

# 山东临朐中中新世柄杯鹿头骨的发现

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(北京自然博物馆)

## 一、柄杯鹿头骨的发现

1965年春,山东省临朐县解家河硅藻土矿的工人同志们,在开采时发现了一批保存完好的动、植物化石。矿区党政领导及工人群众,十分重视这一发现,及时将情况反映给北京自然博物馆和有关部门。同年四月间,笔者之一赴现场采集了一批化石。本文所描述的柄杯鹿头骨即其中之一件。柄杯鹿类化石过去发现报导的多为鹿角和零星牙齿及其它部分。因此,有关这类动物的形态特征、亲缘关系以及分类系统位置等问题至今悬而未决。此次所发现的完整新材料,有助于对诸问题的进一步的了解,故予以记述。

## 二、杯柄鹿头骨的描述

鹿总科 *Cervoidea* Simpson, 1931

鹿科 *Cervidae* Gray, 1821

鹿亚科 *Muntiacinae* Pocock, 1923 = *Cervulinae*<sup>1)</sup> Sclater, 1870

柄杯鹿属 *Lagomeryx* Roger, 1904

寇氏柄杯鹿 *Lagomeryx colberti* (Young) 1937

*Stephanocemas colberti* Young (Young, 1937, p. 224—228)

*Lagomeryx simpsoni* (Young) (Teilhard, 1939, p. 269—278)

*Lagomeryx teilhardi* Young (Young, 1964, p. 329—340)

(插图1; 图版1)

**层位** 中中新统,山旺组。

**地点** 山东省临朐县尧山公社解家河硅藻土矿。

**标本** 一个经受侧压头骨的左半侧,附有左、右角柄,下颌骨及相当完好的上、下齿列。北京自然博物馆标本编号 (PM. 0301)。

**描述** 头骨石化很深,黑色,受过侧压。除右角及右侧犬齿以外,头骨右半侧由于采集不慎,均已损失;左侧保存较好,头骨的脑颅部分,自角柄基部以后及颧弓后方大部均损失。上第三臼齿以后腭骨部分以及下颌骨在第三下臼齿的后叶之后的部分均缺失。左角柄只保存下半段;右角保存较好,角柄上段的掌状分叉的中心部分保存完好,可以清楚地见到其分叉状况,掌状部分以上的角枝则已损失。

头骨: 额骨上一对几乎垂直耸立的角及上颌骨上一对锐利长大的犬齿是突出的特

1) 本文将柄杯鹿属归此亚科之理由见116页。

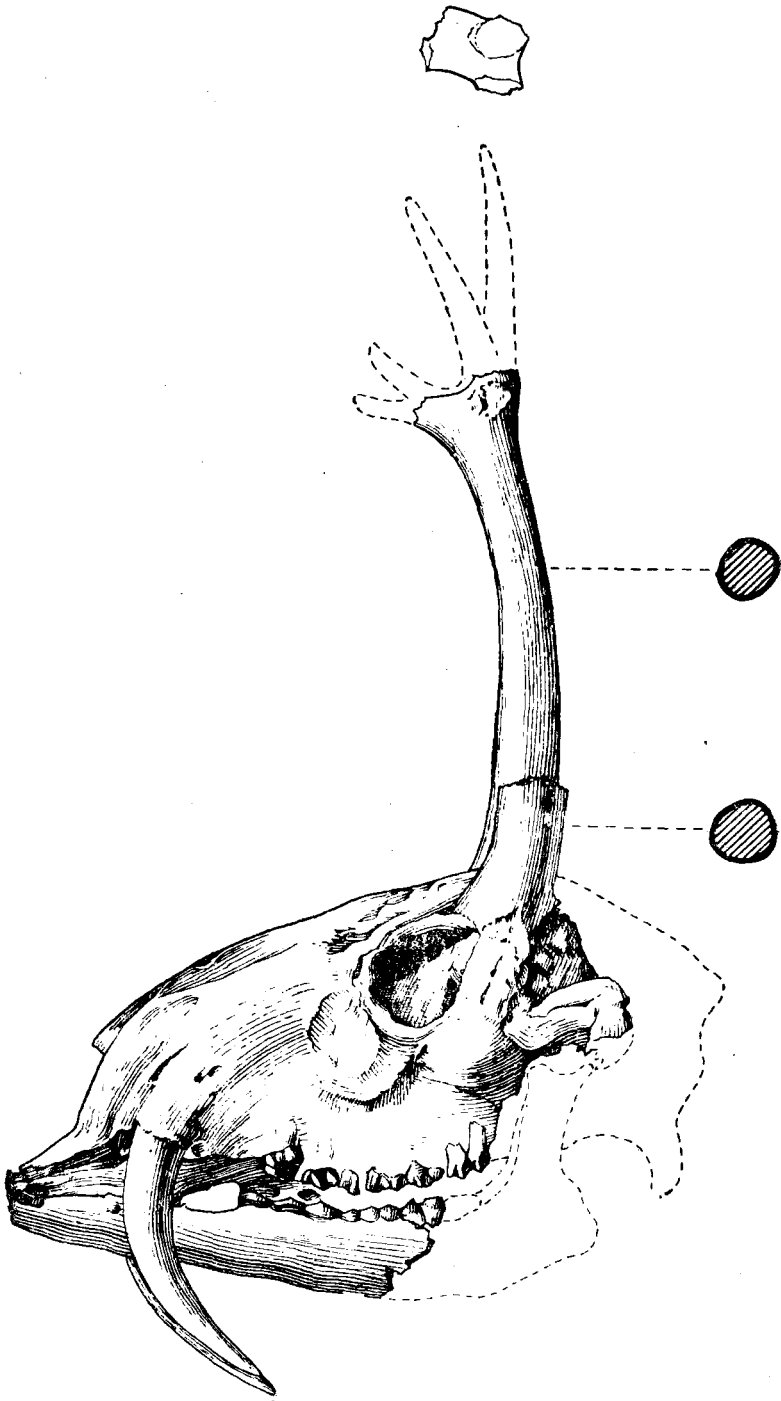


图1 寇氏柄杯鹿头骨及下颌骨，1/2 原大。  
Skull and mandible of *Lagomeryx colberti* (Young), 1/2 natural size.

征。头骨的面骨轴与颅骨轴大致在一条直线上，但鼻部稍稍向上，而不是向前方。头骨的面骨部分较短，吻部很短，而且高隆，两侧面及前端几乎是陡直的。前颌骨短、窄而尖锐，

腭突尖锐,无门齿。前颌骨的上端向上陡升不与鼻骨相接,二者之间被上颌骨的翼状尖突部分所分隔。上颌骨外侧面甚粗糙,上犬齿齿槽粗大而深,所容纳的上犬齿根深入达到上颌骨高度的  $2/3$  处。吻部高陡与鼻梁几成直角相交。眼眶前之眶下腺窝大且深,呈梨形,其直径小于眼窝的直径,其长轴与头骨之长轴相交。眼窝大,呈卵圆形,其长轴大致与头骨长轴相平行,后眶稍稍向上挑,泪窝与眼窝的上前缘均有突起物。眼眶的前上方有一显著的眶上突起。眼眶的后沿由额骨粗壮的眶上突和角柄基部粗壮的稜嵴所构成。颧骨的颧突短,颧骨短壮,稍侧扁,颧突很粗壮。额面近乎平坦,外侧有粗糙的隆起。鼻额部分稍稍隆起。头骨整个外形大致与现代的毛冠鹿有些相似,但不像现代麂类头骨有由角柄基部向前延伸所形成的三角形的角稜。

角: 两支鹿角几乎垂直着生于头骨之上,角柄长,上端有明显的掌状部分,面积不大,由此分出四支分叉。角柄基部外侧有角稜,由角柄基部至上端掌状分枝之底部(外侧分双叉的一支)的直线长度为 132 毫米,至前内侧分支基部的直线长度为 137 毫米。角柄基部的横剖面呈三角形,内一外径长 33 毫米,前一后径长 24 毫米,角柄中段横剖面卵圆形,径长  $18 \times 16$  毫米,整个角柄呈弓形,中段向后弯,而掌状分支部分与角柄基部贯穿在弓弦的直线上。掌状部分较小,由此分出四支分叉,第一分支已断失,由柄前表面上长圆形的凹痕所证明,从疤痕的形迹看,这支分支是在动物生前受伤折断(值得注意的是,柄杯鹿类的角支常常有折断受伤的痕迹,例如陕西兰田的复角柄杯鹿;德日进 1937 年描述的山旺的标本以及通古尔的三叉柄杯鹿都在角柄朝前的分枝上可以见到伤痕或伤后复愈的疤痕,说明柄杯鹿的角枝可能是雄性在生殖季节争偶的武器)。第二支,为朝前靠内侧的一支,较长,圆柱状。第三支,是主枝,为后内侧的一支,长,圆柱状。第四支,靠近外侧,短,从基部分叉,较扁。

角柄外表光滑,但有些较深的沟槽,分布在角柄的后表面,由头骨延伸到各支分枝,可能是容纳动脉血管的沟槽。此外,整个角柄表面还有许多虫蛀形迹的小槽,为容纳小血管的通道,为动物生活时角柄外表“鹿茸”提供营养,也说明角柄是不脱换的。

下颌骨: 下颌骨体低矮而侧扁,前端每侧有三个门齿及一门齿形的小犬齿。颞孔位置在上犬齿掩覆下颌骨部分的前沿。下颌支的水平部分在下第一臼齿处的高度为 20 毫米。估计这种柄杯鹿的活体大小与现代麂类相仿。下颌支的垂直部分自下第三臼齿的后叶以后损失。

#### 牙齿:

a. 上牙 无上门齿。上犬齿长大,为一向后弯曲的獠牙,具有锋利的后刃。窄而侧扁,外侧凸圆,内侧平扁。由齿颈至齿尖的直线长度 75 毫米,由上犬齿到上第二前臼齿间的齿隙 19 毫米,左侧上颌骨保存了磨耗程度颇深的  $P^2-M^3$ 。上颊齿列排列紧凑,齿冠极低,釉质层厚,有细密皱纹。 $P^{2-4}$  有明显的前附尖, $M^{1-3}$  有显著的前附尖、中附尖,前外侧有凸肋,后外侧壁凹入, $M^{1-2}$  无后外肋凸, $M^3$  有弱小的后外凸肋。

b. 下牙 三个下门齿均保存(左侧),牙冠形状相似,抹刀形,咬合面呈半圆形,有釉质层包围。下犬齿小,门齿化,位于第三下门齿之外侧,牙冠裂失。下颊齿齿冠很低,釉质层有皱纹,外侧有明显的齿带。 $P_1$  小,齿冠裂失,其齿槽与下  $P_2$  之间有一小段齿隙。由下犬齿至  $P_2$  之间的齿隙, 19mm。下  $P_{2-4}$  相当长大,形状简单, $P_2-M_3$  有外齿带。 $M_{1-3}$  有明

显的下后附尖与下内附尖 (entostylid), 两个齿脊之间外侧基部无附属齿柱。在  $M_2$  的下原尖 (Protoconid) 的后外壁上有一很弱的“古鹿褶”。第三下臼齿的后半叶裂失, 可能有第三小叶。

### 测 量 (以毫米为单位)

(Measurements of *Lagomeryx colberti* (Young), in mm.)

#### 头骨保存部分的长度

(Preserved length of the Skull)

前颌骨尖端至上 $M^3$ 后缘的长度 (Posterior border of $M^3$ to tip of premaxillae)	126.5
前颌骨尖端至眼眶前缘的长度 (Anterior border of orbit to tip of premaxillae)	107.0
前颌骨尖端至角柄基部前沿的长度 (Anterior border of antler at base to tip of premaxillae)	113.0
前颌骨尖端至颧弓后缘的长度 (Posterior border of zygomatic arch to tip of premaxillae)	171.0
眶下腺窝的长径 (Long dia. of suborbital pit)	23.0
眼眶的长径 (Long dia. of orbit)	30.0
前颌骨尖端至上犬齿基部前缘的长度 (Anterior border of upper C at base to tip of premaxillae)	29.0

#### 角柄 (The pedicle)

角柄基部至掌状分支基部(外侧支之下)的长度 (Length of pedicle, from base to palmature, below the external bifid tine)	132.0
角柄基部至掌状分支基部(内一前支之下)的长度 (Length of pedicle, from base to palmature, below the inner-anterior tine)	137.0
角柄基部的横径 (Trans. dia. of pedicle at the base)	33.0
角柄基部的前一后径 (Ant. -post. dia. of pedicle at the base)	24.0
角柄中段的剖面径 (Cross section of the pedicle at mid.)	18.0 × 16.0

#### 牙齿 (The dentition)

上牙 (Upper teeth)	长 (L)	宽 (W)	高 (H)
$M^3$	12.0	6.0	5.0
$M^2$	11.0	6.0	4.5
$M^1$	10.0		4.0
$P^4$	9.0		4.0
$P^3$	8.5		4.0
$P^2$	9.0		4.0
$P^2-M^3$	61.0		4.0
$p^{2-4}$	28.0		
$M^{1-3}$	34.0		
C	12.0		75.0@

@ 由基部至尖端的直线长 (from tip to base in a straight line)

下牙与下颌骨 (Lower teeth and mandible)

长 (L) 宽 (W) 高 (H)

I <sub>1</sub>	4.0	5.7
P <sub>2</sub>	9.0	3.0
P <sub>3</sub>	9.0	3.0
P <sub>4</sub>	10.0	4.0
M <sub>1</sub>	10.5	3.0
M <sub>2</sub>	10.5	3.0
C—P <sub>2</sub> 齿隙长度 (Diastema)	19.0	
P <sub>2-4</sub>	25.0	
P <sub>2</sub> —M <sub>2</sub>	41.5	11.5
下颌骨在 M <sub>1</sub> 之下的高度 (Depth of the mandible under M <sub>1</sub> )		2.00

**鉴定与讨论** 根据以上描述,本文所记述的标本,无疑的属于柄杯鹿属。关于属的特征,我们可以主要根据新发现的头骨的特征,并综合斯泰林(1937),寇伯特(1936,1940),杨钟健(1937,1964),德日进(1939)的描述和插图,归纳如下:

一类小型的原始鹿类,大小与现代麋类相仿。头骨较短,鼻吻部很短而高隆,眶下腺窝大而深,但其直径比眼窝的小;额骨上有一对不脱换的鹿角,近乎垂直地耸立在头骨上,角柄很长,角柄基部横剖面呈三角形,中段横剖面卵圆形,上端掌状分支基部局限,有三至四支,向前或向外的分支。齿式: 0·1·3·3/3·1·3—4·3。上犬齿是长大而后弯的獠牙,后刃锋利。下颌骨骨体低矮。上、下颊齿齿冠很低,釉质层有细密的皱纹。上 P<sup>2-4</sup> 的前附尖明显, M<sup>1-3</sup> 的前附尖及中附尖明显,前叶外壁有前外肋,后叶外壁凹入,仅 M<sup>3</sup> 有小的后外肋。三个下门齿的形状相似,呈抹刀形,咬合面切缘卵圆,门齿型的下犬齿小。P<sub>1</sub> 小或无。P<sub>2</sub>—M<sub>3</sub> 有外齿带。下 M<sub>2</sub> 的下原尖的后外壁上有发育程度不等的“原古鹿褶”。

对山旺的柄杯鹿种名的确定,有一些困难。因为早期的研究者后提出了好几个种名,需要讨论。山旺的柄杯鹿化石,最早由杨钟健(1937)描述为寇氏皇冠鹿 (*Stephanocemas colberti* Young), 但根据描述与插图(图 10a、b)看来,这些材料显然属于柄杯鹿。德日进(1939)、胡长康(1957)都曾提到过这一点。因为较长的角柄,柄杯型的掌状分支等特征,都与皇冠鹿的不同,而是柄杯鹿的式样,所以我们认为这个种属于柄杯鹿属。第二个种名是德日进修定的辛氏柄杯鹿,原是杨钟健(1937)在同一篇文章中根据同一地点的一支鹿角描述的另一新的属和种,即辛氏异角鹿 (*Heterocemas simpsoni* Young)。这支鹿角有三个分叉,角柄上端全然没有掌状分叉的特征,也不同于皇冠鹿角。但是,德日进(1939)在补充描述杨钟健从山旺所采集的一些保存较好的柄杯鹿化石的文章中,不恰当地认为杨氏所定的异角鹿属 (*Heterocemas*) 是柄杯鹿属的同物异名,因而把他自己描述的标本记名为辛氏柄杯鹿 [(*Lagomeryx simpsoni*) (Young)]。此后,异角鹿属通常被看作是柄杯鹿属的同物异名或亚属(德日进, 1939; 辛普森, 1945; 惠特沃思, 1958)。

杨钟健(1964)提出,异角鹿属仍当认为是一个独立的属,并认为德日进(1939)所记述的“辛氏柄杯鹿”应另记一个新种名,即德氏柄杯鹿 (*Lagomeryx teilhardi* Young), 是为山旺的第三个柄杯鹿名称。

我们研究了山旺中中新世的柄杯鹿的新、旧标本之后,认为这里已知的只是一个种。因此,杨钟健(1937)根据山旺标本所描述的寇氏皇冠鹿 (*Stephanocemas colberti* Young) 应订正为寇氏柄杯鹿 [*Lagomeryx colberti* (Young)], 这个种名具有优先权,应予保留。此

外,德日进(1939)所记述的同一地点的柄杯鹿角及小型组(或B组)的原古鹿型的牙齿,均属于寇氏柄杯鹿。德日进(1939)所修订的辛氏柄杯鹿 [*Lagomeryx simpsoni* (Young)]; 杨钟健(1964)新提出的德氏柄杯鹿 (*Lagomeryx teilhardi* Young) 均为无效种名。

目前已知山旺中新世的原始鹿类共有三属、三种,即:辛氏异角鹿、涂氏皇冠鹿和寇氏柄杯鹿。辛氏异角鹿属可能属于原古鹿科,后两个属均属于麝亚科。

### 三、柄杯鹿属的系统位置

自从罗杰(Roger, 1904)采纳施罗塞(Schlosser, 1902)的意见,把原古鹿属(*Palaeomeryx*)中有角的小型种(根据牙齿大小)分出来另立柄杯鹿属(*Lagomeryx*)以来,这个属的系统位置一直未能确定下来,至今世界古生物学者意见分歧。为了弄清问题,不妨将前人的意见简单归纳。

(1) 首先一个问题,柄杯鹿是否是一个独立的属,或者仅仅是原古鹿属的同物异名。

从化石记录看,欧亚大陆可能是鹿类的发源地,中新世中期至晚期的不少化石地点都发现有原古鹿型的牙齿,根据大小可分两组。德日进(1939)把山东山旺中新世的原古鹿型牙齿化石,分出两组,大型组或称A组,推测其个体大小相当于现代马鹿,下 $P_{2-4}$ 的长度为48毫米;小型组的个体大小相当于麝,其下 $P_{2-4}$ 的长度为34毫米。小型组或称B组。德日进估计在同一地点发现的柄杯鹿角,按大小与B组的牙齿配套。致于大型组则尚未发现与之配套的鹿角。

在欧洲,原古鹿属最早由迈耶(Meyer, 1834)所建立,根据的材料是大型的牙齿,并认为它具有真鹿类的特征。后来的一些工作者逐步地把一些新种纳入该属,其中包括了一些由小型牙齿所代表的个体。到十九世纪后半叶,弗拉斯(Fraas, 1862),吕特迈耶(Rütimeyer, 1883)和罗杰(Roger, 1893)等人提出,原古鹿属,只限于小型组的种才具有非脱换性的鹿角。于是罗杰采纳施罗塞的意见,把小型组从原古鹿属里分出来,另立一属即柄杯鹿属。但是,长期以来,由于没有发现鹿角与头骨、牙齿相连系的标本,所以这两个属单就牙齿比较,除了大小外很难找出特异性较强的标准。德日进(1939)也提到过,单就牙齿而论,山旺的标本(牙齿)很难区别于欧洲原古鹿的。在此情况下,惠特沃思(Whitworth, 1958)在描述东非肯尼亚中新世的原古鹿时,就此问题作了一篇翻案文章,认为仅仅大小之差不足以把柄杯鹿从原古鹿中分出,前者仅为后者的同物异名。而置小型种有非脱换性鹿角之特征于不顾,并强调大型种也可能有角,虽然并未证实。

本文所描述的完整头骨,证明非脱换性的鹿角确实为小型种的特征,有充分的特征表现为一个独立的种。至于大型的原古鹿牙齿所代表的个体是否有非脱换性的角,是否与小型组同一类型,均尚待充分的化石证据以兹证实。所以,目前我们认为柄杯鹿属是独立的属。

(2) 柄杯鹿属,属于长颈鹿总科还是鹿总科?柄杯鹿属原来分在麝亚科(齐特, 1925;寇柏特, 1936)。德日进(1939)首先提出了异议,他认为旧大陆中新世的柄杯鹿、原麝和其它一些具有非脱换性鹿角的原始鹿类,应当另立一个新科,这个绝灭了科曾联系着长颈鹿科与鹿科。对于柄杯鹿属,德日进承认这个属具有鹿类的一些特征,诸如:有分

支的鹿角、牙齿具有鹿类的特征,尤其是上犬齿为獠牙等。但是他强调柄杯鹿上臼齿外壁的前、后两个肋状突起发育不对称,前外壁凸出,后外壁凹入;牙齿外表的釉质层有皱纹,以及鹿角是不脱换的等三方面的特征是长颈鹿类的特征。

皮尔格林 (Pilgrim, 1941), 采纳德日进的上述意见,以柄杯鹿为典型属,提议建立一原始的长颈鹿类的新科,即柄杯鹿科 (Lagomerycidae)。辛普森 (1945) 采纳这一意见(有保留地),认为柄杯鹿科是与长颈鹿类关系更近的一个独立的科,列在长颈鹿总科之下。杨钟健(1964)表示了相同的看法。

另一方面,罗美尔 (1961), 惠特沃思 (1958) 等则认为这类鹿类属于原古鹿科 (Palaeomerycid), 说它的系统位置处在鹿类与长颈鹿类共同系统的起点上,但未能提出事实根据。

我们认为,柄杯鹿类属于鹿总科。德日进 (1939) 所提出的,柄杯鹿属应归在长颈鹿类的理由以及皮尔格林 (1941) 的补充假设,都是片面的或与事实不符合。因为德日进提出的前两点理由是原始鹿类(包括原始的长颈鹿类)的共同特征,而非长颈鹿类的独特的性状。至于第三点,不脱换的鹿角,也是原始鹿类的特征,虽然现代真鹿类没有这一性状,而长颈鹿类除主要方面已发展为另一支系外,仍然保留着这种鹿角。我们不能仅根据此,而人为地把它们分为一类。现代真鹿类的脱换的角,正是由类似于柄杯鹿型的,非脱换性的角发展出来的。从柄杯鹿头骨的特征,如头骨的结构、比例以及眼眶前较大的眶下腺窝(皮尔格林, 1941 推测柄杯鹿没有这一特征,而与长颈鹿类相似),牙齿的特征,以及肢骨的特征(惠特沃思, 1958)都不是长颈鹿型的,而是鹿类的。所以柄杯鹿是鹿总科,鹿科的一个属。

(3) 柄杯鹿属的系统位置 柄杯鹿类的形态特征,可说与现代的、比较原始的毛冠鹿 (*Elaphodus*) 和麂属 (*Muntiacus*) 最为接近。

因为它们的头骨形状、比例、眼眶的位置,眼眶前眶下腺窝大而深陷;獠牙形的上犬齿,上臼齿外壁发育不对称,颊齿釉质层外表有皱纹等都相似。而且它们都有长的角柄和小的角支。从化石的角柄外表有血管细槽供给营养的情况推测,柄杯鹿的角柄是不脱换的。但是角枝受伤后复愈的情况,在柄杯鹿化石上是屡见不鲜的(见 113 页,角的描述部分)。这说明,柄杯鹿的雄性个体,在繁殖季节,可能以角作为争偶的武器,由于角柄外层的皮肤层有丰富的血管供给营养,所以角支折断或受伤后,可以复愈。通过长期的自然选择,先是角支较长的个体占优势。后来是角枝长而角柄短的个体占优势。角柄上端分出角支的掌状部分,逐步由掌状变成环状,而最终成为真鹿类的“角环”。由掌状部分以上的分支伤愈的再生,发展成角环及以上部分的季节性脱换。正如皮尔格林(1940)所说的,鹿类季节性脱换的角,可能是由柄杯鹿型的角发生的。我们认为,更确切地说,是真鹿类有季节性脱换的鹿角的类型,逐步取代了后者。

柄杯鹿类是原始鹿类中以角为武器的类型(除角以外,还保留有獠牙形的上犬齿),在中新世时,朝着有角的方向发展中的一个“尝试”阶段。但是,由于具有季节性脱换鹿角的类型(早期的)的发展和竞争,使之不能成功,而在上新世之前趋于绝灭。

毛冠鹿类与麂类也有长角柄和短角支,它们是否换角? 有记载说是换角,但是根据北京自然博物馆同志的实际狩猎记录,各个月份的标本均无换角的情况,所以可能不是季节性换角。它们有发达的獠牙作为争偶的武器。它们在许多方面仍保持着原始的特征。它

们可说是第三纪的原始鹿类的变化不很大的后裔。在亚洲局部地区延续下来的较原始的类型。它们与柄杯鹿类的系统关系很近,可以说是一个很近的类群,它们之间的差别不会超出亚科一级分类,其关系可以用以下的分类系统表示:

鹿总科 Cervioidea

鹿科 Cervidae

麂亚科 Muntiacinae

属 *Lagomeryx*

属 *Elaphodus*

属 *Muntiacus*

属 *Metacervulus*

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## A SKULL OF *LAGOMERYX* FROM MIDDLE MIOCENE OF LINCHU, SHANTUNG

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In the spring of 1965, workers excavating the diatomaceous earth at Hsiehchiaho in Linchu County, Shantung Province, came across a considerable amount of fossil plants and animals. This discovery was reported to the Peking Museum of Natural History, and one of the authors (Shih) visited the site in April of the same year and collected some fossils from the diatomaceous shale of the 'Shanwang Series' in the valley called Hsiehchiaho near the village Hsiehchiachuang, 2 Kilometers north of Shanwang. Of particular interest is a well preserved skull of *Lagomeryx*, which is described in the present paper.

The fossil bearing deposits were formerly attributed to the Upper Miocene (Young, 1937, 1964), but more recent studies (Li, 1974; Chang, 1974) have assigned them to the Middle Miocene.

Superfam. Cervoidea Simpson, 1931

Fam. Cervidae Gray, 1821

Subfam. Muntiacinae Pocock, 1923 = Cervulinae Selater, 1870

Genus *Lagomeryx* Roger, 1904

*Lagomeryx colberti* (Young) 1937

*Stephanocemas colberti* Young (Young, 1937, p. 224—228)

*Lagomeryx simpsoni* (Young) (Teilhard, 1939, p. 269—278)

*Lagomeryx teilhardi* (Young) (Young, 1964, p. 329—340)

(Text-fig. on p. 112; Plate I)

Horizon and Locality: Middle Miocene 'Shanwang formation'; Hsiehchiaho, Linchu, Shantung.

Material: A laterally crushed skull with attached antlers of both sides, associated lower jaw, and with upper and lower teeth, *in situ*. Peking Museum of Natural History Cat. No. PM. 0301.

Diagnosis: Cervids of small size. Skull rather short, muzzle very short and deep with nearly vertical sides. Suborbital pit large and deep but smaller than the bony orbit in diameter. Non-deciduous antlers extending vertically upward over the orbits, with whorl of rather short tines, supported on very long pedicle. Cross-section of the antler at the base triangle in outline, oval at the middle. The restricted complex palmate portion of the pedicle with three-four tines of prongs projecting anteriorly and externally. Dental formula: 0.1.3.3/3.1.3—4.3. Upper canine narrow, long curve tusk-shaped with posterior sharp edge. Upper and lower cheek teeth extremely brachyodont, enamel thick and corrugated. Parastyle prominent on Upper P<sup>2-4</sup>, parastyle and mesostyle strong on M<sup>1-3</sup>. Lower incisors all the same shape, have oval, spatulate crowns. Lower canine incisiform, lying alongside the third incisor. P<sub>1</sub> small

or absent.  $P_{2-4}$  elongated, simple.  $M_{1-3}$  with prominent metastylid and entostylid and external cingulum. *Palaeomeryx-fold* developed to varying degree. Mandible very shallow.

Description: (1) Skull — Rather slender, the cranial and facial axes lie nearly in a straight line, but the nose is somewhat directed upwards and not forwards. The facial part of the skull rather short, the muzzle very short and deep. The body of the premaxilla is short, narrow and pointed, the palatine process is extremely narrow in front. The expanded upper end of the premaxilla is sharply upwards and does not reach the nasal, but is separated by a wing-like intervening tongue of maxillary. The facial part of the maxilla complete the medial wall of the very large alveolus for the upper canine tooth, the root of it extending about  $2/3$  way into the height of the maxilla. The steep sides of the muzzle turn down at nearly right angles to the bridge of the nose. The long diameter of the suborbital pit being more or less across the long axis of the skull. The bony orbit is oval in outline, the long diameter of which more or less parallel with the long axis of the skull is tilted up at a considerable angle. The powerful zygomatic arch short and massive. The frontal surface is nearly flat. The naso-frontal part is slightly curved.

The skull is in general appearance recalls that of a Tufted Deer, but may at once be distinguished by its greater size of upper canine and the peculiar antlers to the recent more primitive deer:

(2) Antler — The antler is borne nearly upright above the orbit, supported on a very long pedicle with a restricted palmate portion, composed four forks. The first one is indicated by an excavated area on the anterior surface of the pedicle below the palmate portion, being set much below the three others, the thine was wanting, probably injured in life (it must be noted that the injured tines were frequently found in *Lagomeryx*). The second, antero-inner tine is long and cylindrical. The third, the main tine, represents the postero-external one, also elongated and rounded. The fourth, is the external one, short and bifid at the base.

Surface of the pedicle smooth. There are numerous vermiculations for the smaller blood vessels, and some rather deep furrows for the arteries arise from the skull to the tines, mainly along the posterior surface of the pedicle.

(3) Mandible — The body of the mandible is shallow and narrow, and the anterior portion of the ramus is rather stout. The mental foramen is set further forward. The depth of the mandible beneath the first lower molar, 20 mm., suggest a creature equal in size to an adult Muntjac, *Muntiacus muntjak*.

(4) Dentition — (a) Upper teeth: The upper canine is enlarged as a long curved tusk reaches a length of about 75 mm. in a straight line from the tip to the base. It is narrow with a sharp posterior edge and laterally compressed, convex on the outer face and flat on the inner. The closed series of cheek teeth extremely brachyodont, with enamel thick and wrinkled.  $P^{2-4}$  with prominent parastyle.  $M^{1-3}$  with prominent parastyle, mesostyle and antero-external rib, the posterior lobe deeply concave externally. Postero-external rib absent on  $M^{1-2}$ , feeble on  $M^3$ . (b) Lower teeth: The lower incisors are all present and have oval, spatulate crowns. The lower canine becomes incisiform, lying alongside the third incisor. All the lower cheek teeth with prominent external cingulum. The crown of  $P_1$  was missing, the alveolus isolated by

a short diastema.  $P_{2-4}$  elongated, simple.  $P_2$  without metaconid.  $M_{1-3}$  without external pillar between the outer two cresscents. The rear of the protoconid supports a feeble *Palaeomeryx*-fold on  $M_2$ . The posterior part of the last lower molar was missing, probably with a third lobe.

The dimensions of the skull are given on pp. 114 in the Chinese text.

Determination and Discussion: The remains of *Lagomeryx* found in Shanwan were first described by Young (1937) as a new species, *Stephanocemas colberti*, based on two fragments of antlers with basal partly preserved and three canines. However, from the description and illustrations (fig. 10. a, b) given by Young (1937), all prove that this animal is not a species of *Stephanocemas*, but a true *Lagomeryx*, as already pointed out by Teilhard (1939, p. 272, footnote 3) and Hu (1957, p. 163—166). We are therefore, regarding it as a species of the latter genus, viz., *Lagomeryx colberti* (Young). In the same paper, Young (1937) erected another new genus and species, *Heterocemas simpsoni* Young, based on a long three-tined right antler wholly absent of an palmate area, found in the same locality. Slightly later, in describing some better preserved materials of Cervoid collected by Young from the same site, Teilhard (1939) referred a left antler as *Lagomeryx simpsoni* (Young), and considered the genus *Heterocemas* as a synonym of *Lagomeryx*. In 1964, Young reviewed the *Lagomeryx* found in China, considering that the specimen described by Teilhard (1939, text-fig. 1) as a separated species, which he named as *Lagomeryx teilhardi*.

After examining all the specimens of *Lagomeryx* from Linchu, we would at present recognize only the single species, the earliest published *Lagomeryx colberti* (Young), therefore, the *L. teilhardi* is an invalid name. The specimens referred to the so called *L. simpsoni* by Teilhard (1939), obviously belong to *L. colberti*. As to the genus *Heterocemas*, although it was generally considered as a synonym or subgenus with *Lagomeryx*, on account of the peculiar shape of the antler, wholly absent of an palmate area, we feel it may be retained as a distinct genus.

Systematic position of *Lagomeryx*: Since Roger (1904) adopted Schlosser's suggestion, segregated the small species of *Palaeomeryx* under the name *Lagomeryx*, the systematic position of the genus is not yet settled, so far, diverse opinions are held by palaeontologists. *Lagomeryx* was originally grouped within the subfamily Muntiacinae = Cervulinae (Zittel, 1925; Colbert, 1936). As is generally known, Teilhard (1939) had expressed the opinion that *Lagomeryx* may be regarded as an aberrant Giraffid, Pilgrim (1939) following this idea erected the name 'Lagomeryxidae' under the superfamily Giraffoidea. Simpson (1954) and Young (1964) considered the genus as the representative of an independent family and closer to Giraffoidea rather than to Cervidae. The usual reference of this genus to the Giraffid is in regarding chiefly as the occurrence of long-pedicle non-deciduous antlers, a feature which they considered as the evidence of the giraffid nature require further consideration. For this feature is found not only in the extinct and living Giraffes, but also in most Miocene Cervoids of the Old World and some primitive small living deer, and this probably the primitive cervoid condition as the giraffoid. Judging from the total morphological pattern of the skull and comparison with the other known genera of Cervoid, we may come to the conclusion that *Lagomeryx* are most closely related with *Ela-*

*phodus* and *Muntiacus*. Thus the present authors would rather insist that it belongs to the subfamily Muntiacinae under the family Cervidae. As the antlers had become much specialized, *Lagomeryx* was probably a side branch of the Muntiacinae which became extinct at the end of Miocene. *Elaphodus* and *Muntiacus* of China, where they seem to have found a congenial environment and continuing today as little changed descendants from generalized Tertiary types. It is difficult to see much merit in a classification that gives family rank to distinctions, as between *Lagomeryx* and *Elaphodus*. If this is accepted, it does not matter much what rank may be given to that unit, to keep with the subfamily rank is most convenient here. Thus the following classification of the subfamily Muntiacinae is suggested.

Superfam. Cervoidea Simpson 1931

Fam. Cervidae Gray 1821

Subfam. Muntiacinae Pocock 1923 (= Cervulinae Selater 1870)

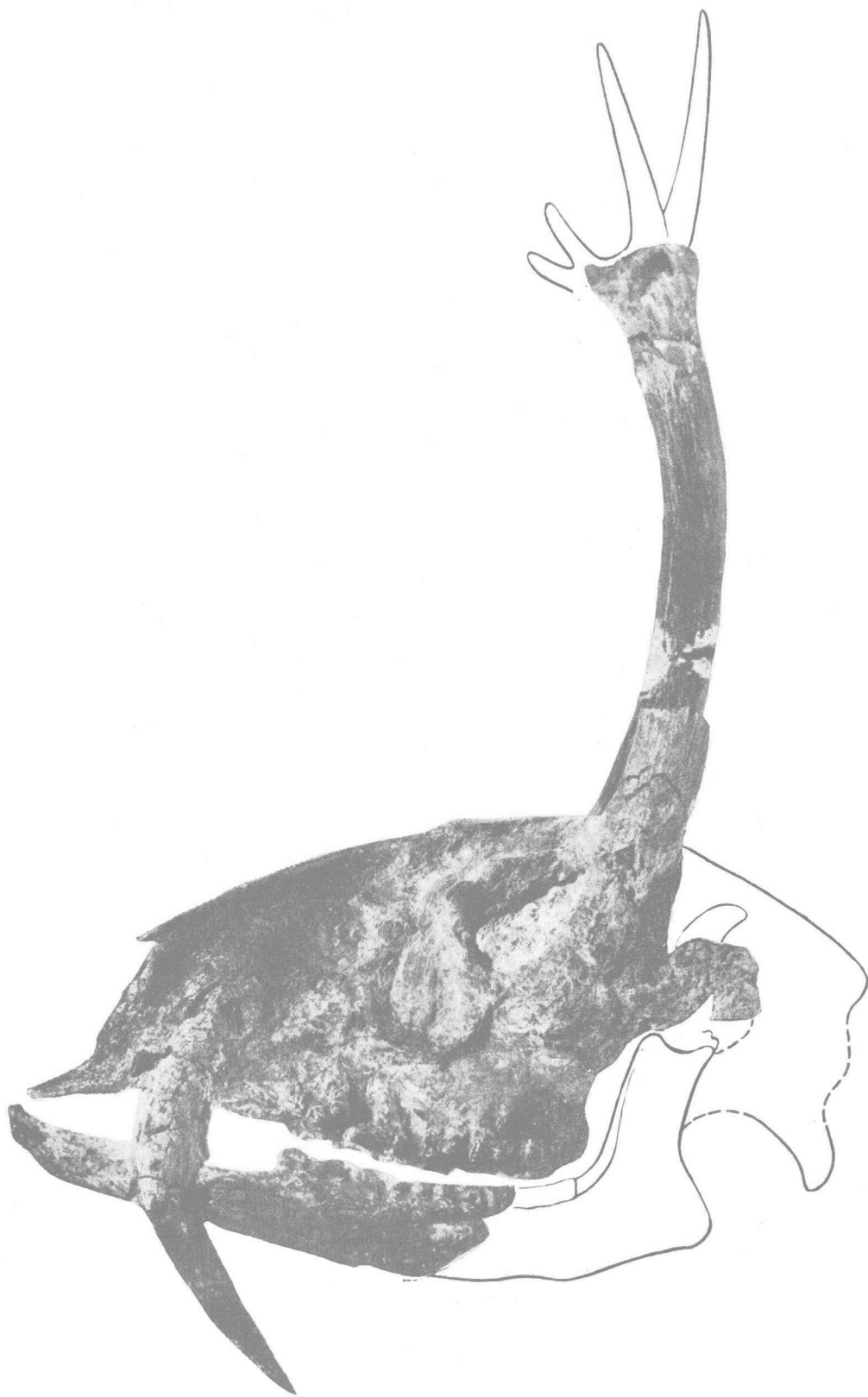
Tribe Muntiacini Weber 1928 L. Mioc.-Plioc. Eu.; L. Mioc.-R. As.

*Metacervulus* Teilhard M. Plioc.-Pleist. As.

*Muntiacus* Rafinesque Plioc.-R. As.

*Elaphodus* Milne-Edwards Pleist.-R. As.

*Lagomeryx* Roger L.-U. Mioc. Eu.; M.-U. Mioc. As.



寇氏柄杯鹿头骨及下颌骨，2/3 原大。  
Skull and mandible of *Lagomeryx colberti* (Young), 2/3 natural size.