第33卷 第1期 古脊椎动物学报 Vol. 33, No. 1
1995 年 1 月 VERTEBRATA PALASIATICA Jan., 1995

江苏泗洪下草湾中中新世脊椎动物群
——9. 鼠兔科(哺乳纲,兔形目)[1)]

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摘要 江苏泗洪松林庄、双沟和郑集早中新世(山旺期,约与欧洲新第三纪陆相哺乳动物分带 MN4 相当)的新种泗洪跳兔 *Alloptox sihongensis* sp. nov. 是迄今为止该属中出现最早、个体最小的种。该种已有较明显的形态分化。主要表现在 p3 上。p3 在形态和大小上可分为两类。第一类个体较大,珐琅质厚度分化较明显,个别 p3 的下后尖前端已呈圆钝的角状,具有两个前外沟。第二类个体较小,珐琅质厚度分化较差,下后尖前端浑圆,仅具一个前外沟。由于对 *Alloptox* 的系统进化尚无足够的了解,现将其作为同一个种处理。根据上下齿列尤其是 p3 的形态分析,推测 *Alloptox* 可能由晚渐新世的 *Sinolagomys ulungurensis* 或与其相近的鼠兔进化而来。

关键词 江苏泗洪,早中新世,鼠兔科

本文记述了采自江苏泗洪松林庄、双沟和郑集早中新世下草湾组中的 *Alloptox* 一新种。这里描述的材料是邱铸鼎、顾玉珉、周正、曹强和笔者等人在 1982 年及 1983 年两次在江苏省泗洪县双沟镇淮河引河北岸以筛洗法,在松林庄和郑集以粉碎和筛洗钙质砾岩的方法采得。共有标本 113 件(松林庄 68 件,双沟 27 件,郑集 18 件)。除个别颌骨残块外,几乎全为零散牙齿。关于这些地点的地质地层概况参见李传夔等(1983)及邱铸鼎等(1986)的文章。与其他门类化石一样,这三个地点的兔类化石并无明显的进化水平上的差别,因此仍把他们放在一起作为一个居群描述,但标本测量数据和插图按地点分开。

测量数据是在 Wild M7A 的实体显微镜下放大 10 倍测得。插图是在该镜下以反光绘图仪绘制成。所有牙齿都表现为左侧齿,凡原标本为右侧者,都在图下方标以"inv." 字样。

对鼠兔牙齿的描述,至今尚无统一的术语。这里暂沿用吴文裕等(1991)使用的术语(图 1)。

邱占祥,顾玉珉, 1991. 江苏泗洪下草湾中中新世脊椎动物群. ——8. *Dorcatherium* (Tragulidae, Artiodactyla). 古脊椎动物学报, **29**(1): 21—37.

1) 本文是《江苏泗洪下草湾中中新世脊椎动物群》系列文章之一。1990 年邱占祥等根据欧洲新第三纪陆相哺乳动物分期的划分,将下草湾动物群也归入早中新世,但该动物群在排序中的相对位置并未改变。本文采纳这种划分,但仍保留原系列文章命题。

收稿日期: 1994-08-26

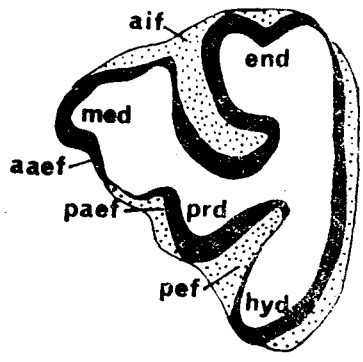

图 1 本文使用的关于 *Alloptox* 的 p3 的术语图解

Fig. 1 Schematic explanation of the terminology of p3 of *Alloptox* used in the present paper

aaef. anterior anteroexternal fold 前前外沟; aif. anterointernal fold 前内沟; end. entoconid 下内尖; med. metaconid 下后尖; paef. posterior anteroexternal fold 后前外沟; pef. posteroexternal fold 后外沟; prd. protoconid 下原尖; hyd. hypoconid 下次尖

兔形目 Lagomorpha Brandt, 1885

鼠兔科 Ochotonidae Thomas, 1897

跳兔属 *Alloptox* Dawson, 1961

泗洪跳兔(新种) *Alloptox sihongensis* sp. nov.

(图 1—6)

正型标本 右 p3(V8840.7)。

副型标本 dp3(V8840.1); 3p3(V8840.3,5,6); 1p4(V8840.9); 2m1/m2(V8840.12, 16); 一左下颌断块带 p4(V8840.18); 一右下颌前段带 i2 及 p3—p4 (V8840.24); 2I2 (V8840.21, 23); 4P3(V8840.31—33, 56); P4(V8840.27); 一左上颌断块带 P3—M1 (V8840.57); 2M2(V8844.50, 53)。

模式地点 江苏省泗洪县松林庄。

时代与层位 早中新世,山旺期,相当于欧洲新第三纪陆相哺乳动物分带 MN4; 下草湾组。

种名由来 Sihong, "泗洪"的汉语拼音。泗洪是该种的模式地点所在县。

种的特征 迄今最小型的跳兔 *Alloptox*。通常珐琅质厚度分化较差; 白垩质不甚发育; p3 的下后尖前端浑圆,并仅有一个前外沟。

归入标本 松林庄 (V 8840)——48 枚零散牙齿: 3p3 (V 8840.2 仅保留跟座部分, V8840.4,8); 3p4(V8840.10,14,15); 4m1/m2(V8840.11, 13, 17, 26); 4I2(V8840.19—20,22,25); 5P3(V8840.28—30,55,58); 21P4/M1(V8840.34—37, 39—46, 49, 51, 52, 59—63,68); 8M2(V8840.38,47,48,54,64—67)。

双沟 (V 8841)——27 枚零散牙齿: 1dp3 (V 8841.1); 2p3 (V 8841.2—3); 2p4 (V

8841.4—5)；2m1/m2 (V 8841.6,27)；4I2 (V 8841.7—10)；1DP3 (V 8841.11)；5P3 (V 8841.12—16)；1P4(V8841.17)；7P4/M1(V8841.18—23,25)；2M2(V8841.24,26)。

郑集 (V8842)——18 枚零散牙齿：4dp3 (V8842.1—3, 13，其中 V 8842.1 破碎)；5p3(V8842.4—6, 14—15, 3 枚为残块)；3dp4 (V8842.7—9)；2DP3 (V8842.10, 16)；2DP4(V8842.11—12)；2P4/M1(V8842.17—18)。

归入标本的时代与层位　早中新世，山旺期；下草湾组。

测量数据(毫米 mm)：

(1) 松林庄 (Songlinzhuang)

	标本数 (N)	范围 (Range)	均值 (Mean)
I2	6	1.08—1.50 × 0.85—1.27	1.32 × 1.07
DP4	1	0.98 × 1.37	
P3	9	1.19—1.51 × 1.56—2.74	1.38 × 2.16
P4/M1	18/14	1.18—1.56 × 1.76—2.65	1.38 × 2.21
M2	10/10	0.99—1.47 × 1.61—2.24	1.32 × 2.02
dp3	1	1.37 × 1.07	
p3	6/7	1.17—1.56 × 1.17—1.56	1.34 × 1.32
p4	6/6	1.38—1.94 × $\frac{1.27—1.76}{1.47—1.79}$	1.60 × $\frac{1.49}{1.60}$
m1/m2	6/6	1.27—1.70 × $\frac{1.27—1.76}{1.17—1.86}$	1.54 × $\frac{1.48}{1.48}$

(2) 郑集 (Zhengji)

	标本数 (N)	范围 (Range)	均值 (Mean)
DP3	2	0.88—0.99 × 1.37—>1.86	0.94 × ca.1.62
DP4	2	0.98 × 1.56—1.71	0.98 × 1.64
P4/M1	1	1.07 × 1.47	
M2	1	1.00 × $\frac{1.37}{1.07}$	
dp3	3	1.37- 1.47 × 1.08—1.39	1.44 × 1.28
p3	2	1.28—1.47 × 1.38—1.47	1.38 × 1.43
dp4	3	1.08—1.22 × $\frac{0.98—1.07}{0.98—1.12}$	1.14 × $\frac{1.01}{1.03}$

(3) 双沟 (Shuanggou)

	标本数 (N)	范围 (Range)	均值 (Mean)
I2	4	1.51—1.69 × 1.37—1.66	
DP3	1	1.07 × 1.37	
P3	5	1.23—1.56 × 2.05—2.54	
P4	1	1.09 × 1.66	
P4/M1	8/7	0.99—1.50 × 1.81—2.35	1.33 × 2.16
M2	1	1.17 × 1.76	
dp3	1	1.37 × 1.17	
p3	2	1.27—1.66 × 1.51—1.76	1.47 × 1.64
p4	2	1.56—1.61 × $\frac{1.27—1.56}{1.37—1.71}$	1.59 × $\frac{1.42}{1.52}$
m1/m2	2	1.51—1.76 × $\frac{1.51—1.52}{1.37—1.56}$	1.64 × $\frac{1.52}{1.47}$

描述　正型标本右 p3(V8840.7；图 2b)，1.27 × 1.30，齿柱高 4.5mm。齿柱直，冠面具 *Alloptox* 属的一般牙齿型态。嚼面呈圆钝的三角形。下后尖唇—舌向拉长，其前端呈均匀光滑的圆弧。唇侧仅具一个前外沟。前内沟平行齿纵轴向后延伸较深。下内尖

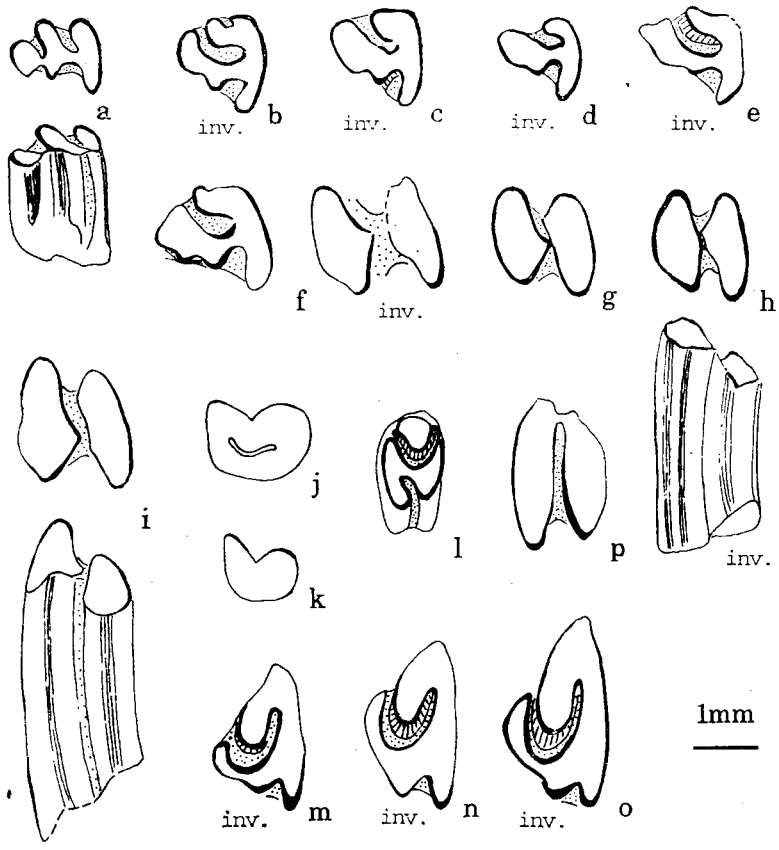

图 2 江苏泗洪松林庄的泗洪跳兔(新种) *Alloptox sihongensis* sp. nov. (V8840)

Fig. 2 *Alloptox sihongensis* sp. nov. from Songlinzhuang (V8840)

a. dp3 sin V8840. 1, 副型标本 (paratype); b. p3 dex V8840. 7, 正型标本 (holotype); c. p3 dex V8840. 6, 副型标本 (paratype); d. p3 dex V8840. 3, 副型标本 (paratype); e. p3 dex V8840. 5, 副型标本 (paratype); f. p3—p4 dex V8840.24, 副型标本 (paratype); g. p4 sin V8840.9, 副型标本 (paratype); h. m1/m2 dex V8840. 16, 副型标本 (paratype); i. m1/m2 sin V8840. 12, 副型标本 (paratype); j. I2 sin V8840. 21, 副型标本 (paratype); k. I2 sin V8840. 23, 副型标本 (paratype); l. P4 sin V8840. 27, 副型标本 (paratype); m. P3 dex V8840. 33, 副型标本 (paratype); n. P3 dex V8840. 31, 副型标本 (paratype); o. P3 dex V8840.56, 副型标本 (paratype); p. M2 sin V8840.50, 副型标本(paratype) 除 a,h 和 i 为冠面及唇面视外,均为冠面视 a,h and i show occlusal and labial views, the remains occlusal views

内侧具一较深的沟。该沟与前内沟、后外沟内都为白垩质所充填。前外沟内未见白垩质。齿冠向底部渐大,基部尺寸为 1.60 × 1.56。牙齿珐琅质分化程度不高,仅前外沟、前内沟的后内段和后外沟的后壁稍薄。该牙齿磨蚀很浅,前外沟和后外沟之间的下原尖的顶部珐琅质尚未被全部磨蚀掉。

松林庄的副型标本——左 dp3(V8840.1; 图 2a), 具 *Alloptox* 的一般形态。1.37×1.07。

三枚稍经磨蚀的 p3(V8840.3,5,6；图 2d,e, c)，1.17—1.48 × 1.17—1.40；齿柱高 4.89—5.93，明显向内向后弯曲。下后尖窄长(2 例)或唇舌向拉长(1 例)，前端略角型(1 例)或浑圆(2 例)，仅具一个前外沟(2 例)或两个很浅的前外沟(1 例)。下内尖内壁上的内沟有(1 例)或无(2 例)。前内沟直指向后方或其后端稍向内弯。其它特征同正型标本。

右下颌骨前段带 i2 及 p3—p4(V8840.24；图 2f)。下颌在 P4 内侧高度约 8.7mm，颏孔位于 p3 前缘约在下颌一半高度处。p 3 尺寸 1.56 × 1.56，显然大于其它标本。下后尖前端略尖，具两个前外沟，前面的前外沟较浅。前内沟向后延伸较浅，其后端稍向内弯。下内尖内侧有一浅沟。除前内沟及后外沟内有白垩质充填外，从齿柱侧面看，前外沟和下内尖内侧沟内都有白垩质充填。珐琅质厚度分化较明显：下后尖内壁、后外沟后壁及前内沟后端明显变薄。p4 珐琅质厚度分化也较明显，前叶后壁明显增厚。

一左 p4 (V 8840.9；图 2g)。1.38 × 1.27 (前叶宽) × 1.47 (后叶宽)。具一般鼠兔 p4 的特征，齿柱直，前叶后壁为明显的向后突的“V”形。齿柱基部明显加宽，前叶宽 1.41，后叶宽 1.56。珐琅质分化不强，仅前叶后壁显厚，前后叶之间稍有白垩质充填。

两左 m1/m2(V8840.12,16,；图 2i,h)。齿柱微向后弯曲，底部仅稍加宽。珐琅质分化不明显。前叶后壁呈宽“V”形向后突出。这两齿大小相差较明显。

两左 I2(V8840.21,23；图 2j,k)。此两齿大小相差悬殊，具 *Alloptox* 门齿的一般形态。

P3(V8840.31—33,56；图 2m,n, o)。同 *Alloptox* 的一般形态，但其前后叶宽度比不一，为 0.43—0.64。

一年轻个体的左 P 4 (V 8840.27；图 2l)，齿柱很短，与宁夏同心黄家水沟 26 层的 V8833.27 中的 P4 (吴文裕等，1991，插图 IV，图 8) 和套子梁的 V8836.20 (吴文裕等，1991，插图 VI，图 13) 形态一样，但磨蚀程度较深。因此前后叶间的唇侧齿柱经磨蚀后成不规则的珐琅质圈。

左上颌断块带 P3—M1(V8840.57)。该标本个体较大。P3 1.48 × 2.74，P4 1.48× 2.36。M1 破损。

M2(V8840.50,53；图 2p)，与宁夏同心 M2 的形态相同，前叶明显宽于后叶，此两枚 M2 尺寸相差较大。

归入标本——应该强调的是，在归入标本中郑集的一枚不完整的右 p3(V8842.6；图 3c) 和双沟的一枚左 p3(V8841.3；图 4b)，尺寸都较大。珐琅质厚度分化较明显，前内沟的内外壁、后前外沟的后壁及后外沟前内壁明显地较其它部分珐琅质厚。下后尖的前端浑圆，唇舌侧方向拉长。显然有两个前外沟，前前外沟较浅。下内尖内侧有一浅的内沟。除前前外沟外，所有齿沟内都有白垩质充填。其余 p3 仅有一前外沟，下后尖唇一舌向拉长(3 例)或窄(3 例)，前端浑圆。

双沟的一枚右 DP3(V8841.11；图 4h)，齿冠低，尺寸较小(1.07 × 1.37)，并有明显的齿根——一粗壮的舌侧和两较细弱的唇侧齿根，但后唇侧齿根缺损。次沟位于中央新月形窝的前翼的前方。中央齿柱的前后向轴较短。郑集的两枚 DP3，V8842.10 (图 3f) 及 V8842.16 (0.99 × >1.86；0.88 × 1.37)，形态与双沟者相似，但 V8842.10 很宽。次沟约

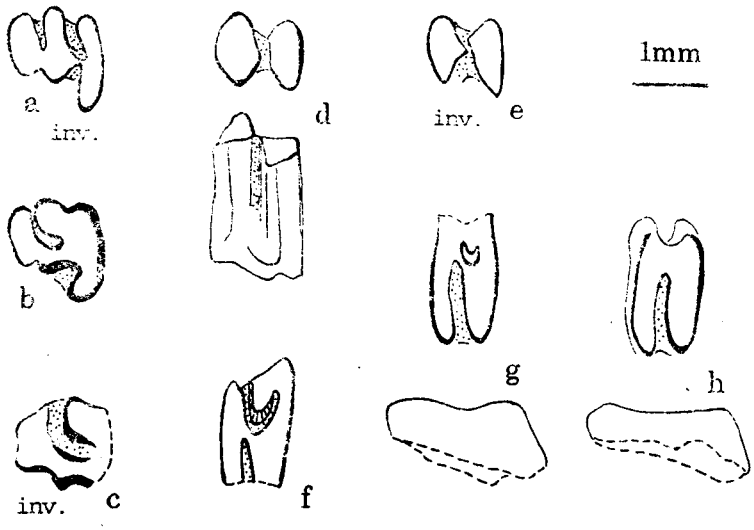

图 3 江苏泗洪郑集的泗洪跳兔(新种) *Alloptox sihongensis* sp. nov. (V8842)

Fig. 3 *Alloptox sihongensis* sp. nov. from Zhengji (V8842)

a. dp3 dex V8842. 3; b. p3 sin V8842. 5; c. p3 dex (fragment), V8842. 6; d. dp4 sin V8842. 7; e. dp4 dex V8842. 9; f. DP3 sin V8842. 10; g. DP4 sin V8842. 11; h. DP4 sin V8842. 12

d 图为冠面和唇面视，其余均为冠面视 All figures but d show occlusal views, fig. d occlusal and labial views

为齿宽的一半。一枚稍经磨蚀的左 P4 (V8841.17; 图 4i) 形态与宁夏同心黄家水沟 26 层和西黄家水沟 26 层的一样。

仅有的两枚采自郑集的 DP4(V8841.11,12; 图 3g,h)，尺寸小、齿冠低。磨蚀较轻的一枚 DP4 的嚼面上的后叶唇侧有一新月形窝。

测量数据表明泗洪的 *Alloptox* 是该属中平均最小的种(参阅吴文裕等 1991 表 2)。

比较与讨论 1. 种的归属 江苏泗洪三个地点的 *Alloptox* 在形态上已发生明显的分化。这一分化主要表现在 p3 上。总共 15 枚 p3 在形态和大小上可分为两类。第一类个体较大，在散点图(图 5)上分布在右上方。珐琅质厚度分化较明显。下后尖窄或向两侧拉长,前端浑圆或呈略圆的角,具有两个前外沟。下内尖内侧有一浅内沟。此类仅以四枚牙齿为代表——V8840.5,24, V8841.3 和 V8842.6 (图 2e,f; 4b 和 3c)。第二类个体较小,在散点图上分布在左下方。珐琅质厚度分化较差。下后尖窄或向侧方拉长,其前端都很浑圆，仅具一个前外沟。除以上四枚牙齿外都可归入此类。在此两类中前内沟的延伸方向均为向后直伸或先伸向后外然后末端稍向内弯,但前一类多内弯，后一类多直伸。此两类齿的白垩质都不甚发育,大部分的前外沟内无白垩质充填。

吴文裕等(1991)在研究宁夏同心的 *Alloptox* 时，通过对已知的各个种的形态分析认为 p3 和 P2 在 *Alloptox* 的种的划分和系统进化方面都具有重要意义，并认为"较简单的、窄而前端圆、仅具一个前外沟的下后尖和向后直伸的前内沟代表了该属的原始性状;前端角状、轮廓近似横宽菱形、具两个前外沟的较复杂的下后尖及向后内方拐的前内

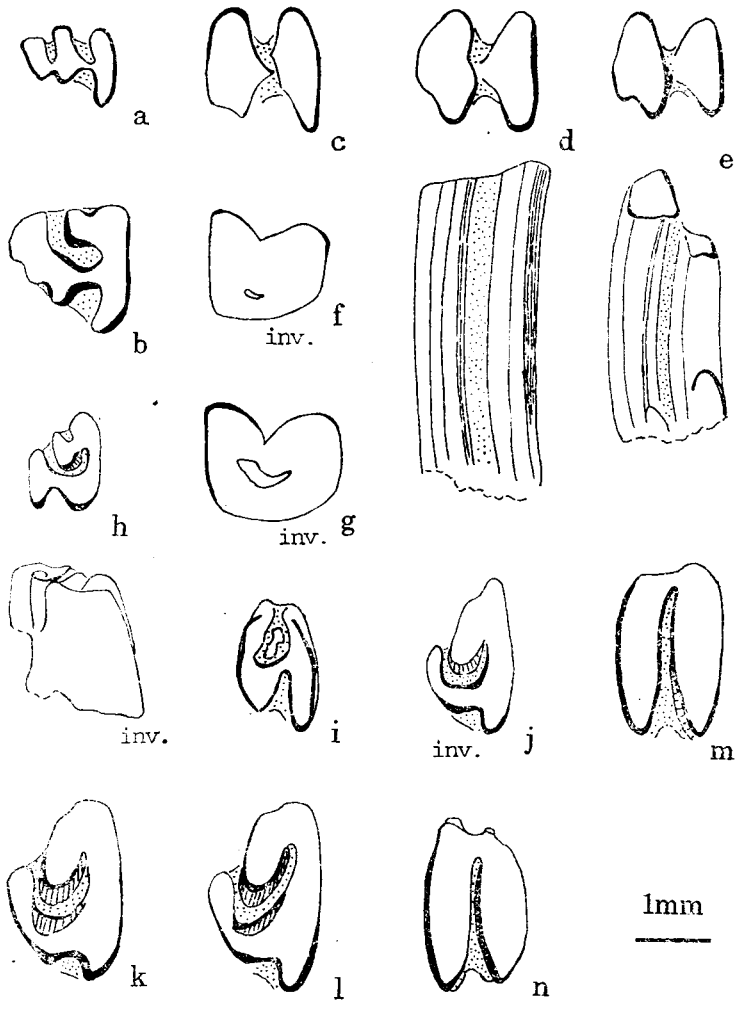

图 4　江苏泗洪双沟的泗洪跳兔(新种) *Alloptox sihongensis* sp. nov. (V8841)

Fig. 4　*Alloptox sihongensis* sp. nov. from Shuanggou(V8841)

a. dp3 sin V8841. 1; b. p3 sin V8841. 3; c. p4 sin V8841.4; d. m1/m2 sin V8841. 6; e. m1/m2 sin V8841. 5; f. I2 dex V8841. 8; g. I2 dex V8841.9; h. DP3 dex V8841. 11; i. P4 sin V8841.17; j. P3 dex V8841. 16; k. P3 sin V8841.12; l. P3 sin V8841.13; m. P4/M1 sin V8841.20; n. M2 sin V8841.24

d 和 e 为冠面和唇面视；h 为冠面和前面视；其余均为冠面视

d and e display occlusal and labial views; h shows occlusal and anterior views; The remains are occlusal views

沟是该属的衍生性状"。还推测 p3 在进化过程中"某些适应性进化较强的种的下后尖横向拉得更长，珐琅质厚度分异更明显，前端加厚并出现两个前外沟，形成角状前缘。"(219 页)

显然，在江苏泗洪三个地点的所有 15 枚 p3 (14 枚单个的及一枚位于下颌上的) 中大部分表现出原始性状：珐琅质分化较差，下后尖前缘不加厚；下后尖窄或侧方拉长，前

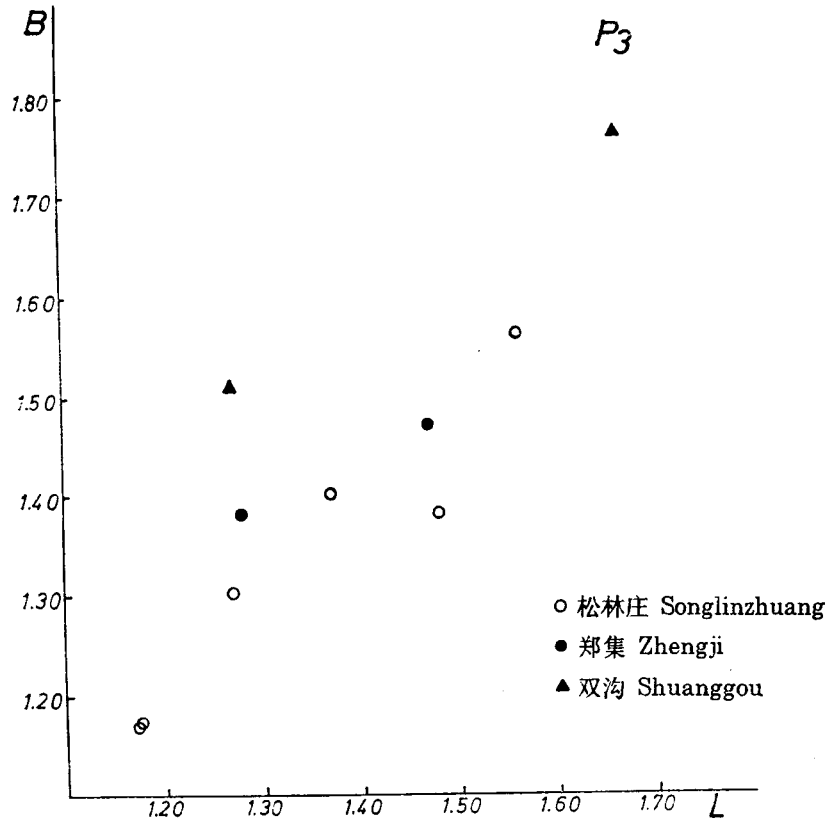

图 5 松林庄、郑集和双沟的 *Alloptox sihongensis* 的 p3 的长宽散点图

Fig. 5 The length-width scatter diagram of p3 of *Alloptox sihongensis* from Songlinzhuang, Zhengji and Shuanggou

端浑圆，仅具一个前外沟；前内沟多向后直伸；此外，平均尺寸小于所有的已知种。小部分标本具一定的进步性状：珐琅质分化较明显，下后尖前端呈圆钝的角状，具两个前外沟；前内沟后端内弯；所有牙齿的白垩质不太发育，也是一种原始性状。

对于泗洪的 *Alloptox* 在形态和大小上的分化的性质可以有两种解释。(1) 泗洪的 *Alloptox* 是一个处于进化过程中的种，表现在该居群中既有具原始性状的个体，又有具进步性状的个体，在形态上渐变和镶嵌。(2)它正处于向两个支系分化的过程或已分化为两个支系(两个种)。由于所有已知的 *Alloptox* 各个种，除 *A. gobiensis* 外，所拥有的标本都很少，关于地史和地理分布的信息度还不足以使我们对该属的系统发育作出肯定的分析和判断。目前，我们暂将泗洪的 *Alloptox* 作为一个种。由于在形态和大小上有别于其它各种，命名为新种 *Alloptox sihongensis*。它是目前在该属中出现时间最早、尺寸最小和形态原始的种。

2. 关于 *Alloptox* 的起源，邱铸鼎(1987)在研究内蒙古二登图和哈尔鄂博晚中新世及最早上新世的兔形类时曾有保留地推测，跳兔 *Alloptox* 是与链兔 *Desmatolagus* 更相近的兔类 (textfig. 148)，并认为中华鼠兔 *Sinolagomys* 不太可能是晚期鼠兔的直接祖

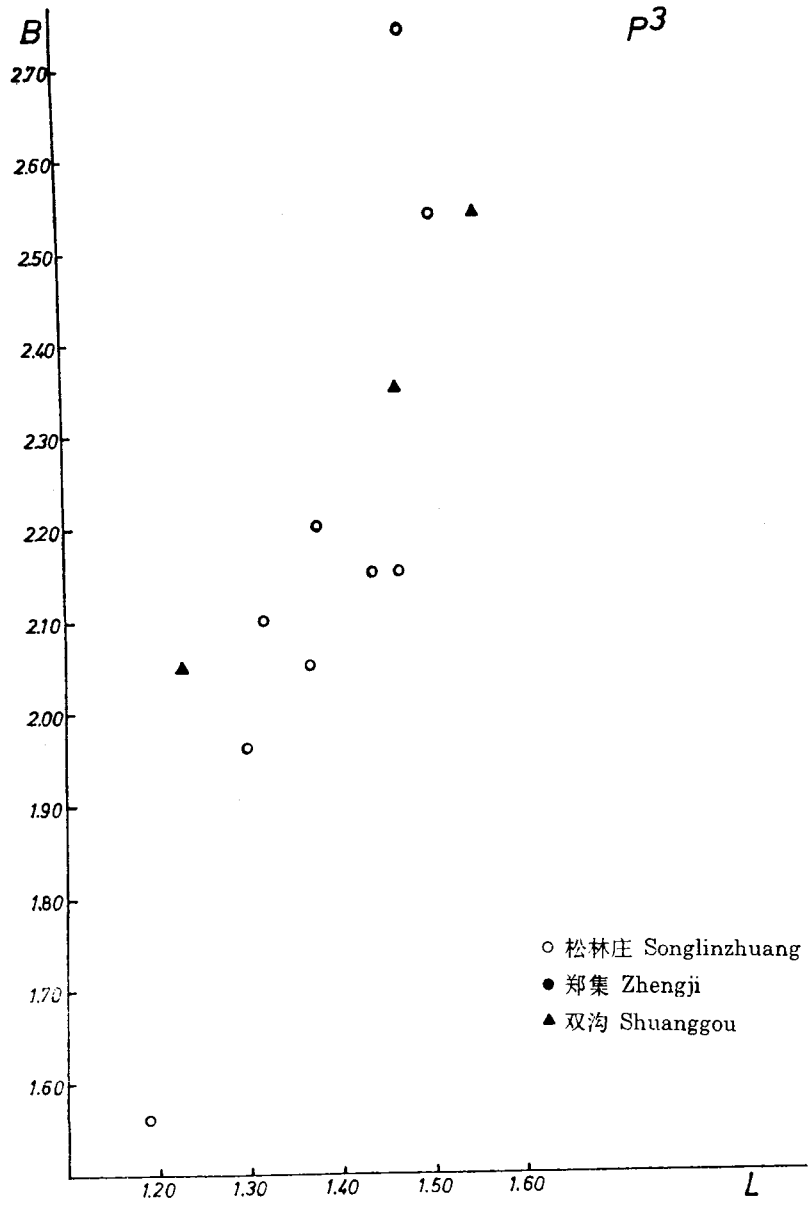

图 6　松林庄、郑集和双沟的 *Alloptox sihongensis* 的 P3 的长宽散点图

Fig. 6　The length-width scatter diagram of P3 of *Alloptox sihongensis* from Songlinzhuang, Zhengji and Shuanggou

先(参见邱 1987，396 页)。

童永生(1989)研究了新疆北部乌伦古河北岸晚渐新世索索泉组中丰富的中华鼠兔化石材料，建立了新种乌伦古中华鼠兔 *Sinolagomys ulungurensis*。此后王伴月等(1990)在内蒙古阿拉善左旗乌尔图地区的早中新世地层 (MN3) 中发现有这个种的相似种

S. cf. *ulungurensis*。无论从上颊齿或下颊齿的形态来看乌伦古中华鼠兔与 *Alloptox* 都很接近。*S. ulungurensis* 的 p3 已有了前内沟、后外沟和下内尖的内侧沟的雏形。内蒙古乌尔图的 *S.* cf. *ulungurensis* 的 p3 的前内沟和后内沟更为发育。此外 p4—m3 和 P3—M2 的形态也是很接近的(参见童永生 1989,图 4)。

黄学诗(1987)在描述内蒙古乌兰塔塔尔中渐新世的鼠兔化石时，总结了链兔和中华鼠兔在牙齿形态上的主要差别。除 p3 的形态不同外,链兔的中间下颊齿的跟座窄长,年轻个体具后褶沟，m 3 双叶。链兔的中间上颊齿具原始结构如新月形谷，次沟短。中华鼠兔的中间下颊齿的跟座短宽、无后褶沟，m3 单叶；其中间上颊齿不具原始结构，次沟长。由此可见 *Alloptox* 在中间颊齿特征上是与中华鼠兔一致的,而与 *Desmatolagus* 相距很远，*Alloptox* 有可能是由 *Sinolagomys ulungurensis* 或与它相近的种进化而来。

致谢 作者感谢王伴月教授提供尚未详细研究的内蒙古乌尔图的对比标本。感谢童永生、王伴月、邱铸鼎和郑绍华等教授阅读初稿,提出宝贵意见。

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THE ARAGONIAN VERTEBRATE FAUNA OF XIACAOWAN, JIANGSU —— 9. OCHOTONIDAE (LAGOMORPHA, MAMMALIA)

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Key words Sihong, Jiangsu, Early Miocene, Ochotonidae

Summary

A new species of *Alloptox* is described in this paper. All the material was gathered from three localities (Songlinzhuang, Zhengji and Shuanggou) of Sihong County, Jiangsu Province. For detailed information on geological and stratigraphical background and others the reader is referred to Li *et al.* (1983) and Qiu and Lin (1986). Almost all here described 113 specimens (Songlinzhuang 68, Shuanggou 27, Zhengji 18) are isolated teeth with exception of three fragments of upper and lower jaws with few teeth. All specimens of these three localities are treated as members of one and the same population. However the measurements and figures of specimens from each locality are separately represented. The figures are represented as left ones, the abbreviated word "inv." is used under the figures of right teeth. All specimens are stored in IVPP under the inventory numbers V8840—8842.

The present paper is one of the series studies of Xiacaowan Fauna of Miocene from Sihong. In all previous papers the fauna was assigned to Middle Miocene. Qiu *et al.* (1990) adapted the boundry between early and middle Miocene to the European one. Therefore Xiacaowan fauna was reassigned to Early Miocene.

I am very grateful to Prof. Wang Banyue for showing me the specimens of *Sinolagomys* cf. *ulungurensis* for comparison. Thanks are due to my colleagues: Profs. Wang Banyue, Tong Yongsheng, Qiu Zhuding and Zheng Shaohua who critically read the manuscript.

Ochotonidae Thomas, 1897

Alloptox Dawson, 1961

Alloptox sihongensis sp. nov.

(Figs. 1—6)

Holotype A right p3, V8840. 7.

Paratypes 1dp3, V8840.1; 3p3, V8840.3,5,6; 1p4, V8840.9; 2m1/m2, V8840. 12,16; A fragment of left mandible with p4, V8840.18; the front part of right mandible with i2, p3—p4, V8840. 24; 2I2, V8840.21, 23; 4P3, V8840. 31—33,56; P4, V8840.27; A fragment of left upper jaw with P3—M1, V8840.57; 2M2, V8840.50,

53.

Type locality Songlinzhuang, Sihong County, Jiangsu.

Stratum typicum and age Xiacaowan Formation, Early Miocene (Shanwangian), equivalent to MN4 of the European land mammal zonation of Neogene.

Derivatio nominis Named after "Sihong", the county where the type locality of the new species is located.

Diagnosis So far the smallest species of *Alloptox* with less enamel differentiation in thickness and less developed cement, p3 usually with blunt and rounded front border of metaconid and one single anteroexternal fold.

Referred material 1. Type locality Songlinzhuang: 48 isolated teeth (V8840. 2, 4, 8, 10, 11, 13—15, 17, 19—20, 22, 25, 26, 28—30, 34—49, 51—52, 54—55, 58—68).

2. Shuanggou: 27 isolated teeth (V8841. 1—27).

3. Zhengji: 18 isolated teeth (V8842. 1—18).

Stratum and age of referred specimens Xiacaowan Formation, Early Miocene (Shanwangian).

Measurements (in mm) ref. Chinese text.

Description Holotype p3dex (V8840.7; fig. 2b). Measurements L × B × H = 1.27×1.30×4.5. Tooth-shaft straight. Occlusal surface is rounded triangle in shape. Metaconid lingual-labially elongated and rounded anteriorly. Only one anteroexternal fold is present. Anterointernal fold extends far backwards, being parallel to longitudinal axis of the tooth. An internal fold is present on the inner wall of the entoconid. This fold, the posteroexternal fold as well as anterointernal fold are filled with cement. No cement exists in anteroexternal fold. Tooth-shaft expands gradually towards the base of tooth. The size is 1.60 × 1.56 at the base. The enamel is not well differentiated in thickness. It becomes thin only at anteroexternal fold, posterior part of the inner wall of the anterointernal fold and posterior wall of the posteroexternal fold. The tooth is slightly worn.

Paratypes The three isolated p3(V8840.3,5,6; figs. 2d,e,c) are slightly worn and measured 1.17—1.48 × 1.17—1.40, tooth-shaft is 4.91—5.93 high, obviously curved backwards and inwards; metaconid narrow or labial-lingually elongated with rounded (2 cases) or blunt angular (1 case) front border; The inner wall of entoconid is flat (2 cases) or with a shallow fold (1 case); One single anteroexternal fold is present on two teeth, two but very shallow anteroexternal folds on one tooth (V8840.5). Anterointernal fold extends posteriorly (V8840. 3,5) or posteroexternally first, then bends internally (V8840.6).

V8840. 24 (fig. 2f) is the front part of a fragmentary right mandible with i2, p3 and p4. Mandible is 8.7mm in depth on the inner side at the level of p4. The mental foramen is just anterior to p3, at the midlevel of the jaw; p3 is 1.56 × 1.56 in size, obviously larger than the other p3s of this locality; the anterior border of the metaconid is blunt angular, two anteroexternal folds are present, the anterior one is shallow; anterointernal fold does not extend far backwards, its posterior end bends slightly internally; a shallow fold is present on the inner wall of the entoconid; all the folds are filled with cement; enamel is obviously differentiated ——the inner wall of metaconid, posterior wall of posteroexternal fold as well as the post-

erior end of the anterointernal fold is obviously thin. The thickness differentiation of the enamel on p4 is obvious too, the posterior wall of the anterior lobe is distinctly thicker.

Most of the other paratypes possess in general the normal morphology of *Alloptox*. Among them we mention only the P3(V8840. 31—33, 56; figs. 2m, n, o), of which the ratio of width of anterior loph: posterior loph is variable, ranging from 0.43 to 0.64.

Referred material from Songlinzhuang, Zhengji and Shuanggou; an incomplete p3dex (V8842. 6; fig. 3c) from Zhengji and a p3sin (V8841.3; fig. 4b) from Shuanggou should be emphasized: They are large in size, with obviously differentiated enamel. The inner and outer walls of the anterointernal fold, posterior wall of the posterior anteroexternal fold and the anterointernal wall of the posteroexternal fold are obviously thicker. Metaconid is labiallingually elongated, with rounded anterior border. Two anteroexternal folds are present. The posterior anteroexternal, posteroextrernal and the anterointernal folds are filled with cement. The other p3 of referred specimens possess only one single anteroexternal fold, whose metaconid labiallingually elongated (3 cases) or not (3 cases), with rounded anterior edge.

The measurements indicate that the form from Sihong is so far the smallest species of all known species of *Alloptox* (ref. Wu *et al.*, 1991, table 2).

Comparisons and discussions 1. Specific assignment: The *Alloptox*-form from Sihong shows already distinct morphological differentiation, which displays mainly in p3. Altogether 15 p3 can be divided morphologically into two groups. The first group is characterized by large size, being located on the right upper part of the scatter-diagram; obvious enamel thickness differentiation; narrow or laterally elongated metaconid with blunt angular or rounded anterior border; the presence of two anteroexternal folds; the presence of an inner fold, although shallow, on the inner wall of the entoconid. this group is represented only by 4 teeth (V8840. 5, 24, V8841. 3 and V8842. 6; ref. figs. 2e, f; 4b; 3c). The second group is characterized by small size, being located on the lower left part of the scatter-diagram; less differentiated enamel; narrow or laterally elongated metaconid with rounded anterior border; single anteroexternal fold. The way of extension of the anterointernal fold is same in both groups: (1) extending directly backwards or (2) extending posteroexternally first, then bending posterointernally. However the anterointernal fold extends mainly posteroexternally in the first group and mainly posteriorly in the second group. The cement is not well-developed in both groups.

Based on the analysis of dental morphology of all known species of *Alloptox* Wu *et al.* (1991) mentioned the significance of p3 and P2 for classification of this genus at species level and inferred:

"the simpler, narrow and anteriorly rounded metaconid with single anteroexternal fold and the posteriorly extended anterointernal fold are primitive characters of *Alloptox*; while the more complicated, anteriorly angular and transversely extended rhomboid-shaped metaconid with two anteroexternal folds and the posterointernally bent anterointernal fold are advanced or derived characters" (p.228).

Furthermore a speculation about the evolutionary trend of p3 of *Alloptox* was given as follows (partly cited):

"Some well-adaptable species developed even wider metaconid with two anteroexternal folds, more differentiated enamel —— thicker at the anterior end, forming anteriorly angular metaconid" (p.229).

It is obvious that most p3 (11 out of 15 specimens) demonstrate primitive characters: Less differentiated enamel, the enamel on the anterior border of the metaconid is not thickened; metaconid narrow or laterally elongated and round-headed; single anteroexternal fold; anterointernal fold extends mainly backwards. Finally, small-sized on an average. Four teeth show more advanced features (see above). The not well-developed cement in both groups is in fact of primitive character too.

There are two explanations on the morphological and dimensional differentiation of *Alloptox* of Sihong. (1) It is a species in the process of evolution with both primitive and derived features; (2) The species is in the process of splitting into two lineages or has been split into two species. Because of rarity of the specimens of all known species with the exception of *Alloptox gobiensis* and of the inadequate data on the stratigraphical and geographical distribution a reliable reconstruction of the phylogeny of *Alloptox* is impossible at the moment.

For the time being all the specimens of Sihong are assigned to one and the same species. In view of the obvious morphological and dimensional differences from the previous known species, a new species is erected, named as *Alloptox sihongensis*. It is so far the earliest, smallest and primitive species of the genus.

2. Origin of *Alloptox*: While studying Lagomorpha from Ertemte and Harr Obo (Nei Mongol) Qiu (1987) speculated with reservation on the origin of *Alloptox*:

"*Desmatolagus* seems to be closer to the line leading to *Alloptox*." "It is unlikely that *Sinolagomys* is the direct ancestor of later ochotonoids" (ref. Qiu, 1987, p. 396 and text-fig. 148).

Tong (1989) erected a new species *Sinolagomys ulungurensis* based on abundant material from Suosuoquan Formation of Late Oligocene on the north bank of the Ulungur River of Xinjiang. Later in 1990 Wang *et al.* reported the recovery of *Sinolagomys* cf. *ulungurensis* from Early Miocene of Urtu, Nei Mongol. Either upper or lower cheek teeth of *Sinolagomys ulungurensis* are morphologically close to those of *Alloptox*. The anterointernal fold, posteroexternal fold as well as the fold on the inner wall of the entoconid have been initially formed on the p3 of *Sinolagomys ulungurensis* (Tong, 1989, fig. 4). These folds are still more developed on some p3 of *S.* cf. *ulungurensis* from Early Miocene of Nei Mongol.

When describing ochotonids from Middle Oligocene of Ulantatal of Nei Mongol Huang (1987) tabulated the dental differences between *Desmatolagus* and *Sinolagomys* (p. 278). Except for the differences in the morphology of p3, the talonid (posterior lobe) of p4-m2 of *Desmatolagus* is narrower and longer, and a posterior fold is present on the talonid of young individuals; m3 is double-lobed on young individuals; the P4-M2 possess a crescent valley and a short hypotria. The talonid of p4-m2 of *Sinolagomys* is wider and shorter with no posterior fold; m3 is single-lobed; the P4-M2 of *Sinolagomys* does not possess crescent valley but with long hypotria. Therefore the P4-M2 and p4-m2 of *Alloptox* are similar to those of *Sinolagomys* and different from those of *Desmatolagus*. It can be inferred that *Alloptox* is probably derived from *Sinolagomys ulungurensis* or from its close relatives.