类冠面较光滑，其分类地位未定，暂以 Ursinae indet. 标之。关于前一类，经本文作者进一步研究，认为它应是大熊猫的祖先，并建立了一个新属 *Ailurarctos*（邱占祥和祁国琴，1989)。关于后一类，祁曾把它和 M. Crusafont-Pairo 和 B. Kurten 1976年所订的一个新属 *Protursus* 相比较，但也觉得二者在大小方面相距甚远，在特征方面亦有所不同，因此没有肯定其分类地位。1977年 E. Thenius 提出 *Protursus* 的正型标本(一枚 M_2)实际上是 *Simocyon* 的。在观察了我所保存的 *Simocyon* 之后，我们认为 Thenius 的意见是正确的。通过对禄丰 Ursinae indet. 标本的进一步观察和研究，我们认为它们才是真正的 *Ursavus*、而且代表该属中的一个新种 *U. sylvestris*。在1985年补记的材料中有两枚 M_1，它们虽然也属 *Ursavus*，但与上述新种的 M_1 有较明显的差别，考虑到只有 M_1，暂以 *Ursavus* sp. 记之。

一、标本的补充记述

在原认为是 Ursinae indet. 的标本中，除 V.6894.8 的三个牙齿可能同属一个体外，

1) 其中有两颗后经仔细鉴定不是属于 Ursinae 的，故未列入本文。

在其余原以为是单个的牙齿中，有些也可能是属于同一个体的。它们可能的组合是：1) V6894.9 和 10：右 P_4 和 M_1。都产于第三层，都为深黑色，P_4 看不出有磨蚀面，M_1 有刚刚磨蚀的痕迹，大小也相匹配。2) V6894.2 和 3：一个左 M^1 和一个左 M^2（跟座破损），还有在原来未曾编号的残破碎片中发现了一枚左 P^4 的后附尖部分（V6894.13）。都为浅黄褐色，都产自第三层，都有较重的磨蚀痕迹，保存状态相似，齿带在宽度和形状上几乎完全一致，且在相邻的部位有同等形状和大小的接触平面。3) V6894.1 和 4：前者原鉴定为乳齿，实际上是一破碎的右 P^4。后者为右 M^1，其内齿根正好与带右 P^4 的上颌骨能吻合在一起。它们的保存情况一致，只是 M^1 几乎未经磨蚀，都产自第三层。

上述的 V6894.2 和 3 以及 V6894.1 和 4 虽然磨蚀程度不同，但两者的 M^1 在大小和形态上几乎完全一样，因此可以肯定它们属于同种。同样，V6894.9 和 10 以及 V6894.8 在 P_4 和 M_1 的大小和形态上也很一致，也应归入同种。还有 V6894. 8 就其保存状况、颜色，与上颊齿者也是一样的，因此把这些上、下颊齿做为同一个种看待是可信的。

剩下的一个 M_2(V6894.11)、几个前面的前臼齿、犬齿和门齿的归属则带有推测性。不过它们的颜色（浅棕色）及保存状况和上述牙齿很接近，在形态特征上也相吻合，因此将它们与上述牙齿视为同种也还是合适的。

鉴于裂齿和臼齿在确定本种特征上更为重要，下面首先对它们进行补充记述。

P^4 如前所述没有完整的牙齿，以前也未记述过。右 P^4 保存了齿冠的前半部和全部齿根。前尖高大，是上颊齿中最高大的。一条纵脊将前尖分成不对称的内、外两半：外半部大，向外隆凸。内半部小、较平；后脊比前脊更偏向舌侧，且只伸至齿冠高度的一半左右，这表明裂凹的 V 形谷较深，而后附尖较急剧地斜向外后方。前附尖完全缺失。原尖极小，为一小锥状，位于裂凹之前、前尖后半部的内面。在它之前、前尖内侧相当尖顶基部的位置，齿带稍稍隆突成一小锥，比原尖小，二者以一小凹相隔。齿带从外、前、内三方将前尖包围。齿带细窄、但很清楚。牙齿有三个根：外侧的两个近于等大；内侧的一个很细弱，距前外根近，距后外根远。另外一件标本为左 P^4，只保留了后附尖。其外面隆凸、内面平。和前尖一样，内、外均有细但清楚的齿带。内齿带部分已被磨蚀掉。后附尖的后面有一很小的、与 M^1 相接的椭圆形平面(图版 I,2,3;图 1，A、B)。

M^1 1984 年已记述过，要补充记述的有以下几点：牙齿的前外角近直角外，其余三个角都较钝圆；内缘呈弱弧状，无明显的突出部。前尖和后尖高大，一条纵脊贯穿两尖的中部。两尖间的谷近直角 V 形，在唇缘两尖间有明显的凹入。前、后附尖均无。原尖与次尖连成一脊，两尖的分隔并不明显，原尖的前脊伸至前尖前脊的基部。后尖和次尖之间没有明显的连脊将中央谷自后方封闭。齿带仅在前缘缺失，外齿带在中凹处最为发育，内齿带在次尖前方最发育，但未达前内角即消失(图版 I,2,4;图 1 A、C)。

M^2 和大多熊类特别是和祖熊的一样，整个齿冠都比 M^1 者低。其前尖小于和低于 M^1 的后尖，而其后尖更低小。前尖的形态和 M^1 的一样，而后尖与 M^1 不同的是有两条后脊：一条伸向外后方，与外齿带相连；另一条先伸向内后方，再稍稍转向前内方，然后消失。在唇缘两尖之间的凹不及 M^1 的明显。原尖也为脊形，但它和前尖之间的距离较 M^1 者小。跟座破失，但从牙齿外缘向后收缩的趋势看，跟座似乎不大。齿带就保留的部分看，和 M^1 是相同的(图版 I,4;图 1，C)。

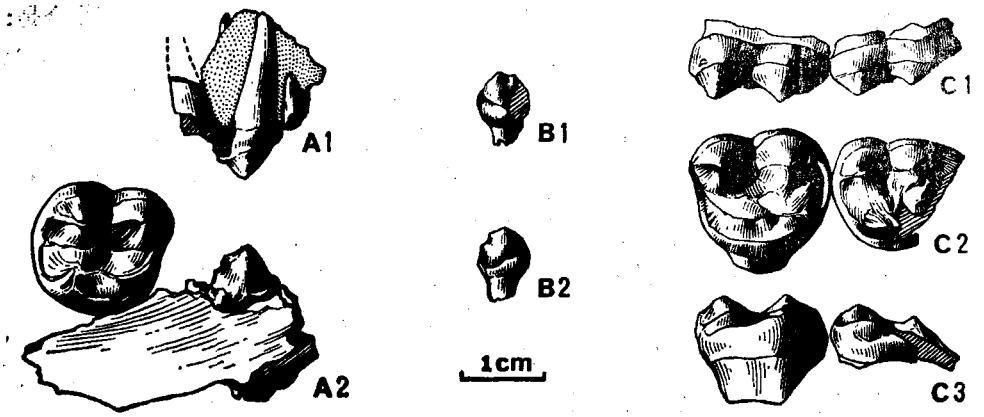

图 1 林祖熊(新种)上颊齿

Fig. 1 *Ursavus sylvestris* sp. nov. upper cheek teeth

A 右 P^4(P^4 dext.) V6894.1 和右 M^1 (M^1 dext.) V6894.4

A1 右 P^4 (P^4 dext.) V6894.1 唇面视 labial view

A2 右 P^4 (P^4 dext.) V6894.1 和右 M^1 (M^1 dext.) V6894.4 冠面视 occlussal view

B 左 P^4 (P^4 sin.) V6894.13, 正型标本 (holotype),

B1 唇面视 labial view; B2 舌面视 linqual view

C 左 M^1 (M^1 sin.) V6894.2 和左 M^2 (M^2 sin.) V6894.3, 正型标本 (holotype), C1 唇面视 labial view,

C2 冠面视 occlussal view; C3 舌面视 linqual view

M_1 1984 年记述过，现补充如下：三角座与跟座相比高大粗壮得多，这在熊亚科中是少有的。下前尖高大，高于下后尖，其后脊短于下原尖的前脊，因此组成不对称的 V 形裂凹。下前尖仅稍斜向舌侧。自下原尖顶向后面和舌面各伸出一脊，二者为弧形，末端几乎交汇于下后尖的外侧，将下原尖的内后缘围成一小舌形面。其中舌侧的一条脊直接与下后尖相连。下后尖高于跟座各尖、特别是高于舌侧的两个尖。所以自舌面看，下后尖和下内尖在高度上差别较大，且中间以凹相隔。但在显微镜下仍可看到此凹处还有一个小尖，并将跟座谷封闭。下后尖的唇侧后面，还有一条微弱的脊，它向下逐渐转向后方，但未达谷底即消失。下次尖粗大，自其尖顶至少伸出四条脊：前面的一条伸向下原尖的后壁，至其基部即消失；后面的一条呈弧形，先向后再向内，并转向舌侧；此外还有一条前内脊和一条后内脊，它们都不至跟座凹底即消失。下内尖高大，锥形。下内小尖低于下内尖。此二尖间有凹，正与次尖相对。三角座和跟座在唇侧分隔不明显，跟座不特别加宽。齿带在此分隔处明显，在三角座唇侧的前半部也微弱可见，其它部位则无(图版 1,6; 图 2,A, B)。

如前所述，在原归入 Ursinae indet. 的材料中另有两个 M_1，它们是一个左 M_1 (V 6894.14) 和一个右 M_1 (V6894.15)，前者产于第五层，后者产于第二层。它们本身无论在大小和形态特征上几乎完全一样，但与上述的 M_1 之间的区别还是明显的：1) 尺寸较小(见表 1)。2) 下前尖很小，低于下后尖，所以它的后脊几乎是水平地向后延伸的，在长度上也只有下原尖前脊的一半。3)三角座不象上述 M_1 的那么高大粗胖，跟座相对较高。

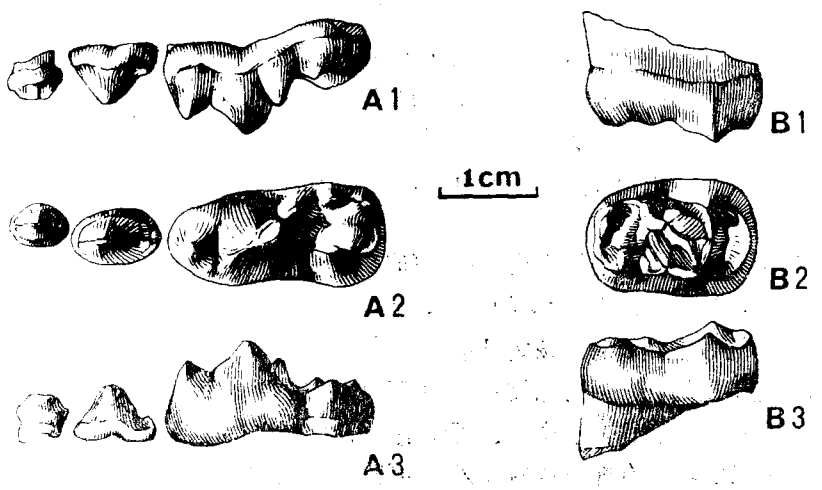

图 2　林祖熊(新种)下颊齿

Fig. 2　*Ursavus sylvestris* sp. nov. lower cheek teeth

A　左 P_3-M_1 (P_3-M_1 sin.) V6894.8, A1 唇面视 labial view; A2 冠面视 occlusal view; A3 舌面视 linqual view

B　右 M_2 (M_2 dext.) V6894.11, B1 唇面视 labial view; B2 冠面视 occlusal view; B3 舌面视 linqual view

下内尖和下后尖之间的高差不显著。下次尖向舌侧有较大的锥形隆起，此隆起与唇侧脊之间有一沟相隔。下内尖与下内小尖分离不显著。整个跟座的舌缘为一条连续的脊将跟座凹封闭。外齿带发育较好些(图版 I, 8;图 3)。

M_2 是 1984 年记述得最详细的一个牙齿。需要补充的只是：它的下后尖的位置比下原尖更靠前，因此下三角座的凹是内窄外宽(图版 I,7; 图 2,B)。

P_4 单尖双根。前脊一直伸至齿冠基部，而后脊伸至冠高的一半突然转向内下方，未达齿冠基部即消失。在转折处的内下方另有一短脊出现，向后延伸达后齿带处。牙齿内外壁的圆隆程度大体上一样。内侧齿带微弱，外侧齿带仅见于牙齿后端。

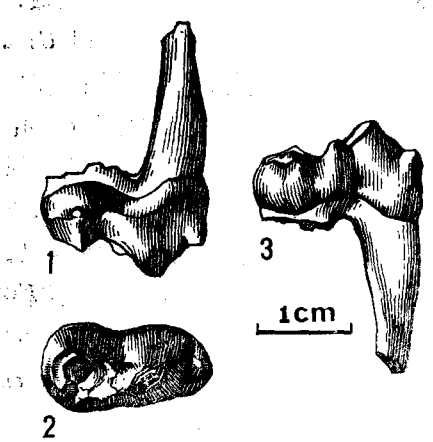

图 3　祖熊(未订种)

Fig. 3　*Ursavus* sp.

左 M_1 (M_1 sin.) V6894.14

1—3 唇面视 labial view; 冠面视 occlusal view; 舌面视 linqual view

前面已提到，V 6894.8 标本中包括一个 P_3。它是否确是 P_3、是否与另外两个牙齿 (P_4 和 M_1) 确属同一个体，还不能十分肯定。但它不会是 P^3，因为在 V6894.1 残破上颌骨上可看到 P^3 的后齿根，显然比这个 P_3 的齿根粗大。因此，如果它不是 P_3 的话，只可能是 P_2 或 P^2 了。它也不

可能是 P^1_1,因为后者是单根的。鉴于我们还有另一个更象 P_2 或 P^2 的牙 (V6894.7),因此我们把这个牙齿仍看作是 P_3。其特征是:齿冠低小,冠高小于冠长。有前、后脊,后脊与 P_4 的相似,有一个拐折和一个短小而独立的后脊。在舌面可以看到一个弱脊将舌面分成前小后大的两个面。纵脊更偏向唇侧,因此舌面宽于唇面。齿带仅在内面隐约可见。齿冠自顶面看前窄后宽。齿根在齿冠下即分开,后面的齿根末端向后歪斜 (图版I,6;图 2, A, B)。

V6894.7 齿冠的形态和上述牙齿一样,可能稍微短点。但它的齿根不分成两个独立的根。自唇侧看,齿根中部有一较深的纵沟,而在舌侧此沟很细很浅。齿根越近末端越细。从齿根愈合的程度判断它应该是 P_2。

V6894.6 是单根的,齿根与齿冠斜交。齿冠细长,唇面凸、舌面平,前脊斜向舌侧。内齿带较发育。齿根上没有沟。这个牙齿可能是 P_1,也不能排除是 P^1。

至于犬齿和 I^3,都具有熊亚科相应牙齿一般的特征,把它们归入本种并不一定可靠 (图版 I,1,5)。

二、比较与讨论

如果上述颊齿(除 V6894.14 和 15)确实属于同一种熊的话,以下几点理由说明它们只可能是 *Ursavus*,而不是 *Ursus*: 1) 它们的 P_2 和 P_3 都是双根的,这是 *Ursavus* 的特点。而最原始的 *Ursus* 其 P_2 和 P_3 也都是单根的。2) 禄丰的 P^4 是三根的,原尖位于裂凹之前,这又是 *Ursavus* 的特征。*Ursus* 的 P^4 只有两根,而原尖后移,至少至裂凹水平。3) M^1 无后附尖,前内角向内收敛,原尖前脊比较直地伸向前尖前脊的基部,唇侧齿带发育,具中凹。这些都是早、中期 *Ursavus* 的原始特征。在 *Ursus* 中,M^1 后附尖总是很大,前内角近直角,原尖前脊主要向前伸,而伸向前尖的部分比较弱,唇侧齿带弱、也不贯穿全齿,唇侧无中凹。4)禄丰的 M_1 三角座高大,裂叶发育。跟座短,跟座凹在舌侧前方封闭,三角座和跟座之间不以宽而深的凹分开。在 *Ursus* 中,M_1 细长,三角座变低,裂叶构造退化,下后尖的位置更靠前,或分为两至多个。分隔三角座和跟座的沟宽大,跟座凹在舌侧前方总是开放的。如果再考虑到禄丰标本 M^2 相对于 M^1 以及 M_2 相对于 M_1 的长度都较小这一特征的话,禄丰这种熊类肯定是 *Ursavus* 无疑了。

现知 *Ursavus* 共有八个种,按其出现时间先后和进化水平排列如下: *U. elmensis* Stehlin, 1917 (欧洲,MN 3—4),*U. intermedius* Koenigswald, 1925 (欧洲, MN 6—7), *U. brevirhinus* Hofmann, 1887(欧洲, MN 5—9), *U. orientalis* Qiu et al., 1985(亚洲, MN5), *U. pawniensis* Frick, 1926 (北美, Barstovian), *U. primaevus* Gaillard, 1899 (欧洲, MN 8—9), *U. depereti* Schlosser, 1902 (欧洲, 9—10), *U. ehrenbergi* Brunner, 1941(欧洲, Turolian)。

禄丰标本与上述前五个种相比,在大小上相差甚远、在形态上要进步得多。因此只需将它们和后三个种进行对比。

Ursavus primaevus 据以建种的标本是产自法国 St. -Alban (MN8) 的 P^4-M^2 和 M_1。大小方面它们比禄丰者稍小。根据 C. Gaillard 的测量(单位: 毫米), P^4: 13 × 8;

M^1: 13 × 12; M^2: 17 × 13; M_1: 20 × 10。禄丰标本相应的尺寸是：13.4 × 8.5; 16.5 × 15.1; —×14 和 20.5 × 9.6。从上述比较可看出，二者牙齿大小上的差别主要表现在 M_1 上。*U. primaevus* 的 P^4 原尖发育正常，禄丰者退化至极小。*U. primaevus* 的 M^1 内齿带特别发育，舌面中部明显向内凸出，以致 Gaillard 将 M^1 形容为近三角形。此外 M^1 上已有小的后附尖了。这两个特点在禄丰标本上都不具备。*U. primaevus* 的 M_1 下前尖低于下后尖，跟座上下次尖之后还有一个下次小尖。这和禄丰的标本也是不同的。在欧洲其他一些地点的化石，如 Wegner 记述的 Oppeln 的牙齿，H. Tobien 记述的 Wißberg 的(原订 *U. depereti*) 以及 M. Crusfont-Pario 和 B. Kurten 记述的采自西班牙 Can Llobaters 的材料等，虽然在大小和形态上与 St. -Alban 者有些差异，但基本的特征稳定与禄丰的标本还是有明显的差别。

Ursavus ehrenbergi 是 J. Brunner 1941 年建立的，但对它进行详细记述的却是 E. Thenius，遗憾的是我们所能看到的只是 Thenius 关于这个种的一个简报 (E. Thenius, 1947)。根据这个简报和其他一些作者关于这个种特征的转述，我们可做以下判断：首先在大小上这个种与禄丰的标本很接近 (见表 1)。这个种颊齿的各尖较为低平，齿冠面上没有小褶皱，P^4 *Ursavus* 型、但脊较钝，上臼齿不特别拉长。这些特征中的某些，如上臼齿不特别拉长、冠面无小褶皱，与禄丰标本是一致或比较接近的。但是禄丰标本的颊齿各尖较高大，而且 P^4 的原尖极为退缩则是与 *U. ehrenbergi* 不同的。

表 1　*Ursavus sylvestris* 颊齿测量(最大长 × 最大宽)与有关种的对比(单位：毫米)

	Ursavus sylvestris	*Ursavus* sp.	*Ursavus primaevus*	*Ursavus depereti*[1]	*Ursavus ehrenbergi*[2]
			(after Crusfont-Pairó et Kurtén, 1976)		
P^4	~13.4×8.5		13.2—16.0×9.0—11.2	19.7—21.3×13.1—14.5	14.5×—
M^1	16.5×15.1				
	16.1×15.1		13.8—15.8×11.8—13.3	18.9—19.9×16.7—17.2	16.5×—
M^2	—×14.0				
P_1	7.2×4.3		15.6—17.2×11.5—12.4	21.3—23.4×15.8—16.2	19.5×—
P_2	5.4×4.1				
P_3	5.5×4.1		9.4—9.6×4.9—5.1		
P_4	8.7×5.6				
	9.0×5.6	18.9×8.6	19.2—21.2×9.5—10.4	23.5×11.4—12.5	
M_1	20.5×9.6	17.9×8.6			
M_2	17.1×11.8		14.2—15.9×9.2—9.9	17.3—17.6×10.6—11.8	

1) 上颊齿产自 Soblay，下颊齿产自 Luzinay、Melchingen。
2) 根据 M. Crusfont-Pairó et B. Kurtén, 1976 表 11 计算得出。

Ursavus depereti 是该属内个体最大的一个种。如果产自 Soblay 的一些上颊齿也肯定是属于这个种的话，那么它也是最为特化的一个种。Schlosser 建种时所依据的材料只是采自德国 Melchiggon 的一个 M_1 和一个 M_2。根据 Schlosser 的测量 (单位：毫米)，M_1: 22.5 × 10; M_2: 16.8 × 10.8。但是根据后来 Frick 的重新测量它们分别是：23.5 × 12.5 和 17.3 × 11.8。从大小看，这两个牙齿中的 M_2 与禄丰相应的标本差不多，

但 M_1 却明显地更大些。在形态上，*U. depereti* 与禄丰标本的差别则相当显著：首先它的 M_1 跟座明显膨大，下前尖低于下后尖，跟座内缘只有一个下内尖，而无下内小尖；还有它的 M_2 在前后方向上相当长，在唇、舌两侧三角座与跟座之间均以凹分开。如果 Soblay 的上牙也是 *U. depereti* 的话，那么二者在上牙方面区别也很明显：它的 P^4 具有三个外侧的齿尖，即多一个前附尖，而且原尖也特别大，并向牙齿中部移；它的 M^1 更引长，在后尖和次尖之间有一横脊将三角凹自后方封闭；M^2 在后尖之后还有第三个小尖，后附尖等。

总之，禄丰标本显示了与 *Ursavus* 已知诸种均不相同的特征，我们把它们订为一个新种：*Ursavus sylvestris*。这个种一方面保留了若干原始性状，例如 P^4 原尖前位，M^1 近方形、没有后附尖，M^2 不特别伸长，M_1 三角座高大、裂叶发育，所有的颊齿齿带都较发育等；另一方面它也有一些相当进步的特征，如 P^4 与 M^1 相比较退化，原尖退缩至很小，前臼齿变得很小，P_2 的双根已愈合成一个根，M_2 相对较长，三角凹非常宽短等。从整体看来，禄丰的这个种可能和 *U. ehrenbergi* 大体处在同一进化水平上。

V6894.14 和 V6894.15 这两个 M_1，以其尺寸较小，跟座内缘尖的分隔弱等特征和上述新种不同。由于材料太少，暂不订种。

这样，原归为 Ursinae indet. 的禄丰标本可记述为以下两类。

熊亚科 Ursinae Flower, 1869

祖熊属 *Ursavus* Schlosser, 1899

林祖熊(新种) *Ursavus sylvestris* sp. nov.

(图1,2; 图版 I,1—7)

1984 Ursinae indet. 祁国琴 PP 55—61

1985 Ursinae indet. 祁国琴 PP 33—43

正型标本 左 M^1 (V6894.2) 和 M^2 (V6894.3, 跟座部分破失) 以及可能与它们属于同一个体的一个左 P^4 的后附尖 (V6894.13)。产自第三层。

归入标本 第三层：1. 可能属于同一个体的右 P^4 (V6894.1, 只有前面多半部分，原鉴定为乳齿)和 M^1 (V6894.4)；2. 可能属于同一个体之右 P_4 (V6894.9) 和 M_1 (V6894.10) 只有三角座部分；3. 一个单个的右 M_2 (V6894.11)；4. 右 P_1 (或左 P^1?，原鉴定为左 P_1, V6894.6)；5. 右 P_2 (或左 P^2?，原鉴定为左 P_2, V 6894.7)；6. 三段犬齿末端 (V6894.5)。第二层：可能属于同一个体的左 P_3-M_1 (V6894.8)。第六层：右 I^3 (V 6894.12)。

时代及层位 云南禄丰古猿地点二至六层，晚中新世晚期。

种的特征 一种体型较大的祖熊。P^4 原尖前位、但很小，无前附尖；M^1 外侧尖高大、圆锥形，无前、后附尖；M^1 和 M^2 都有完整的外齿带，而内齿带发育弱，上颊齿冠面上小褶皱不发育；P_1 单根，P_2-P_4 都较小，双根，但 P_2 的是愈合的；M_1 三角座高大，下前尖的高度仅次于下原尖，裂叶发育，跟座不特别加宽；M_2 三角凹横宽，唇、舌侧三角座与跟座间无中凹。

祖熊(未定种) *Ursavus* sp.

(图版1,8;图3)

1985 Ursinae indet. 祁国琴，PP 33—43

标本　左 M_1 (V6894.14),产自第五层。右 M_1(V6894.15),产自第二层。

特征　M_1 的下次尖在跟座凹内发达成锥状，与唇缘以沟分开，跟座舌缘脊形，下内尖和下内小尖分隔不明显。

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RESTUDY OF MAMMALIAN FOSSILS REFERRED TO URSINAE INDET. FROM *LUFENGPITHECUS* LOCALITY

Qiu Zhanxiang Qi Guoqin

(Institute of Vertebrate Palcontology and Paleoanthropology, Academia Sinica)

Key words Late Miocene; Lufeng; *Ursavus*

Summary

One of the authors of this paper (Qi) described fifteen teeth under the name of Ursinae indet. in 1984. Among these teeth, V. 6894.8 consisting of left P_3, P_4 and M_1 was considered as the same individual, while the rest were treated as isolated teeth. In 1985, Qi also added another three isolated teeth to the assemblage and pointed out that except the large *Indarctos*, the smaller Ursidae fossils from *Lufengpithecus* locality fall into two groups: one with strongly wrinkled crown surface was referred to *Ursavas depereti*. Another with smooth crown surface could not be precisely defined systematically and was temporarily assigned as Ursinae indet.

Reexamination of the two small forms mentioned above has convinced the authors of the present paper that the first small form is an ancestral form of *Ailuropoda*, for which a new genus and species, *Ailurarctos lufengensis*, was given (Qiu and Qi, 1989) and second one is nothing but a true *Ursavus*. It is distinct from all the previously known species of *Ursavus*. The name *U. sylvestris* is given to it. Of the materials described in 1985, the two M_1 (V. 6894. 14 and 15) evidently differ from that of *U. sylvestris* in shape and are referred to *Ursavus* sp.

Supplemental description

In addition to V. 6894. 8, the following isolated teeth are likely regarded as belonging to the same individual, based on color and wear congruence: [1] V. 6894.9 and 10, right P_4 and M_1; [2] V. 6894. 13, metastyle of left P^4 plus V. 6894. 2 and 3, left M^1 and M^2; (3) V. 6894. 1 and 4, right P^4 (broken) and M^1.

Though different in wear degree V. 6894. 2 and 4 (M^1) are almost the same in size and shape. Similarly, the P_4 and M_1 of V. 6894. 9, V. 6894. 10 and V. 6894. 8 are quite identical in size and shape too. In addition, the lower and upper cheek teeth mentioned above are in good accordance as far as their state of preservation and size are concerned. Therefore it is logical to regard all the above-mentioned teeth as belonging to the same species.

As to the rest, a right M_2 (V. 6894. 11), two anterior premolars (V. 6894. 6 and 7), an incisor (V. 6894. 12), three canine fragments (V. 6894. 5), their referal to this species is only conjectural, but quite plausible.

In view of the importance of the carnassials and molars in species determination, we first give a supplemental description as follows:

P^4, no complete tooth is preserved. Of a right P^4 (V. 6894. 1), only the anterior part

of its crown and the roots of which are preserved, the paracone is the highest and largest among the cheek tooth cusps. It is divided into two unsymmetrical halves by a longitudinal ridge. The labial side is bigger and convex. The lingual side is smaller and more or less flat. The posterior ridge extends more lingually than its anterior one, with its posterior end reaching only about half of the crown height. This indicates that the carnassial notch is rather deep and the metastyle seems to incline posteroexternally. The parastyle is lacking. The protocone is a small cone in shape and situated anterior to the carnassial notch. In front of the protocone there is another small cusp, formed by the bulging cingulum. The two cusps are separated by a small notch. The paracone is surrounded by a cingulum on the anterior, internal and external sides. P^4 is three-rooted. The labial two are equal in size. The lingual one is very thin and weak. It is closer to the anterior labial root than to the posterior one. Of another P^4 (V. 6894. 13) only metastyle is preserved. The broken tooth was found from the unnumbered fragments. As the paracone, the metastyle is surrounded by a thin, but clear cingulum on both sides. A small elliptical facet on its posterior side represents the contacting surface with M^1.

M^1 was described in 1984. The following is to be added: Except the antero-external angle which is almost right one, the rest three are all blunt. The lingual margin of the tooth forms a weak curve, without any clear concavity. The paracone and metacone are high and large. A longitudinal ridge runs through their middle. The valley between them is nearly a right angled of V-shape. An obvious labial notch exists between the two cusps. No parastyle and metastyle are discernible. The protocone and hypocone form a continuous ridge. The anterior ridge of the protocone extends to the base of the anterior ridge of the paracone. No continuous ridge between the metacone and hypocone is formed to close the central basin from behind. The cigulum is well developed at the middle notch on the labial side and in front of the hypocone on the linqual side.

M^2 as is usual in Ursavus, the crown is generally lower than that of M^1. Its paracone is lower and smaller than the metacone of M^2, and its metacone is still smaller, but possesses posterior ridges: one extends postero-externally and connects with the labial cingulum, another extends postero-internally first, then slightly turns anterointernally and disappears finally. The labial notch between the two external cusps is less marked than that of M^1. The protocone is ridgeform, the distance between it and the paracone is shorter than that of M^1. The talon is damaged, it does not seem very large judging by its contracted posterior part. The cingulum is similar to that of M^1, as far as its preserved part is concerned.

M_1 was described too in 1984. Only several points are to be supplemented: The trigonid is much higher and robuster than its talonid, which is rare in Ursinae. The paraconid is even higher and larger than the metaconid. The posterior ridge of the paraconid is shorter than the anterior ridge of the protoconid. Therefore, the V-shaped carnassial notch is unsymmetrical. The paraconid inclines a little lingually. Two ridges extend from the top of the protoconid posteriorly and internally respectivelly. They are curved, rejoining towards the metaconid, a tongue-shaped depression on the posterolingual slope of the protoconid. The metaconid is higher than talonid cusps. The metaconid and entoconid are not only diferent in height, but separated by a notch between them. There is a small cusp (discernible under the microscope) in the notch which somewhat closes the talonid basin. Another weak ridge exists on the postero-external surface of the metaconid. It runs down, gradually turns posteriorly and disappears before reaching the bottom of the basin. The hypoconid is quite robust. At

least four ridges extend from its top. The anterior one extends to the posterior wall of the protoconid and disappears at its base. The posterior one is curved. It runs first posteriorly, then turns internally. The Two internal ridges disappear before reaching the base of the talonid. The entoconid is high, large and coniform. The entoconule is lower than the entoconid. There is a cleft between the two cusps just opposite the hypoconid. The separation between the trigonid and talonid is not very clear on the labial side. The talonid is not particularly widened. The cingulum is traceable around the jucture between the trigonid and talonid on the labial side, but very weak or invisible otherwise.

As previously mentioned, among the specimens originally referred to Ursinae indet. a left M_1 from the layer 5 (V. 6894. 14) and a right M_1 from the layer 2 (V. 6894. 15) are similar in size and shape, but differ from the M_1 mentioned above. Their distinct characters are: (1) The size is smaller (see Table 1). (2) The paraconid is even smaller and lower than the metaconid. Therefore its posterior ridge extends almost horizontally and is only a half of the anterior ridge of the protoconid in length. In general, the trigonid is not so robust as in the M_1 mentioned above. The talonid is higher. The entoconid and metaconid are about equal in height. The hypoconid bulges lingually, but the bulge is separated by a small groove from longitudinal ridge of the hypoconid. The division between the entoconid and entoconule is not very marked. The lingual margin of the talonid forms a continuous ridge which encloses talonid basin lingually. The labial cingulum is better developed than the above described M_1.

M_2 was described detailedly in 1984. What we can add is only: Its metaconid is rather anteriorly situated in comparison with the protoconid. As a result, the lingual side of the trigonid is shorter than the labial side.

P_4 is single-cusped and two-rooted. Its anterior ridge extends to the base of the crown. The posterior one extends only a little more than half of the crown height, then rapidly turns internally and disappears before reaching the crown base. There is another short ridge on the postero-lingual side of the turn. It extends posteriorly to the cingulum. The lingual cingulum is weak, but discernible. The labial cingulum can only be seen in its posterior end.

The crown of the P_3 (V. 6894. 8) is lower and smaller. Its height is smaller than its length, with an anterior and a posterior ridge. As in P_4, the posterior ridge also has a turn and a short and independent postero-lingual ridge. Its lingual side is divided by a weak ridge into two faces. The anterior face is smaller than the posterior one. the longitudinal ridge inclines labially. So the lingual half is wider than the labial one. The cingulum can only be seen on the lingual side. Seen from occlusal view, the anterior part is narrower than the posterior one. The root is separated into two. The tip of the posterior root slants posteriorly.

P_2 (V. 6894. 7) is similar to P_3 in crown shape, only a little shorter in length. Its root is not divided into two but there is a deep and vertical groove in the middle on the labial side. A similar, but thin and shallow groove exists on the lingual side too.

P_1 (V. 6894. 6) is single-rooted. The crown is planted obliquely on the root. The crown is thin and long. It is flat lingually and convex labially.

As to the canines and incisor, their referral to this species is only tentative.

Comparison and discussion

If all the above mentioned cheek teeth (except V. 6894. 14 and 15) indeed belong to one

species, they can only be attributed to *Ursavus*. Their Ursavus affinities are shown in: (1) P_2 and P_3 are doublerooted (single-rooted even in the most primitive *Ursus*). (2) P^4 is three-rooted and its protocone is situated anterior to the carnassial notch. This is an important feature of *Ursavus*. In *Ursus*, P^4 is double-rooted and its protocone shifts posteriorly, at least at the level of the carnassial notch. (3) M^1 lacks metastyle. Its antero-internal angle is blunt. The anterior ridge of the protocone extends to the base of the anterior ridge of the paracone. The labial cingulum is developed, with a pronounced middle notch. In *Ursus*, the metastyle of M^1 is always quite large. The antero-internal angle is nearly a right one. The anterior ridge of the protocone mainly extends anteriorly. The part extending to the paracone is weak. The labial cingulum is little developed and does not run through the whole side, without the middle notch. (4) The trigonid of M_1 is high and large and its carnassial lobes are developed. The talonid is short and its basin is closed antero-internally. There is no wide and deep groove between the trigonid and talonid. In *Ursus*, M_1 is thin and long, with a low trigonid and degenerated carnassial lobes. The metaconid is rather anteriorly situated, and divided into two or even more cusps. A wide groove separates the trigonid from the talonid. The basin of the talonid is open. Moreover, if we take the small lengths of M^2 relative to M^1 into consideration, the above described specimens (except V. 6894. 14 and 15) should undoubtedly belong to *Ursavus*.

So far eight species have been known in *Ursavus*. According to the order of their appearance and level of evolution they can be arranged as follows: *U. elemensis* Stehlin, 1917 (Europe, MN 3—4), *U. intermedius* Koenigswald, 1925 (Europe, MN 6—7), *U. brevirhinus* Hofmann, 1887 (Europe, MN 5—9), *U. orientalis* Qiu et al, 1985 (Asia, MN 5), *U. pawniensis* Frick, 1926 (North America, Barstovian), *U. primaevus* Gaillard, 1899 (Europe, MN 8—9), *U. depereti* Schlosser, 1902 (Europe, MN 9—10) and *U. ehrenbergi* Brunner, 1941 (Europe, Turolian). As compared with the first five species, the Lufeng species is much more progressive morphologically, and also larger in size. Therefore what we need is only to compare it with the latter three species.

The specimens based on which *U. primaevus* was erected are one maxilla fragment with P^4-M^2 and one isolated M_1 from St. -Alban (MN8), France. These teeth (especially M^1) are smaller than that of Lufeng species in size (see Table 1); The protocone of P^4 is normally developed (very small in Lufeng species); The lingual cingulum of M^1 is well developed and the middle of the lingual side is strongly projecting inward, with a small metastyle. The paraconid of M_1 is lower than the metaconid. There is still a hypoconule behind the hypoconid in the talonid. In all these features *U. primaevus* differs from those of Lufeng species. Furthermore, the materials once referred to *U. primaevus* from other localities in Europe, such as Opplen, Wißberg and Can Llobaters, although a little different from those of St. -Alban both in size and morphology, remain stable in their basic characters. It is easy to distinguish them from Lufeng specimens.

U. *ehrenbergi* was erected by Brunner in 1941, but Thenius described it in detail. It is a pity that only a brief report on it (Thenius, 1947) is available here. Based on this report and its features mentioned by some authors the following judgements can be made: First, it is very close to the Lufeng species in size (see Table 1); Second, All the cusps of its cheek teeth are lower, without clear wrinkles on crown surface. P^4 is *Ursavus*-type, but its ridges are more blunt. The upper molars are not elongated. Probably the most distinctive features of our new species from *U. ehrenbergi* are the comparative height of the cusps of the cheek teeth and

the strong reduction of the P^4 protocone.

U. depereti is the largest and the most specific species of the genus *Ursavus*. It was erected by Schlosser on the basis of a M_1 and M_2. The talonid of M_1 is obviously robust, its paraconid is lower than its metaconid; The trigonid of M_1 is long antero-posteriorly, there are notches between the trigonid and talonid on both sides. All these are different from those in Lufeng specimens. If the upper teeth from Soblay also belong to *U. depereti*, then the upper teeth of *U. depereti* differ clearly from those of Lufeng species as well. There are three labial cusps. (i.e. it has a parastyle on its P^4). The protocone is particularly large and situated at the middle of the lingual side. The M^1 is more elongated and its trigone basin is enclosed by a transverse ridge between the metacone and hypocone from behind. There is still a small metastyle behind the metacone in M^2.

In a word, it is shown that the Lufeng species is distinct from any known species of *Ursavus*. For it we erect a new species, *U. sylvestris*. It is possible that this species and *U. ehrenbergi* are at about the same level of evolution.

It is to be mentioned here that the two M_1, V. 6894. 14 and 15, show some characters (such as the size is smaller, the weak separation of lingual cusps and so on) somewhat distinctive from our new species.

In result, the specimens once referred to Ursinae indet. in 1984 and 1985 can be described as the following two forms:

Ursinae Flower, 1869

Ursavus Schlosser, 1899

Ursavus sylvestris sp. nov.

(Fig. 1, 2; Pl. 1, 1—7)

1984 Ursinae indet. Qi Guoqin, pp 56—61

1985 Ursinae indet. Qi Guoqin, pp 33—43

Holotype Left M^1 (V. 6894. 2), Left M^2 (V. 6894. 3) (talon damaged), and left P^4 (V. 6894. 13) (only metastyle preserved). All of them are from the layer 3 and belong to the same individual.

Referred specimens From the layer 3: (1) Right P^4 (V. 6894. 1) (only anterior half preserved) and right M^1 (V. 6894. 4) belonging to the same individual; (2) Right P_4 (V. 6894. 9) and right M_1 (V. 6894. 10) (only trigonid preserved); (3) Right M_2 (V. 6894. 11); (4) Right P_1 (V. 6894. 6) (or left P^1?, originally regarded as leftP_1); (5) Right P_2 (V. 6894. 7) (or left P^3? originally regarded as left P_2). (6) three canine fragments (V. 6894. 5). From the layer 2: Left P_3-M_1 (V. 6894. 8) From the layer 6: Right I^3 (V. 6894. 12).

Age and horizon Lufengpithecus locality, Lufeng, Yunnan, layers 2—6; Late Miocene.

Diagnosis A larger species of *Ursavus*. P^4 characterized by very small and rather anteriorly situated protocone, no parastyle; In $M^1$the labial cusps are high, large and coniform, without parastyle and metastyle; M^1 and M^2 are provided with complete labial cingulum, but lingual cingulum weak, there are no distinct, wrinkles on the crown surface; P_1 is single-rooted, P_2-P_3 are small and double-rooted, but in P_2 the two roots are fused; M_1 has high and large trigonid, its paraconid is only lower than the protoconid, the carnassial lobes are developed, the talonid is not widened; In M_2 the trigonid valley is wide transversely. There are no

notches betwwen the trigonid and talonid on both sides.

Ursavus sp.

(Pl. I, 8; Fig. 3, 3)

1985 Ursinae indet. Qi Guoqin, pp 33—43

Specimen Left M_1 (V. 6894. 14) from the layer 5. Right M_1 from the layer 2 (V. 6894. 15).

Distinctive features The hypoconid has a bulging cusps on its lingual surface which is separated by a groove from the longitudinal ridge of the hypoconid. The lingual bordor of talonid is ridge-form. The division between the entoconid and entoconule is not obvious.

图　版　说　明

1—7 林祖熊(新种) ***Ursavus sylvestris sp. nov.***

1.右 I^3 (I^3 dext.) V6894.12 × 1.5

a 唇面视 labial view b 冠面视 occlusal view c 舌面视 lingual view

以下均为立体照片 (stereoscope) × 1.5，冠面视 occlusal view

2.右 P^4 (P^4 dext.) V6894.1 和右 M^1 (M^1 dext.) V6894.4

3.左 P^4 (P^4 sin.) V6894.13, 正型标本 (Holotype)

4.左 M^1 (M^1 sin.) V6894.2 和左 M^2 (M^2 sin.) V6894.3 正型标本 (Holotype)

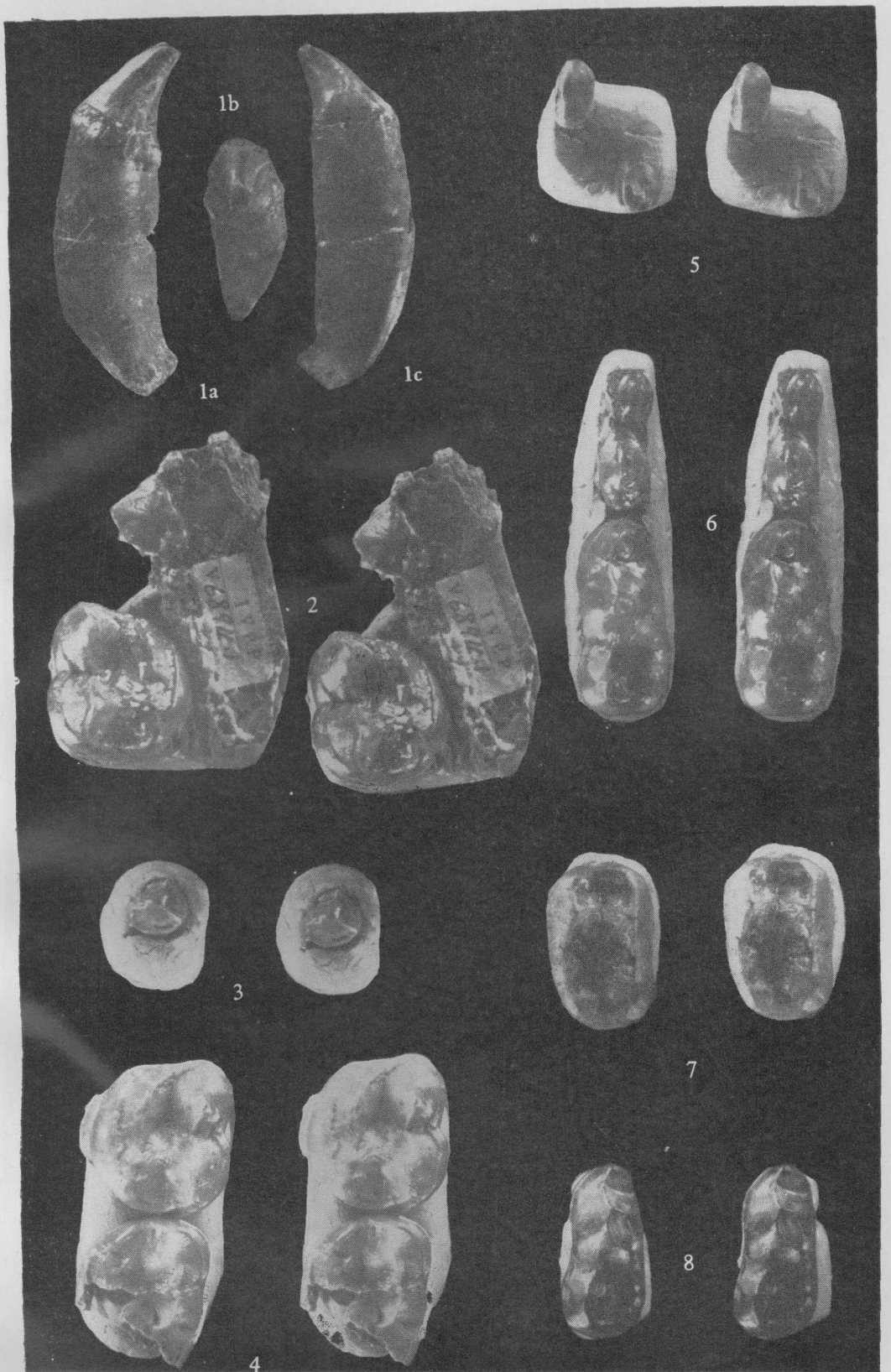
5.左 P_1 (P_1 sin.) V6894.6 和右 P_2 (P_2 dext.) V6894.7

6.左 P_3-M_1 (P_3-M_1 sin.) V6894.8

7.右 M_2(M_2 dext.) V6894.11

8.祖熊(未订种) ***Ursavus sp. indet.***

立体照片 (stereoscope) × 1.5，冠面视 occlusal view 左 M_1 (M_1 sin.) V6894.14


1b
1a
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