

# 江苏南京浦鎮及泗洪下草湾 中新世脊椎动物化石\*

周明鎮 王伴月

(中国科学院古脊椎动物与古人类研究所)

本文包括两部分,分別記述了近年来在江苏南京市浦鎮和泗洪下草湾两个地点发现的一些脊椎动物化石,討論了产化石地层的时代和有关的地层問題。

浦鎮的化石是鎮江地質部第六普查綜合研究队,南京师范学院地理系和南京大学地理系的几位同志,在該地的猪头山的一个砂砾层的砂砾层中采集的。泗洪的化石是前“华东文物工作队”在 1955 年送交前“古脊椎动物研究室”鉴定的,由同一地点发现的其他化石,过去已經研究发表(見后)。

除了南京方山发现的一个安琪馬 (*Anchitherium aurelianense*) 的标本(周明鎮、胡长康,1956)以外,这两个地点是目前我国南方仅有的可以确定的中新世脊椎动物化石地点。浦鎮发现的一种短吻鱔的化石,是我国第一次发现的新生代晚期的鱔类化石,为了解我国揚子鱔(*Alligator sinensis*)的历史提供了有价值的綫索。

作者感謝上述三单位和段达济、陈高庄(第六普查队),李立文(南京师范学院),芦友裕(南京大学)四位同志,他們将标本交我們研究,并提供有关地层和化石产状的資料,李立文和方艱森(南京大学)两同志,將他們的未发表的論文的原稿供我們参考,并帮助我們了解了一些在研究工作中遇到的关于化石产地和地层方面的問題。

## 一、南京浦鎮化石地点

### 1. 化石地点和动物羣的时代

浦鎮的化石地点位于南京市长江北岸,离江岸約 8 公里的猪头山的东坡。猪头山的新生代地层,照李立文、方艱森(1963)的意見,可分为三部分(插图 1)。下部为浦口組,主要为紫紅色砂頁岩,地层微向北西傾斜。中間是浦鎮組,主要是灰白色和棕黄色砂砾层,厚約 70 米,岩层水平,以角度不整合复于浦口組之上。上为深灰色的玄武岩,与浦鎮組成假整合接触。脊椎动物化石产自浦鎮組砂砾层的下部,包括三个小化石层。上面一层(第三化石层)产 *Dicrocerus* cf. *elegans*, cf. *Stephanocemas colberti* 等化石;中层(第 2 层)产植物化石;底层(第 1 层)产 *Brachypotherium* cf. *aurelianense*, ?*Listriodon* sp. 及爬行类化石。

下伏的浦口組的时代,过去一般都認为是早第三紀(始新世),据夏树芳等的意見

\* 8 月 21 日收到。

(1964)认为是晚白垩世,可与胶东的王氏系对比,但文章中并未提出可信的根据。

浦镇组发现的化石,经我们鉴定包括下列几种:

爬行类 (Reptilia)

鳖类 (*Trionyx* spp.)

短吻鳄 (*Alligator* sp.)

哺乳类 (Mammalia)

Mastodontoidea indet.

短腿犀 (*Brachypotherium* cf. *aurelianense*)

利齿猪 (?*Listriodon* sp.)

柯氏皇冠鹿 (cf. *Stephanocemas colberti*)

双角鹿 (*Dicrocerus* cf. *elegans*)

以上化石的时代,可确定为中新世。短腿犀,利齿猪(或与它相近的属,见后),柯氏皇冠鹿和双角鹿都是欧洲和亚洲其他地区(我国北方,印度,日本等)中新世比较典型的属或种。至于浦镇组下部第1、第3两个化石层是否都属同一时代单元,目前还无法知道。

从上述脊椎动物化石总的性质看来,浦镇组含化石地层的时代,显然和南京长江南岸方山的洞玄观组的安琪马层相同。这个以 *Anchitherium-Brachypotherium-Listriodon-Dicrocerus* 为代表的动物群的分布,经过苏联中部,往西一直到欧洲西部。在西欧和日本这一动物群的时代主要为中期(Vindobonian)或更早一些(Burdigalian)。但浦镇和方山的化石,有一部分也曾发现于内蒙的通古尔组,后者的时代,一般认为是晚中新世(Sarmatian),因此,浦镇化石群的时代,从目前仅有的少数化石,还不能作进一步的确定,但与欧洲和日本相应的化石

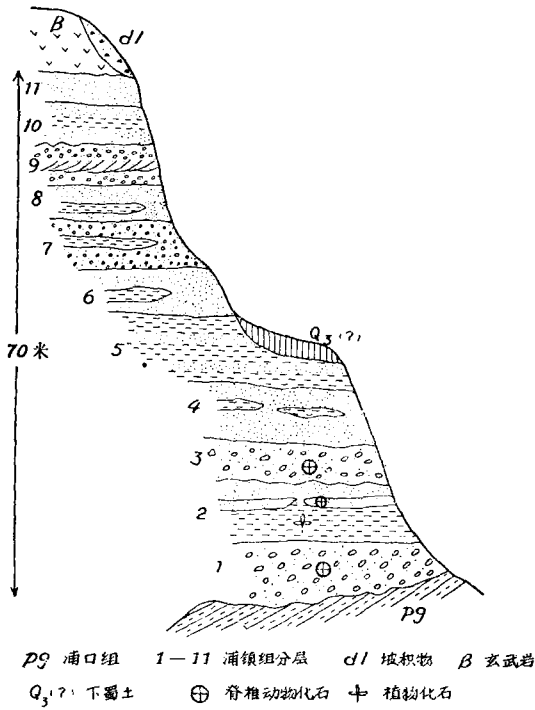


插图 1 浦镇江浦砂矿剖面示意图

群比较,可能为中新世中期,比通古尔的稍早。

## 2. 化石记述

### 爬行类 (Reptilia)

#### 鳖 (*Trionyx* spp.)

**材料** 包括一些零散的骨板,至少代表两个种。一个种较大,以一块较好的肋板为代表(编号:古脊椎动物与古人类所 V. 2956)。

**地点及层位** 江苏南京浦鎮猪头山东坡，浦鎮組下部第 1 化石层；中新統。

**标本描述** V. 2956 肋板保存較好，长 43 毫米，寬 103 毫米，厚 13 毫米（包括肋骨厚），肋骨伸出在肋板以外的部分已破損。肋板表面的紋飾成密集的、大小不等的圓形或多边形的凹坑。它代表一种个体較大的 *Trionyx*，不能作进一步鉴定。此外，尚有一些較小的甲板碎片，表面紋飾也較細致，可能代表另一較小的种。

### 短吻鱷 *Alligator* sp.

（插图 2，图版 I，图 1）

**材料** 一些破碎的甲片和一个完整的牙齿（V. 2957）。

**地点及层位** 同上。

**标本描述** 一个完整的牙齿，属于一种較大个体的短吻鱷的顎骨中部的頰齿。牙齿成粗壯的圓錐形，略向舌面弯曲；牙尖鈍圓，頂上有一極小的尖。牙齿极大，基部直径約为 21 毫米，高約 24 毫米，牙冠表面有一层极薄的珐瑯質层（頂端已磨蝕掉一部分），表面有很細的縱紋。牙齿的前后边沿上，各有一条低而尖銳的縱稜。

上述形态特点，如成圓柱形，頂端鈍圓，只微微地向舌面弯曲，表面有細紋，沒有沟稜等，却与短吻鱷类的牙齿的形态相同，而与 *Crocodylus* 的显然不同。牙齿的大小比現生种 *Alligator sinensis*（揚子鱷）的最大个体的还要大得多。可能代表一个新种。

現代分布于我国长江下游的揚子鱷，不論从地理分布或地質时代上說，都是一个孤立的种。在我国的新第三紀和更新統中还未有过关于这一类化石的記錄。浦鎮的地点正在这一属現代分布的范围内，但由于材料太少，看不清楚它和揚子鱷的关系。

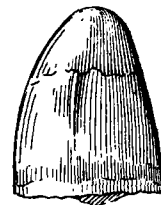
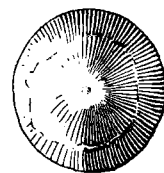


插图 2 *Alligator* sp.  
的牙的頂面和后(?)  
側面

### 哺乳类 (Mammalia)

#### 长鼻目 (Proboscidea)

#### *Mastodontoidea* indet.

（乳齿象类，属、种不能鉴定）

在采集品中有一小块象类門齿的碎块，牙較細、直，横剖面成卵圓形，代表一种乳齿象类（V. 3003）。

### 奇蹄目 (Perissodactyla)

#### 眞犀科 (Rhinocerotidae)

#### Subfamily Teleoceratinae

#### *Brachypotherium* cf. *aurelianense* Nouel

（图版 II，图 1）

**材料** 右上第四前臼齿，其前附尖，原脊前沿和后凹附近部分缺失（V. 2959-1）。另外，在同一地点还采集有右边的根骨和左第二趾骨的近端部分各一枚，它們与牙齿显然不

属同一类(V. 2959-2, V. 2959-3)。

**地点及层位** 同上,中新統。

**标本描述** 牙齿寬而短,寬約 57 毫米(次尖—外壁),長約 44 毫米。齿冠較低,外壁平直,頂端微向舌面傾斜;后尖仍較发育,在外壁上有弱的后尖肋。原脊和后脊內端向后傾斜度小,后脊向舌面延伸較长。原尖与次尖均稍收縮。中谷窄、浅,底部尖凹。无小刺,但有极弱的,圓凸的前刺和反前刺。齿带仅在牙齿的后沿稍发育。釉質层相当厚,表面光滑。齿質层硬度低,磨蝕后造成凹陷很深。

右跟骨,长,左右較扁。骨体前后長約 109 毫米,前后厚約 46 毫米,寬(連載距突)約 45 毫米。載距突約从骨体中間向內方伸出,但很弱;載距关节面为橢圓形。蜗突与載距突大小几乎相等,它与距骨的关节面凸出,分成大小相等,互相約成直角的两个面。骨体远端伸出較长,末端与骰骨关节,关节面橫向很凹。*Chilotherium*, *Teleoceras*, 和 *Brachypotherium* 的根骨的骨体粗壮,載距突很发育,向內突出很长。骨体远端收縮,与浦鎮标本显然不同。而真犀亚科的載距突虽不如上述几属的突出,但仍較浦鎮标本突出,且載距关节面前后伸长。左第二蹠骨近端,上方与第一、二楔骨关节,关节面橫向凹;內面有两个关节面,前面的关节面分上下两部分,上面与第三楔骨关节,下面与第三蹠骨关节;后面的关节面破損。此蹠骨以較細,較长明显地与 *Brachypotherium* 的短而粗的蹠骨区别开。

**比較** 浦鎮的标本,从它的前白齿具低冠、寬而短、后脊长、后尖較发育、无小刺、前刺弱、无外齿带等性质来看,都与欧洲中新世中期的 *Brachypotherium aurelianense* 相似。仅有的差别是:*B. aurelianense* 的反前刺发育,有弱的內齿带或在中谷入口处有疣;个体稍小。与最近(Hooijer, 1963)記述的刚果早中新世的 *B. heinzeli* 比較,两者在大小、无小刺、前刺、反前刺弱等都相似,但 *B. heinzeli* 沒有后尖肋,具有外齿带,在中凹入口处有疣。根据以上比較,浦鎮标本与两个种都相似,但从总的形态来看,浦鎮标本更接近 *B. aurelianense* 些,可以暂时将浦鎮标本归入此种。

## 偶蹄目 (Artiodactyla)

### 猪科 (Suidae)

#### 利齿猪亚科 (Listriodontinae)

##### ?*Listriodon* sp.

(图版 I, 图 3, 4)

**材料** 一个完整的左下第三白齿(V. 2960-1);另外有一左下第三門齿也暂时归入这一种(V. 2960-2)。

**地点及层位** 地点同上,浦鎮組下部第 1 化石层;中新統。

**标本記述** 白齿长 31 毫米,寬 15 毫米,結構較簡單,主尖的釉質层少褶曲,磨蝕后略成圓形。下原尖和下后尖,下次尖与下內尖,分別互相紧靠,略成“脊”状。前、后“脊”間有一开闊的谷部,中央有一附尖。

牙的另一个明显的特征是跟座(第三叶)长,約占牙齿全长的 1/3 強。下次小尖較大,它与后脊之間有一附尖。齿带在牙齿的前緣,后脊和下次小尖間齿谷的两侧发育。

这个牙齿和一些早期的猪类,如 *Listriodon*, *Hyotherium* 等相应的牙齿不易区别。这

里暂时归入利齿猪属，因这一属在我国北方分布很广，形态上也基本接近。与我国已知各种利齿猪比较，个体较小。

另外有一个左第三下门齿，成半圆锥状，尖端较钝圆。牙齿的唇面较凸起，和较低凸起的舌面由弧形的棱分开。舌面有弱的齿带。在大小上可与上述臼齿相适应，但形态与一般利齿猪的有很大差别。

## 鹿科 (Cervidae)

### 鹿亚科 (Muntiacinae)

#### *Dicrocerus cf. elegans* Lartet

(图版 I, 图 4)

**材料** 一个较年幼个体的右角(V. 2961); 在地质部第六普查队在浦鎮砂矿收集的化石中, 也有一个小的双叉的鹿角, 标本已强烈磨蚀, 可能也属于同一种。

**地点及层位** 地点同上, 浦鎮組下部第 3 化石层; 中新統。

**标本描述** 鹿角简单地分为主枝和眉枝两部分, 表面上都有较粗的纵沟和棱。各枝的横切面都约成圆形, 主枝较长, 保存部分约 61 毫米, 微向前向内弯曲; 眉枝较短, 较直, 长约 42 毫米。两枝在基部由一低的脊相联接, 成约  $70^\circ$  夹角; 角基部极短。角基从角柄脱落的面平, 略成椭圆形, 长径为 20 毫米, 短径为 26 毫米, 四周边缘光滑。

**比较** 浦鎮的这个鹿角明显地接近或即属于双叉鹿属(*Dicrocerus*), 并与 *D. elegans* 的角基本上相象。

在内蒙古通古尔中新統中, 柯伯特 (Colbert, 1936) 曾记述过一种 *Dicrocerus grangeri* 的化石。它和浦鎮标本的基本构造也相同, 但主枝和眉枝的夹角为  $50^\circ$ , 角枝较直, 联接基部的横脊不显著。*D. elegans* 是这一属中最常见的一种, 与浦鎮的标本更为接近, 只是主枝和眉枝间的夹角比我们的标本稍小。不过这一个种的材料发现很多, 形态变异较大, 所以浦鎮的标本可能还是属于这一种的。

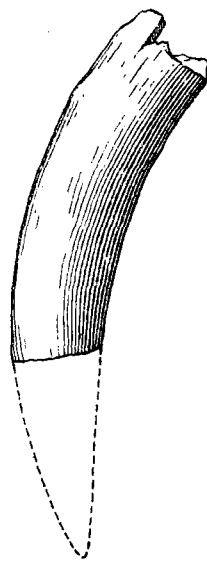


插图 3 *cf. Stephanocemas colberti* 的左上犬齿, 原大

#### *Stephanocemas colberti* Young

(插图 3, 图版 I, 图 2)

*Stephanocemas colberti*, Young, 1937, Bull. Geol. Soc. China, p. 226—227.

*Lagomeryx colberti*, (Young) Teilhard, 1939, Bull. Geol. Soc. China, p. 272.

*Stephanocemas colberti*, Young, 1964, 古脊椎动物与古人类 8 (4), p. 333.

**材料** 一左上犬齿的中間一段 (V. 2958)。

**地点和层位** 同上。

**标本描述** 这个犬齿, 除根部和尖端断掉外, 保存很好。牙细长, 侧扁, 微向后弯曲, 但不扭曲。齿冠的前沿上端较钝圆, 向下渐次收缩变薄, 成尖利的刃状。前后沿边缘光滑, 无锯齿。釉质层很薄, 从保存部分观察, 看不出根部有收缩和趋于封闭的现象。牙冠

基部长度为 14 毫米,左右宽 6 毫米。

从上述特征和牙的大小来看,浦镇标本与山东山旺的 *Stephanocemas colberti* 的犬齿十分相近。

## 二、苏北泗洪下草湾的犀类化石

### 1. 标本描述

#### *Brachypotherium pugnator* Matsumoto

(图版 II, 图 2—5)

*Teleoceras* (*Brachypotherium*) *pugnator*, Matsumoto, 1921, Sc. Rep. Tohoku, Imp. Univ. Sendai, Ser. 2, 5 (3), p. 80—83.

*Teleoceras* (*Brachypotherium*) *pugnator*, Tokunaga, 1933, Amer. Mus. Nov. No. 627, p. 3.

*Rhinoceros* (*Chilotherium*) *pugnator*, (Matsumoto) Takai, 1939, Jubilee Public. for Prof. Yabe, p. 192—193.

*Rhinoceros* (*Chilotherium*) *pugnator*, (Matsumoto) Takai, 1949, Japanese Jour. Geol. Geogr. Vol. XXI, Nos. 1—4, p. 285—290.

*Rhinoceros* sp., Chow, 1958, (part) Jour. Palaeont. Soc. India, V. 3, p. 127.

**材料** 属于同一个体的右上第三前臼齿(前附尖及后尖内壁破损),第一臼齿原脊和第三臼齿(前附尖缺失),左上第四前臼齿(外壁完全缺失,只剩下外脊以内部分)和第一臼齿原脊部分,及其他碎片。编号: V. 2962。由前治淮委员会华东文物工作队采集。

**地点及层位** 江苏泗洪县下草湾引河,确实层位不明,可能产自含大河狸化石下面的灰绿色泥灰岩层。中新统。

**标本描述** 颊齿齿冠低,前后缩短,横向伸长。第三前臼齿短而宽,长约 40 毫米,宽约 54 毫米,磨蚀程度很深。有封闭的后窝,原尖收缩明显,反前刺很发达,在磨蚀相当深时与后脊相联,形成封闭的中窝,外壁较平直,近根部有白垩质复盖,齿带在原尖的前沿、后沿发育,但在内沿中断。

上第四前臼齿,原尖收缩明显,反前刺向后圆凸突出,底部与后脊联接起来,因磨蚀得不够深,中窝还未封闭。后窝也只在磨蚀深的情况下才出现。中谷入口处极窄,前刺极弱。后脊直,向内后伸延到几乎与原脊等长。齿带在前沿、内沿、后沿均很发育,连续不断。牙齿表面近根部有极薄的白垩质复盖。

上第一臼齿,原尖强烈地收缩,反前刺很发达,前刺较发达,中窝强烈地磨蚀后才封闭。齿带在原尖的前、内沿发育,在中谷入口处中断,但有疣状突起。

上第三臼齿,轮廓略成三角形。长约 56 毫米,原尖强烈收缩,但比  $M^1$  的稍弱。反前刺和前刺明显,两脊间比较开阔。齿带在原脊前沿和外后脊的后内沿发育;在舌面只是在两脊开口处成小疣状。

**比较** 下草湾这种犀类的颊齿的主要特征,例如:齿冠低,牙齿宽短,原尖强烈收缩,反前刺发达和齿带的发育程度等,都和日本发现的 *Brachypotherium pugnator* 的性质相同。后者化石发现于日本岐阜县平牧层(中新统中部)。我们的标本和日本的这一种仅有的差别是前者个体稍小,  $M^1$  的前刺较发育,但基本上可以认为是同一种。

*B. pugnator* 是松本彦七郎(Matsumoto, 1921)命名的一种短脚犀类。后来高井冬二(Takai, 1939)认为它应归入大唇犀(*Chilotherium*)属。根据我们的标本和有关的类型比

較,覺得 *B. pugnator* 和 *Chilotherium* 有很明显的差別,后者的齿冠高得多,个体一般較小,横脊在靠近舌面部分急剧地向后傾斜,前刺非常发育。岐阜平牧层中的标本,和下草湾标本(見前)的这些特征,与大唇犀的完全不同,而与欧洲的短脚犀属的牙齿的性質基本相似。虽然, *B. pugnator* 与我国山东山旺的 *Plesiaceratherium gracile* Young 的牙的特征相似,也有归入 *Plesiaceratherium* 属的可能,但它們的其余部分的关系还不清楚,因此,仍按松本最初提出的,将它归入 *Brachypotherium* 属中。

## 2. 关于下草湾产脊椎动物化石地层的时代

对泗洪下草湾的脊椎动物化石,楊鍾健、周明鎮曾描述过一部分(楊、周,1955;周,1957),并对产化石地层进行了現場观察。由于当时引河已經灌水,产化石的地层被淹沒,无法作具体了解。这批材料中,除了已发表的几种(*Chinemys* sp. *Trogontherium sinensis* Young, *Stegolophodon hueiheensis* Chow)外,还有一些尚未最后鉴定,其中有一种象类(?*Archidiscodon*),至少两种犀类,一种相当大的鱉类(*Trionyx*)和其他龟鱉类。本文中記述的犀类化石就是其中的材料。

下草湾含化石地层的时代,最早主要根据大河狸(*Trogontherium sinensis*)的性質认为是中更新世,并初步提出可与周口店第一地点相比。后来本文前一作者(周,1957)在研究其中的淮河象(*Stegolophodon hueiheensis*)的化石时,曾提出“下草湾系”的时代可能較早,后来(1958)又进一步明确地提出該动物羣(包括这里記述的一种犀类)的时代可能为更新世初期。

从我們現在研究的犀类的材料看来,“下草湾系”中至少包括两个化石层位。上部的由中国大河狸(*Trogontherium sinensis*)和原脊象(*Archidiscodon*)和另一种較进步的犀类为代表,时代为早更新世;下部的可以本文中所記述的短脚犀(*Brachypotherium pugnator*)为代表,时代为中新世(近于中期)。淮河象(*Stegolophodon hueiheensis*)和一种还未描述的大的鱉类,虽然还未經証实,大概也是属于这一层位的。在日本, *Stegolophodon*(*S. latidens*)也发现于中新統(中部)平牧层中,并与短脚犀共生(Shikama, T., 1961, p. 304)。

在下草湾地点,有一层过去被推测为“老第三系”的赭紅色砂岩,可能也是属于当地中新統的一部分。

从最近的一些資料看来,在我国东部沿海和江淮平原地区,中新統地层分布相当广泛,在山东(山旺),苏北(泗洪、浦鎮),苏南(方山)都有零星分布。由此往西,在洛阳也有发现(刘东生、李玉清,1963)。但缺失上新統和更新統中部地层,更新統上部則比較发育(七嘴、新沂等)。所以,正如楊鍾健、周明鎮(1955)曾暗示过的,长江和淮河下游沿海的“冲积平原”的历史,并不象过去一般理解的那样簡單,即:从新第三紀以来,这里基本上是一个連續沉降的地区。現在看来,在中新統(中期或晚期)沉积以后,至少在长江以北某些地区,有局部的侵蝕或上升,引起上新統(絕大部分)和中更新統地层的缺失。

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## FOSSIL VERTEBRATES FROM THE MIOCENE OF NORTHERN KIANGSU

CHOW MINCHEN      WANG BANYUE

(Institute of Vertebrate Paleontology and Paleoanthropology, Academia Sinica)

In this paper some vertebrate fossils collected from the Miocene at Puchen, Nanking and at Hsiachaohwan, Shihung County, both in northern Kiangsu, are described; and the age of the localities as well as that of the "Hsiachaohwan fauna" are discussed.

### 1. The Puchen fauna

The fossils were found when siliceous sands were quarried from a small hill at Puchen, a town in the Nanking district, some 8 kilometers on the northern bank of the Yangtze River. They occur in a series of greyish and brownish sands and conglomerates, which is overlain by a bed of basalt lava and underlain unconformably by red sandstones of Lower Tertiary Pukow formation. Lithologically the section as a whole is quite similar to the one with *Anchitherium aurelianense* of Fangshan on the southern side of the



Yangtze (Chow and Hu, 1956). The fossils of the following vertebrates are recognized in the collection.

Reptilia

*Trionyx* spp.

*Alligator* sp.

Mammalia

Mastodontoidea indet.

*Brachypotherium* cf. *aurelianense* (Noel)

? *Listriodon* sp.

*Dicrocerus* cf. *elegans* Lartet

cf. *Stephanocemas colbert* Young

The fossil assemblage, though containing only a few species, is evidently one of Miocene age with such diagnostic forms as *Brachypotherium*, Listriodont suid, and *Dicrocerus* and belongs certainly to the same fauna as that of Fangshan. It may also be correlated with the Tung Gur Miocene of Inner Mongolia, though the horizon of the latter is probably higher than that of Puchen and Fangshan.

The occurrence of the fossils of an *Alligator* is interesting because the genus exists still now in this district, but no fossil representative of it has yet been known in the younger Tertiary and Pleistocene of China before.

The localities of Fangshan, Puchen and Hsiachaohwan (*vide infra*) are the only Miocene vertebrate localities so far known in the southern part of China.

Description of the Puchen fossils:

### Reptilia

***Trionyx* spp.** At least two species are present in the faunule. One is of small size and its presence is indicated by some fragments of shells. The other is a rather large species, represented by a costal plate (2956), which measures 42 mm long (distal), more than 103 mm wide and 13 mm thick (that of rib inclusive). The surface of the shell is densely decorated with irregularly distributed rounded or polygonal pits of fairly large size.

***Alligator* sp.** The presence of a crocodile of large size is shown in the collection by a few scutes fragments and an intermediate tooth (V.2957). The tooth is stout, conical, flat-topped and with low but sharp ridge on both its anterior and posterior sides. It was detached off at the alveolar border and has a basal diameter of about 21 mm. The enamel layer of tooth is very thin and its surface shows fine striations. Our specimen, except of much larger size, is indistinguishable from those of *Alligator sinensis*, now inhabiting this region.

### Mammalia

**Mastodontoidea indet.** A fragment of a small tusk which is straight and elliptical in cross section shows the presence of a mastodontoid elephant in the faunule.

***Brachypotherium* cf. *aurelianense* (Noel)** A right upper p4, slightly damaged (V.2959), a right calcaneus and the proximal end of metatarsal (II, sin.). The association of the limb bones with the tooth and the species is uncertain.

The tooth is short and transversely very wide, being about 44 mm long and 57 mm broad (posterior). It is comparatively low-crowned and with nearly flat external wall.

Metacone large and metastylic fold distinct. Protoloph and metaloph slant slightly backwards, the latter extending farther backwards. Protocone and hypocone constricted; median valley shallow and narrow. Crista absent, crochet and antecrochet very weak, being indicated by a broad undulation. Cingulum almost absent except on the posterior side. Enamel layer moderately thick and with smooth surface. Dentine material rather soft, forming deep and large depression after wearing.

This species as shown by its brachypodont cheek teeth and the structure of the tooth described above is decidedly *Teleoceras*-like, and furthermore shows very close resemblance to some species of the common Eurasiatic genus *Brachypotherium*, in particular *B. aurelianense* to which the Puchen species is tentatively referred.

**?*Listriodon* sp.** A complete left  $M_3$  (V.2960) and a left  $I_3$  are provisionally referred to the same species. These teeth and the reptiles occur in a bed slightly lower than that yields the other fossils described above.

The lower molar is 31 mm long and 15 mm wide and rather simple in construction. The enamel of the main cusps is not wrinkled and shows subcircular figures after some wearing. The protoconid and metaconid, as well as the hypoconid and endoconid, set close together and are slightly lophoid. An accessory cuspule is present in the valley separating the "protolophid" and "metalophid".

Another character shown by the tooth is the proportionately greater length of the talonid, which is about  $1/3$  of the tooth length. There is another accessory cuspule between the hypoconulid and the "metalophid". Cingulum is present on all sides.

***Dicrocerus* cf. *elegans* Lartet** A right antler of a young individual (V.2961) and a small bifurcated antler, provisionally referred to the same species.

V.2961 simply bifurcated, with anterior prong straight and shorter (42 mm) than the posterior one (61 mm), which is slightly bent inwards. The surfaces of antler decorated with grooves and ridges. Cross-section of prongs round. There is a low antero-posterior ridge at the juncture of the prongs, from which the two prongs diverged at an angle of about  $70^\circ$ . The beam or the basal part of the antler is very short and with a flat, elliptical base. This specimen closely resembles that of *Dicrocerus elegans*, but is clearly distinguished from that of *D. grangeri*.

**cf. *Stephanocemas colberti*** A broken tusk-like upper canine (V.2958). It is long, slender and slightly bent and opens at the upper end. The anterior border is round on the upper part but becomes sharper towards the tip, which is broken off in our specimen. The posterior edge of the crown is thin and sharp throughout. There is no indication of presence of crenulation on both the anterior and posterior edges.

The maximum antero-posterior diameter is 14 mm.

The size of the canine matches well in size and construction with those described by Young (1937) as *Stephanocemas colberti* and may belong to the same cervuline deer.

## 2. Rhinoceros fossils of Hsiachaohwan, N. Kiangsu, and the age of the Hsiachaohwan fossils

In the fossils collected from Hsiachaohwan formation preliminarily determined by the senior writer (1958), there are some undescribed rhinoceros teeth, a part of which, on closer examination, turns out to be similar to those of *Brachypotherium pugnator* Matsumoto (1921). It further reveals that the so-called "Hsiachaohwan fauna" is really

a mixed one. It includes at least fossils of two horizons differing greatly in age. The older one contains fossil of *Brachypotherium* and *Stegolophodon* (*S. huiheensis* Chow, 1959) and is of middle or late Miocene age. The other contains *Trogotherium sinensis*, *Archidiscodon*, *Rhinoceros* etc., and is of Early Pleistocene.

***Brachypotherium pugnator* Matsumoto**

Referred to the Chinese text for synonyms.

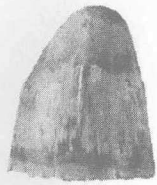
**Material:** P<sup>3</sup>(dex.), P<sup>4</sup>(sin.), M<sup>1</sup>(sin. and dex.), M<sup>3</sup>(dex.) and many fragments, all belong to the same individual. V.2962.

**Locality and Horizon:** Hsiachaohwan, Shihung County, N. Kiangsu; exact horizon unknown, probably from the lower part of "Hsiachaohwan formation" in greyish green marls; Miocene, probably Middle.

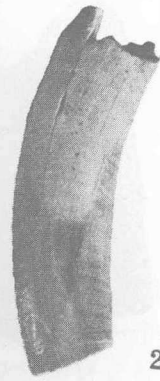
**Description:** Cheek teeth brachyodont, short and transversely elongated. P<sup>3</sup>—much worn, about 40 mm long and 54 mm wide; protocone distinctly constricted; antecrochet well-developed and connected to the metaloph at the base to form a narrow and deep mesofossette; postfossette closed; external wall flat, with cements covering the basal part; cingulum interrupted on the lingual side of protocone. P<sup>4</sup>—incompletely preserved, but less worn. Similar to P<sup>3</sup>, except for the antecrochet less prominent and the cingulum more developed. M<sup>1</sup> of both the right and left sides are available, but only the protocones of them are preserved. Protocone strongly constricted; crochet and antecrochet well developed; mesofossette deep, narrow and closed at the base. Cingulum well developed at the anterior and internal sides of protocone and interrupted at the entrance to medisinus, where the cingulum is replaced by a tubercle. M<sup>3</sup> triangular in outline, about 56 mm long; protocone not so strongly constricted as in M<sup>1</sup>; antecrochet and crochet distinct; cingulum well developed at the anterior of protocones and at the internal side of ecto-metaloph, but weakly developed on the lingual side of the tooth; and a tubercle is present at the entrance of medisinus.

**Comparison:** The rhinoceros of Hsiachaohwan is in general quite similar to that of Puchen described above and may belong to the same type of *Teleoceras*-like rhinoceros. It is quite similar to *B. pugnator* of Japanese Middle Miocene (Hiramakian) in such characters as that the cheek teeth are brachyodont, short and wide, with strongly constricted protocone and with same degree of development of cingulum, and antecrochet. Our form differs slightly from the said species in being of somewhat smaller size and with better developed crochet on M<sup>1</sup>. The two can well be considered as conspecific.

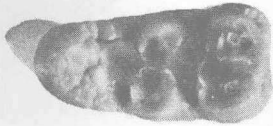
1. 短吻鳄 *Alligator* sp., 牙齿, 前面, 原大。
2. 柯氏皇冠鹿 cf. *Stephanocemas colberti* Young, 左上犬齿, 外面, 原大。
3. ?*Listriodon* sp. 左下第三臼齿, a. 嚼面; b. 舌面, 原大。
4. ?*Listriodon* sp. 左下第三门齿, 舌面, 原大。
5. *Dicrocerus* cf. *elegans* Lartet 右角, 内面, 底面, 主枝横断面, 原大。



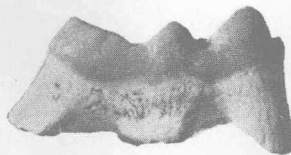
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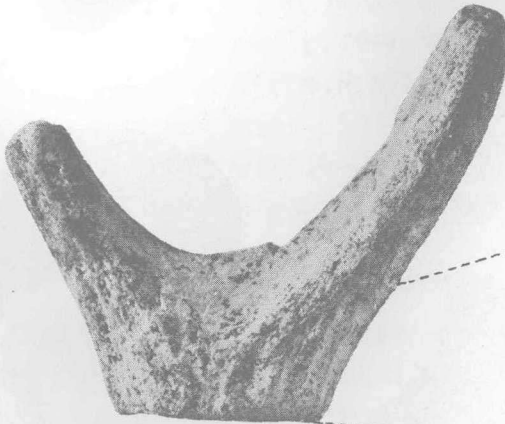
3a



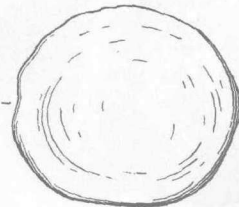
3b

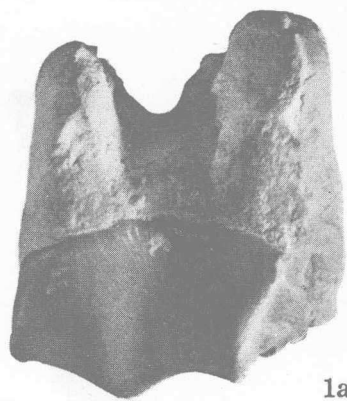


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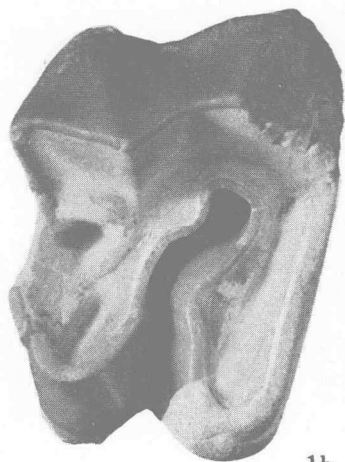




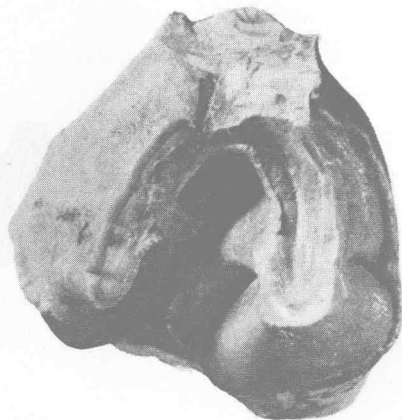
1a



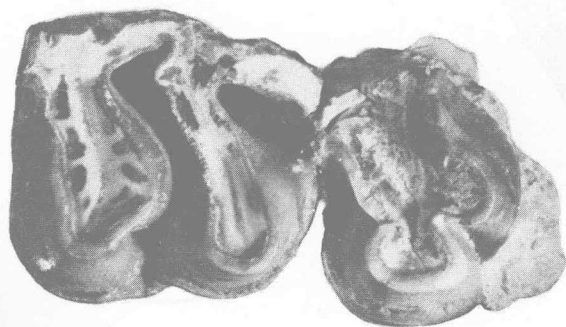
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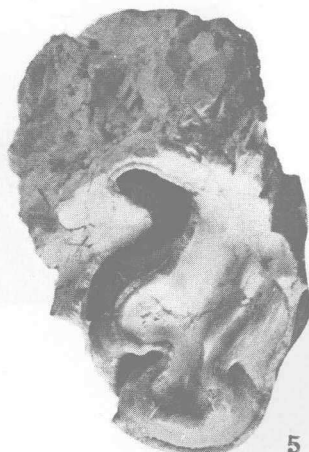
1b



3



4



5

1. *Brachypotherium* cf. *aurelianense* Nouel 右上第四前臼齿, a.唇面; b. 嚼面, 原大。

2.—5. *Brachypotherium* *pugnator* Matsumoto 嚼面, 原大。

2. 右  $P^3$ , 3. 右  $M^2$ , 4. 左  $P^4-M^1$ , 5. 右  $M^1$ 。