

# 陕西蓝田陈家窝中更新世 哺乳类化石补记\*

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1964年,本文前一作者曾记述了1963年在陕西蓝田泄湖陈家窝中更新统发现的与蓝田猿人下颌骨共生的哺乳类化石(周明镇,1964)。1964年古脊椎动物与古人类研究所蓝田发掘队赵资奎、柴凤岐等同志,在贾兰坡教授领导下,又继续在该地点进行了较大规模的发掘工作。由于化石较少,所获不多,但所获化石在古生物学及地层上则很有意义。本文即是1964年度全部发掘材料的研究,以作为前一作者1964年报告的一个补充。同时,在新材料的基础上,对陈家窝地点的时代,与有关地点的对比和动物群性质也做了进一步的讨论和订正。

全部化石除一件 *Ochotonoides* 的上颌骨层位较低外,其余标本都产于该地点的三条相距甚近的棕红色古土壤层上下,可视为采自同一层中。

## 系 统 描 述

### 兔形目 *Lagomorpha* Brandt

#### 鼠兔科 *Ochotonidae* Thomas

#### *Ochotonoides complicidens* (Boule et Teilhard)

(图版1,图1—2)

**标本:** 二件可能属于同一个体的左、右上颌骨,具完整齿列;一破碎上颌;四件不很完整的下颌骨;三段门齿,及一件可能属于 *Ochotonoides complicidens* 的左股骨近端和一件不完整的跟骨(古脊椎动物与古人类研究所野外编号63709(64),登记号V.3155)。

**描述:** 个体较大,大小与 Teilhard 等描述的北京西山第十八地点和山西、陕西的标本一致,上颊齿列长12毫米,  $M^1$  宽3.8毫米。  $P^2$  小,前缘中部有一经磨后封闭的新月谷(crescentic valley,即 Teilhard 记述的 main anterior median fold)。  $P^2$  与京西第十八地点的标本不同处在: 齿的轮廓为卵圆形,内狭外宽,而十八地点的  $P^2$  近长方形,较大;另外,在第十八地点标本上较清楚的前外侧沟不见于蓝田标本上,而在蓝田标本的内侧有一很显著的相当于次沟(hypostria)位置的小沟出现。  $P^2$  的结构亦不同于德日进和杨钟健(1931)描述的山西静乐贺凤的标本,后者  $P^2$  虽较小,但外狭内宽,除新月谷外,前内、前外两侧的沟都不存在。  $P^3$  未臼齿化,新月谷的前翼通入唇面谷(buccal valley)中,后翼封闭。

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冠面上, 牙齿内侧的次沟短。上颊齿列最大宽度在  $P^4$  处, 宽 4.2 毫米。  $P^4$ 、 $M^1$ 、 $M^2$  的次沟长, 但不象第十八地点的标本,  $M^1$ 、 $M^2$  的次沟完全横穿牙齿的内、外两侧。  $M^2$  后内侧有一分叉状突起。

下颌骨体较高厚, 在  $P_4$  下缘颌骨体高 12 毫米。下门齿后端止于  $P_4$  跟座之下。下颊齿列长在 11.5—13.0 毫米间。  $P_3$  近方形, 分前后两叶(齿座和跟座), 前叶狭短, 后叶宽长, 两叶中间有细的釉质层相连, 与十八地点的标本相似, 而不象 Boule 等(1928, 插图 23D) 的标本, 其前、后两叶完全分开。在  $P_3$  齿座的外侧有一清楚前外沟, 该沟将齿座后外侧隔成一纵向的齿柱即 Teilhard (1940, 页 46) 描述的“后外柱 C”。跟座外缘亦发育一横沟, 冠面上约伸达齿的中部。所有冠面上的釉质层都较平直, 不象 Boule 等(1928) 记述的标本上有小的釉质层褶皱。后面的下颊齿, 齿座与跟座近于等宽, 与过去记述的标本结构相同。

股骨近端已破碎, 但还能看出它的尺寸比 *Lepus* 等的小, 骨体相对较粗厚, 第三转子估计位置较低。

**讨论:** *Ochotonoides* 是我国更新世时特有的一属个体较大的鼠兔类化石, 属内仅有一种, 即 *O. complicidens* (Boule et Teilhard)。它的地史分布时代与 *Myospalax tingi* 大约同时, 或可能稍早。就目前的记述材料看, 它肯定在更新世初期(如河北阳原泥河湾、京西十八地点等) 就已出现, 在华北中更新世的“红土”中也经常遇到, 但在中更新世晚期的周口店洞穴堆积和晚更新世的地层中, 目前还没有发现, 因之, 它可能是代表着早更新世到中更新世(? 早期) 的一种层位比较可靠的化石。 *O. complicidens*, 就目前已发现的材料看, 各标本间在形态上还是有一些差异的。特别是在上下两个最前面的颊齿上, 如  $P^2$  的大小轮廓, 牙齿前缘内、外侧沟的存在与否;  $P_3$  齿座、跟座的连结与分开、冠面上有无釉质层的小褶皱及前外沟的位置和深度等等都有些细微的区别, 但这些区别究竟属个体变异, 抑有分类学上的意义, 还有待今后研究、观察。

## Leporidae Gray

### *Lepus wongi* Young

(图版 I, 图 5)

**标本:** 1 个左  $P^2$ , 6 个上颊齿, 3 个  $P_3$ , 2 个下颊齿, 上、下门齿 7 段, 1 胫骨中段, 2 件趾骨 I 和 1 件趾骨 II (登记号 V. 3156)。

**描述:** 个体大小与杨钟健(1927) 描述的正型标本相近。  $P^2$  具典型的 *L. wongi* 结构, 牙齿前缘有三条纵向的沟, 结构显然比 *Lepus youngi* Bohlin 和 *Lepus oiostolus* 的一些标本的复杂。上颊齿的内侧的次沟较长, 沟的两侧釉质层有小的褶皱。牙齿外侧的凹陷(相当于唇面谷) 的位置较 *L. youngi* 的浅。

$P_3$  近方形, 后部稍宽, 牙齿前缘正中有一纵沟, 牙齿后外侧的沟长, 几乎从齿的外侧横贯至齿的内侧, 这正表现出 *Lepus* 属的特征, 与其它一些属不同, 如在 *Hypolagus* 中: 牙齿前缘无纵沟, 后外侧的沟短, 内伸不过齿冠宽度的 1/2 等。

下颊齿、门齿及肢骨等与 *Lepus* 属者相同。

啮齿目 *Rodentia* Bowdich仓鼠科 *Cricetidae* Rochebrune丁氏鼯鼠 *Myospalax tingi* Young

(图版 I, 图 4)

**标本:** 一件近于完整的成年个体头骨, 鼻骨前端、颧弓、右枕部及  $M^3$  缺失; 一破碎的右下颌骨, 具  $M_1$ ; 三门齿及一肱骨远端(V. 3157)。

**描述:** 个体大小与杨钟健(1927)描述的正型标本一致。自门齿前缘至枕上突后缘的颅骨长度约为 65.5 毫米。眼眶间距 9.2 毫米, 枕部最大宽度约为  $16 \times 2 = 32$  毫米。头骨侧视, 顶面平直。矢面(sagittal area)宽; 颧嵴清晰, 但不强烈突起。枕部的盾面(shield area)宽, 明显地成凹入(concave)类型。盾面与矢面为极弱的人字嵴分开。盾面两侧各有一强大的成三角形向后突起的枕上突(supra-occipital process), 该突向下延伸为尖利的枕嵴(occipital ridge)。

臼齿斜“奥米加( $\omega$ )”型。 $M^1$  内侧具有两个凹入的沟。从残留的一左  $M^3$  基部看,  $M^3$  退化。 $M_1$  外侧也仅有两个凹入的沟。

肱骨大, 远端宽 16.5 毫米。

**比较与讨论:** 从蓝田标本头骨的骨缝完全愈合, 门齿深桔黄色, 枕上突极发育等特点观察, 它显然属于一成年期后的个体。在大小上, 它明显地小于周口店第十三地点的 *M. epi-tingi*, 大于个体较小的 *M. chaoyatseni* Teilhard et Young, 而与 *M. tingi* 的大小相当。

*M. tingi* Young 是华北更新统中经常发现的化石。但它的层位或时代, 在近年来, 往往有些混乱, 甚至被误认为更新世初期(Villafranchian)的“标准化石”。查已发表的古生物学文献, 除 Teilhard 和 Piveteau (1930, 页 122) 于河北阳原泥河湾早更新世地层中找到过二件上、下颊齿列外, 其余绝大部分化石都发现于华北的“上三门系红土”(中更新统)中, 如 Teilhard 和 Young(1931)记述的山西静乐、保德、大宁、中阳等地的标本, 杨钟健(1935)记述的山西浮山标本等都采自此层。裴文中 (Pei, 1930) 记述的河北唐山贾家山的 *M. tingi*, 化石与 *Bosin palaeosinensis*, *Trogontherium*, *Ursus*, *Canis sinensis*, *Equus sanmeniensis*, *Prosilphneus intermedius* 等共生, 时代可能较上述者稍老, 但根据裴氏的意见(同上, 页 376, 377), 贾家山动物群与一介于周口店期与泥河湾期之间的一个动物群。至于发现在泥河湾地点的 *M. tingi* 的上下颊齿列, Teilhard (1942, 页 66—67) 曾明确指正过: 泥河湾的鼯鼠化石确属“Tingi group”; 但它并不能肯定代表 *tingi* 种, 或 *chaoyatseni* 种, 抑是属于一种头骨尚未发现的他种化石。因此, 截至目前, *M. tingi* 可靠的 earliest 地层记载当在唐山贾家山堆积中。*M. tingi* 目前尚未发现于晚更新世地层中, 但它究竟于中更新世何时绝灭, 也不十分清楚。值得注意的是, 在中更新世晚期的周口店第一地点, *M. tingi* 已不存在, 而代以 *M. wongi*; 而第十三地点和第一地点的第十三层(赵资奎、戴尔俭, 1962), *M. tingi* 已被它的后裔 *M. epi-tingi* 所代替。是否 *M. tingi* 的层位多半限于泥河湾期之后, 周口店之前的一段上, 这是一个饶有兴趣的问题。

### 方氏鼯鼠 *Myospalax cf. fontanieri* Milne-Edwards

(图版 I, 图 3)

**标本:** 1 件近于完整的头骨, 1 破碎头骨, 7 件不完整的下颌骨, 5 个另个臼齿, 3 件上门齿, 2 件下门齿 (V. 3158) 以及可能属于 *M. cf. fontanieri* 的 5 件不完整的肱骨, 1 件尺骨, 1 桡骨, 1 环椎, 2 脊椎及 2 件趾骨 (V. 3158.1)。

**描述:** 个体较 *M. tingi* 小, 自上门齿前缘至枕部后缘的颅骨全长 46 毫米。头骨盾面凸出, 人字嵴及枕上突等全已破碎。矢面较窄, 左右两矢向嵴突出, 两嵴间距 6—9 毫米, 近于平行的向前延伸到眶区。眶间距 7 毫米。鼻骨虽未保存, 但能看出其前部加宽, 其前缘超出上门齿之前。头骨腹面上, 硬腭止于  $M^2$  与  $M^3$  之间, 与 Leroy (1941, 插图 6) 记述的 *M. fontanieri* 现在种的相同。

臼齿成极斜的“奥米加”型,  $M_3$  都不退化。上颊齿列长 10.5 毫米, 颊齿与过去发现的大部分标本不同处在  $M^1$  的前缘和  $M^3$  的后外侧都无凹入的沟。类似的情况在前人记述的个别标本上也有发现 (Teilhard, 1942, 页 69)。正象 Teilhard 所指出的, 这可能是由年龄所引起的个体变异。下臼齿列长 10.0—10.5 毫米。  $M_1$  外侧有二个凹入的沟, 齿的前叶 (anterior loop) 大, 成圆形,  $M_3$  外侧的两个凹入的沟很深, 齿的后叶很显著。

肢骨有些为幼年个体, 但多数的尺寸小于 *M. tingi* 的尺寸 (肱骨远端宽 11.5 毫米, 桡骨骨干长 21 毫米), 我们暂将它归入此种内。

**讨论:** 在 1963 年发掘的材料中, 曾找到一件 *M. fontanieri* 的左下颌骨 (周明镇, 1964, 页 304), 这批新材料的发现更加确定和证实了这种动物在陈家窝动物群中的存在。

*M. fontanieri* 为华北地区分布相当普遍的现生种类。它的特点是个体较小, 枕面凸出, 颊齿斜“奥米加”型,  $M_3$  不退化等。在我国丰富繁杂的鼯鼠科中, 具有或接近上述特点的, 就目前所知仅有 *M. fontanieri* 一种\*。因之, 在分类上, 枕面凸出的 *M. fontanieri* 群, 就不象属内的其他两群, 枕面凹的 *M. tingi* 群和枕面平的 *M. psilurus* 群, 那样多种复杂。但在垂直的地史分布上, *M. fontanieri* 却又不及上述两群各种清晰和具有明确的地层分带意义了。 *M. fontanieri* 类的化石, 几乎从可能是更新世初期 (Teilhard, 1942, 页 71; 周明镇、周本雄, 1965, 页 228), 经由化石发现众多的更新世中期 (如 Teilhard, 1942, 页 70 等), 至晚期 (如丁村, 见裴文中, 1958, 页 26), 而直到现代。在这一为期不短的地质时期中, 究竟 *M. fontanieri* 群有无形态上的变化, 和进一步分类的可能有待今后详加研究。

### 灞河鼠 *Bahomys* gen. nov.

**模式种:** *Bahomys hypsodonta* sp. nov.

**特征:** 个体较一般仓鼠 (*Cricetulus*) 稍大, 齿式  $\frac{1 \cdot 0 \cdot 0 \cdot 3}{1 \cdot 0 \cdot 0 \cdot 3}$ , 齿冠较高, 齿尖基本两排, 近于左右对称排列, 颊齿的嚼面为平面, 齿尖成不规则的三角或四角柱状, 经磨蚀后各齿间交错相连, 使牙齿四周封闭, 中间构成三排纵向的孔洞。

\* *M. minor*, Teilhard 认为是 *M. fontanieri* 的同物异名。

高冠灞河鼠 *Bahomys hypsodonta* sp. nov.

(图版 I, 图 6—9)

**模式标本:** 一上颌骨,保存了左右完整的颊齿列(登记号 V. 3159)。

**特征:** 同属的特征。

**标本:** 除模式标本外,尚有一对可能与模式标本属于同一个体的二上门齿和另外六件上、下门齿;一成年个体的左上颌骨,具  $M^1-M^3$ ; 一成年个体的右下颌骨及二件老年个体的左右下颌,都具完整的下颊齿列,二件可能属于该种的股骨远端(V. 3159.1)。

**描述:** 个体较仓鼠(*Cricetulus*)为大,上颊齿列长 5.7 毫米,大于更新世时我国常见的两种 *Cricetulus* 化石, *C. varians* 和 *C. obscurus*, 也比华北常见大仓鼠(*C. trilton*)的一般个体为大。颊齿数目上下各为 3 个。齿冠高,齿尖成柱状,不象 *Cricetulus* 等属的齿冠低,由阜丘状的齿尖组成。中等磨蚀的上臼齿  $M^2$  冠高 2.2 毫米,而京西第十八地点的未经磨蚀的 *Cricetulus* cf. *varians* 的  $M^2$ , 冠高仅 1.2 毫米。颊齿有齿根,较长,已暴露出来的  $M_1$  的后部牙根长 3.1 毫米以上。牙齿冠面上齿尖基本为两排,近于左右对称地排列。颊齿嚼面成一平滑的光面,不象 *Cricetulus* 等属由高低齿尖构成的起伏的嚼面。齿尖在嚼面上成三角形或不规则四边形。经磨蚀后,各齿尖更清楚地伸出相互穿连的尖角,彼此串通,构成三排纵向的孔洞。与此同时,齿的四周亦由釉质层封闭,构成在冠面上牙齿类似荷藕式的图案。牙齿边缘的封闭先后顺序,可能是上外侧和下内侧封闭较迟,而相应的这两侧的孔洞也较浅,经磨蚀后消失较早。臼齿列自前向后大小逐渐减小,此情形在上臼齿列更较显著。上下第一臼齿与 *Cricetulus* 等属相同,有三对齿尖对称排列,轮廓为长方形,稍圆。前面的一对愈合较早,在中等磨蚀的牙齿上,  $M_1$  的前一对齿尖已完全合一,而  $M^1$  尚保存了一小的中间孔洞。 $M_2^2$  近方形,齿尖两对,基本仍对称排列,唯内侧的两尖与 *Cricetulus* 类似,较外侧的两尖微微偏前,这在下臼齿上更较显著。 $M_2$  后外侧的齿尖(下次尖)成显著的新月型,有两翼,向齿的前外、后内包裹。牙齿的前内侧的齿尖(下后尖)向齿的前外方伸出“距”状(spur)边缘,构成与 *Cricetulus* 相应的前外侧“齿带”。 $M_3^2$  与  $M_2^2$  结构相似,唯较小,尤其  $M^3$  的后部显著收缩。

下颌骨体结构与仓鼠类相同,齿虚位长 6.2 毫米。

## 测量(毫米)

## 上颊齿 (Upper cheek teeth)

	$M^1$		$M^2$		$M^3$		$M^1-M^3$
	长(L)	宽(W)	长(L)	宽(W)	长(L)	宽(W)	长(L)
V. 3159 (右)	2.8	1.9	2.2	1.8	2.1	1.6	6.8
V. 3159.1	2.8	1.9	2.2	1.8	2.0	1.6	6.7

**比较:** 从上面描述中可以看出,陈家窝的标本从大小、齿式(上下颊齿 3 个)、下颌骨结构,颊齿两排齿尖基本左右对称排列,  $M_1^1$  齿尖三对,  $M_2^2$ 、 $M_3^2$  齿尖两对,  $M_2^2$  内侧的齿尖位置稍前等特点看,它比较肯定的当归入仓鼠科(*Cricetidae*)中,更较接近于仓鼠亚科 (*Criceti-*

## 下颊齿 (Lower cheek teeth)

	M <sub>1</sub>		M <sub>2</sub>		M <sub>3</sub>		M <sub>1</sub> —M <sub>3</sub>
	长(L)	宽(W)	长(L)	宽(W)	长(L)	宽(W)	长(L)
成年个体 V. 3159.1	2.7	1.5	2.2	1.8	2.2	1.8	6.8
老年个体 V. 3159.1	2.6	1.6	2.4	1.8	2.2	1.8	6.8
极老个体 V. 3159.1	2.2	1.6	2.3	1.8	2.3	1.8	6.3

nae)的属种,如 *Cricetulus*。但从它的齿冠相当高;齿尖不成阜尖状,而为三角或不规则四角柱状;牙齿经磨蚀后冠面上各尖串连,封闭成三排纵向的孔洞(釉质环)看,它又与我国乃至欧亚大陆的仓鼠类有所不同。在旧大陆的仓鼠类(或族 Tribe)中,如 *Mesocricetus* Nehring 和 *Cricetulus*, 颊齿经磨蚀后会出现纵向的孔洞(如 *M. newtoni* 和 *C. migratorius*, 见 Stehlin und Schaub 1950, 插图 242、238),但齿的四周并不封闭,而且齿冠也低。

在我国的仓鼠类化石中,除 *Cricetulus* 外,尚有上新世的 8 属,如 *Lophocricetus*, *Paracricetulus* 等。它们同样以齿冠低,冠面不封闭成“藕洞”形状等与蓝田标本相区别。在现在种类中,与陈家窝化石相类似的亦未见有记载。唯一值得提及的是,Allen (1940, 页 779—781)描述的采自甘肃南部的一种较大的灰长尾仓鼠: *Cansumys canus* Allen。该种个体大小与蓝田标本相近;齿尖的形状和臼齿经磨蚀后有时也出现封闭釉质环等特点亦与蓝田标本有描述上的某些相似之处,遗憾的是 Allen 的描述过于简单,又无图版,无法进一步找出两者的异同。

## 鼠科 Muridae Gray

小林姬鼠 *Apodemus cf. sylvaticus* L.

(图版 I, 图 10)

代表该类的化石有二件左下颌骨,分别具有 M<sub>1</sub>—M<sub>3</sub> 和 M<sub>2</sub>, M<sub>3</sub>, 及上下门齿各一件 (V. 3160)。下颊齿列长 4.4 毫米,大于 *Micromys* 和 *Mus*, 小于 *Rattus*, 而与 *Apodemus* 属中一些标本大小相近。由于在鼠亚科 (Murinae) 中各属间构造上的差别主要表现在头骨和上颊齿内侧在早期磨蚀阶段有无小尖存在及个体大小等,而蓝田标本保存的仅是下颌骨部分,我们只能就大小上将它与 *Apodemus* 属相对比。在该属中,蓝田标本略大于杨钟健(1934, 页 74)和裴文中(1938, 页 66)分别记述的北京周口店第一、第三地点的 *A. sylvaticus*; 而与 Teilhard (1940, 页 58)记述的北京西山第 18 地点的 *A. cf. sylvaticus* 大小和结构比较相近。在现生种中,它与 Allen (1940, 页 943)描述的 *A. sylvaticus orestes* 大小也相当。因此,可以初步确定,蓝田标本可能是类似于小林姬鼠的一种化石。

## 测量(毫米)

	M <sub>1</sub>		M <sub>2</sub>		M <sub>3</sub>		M <sub>1</sub> —M <sub>3</sub>	虚位 (diastema)
	长(L)	宽(W)	长(L)	宽(W)	长(L)	宽(W)	长(L)	长(L)
V. 3160	2.1	1.2	1.5	1.2	0.9	1.1	4.4	4.1

### 豪猪科 Hystricidae Burnett

#### ?*Hystrix* sp.

在一件可能属于獾(*Meles* cf. *leucurus*, 见下)的破碎的左下颌骨上,保存了明显的啮齿类啮咬的牙痕,每一啮痕宽达3.5毫米,不可能为上述啮齿目动物,如 *Myospalax*, *Bahomys* 或兔形目动物的啮痕,估计可能为常见到的豪猪(*Hystrix*)的啮迹,但该类动物在我们的材料里没有发现。

### 肉食目 Carnivora Bowdich

#### 鼬科 Mustelidae Swainson

#### 獾 *Meles* cf. *leucurus* Hodgson

(图版 1, 图 11—12)

**标本:** 一右上颌骨碎块,保存有  $P^3-P^4$ ; 二个另个的左  $M^1$ ; 一上犬齿; 左右下颌骨各一件,分别保存有不完全犬齿及颊齿; 一件可能属于该种的下颌水平枝一段,无牙齿保存,但具有可能被 *Hystrix* 啮咬过的痕迹(V. 3161)。

**描述:** 个体大小与华北更新世中晚期常见的 *M.* cf. *leucurus* 的一些标本相同,下齿列(C— $M_2$ )长44.4毫米,稍小于 Teilhard (1945, 页 31) 记述的北京西山第 18 地点 *M. chiai* 的数字,后者 C— $M_2$  长 48 毫米。 $P^4$  构造与裴文中(1934, 页 72)记述的北京周口店第一地点的 *M.* cf. *leucurus* 相似,内侧的原尖部位有些扩大,原尖的位置向后,位于外侧的前尖之后。原尖前部; 齿的前内角有一相当大的附尖。原尖部位的前部,不象 *M. chiai* 还有一包捲牙齿前缘的小尖(Teilhard 的 C 尖)。 $P^4$  内侧与周口店的标本微有不同之处在后附尖的加长,这与 *M. chiai* 又有一些相似。 $M^1$  与周口店的标本相同,内侧齿带延伸至次尖后部,使齿冠内后角加大,成不等边梯形。 $M^1$  冠面上仅有一个较清楚的附尖。

下犬齿相对较小,成圆锥状。无  $P_1$ 。 $M_1$  后部跟座不加宽,跟座上齿尖已磨蚀不清楚。 $M_2$  圆形。

#### 测量(毫米)

##### 上颊齿 (Upper cheek teeth)

	C		$P^3$		$P^4$		$M^1$	
	前后径(Antero-posterior diameter)		长(L)	宽(W)	长(L)	宽(W)	长(L)	宽(W)
V. 3160	7.4		4.4	3.8	8.5	7.0	12.8	10.5

##### 下颊齿 (Lower cheek teeth)

	C	$P_3$		$P_4$		$M_1$		$M_2$	$C-M_2$
	直径(diameter)	长(L)	宽(W)	长(L)	宽(W)	长(L)	宽(W)	长(L)	
V. 3160	6.4	4.8	2.9	5.9	3.3	15.2	7.0	4.8	44.4

## 偶蹄目 Artiodactyla Owen

## 鹿科 Cervidae Gray

大角鹿 *Sinomegaceros* sp.

(图版 I, 图 13)

代表该类动物的化石仅有两个上臼齿( $M^1$ ,  $M^2$ ), 一个  $DP_4$  及左右  $M_1$  各一个(V. 3162)。牙齿较杨钟健 (Young, 1932, 页 38) 描述的周口店第一地点的 *Sinomegaceros pachyosteus* (Young) 略大, 可能与最近在蓝田公王岭发现的一个新种 (*Sinomegaceros konwanlinensis* Chow, Hu et Lee) (1965) 为同一种。牙齿半高冠, 上臼齿外壁上的前、中附尖及前尖的肋(rib)发育, 齿的内侧有底柱。下颊齿内壁与上臼齿的外壁相似, 只是下内尖的肋较显著。

## 测量(毫米)

	$M^2$			$M_1$			$DP_4$	
	长(L)	宽(W)	高(H)	长(L)	宽(W)	高(H)	长(L)	宽(W)
V. 3162	25.7	21.8	22.1	24.8	15.1	21.2	30.6	13.5

## 结 语

截止目前, 蓝田陈家窝地点 (63709) 除蓝田猿人外, 共发现有 14 种哺乳类动物化石, 其名称和地史分布如下页表所示。

从下页表可以看出, 在陈家窝地点的 14 种动物中, 有两种, *Myospalax tingi* 和 *Ochotonoides complicidens* 的地史分布稍早, 可能限于中更新世初期或更早, 目前在中更新世晚期的周口店各地点 (如第一、第十三地点) 没有发现过, 而是分别被相应的晚期的种属, *M. wongi* 和 *Ochotona koslowi* 等代替。有几种, 如 “*Elephas* sp.”, *Myospalax fontanieri*, *Apodemus* cf. *sylvaticus* 和 *Sus* cf. *lydekkeri* 等的地史分布则由早更新世到现代。其余大部分种, 除一新属种 *Bahomys hypsodonta* 外, 差不多全是中更新世开始出现的动物, 有很多而且一直生活到现代。不过, 值得注意的是, 即使在这样一些地史分布稍晚的动物, 有的还是表现出和周口店各地点的标本有着某些不同, 而可能是较原始的特征, 如 *Sus* cf. *lydekkeri* 附尖少、牙齿结构较简单; *Meles* cf. *leucurus* 的  $P^4$  后附尖较长等。因此, 从动物群本身看, 由于材料的增加, 使它有可能显示出较周口店期 (以第一地点为代表) 时代稍早的性质。但它与早更新世的动物群 (如泥河湾、第十八地点) 又有着一些不同。对比第十八地点, 即能看到一些种类又被较原始的古老类型所替代, 如 *Myospalax tingi*, *M.* cf. *fontanieri* 被 *Prosiphneus youngi* 等替代, *Lepus wongi* 为 *Alilepus*, *Meles* cf. *leucurus* 为 *M. chiai* 替代等等。对比泥河湾动物群也有类似情况。因此, 现在初步阐明, 陈家窝动物群可以代表一个介于泥河湾期和周口店期之间的动物群。

由于材料的增加, 也有可能订正文前一作者在 1964 年时对陈家窝动物群的生态类型的意见, 即认为它属于森林类型。在目前看来, 这一推论可能是不够全面的, 它至少是



化 石	泥河湾;第十八地点 (早更新世)	陈 家 窝 (中更新世早期)	周口店第1,13地点 (中更新世中晚期)
<i>Ochotonoides complicidens</i>			
<i>Lepus wongi</i>			
<i>Myospalax tingi</i>			
<i>Myospalax cf. fontanieri</i>			
<i>Bahomys hypsodonta</i> sp. nov.			
<i>Apodemus cf. sylvaticus</i>			
<i>Hystrix</i> sp.	?		
<i>Cuon alpinus</i>			
<i>Meles cf. leucurus</i>			
<i>Felis tigris</i>			
" <i>Elephas</i> sp."			
<i>Sus cf. lydekkeri</i>	—?—		
<i>Pseudaxis grayi</i>			
<i>Sinomegaceros</i> sp.			

不够代表一个典型的森林动物组合。

一个极有兴趣,也引人注意的问题,是蓝田地区两个蓝田猿人地点,陈家窝和公王岭的时代对比问题。在1964年,由于当时公王岭地点的猿人化石尚未发现,所以在研究陈家窝地点时,只把它与周口店第一地点做了对比。当时受材料限制,只提出了“这两个地点大致属于同一地质时期”的意见(周,1964,页305)。不过,作者也曾注意到,根据野外地层的观察和两地点的猿人材料对比情况,存在着一个时代先后的问题。1964年后,由于公王岭地点蓝田猿人头骨及相当多的哺乳类化石的发现,初步研究结果证实了“蓝田猿人比北京猿人原始”(吴汝康,1965)和公王岭动物群的时代应为“中更新世早期,或第一间冰期”(周明镇,1965)。因此,它解决了蓝田公王岭与周口店对比的问题。但对于新产生的蓝田陈家窝和公王岭两地点的对比问题,各家又有一些不同的看法。本文前一作者在最近(1965)曾根据对陈家窝新材料的初步观察,提出“陈家窝地点比过去设想的早,可能与公王岭相当”的意见。较详细的研究结果表明了这一推论的正确性。如上述,从动物群本身观察,陈家窝地点的时代可能是介于泥河湾期与周口店期之间;即相当于公王岭动物群

的时代。另外,本文作者之一(李)最近参观 1965 年度公王岭地点的部分发掘材料时,也发现一些与陈家窝同种的小哺乳动物化石,如 *Bahomys*, *Ochotonoides*, *Myospalax* 等,更加证实了两地点对比的可能性。此外,还值得提及的是 1965 年黄万波、张玉萍等,在蓝田地区的第四系工作时,从地层上提出了这两地点的对比证据,即陈家窝、公王岭两地点都位于灞河第四级阶地上,化石层下全有底砾石层,而化石层之上,公王岭的  $Q_2^1$  的剥蚀面可以与陈家窝地点的三层红色古土壤层相对比。根据我们的野外初步观察,认为黄万波等的对比是有根据的。总之,就目前资料所见,无论根据动物群本身的时代和组合或是蓝田猿人的材料或是野外地层对比证据,都使我们相信,这两个蓝田猿人地点完全有可能是属同一时代(中更新世早期),甚至生态类型亦比较相近。

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## MAMMALIAN FOSSILS IN ASSOCIATION WITH THE MANDIBLE OF LANTIAN MAN AT CHEN-CHIA-OU, IN LANTIAN, SHENSI

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In 1964 the first writer of the present paper described a small collection of mammalian fossils from the Middle Pleistocene of Lantian collected in 1963 by the Lantian Team of the Cenozoic Laboratory of IVPP at Chen-chia-ou Village (Loc. 63709) together with a mandible of the Lantian Man (Chow, 1964; Chang et al., 1964; Woo, 1964). Some more materials, mostly microfossils, were excavated in the summer of 1964. The present paper is a description of the new material, with discussion and revision of the fauna.

With the exception of one of the upper jaws of *Ochotonoides* which was from a slightly lower level, all the fossils were from the same stratigraphical horizon. But all these fossils may be considered to belong to the same mammalian assemblage.

### DESCRIPTION

#### **Lagomorpha Brandt**

#### **Ochotonidae Thomas**

#### ***Ochotonoides complicidens* (Boule et Teilhard)**

(Pl. I, figs. 1—2)

**Specimens:** One each of the left and right maxillae, most probably of the same individual; a broken maxilla; four incomplete lower jaws and three fragments of incisors; a proximal end of left femur probably of the same species. Field no. 63709 (64); Cat. no. V.3155.

**Description:** Size large, close to those from Loc. 18 of Choukoutien in Peking and other localities in Shansi and Shensi described by Teilhard and the others. Upper cheek teeth row 12 mm long;  $M^1$  3.8 mm wide.  $P^2$  small; a closed crescentic valley or main anterior median fold as was called by Teilhard is present in the middle of the anterior part of the tooth; and it differs from those in the specimens from Loc. 18 of Peking in having oval outline with narrow inner side and wider outer side and a very distinct small stria on the inner side at the position of hypostria. It differs also from those of Hofeng described by Teilhard and Young (1931) that in the specimens of the latter locality the  $P^2$ , though of smaller size, is narrow on the external side and wider internally, and except the crescentic fold there are no striae on both inner and outer sides at the anterior.

$P^3$  not molarized, with the anterior wing of crescentic valley extending into the labial valley and with a closed posterior wing. In crown view the hypostria is short. The upper cheek teeth row has its maximum width at  $P^4$ , being 4.2 mm wide.  $P^4$ ,  $M^1$  and  $M^2$  have long hypostriae, but not so long as in the Loc. 18 specimens. Those in

M<sup>1</sup> and M<sup>2</sup> run transversely across the entire width of the tooth; and there is a branch on the postero-internal side in that of M<sup>2</sup>.

The horizontal ramus of lower jaw is thick and high, being 12 mm high at P<sub>4</sub>. Lower incisor ends posteriorly under the tyloid of P<sub>4</sub>. Length of lower cheek teeth row varies between 11.5 and 13.0 mm. P<sub>3</sub> subquadratic and divided distinctly into an anterior trigonid and a posterior lobe, the tyloid. The trigonid is narrow and short, and the tyloid broader and longer; and the two lobes are joined together along a thin layer of enamel as in those of Loc. 18, but it is different from those described by Boule and Teilhard (1928, text fig. 23d), in which the two lobes are entirely separated from each other. In P<sub>3</sub> on the external side of trigonid there is a distinct antero-external groove by which the external side is separated from the trigonid to form a vertical column, or "postero-external pillar C" as was called by Teilhard (1940, p. 46). In the tyloid a transverse stridid also developed on the external side and extends to the middle of the tooth in crown view. The enamel is flat and straight as is shown on the chewing surface and without granulated folds as in the specimens described by Boule et al., (1928). In the posterior molars the tyloid and trigonid are nearly of the same width.

The proximal end of femur are smaller than that in *Lepus* and relatively stout, and with third trochanter probably lower in position.

**Remarks:** The genus *Ochotonoides* which is represented by a single species *O. complicidens* (Boule et Teilhard) is a comparatively large-sized ochotona. Its earliest fossil representatives are known from the lower Pleistocene of Nihowan and Loc. 18 of Peking, and they are of common occurrence in the Middle Pleistocene Reddish Clays of northern China, but unknown in the cave deposits of Choukoutien (Late Middle Pleistocene) and in the Upper Pleistocene. Probably this species is a good horizon marker for the Villafranchian and early Middle Pleistocene of China.

### Leporidae Gray

#### *Lepus wongi* Young

(Pl. I, fig. 5)

**Specimens:** A left P<sup>2</sup>; six upper cheek teeth; three P<sub>3</sub>; two lower cheek teeth; several upper and lower incisors and some limb and foot bones (V.3156).

It is similar to the type specimen (Young, 1927) in size and in construction of P<sup>2</sup>, which has three vertical grooves on the anterior side. The upper teeth have comparatively shorter hypostriae with less granulated enamel folds on each sides. The buccal valley on the external side is shallower than those in *L. youngi* Bohlin.

P<sub>3</sub> nearly quadratic, slightly wider posteriorly, with a vertical groove in the middle of the anterior side, and with long postero-external groove extending nearly to the inner side as in other *Lepus*.

### Rodentia Bowdich

#### Cricetidae Rochebrune

#### *Myospalax tingi* Young

(Pl. I, fig. 4)

**Specimens:** A nearly complete skull of an adult individual, lacking anterior of the

nasals, zygomatic arches, occipital region and  $M^3$  of the right side; a broken lower jaw with  $M_1$ ; three incisors and a distal end of humerus (V.3157).

**Description:** Size as in the type specimen (Young, 1927). Skull length about 65.5 mm; orbital width 9.2 mm. In lateral view the skull has straight upper border. Sagittal area wide; temporal crest distinct, but not strongly projecting. Shield area of occipital region broad and distinctly convex; shield area separated from the sagittal area by a weak lambdoid crest. There are large triangular supra-occipital processes on each sides of the shield area which extend downward to form the sharp occipital ridges.

Molars of "Clio-omegodont" type.  $M^1$  with two grooves on inner side;  $M^3$  reduced;  $M_1$  also carries two grooves on the outer side.

**Discussion:** The skull is evidently of an adult individual. In size it is distinctly smaller than that of *M. epi-tingi* of Choukoutien (Loc. 13) and larger than that of *M. chaoyatseni*, and similar to *M. tingi*. This species is of common occurrence in the earlier Pleistocene beds of northern China. But there are a confusion as to its geological age and its fossils are thought by many geologist as restricted to Early Pleistocene. In fact nearly all the known fossils of this species are from the Middle Pleistocene deposits. In lower Pleistocene only two instances are known. One is in Nihowan, but its specific reference is uncertain. The other is that of Chiachiashan, Tangshan (Pei, 1930) in a fauna which appears to be intermediate in age between those of Nihowan and Choukoutien.

It is interesting to note that this species is absent in Loc. 1 of Choukoutien, in which it is replaced by *M. wongi*, and in Loc. 13, by *M. epi-tingi*, a more advanced larger species or subspecies.

### *Myospalax cf. fontanieri* Milne-Edwards

(Pl. I, fig. 3)

**Specimens:** A nearly complete skull, a broken skull, seven incomplete lower jaws and a number of isolated teeth and bones (V.3158—3158.1).

**Description:** Size smaller than *M. tingi* with a cranial length of 46 mm. Shield area convex; sagittal area rather narrow, with raised sagittal crests on each sides sub-parallel to each other and extending forward to the orbital region. Orbital distance 6—9 mm. Nasals not preserved, but appear to be widened anteriorly and being in front of the incisors. On ventral side, the palate ends posteriorly between  $M^2$  and  $M^3$ , as in the recent forms (Leroy, 1941, fig. 6).

The molars are of strongly "Clio-omegodont" type;  $M_3^3$  not reduced. Upper cheek teeth row 10.5 mm long and differs from most of those in formerly known specimens in that there is no supplementary groove on the anterior side of  $M^1$  and postero-external side of  $M^3$ . Similar cases have been reported (ref. Teilhard, 1924, p. 69) as individual variation. Lower cheek teeth row 10.0—10.5 mm long.  $M_1$  with larger rounded anterior loop and two external grooves; those in  $M_3$  are shallow.

In the 1963 collection the presence of this species was indicated by a lower mandible (Chow, 1964, p. 304). This is now confirmed by the more and better material in the present collection. This species evidently has a longer vertical range, probably from Villafranchian to the present.

***Bahomys* gen. nov.**

**Generic species:** *B. hypsodonta* sp. nov.

**Diagnosis:** Size slightly larger than the common hamsters (as *Cricetulus*), dentition:  $\frac{1.0 \cdot 0.3}{1.0 \cdot 0.3}$ ; teeth rather hypsodont, cusps arranged in two rows and more or less alternating, chewing surface of cheek teeth flat, with cusps in the form of irregular triangular or quadrangular prisms, after slight wearing, those on each side connecting with each other alternately so that the side becomes closed all around and shows three longitudinally arranged rows of loops.

***Bahomys hypsodonta* sp. nov.**

(Pl. I, figs. 6—9)

**Type:** a palate and upper jaws with complete cheek teeth rows. V.3159.

**Diagnosis:** As for the genus.

**Hypodigm:** Type and two upper incisors belong probably to the same individual; six upper and lower incisors; a right upper jaw (adult) with  $M^{1-3}$ ; an adult right lower jaw and two lower jaws of old individuals, both with complete lower cheek teeth (V.3159.1).

**Description:** Size larger than *Cricetulus*, upper cheek teeth 5.7 mm long. Cheek teeth hypsodont, cusps columnar, unlike those of *Cricetulus*, which are more brachyodont and bunodont.  $M_2$  about 2.2 mm high in moderately worn specimens. In an unworn specimen of *Cricetulus* cf. *varians* from Loc. 18, it is only 1.2 mm high. Teeth with rather long roots. The occlusal surface is more flat. The cusps on the crown are basically arranged in two symmetrical longitudinal rows and on masticating surface, they are triangular or subquadratic in outlines. After wearing the adjoining cusps become confluent at the corner, and the entire crown surface shows three rows of loops. Meanwhile, the tooth is surrounded on all sides by a layer of enamel. The closing of the sides of tooth appears to be slightly slower on the outer side in the upper teeth and on the inner in the lower, for the "loops" on these sides are shallower and disappear earlier.

The molars decrease in size from front backward, this being more pronounced in the upper teeth. The first upper and lower molars, as in *Cricetulus*, with three pairs of symmetrically arranged cusps and with elongated subquadrangular outlines. The anterior pair is the first ones to be confluent. In moderately worn specimen  $M_1$  has the cusps confluent and  $M^1$  with a separate pit in the middle.

$M_2^1$  nearly quadratic and with two pairs of cusps basically symmetrical in arrangement; but, as in *Cricetulus*, the two inner cusps are slightly more anteriorly placed than those on the outer side. This feature is more markedly shown in the lower teeth, in which the posterior outer cusps (hyd) are distinctly selenodont, with two wings extending antero-exteriorly and postero-internally. The inner anterior cusps (med) send out a spur-like ridge to the border of tooth, corresponding to the antero-external "cingulum" in *Cricetulus*.  $M_3^1$  similar to  $M_2^1$  and slightly smaller and the posterior side of  $M^3$  distinctly reduced.

Diastema 6.2 mm long in the lower jaw.

**Measurement:** See Chinese text on p. 381—382.

**Comparison:** The above described features show that the new species is essentially cricetid-like and nearer to some species of the subfamily Cricetinae, but differs in having cheek teeth with hypsodont crown and quite different type of cusp pattern. For example, in *Cricetulus* and *Mesocricetus* etc., the teeth are not encircled or closed by enamel and low-crowned (ref. Stehlin and Schaub, 1950; figs. 242, 238). The Chinese fossil hamsters, of which eight genera are known, have cheek teeth with low crown and cusp pattern basically similar to those in the ordinary forms. All the living forms have this type of teeth except one species known in southern Kansu described by Allen (1940, pp. 779—781) as *Cansumys canus* Allen. This is a large long-tailed form similar to *Bahomys hypsodonta* sp. nov. in size and in that  $M^2$  and  $M^3$  after wearing show closed enamel rings.

### Muridae Gray

#### *Apodemus* cf. *sylvaticus* L.

(Pl. I, fig. 10)

Two left lower jaws with  $M_1$ — $M_3$  respectively; and one each of upper and lower incisors (V.3160).

Lower cheek teeth row 4.4 mm long, longer than those in *Micromys* and *Mus*, shorter than that of *Rattus*, and closer to those for *Apodemus*. As the chief differences shown by the species of various genera are mainly seen in the structure of skull and upper cheek teeth and in size, it is difficult to make direct comparison between our specimens and the related ones. But ours are in general closer to those of *Apodemus*, and slightly larger than those of *A. sylvaticus* of Loc. 1 and Loc. 3 described respectively by Young (1934, p. 74) and Pei (1938, p. 66), and more similar to those of Loc. 18 described by Teilhard (1940, p. 58) as *A. cf. sylvaticus* in size and structure of lower teeth.

### Hystricidae Burnett

#### ?*Hystrix* sp.

The surfaces of the bones of *Meles* cf. *leucurus* show markings made by gnawing of the incisors of a large rodent about the size of *Hystrix* as is generally the case with fossils of many other localities.

### Carnivora Bowatish

#### Mustelidae Swainson

#### *Meles* cf. *leucurus* Hodgson

(Pl. I, figs. 11—12)

Some upper and lower jaws, teeth and limb bones (V.3161) of a badger comparable to those of *M. cf. leucurus* from the Middle Pleistocene of N. China. C- $M_2$  44.4 mm long, and slightly smaller than those of *M. chiai* (48 mm long; Teilhard, 1945, p. 31).  $P^4$  similar to that of *M. cf. leucurus* of Loc. 1 of Choukoutien in having slightly enlarged at the protocone which is posteriorly situated on the inner side and behind the paracone of the outer side. And there is a large style at the antero-internal side of the tooth in front of the protocone. But it differs from the  $P^4$  in Choukoutien specimens in having

elongated metastyle, as in *M. chiai*.

### Artiodactyla Owen

#### *Sinomegaceros* sp.

(Pl. I, fig. 13)

Two upper molars ( $M^1$ ,  $M^2$ ), a  $DP_4$  and two  $M_1$  (V.3162) are referred to a species of megalocerotid deer. The teeth are slightly larger than those of *S. pachyosteus* Young of Loc. 1 of Choukoutien. These teeth might belong to deer of the new species *S. konwanlinensis* Chow, Hu et Lee (1965) of Konwanling, Lantian.

### CONCLUSIONS

In addition to the Lantian Man, 14 species of mammals are now known in the fauna

#### Comparison of the Chenchiaou faunule with those of Nihowan, Loc. 1 and 13 of Choukoutien and Loc. 18

Fossils	Nihowan; Loc. 18 (Early Pleistocene)	Chenchiaou (Early Middle Pleistocene)	Loc. 1, 13 of Choukoutien (Late Middle Pleistocene)
<i>Ochotonoides complicidens</i>			
<i>Lepus wongi</i>			
<i>Myospalax tingi</i>			
<i>Myospalax</i> cf. <i>fontanieri</i>			
<i>Bahomys hypsodonta</i> sp. nov.			
<i>Apodemus</i> cf. <i>sylvaticus</i>			
<i>Hystrix</i> sp.	?		
<i>Cuon alpinus</i>			
<i>Meles</i> cf. <i>leucurus</i>			
<i>Felis tigris</i>			
" <i>Elephas</i> sp."			
<i>Sus</i> cf. <i>lydekkeri</i>	?		
<i>Pseudaxis grayi</i>			
<i>Sinomegaceros</i> sp.			



of Chenchiaou. Their stratigraphical ranges are shown in the following table:

From the above table it can be seen that among the mammals now known from this locality there are two species i.e. *Myospalax tingi* and *Ochotonoides complicidens* the fossils of which are so far known only in the earlier Pleistocene deposits and absent in the Loc. 1 and 13 of Choukoutien. In the latter localities they are replaced by more advanced forms i.e. *M. wongi* and *O. koslowi*, respectively. And the other specifically determinable species are mostly of later stratigraphical occurrences or living forms. It is interesting to note that comparing with the specimens of corresponding species of Choukoutien Loc. 13, those of Chenchiaou appear to be somewhat more primitive. For examples, the teeth of *Sus* cf. *lydekkeri* are less complicated and  $P^4$  of *Meles* cf. *leucurus* has more elongated metastyle. The faunule as a whole seems to be slightly earlier in age than those of Loc. 1 and 13 of Choukoutien. On the other hand it is clearly younger than the Nihowan fauna, as well as that of Loc. 18, and contains many forms which made their first appearance in Middle Pleistocene, such as *Lepus wongi*, *Pseudaxis grayi*, *Sinomegaceros* etc.

The age of the faunule of Chenchiaou is, therefore, evidently very close to the Lantian Man Fauna of Konwanling (Chow, Hu and Lee, 1965). The reddish clays of these two localities which yield the remains of the Lantian Man are most probably contemporaneous or very close to each other as have been pointed out recently by Chow (1965). This is verified by the second author of the present paper who has recently made a preliminary examination of the collection of mammalian fossils found in 1965 at Konwanling. It includes also those of *Bahomys*, *Ochotonoides*, *Myospalax* and the others, which were formerly unknown in this locality.

In the paper published in 1964 (p. cit. p. 305) by the first author it was thought that the mammals of Chenchiaou are mostly of forest type. The new materials described here show that steppe forms are probably of equal importance.

### 图 版 说 明

1. *Ochotonoides complicidens* (Boule et Teilhard), 右上颌骨具  $P^2-M^2$ , 嚼面,  $\times 4$ 。
2. 同上, 左下颌骨具  $P^3-M^3$ , 嚼面,  $\times 4$ 。
3. *Myospalax* cf. *fontanieri* Milne-Edwards, 头骨, 背面,  $\times 1$ ; 3A. 腹面,  $\times 1$ 。
4. *Myospalax tingi* Young, 头骨, 背面,  $\times 1$ ; 4A. 腹面,  $\times 1$ 。
5. *Lepus wongi* Young, 右  $P^4-M^3$ , 嚼面,  $\times 4$ 。
6. *Bahomys hypsodonta* gen. et sp. nov., 上颌骨具  $M^1-M^3$  (模式标本), 侧面,  $\times 4$ ; 6A. 嚼面,  $\times 4$ 。
7. 同上, 左下颌骨具  $M_1-M_3$  (极老个体), 嚼面, 略小于  $\times 4$ 。
8. 同上, 右下颌骨具  $M_1-M_3$ , 嚼面, 约  $\times 4$ 。
9. 同上, 右下颌骨具  $M_1-M_3$ , 嚼面, 约  $\times 4$ 。
10. *Apodemus* cf. *sylvaticus* L., 左下颌骨具下门齿及  $M_1-M_3$ , 嚼面, 约  $\times 4.7$ 。
11. *Meles* cf. *leucurus* Hodgson,  $P^3-P^4$ , 嚼面,  $\times 2$ 。
12. 同上, 右下颌骨具下犬齿及  $P_3-M_1$ ,  $\times 1$ 。
13. *Sinomegaceros* sp.,  $DP^4-M^1$ , 嚼面,  $\times 1$ 。

