

中国納瑪象化石新材料的研究及 納瑪象系統分类的初步探討*

張 席 禔

(北京地質学院,中国科学院古脊椎动物与古人类研究所)

这篇文章的主要內容包括五部分:

1. 标准納瑪象化石的研究;
2. 諾氏納瑪象化石的研究;
3. ?矢部氏納瑪象化石的研究;
4. 关于納瑪象的系統分类的初步探討;
5. 結束語。

1. 标准納瑪象化石的研究

Palaeoloxodon namadicus namadi (typicus) Matsumoto

(图版 I, II, III, 1, 1a; IV, 1, 1a)

材料 1) 左下頷水平枝带有完整的第三臼齿和右下頷水平枝的前端一部分(尚与左下頷連接在一处)。单独的右第三臼齿一个,与前者属于同一个体。这两个臼齿除前端两个齿板稍有破損外,基本上保存完好。古脊椎动物与古人类研究所編号 V. 2948 及 V. 2948. 1。产地:北京怀柔臥龍崗。

2) 左下頷带有第三臼齿。編号 V. 2949。产地:河南白龟山(平頂山)。

3) 左上第三臼齿一个。編号 V. 2950。产地:山西万荣邱家庄。

标本描述 北京怀柔象化石臼齿較大,齿冠面輪廓成长椭圆形。齿板共 17 个;咀嚼面具有 13 个齿板。另附一跟座。齿脊頻率 5—5.5。仅前边两个齿板磨蝕的很厉害,并微有破損,其后八个齿板已經磨蝕成长条形。左 M_3 的第 10、11 齿板磨蝕呈(·—·)型;右 M_3 的第 10 个齿板磨蝕后的图型与左 M_3 的第 10 个齿板的情况基本上相似;而右 M_3 的第 11 个齿板呈(·—·)型。最后两个齿板呈(— —)或(·—·)型。每个齿板因磨蝕的程度不同,而表现出不同的模式,非常清楚。但是应当指出的是,这种磨蝕后呈现出来的模式并不能作为分类的依据。因为不同种类的象类的齿板,經過相同程度的磨蝕后,常呈现出相同或类似的模式。第二到第四齿板的中間部分很明显地呈菱形构造,这是古菱齿象(*Palaeoloxodon*)的重要标志。沒有显著的中間突。釉质层厚約 3 毫米,它的前后两面均具有疏松的褶皺。

臼齿的最大长度 330 毫米;咀嚼面长 280 毫米;最大寬度 85 毫米(第八脊);齿冠高

* 5 月 15 日收到。

160 毫米(第 11 脊)。

下颌水平枝粗壮,底部边缘平直。最厚处(上升枝前缘下方)达 210 毫米。下巴短,近陡直。第一齿板的前下方具有两个颞孔(Foramine)。

比較 怀柔的納瑪象与松本彦七郎(Matsumoto, 1929—1930)所描述的 *Palaeoloxodon namadicus namadi* Matsumoto 完全符合,也就是奥斯特朋叫作寬齿型的納瑪象。这个类型与周明鎮(1957)研究过的北京西郊的諾氏納瑪象的齿形构造不同。

河南平頂山的标本包括左下颌水平枝带有第三臼齿。水平枝的前端和 M_3 的前两个齿板有破損。根据第三臼齿的大小和臼齿的构造形态与上述怀柔标本属于同一类型,为了避免重复起見,不再贅述。

属于同一类型的納瑪象另外还有山西万荣邱家庄的左上第三臼齿一个。这块标本刘后一曾經描述过(未发表稿),原文的一部分录下:臼齿大小中等,咀嚼面呈椭圆形,除前面完全磨蝕并破損外,尚留有齿板 9 个,跟座一个。其中前面 6 个齿板已深度磨蝕,在咀嚼面連成脊板,后面三个成未完全磨蝕的乳突脊。保留的齿长 210 毫米,最大寬度在第二齿板处,为 105 毫米,最大高度在第九齿板处,約 200 毫米。珽瑯质层厚度在 3—4 毫米之間。齿脊頻率实测,每 100 毫米,前面及中部約为 5,后面为 5.5。

“第一齿板,前面已深度磨蝕,后半的珽瑯质层呈明显的細微褶皱。第二至第六齿板的珽瑯质褶皱向后渐不显著。但前后均有明显的中間突,且有前后相接的趋势,使齿板珽瑯质层略呈菱形,这一点在三、四齿板之間最为明显。”在这段文內所說的中間突就是指的菱形的尖端。

根据上述各处的材料来看,标准納瑪象化石在中国各处分布甚为广泛,这类納瑪象的重要标志是齿形較大,齿脊頻率較小。地質时代属于更新世晚期。

2. 諾氏納瑪象化石的研究

Palaeoloxodon namadicus naumanni (Makiyama)

(图版 V, VI)

材料 上颌骨带有左、右第二、第三臼齿。第二左臼齿前端內側微有破損。第三臼齿保存完美。编号 V. 2951。

层位及产地 更新統上部? 或中部。江苏北部新沂县西瓦窰鎮。

标本描述 近老年期的古菱齿象,牙齿中等大。齿脊頻率为 6。第二臼齿磨蝕很厉害,只有五个齿板,全部齿板成长条形。左第二臼齿的第三、四、五齿板的中間部分經磨蝕后均带有显著的菱形。第三臼齿共由 19 个齿板組成;咀嚼面上只有 6 个齿板和跟座。第一、二两个齿板已磨蝕成长条形;第三齿板呈(—)或(— —)形;第四、五、六齿板呈(— — —)形;跟座仅有一个或两个圓圈。珽瑯层带有微細褶皱。上颌的后緣具有三孔(Foramine)。

标本測量:

上颌长	275 毫米;
后緣寬	135 毫米;
前緣寬	55 毫米。

第二臼齿长	75 毫米;
最大寬	65 毫米(第四脊)。
第三臼齿最大长	265 毫米;
嚼面长	113 毫米;
最大寬	67 毫米(第二脊);
脊板高	175 毫米(第 12 齿脊)。

根据牙齿的构造形态、大小与齿脊频率,江苏新沂的古菱齿象应该属于狭齿类型的納瑪象,即諾氏納瑪象 *Palaeoloxodon namadicus naumanni* (Makiyama)。

3. ?矢部氏納瑪象化石的研究

Palaeoloxodon namadicus yabei? Matsumoto

(图版 VII)

材料 一个幼年的右下颌带有最后乳齿一个和六个零星的脊椎骨和破碎肢骨。编号 V. 2952; 产地: 河南平頂山。

描述 最后乳齿为 10 齿板和跟座組成。磨蝕程度中等。齿长 145 毫米; 寬 45 毫米(第 7 个脊)。根据牙齿的构造形态与标准納瑪象稍有不同, 就是齿形前边窄, 后边寬。特别使人感到奇异的是齿板频率为 8, 比一般古菱齿象的频率較高(例如諾氏納瑪象的齿板频率为 6; 标准納瑪象的齿板频率为 5 或 5.5)。因为没有更多的比較材料, 这块标本又是幼年个体, 虽然和松本彦七郎(Matsumoto, 1924) 所描述的矢部氏納瑪象的性质相同, 目前只得当作疑問, 以后再行解决。

4. 关于納瑪象的系統分类的初步探討

真象科 Elephantidae 的化石, 除剑齿象 (Stegodontinae) 以外, 从林奈 (Linné, 1735) 起, 直到十九世紀中叶, 这个主要分布在更新世的种类繁多的象类化石, 从前的古生物学家一般都归入于 *Elephas* 这一属。但是这种包括极为广泛的象化石, 无论从头骨或牙齿的构造形态上来看, 都有很大的区别, 并且是属于不同的分类系統, 它所代表的地层层位也不同。因此, 統归入于 *Elephas* 这一个属里, 显然是不合理的。但这也是科学研究历史上所很难避免的。因为化石材料的发现和采集經常是随着時間的推移, 由少积多, 由不完整到完整, 从少数地区到广泛分布。象类化石最初找到的多半是零星牙齿, 殘缺不全, 后来研究人員逐漸增多, 化石发掘的技术也逐漸地有所改进, 比較完整的头骨和牙齿因而也逐漸增多起来, 这就使后来的古生物学者对于真象科的分类特征以及演化系統, 逐漸地明确建立起来, 这都是古生物学者多年来辛勤劳动所得来的果实。

納瑪象 *Elephas namadicus* 最早是 Falconer & Cautley (1846) 所命名。化石来源于印度中部的 Nerbada (或 Narbada) 河谷附近。嗣后 Lydeker (1886) 和 Pilgrim (1905) 也曾根据在这些地区发现的新材料进行过研究, 对于納瑪象的知識更有所补充和进一步的認識。周明鎮(1957)曾經叙述过。

日本的古生物学者横山七郎 (Makiyama) 和松本彦七郎 (Matsumoto) 对于納瑪象化石进行过研究。松本彦七郎首先把納瑪象从过去沿用很久的 *Elephas* 一属分开, 建立了

Palaeoloxodon 一个独立的新属,并以横山七郎 (Makiyama, 1924) 的诺氏纳玛象 (*Elephas namadicus naumanni*) 选为属型种,改名为 *Palaeoloxodon namadicus naumanni* (Makiyama)。

奥斯朋 (Osborn, 1918) 根据头骨和牙齿的构造形态建立了 *Loxodontinae* 这一亚科,与 *Elephantinae* 和 *Mammontinae* 这两个亚科分开。他把现代生存的非洲象 *Loxodonta* 和古菱齿象 *Palaeoloxodon* 这两个属,统归入于 *Loxodontinae* 亚科内。根据我的看法,奥斯朋的这一分类是合适的。

我国的古生物学者杨鍾健(1939),裴文中(1935,1940)对中国的纳玛象化石也曾作过研究,但因当时的材料有限,又多半是零星牙齿,很难作详细和深入的研究。

上面把象 *Elephas* 和古菱齿象 *Palaeoloxodon* 这两个属的分类的历史经过作了扼要的叙述,为了避免在鉴定和研究上的困难与混淆起见,试将古菱齿象和其他象类化石的头骨和牙齿的构造特征和分类关系阐述于下:

古菱齿象 *Palaeoloxodon* 与原齿象 *Archidiskodon*

原齿象的臼齿的齿冠较低;齿形较宽;齿板数目少, M_3 , 9—10 个齿板。齿板频率 3.5—4。齿板中间部分无显著的中間突 (medial sinus); 釉质层厚,前后两面均有小褶皱。

头骨短而高,与猛犸象的头骨比较近似。因此,奥斯朋把它归入于 *Mammontinae* 亚科内。原齿象是这一亚科内最原始的类型。

根据原齿象的头骨和臼齿的构造形态,与古菱齿象的头骨和臼齿相比较,均有显著的区别(参阅图 1 和 2)。

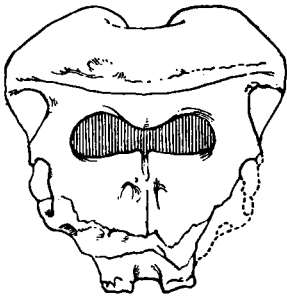


图1 纳玛象 *Palaeoloxodon namadicus* (F. et C.)
头骨 前面视 $\times 1/20$
据奥斯朋,1942. P. 1172 (原据 Falc. 1847, Pl. XII, A)

(1)

(2)

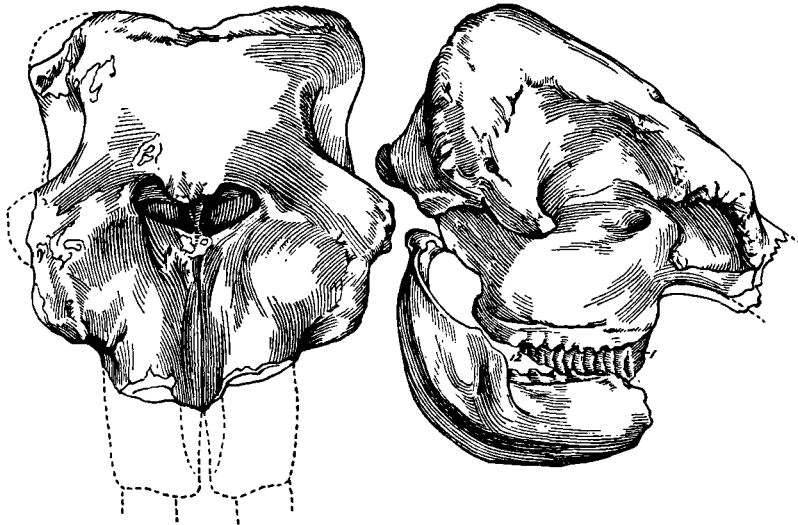


图2 平额原齿象 *Archidiskodon planifrons* (F. et C.)
(1) 头骨 前面视 $\times 1/12$ (2) 头骨 侧面视 $\times 1/12$
据奥斯朋,1942. P. 960 (原据 Falc. et Caut. 1845, Pl IX & Pl. X)

胡步伍 (Hopwood, 1935) 和裴文中 (1958) 把德永氏象归入古菱齿象 *Palaeoloxodon* 这一属里, 名为 *Palaeoloxodon tokunagai* Matsumoto 是合理的。周明鎮 (1961) 在研究德永氏象分类系統的問題上也同意这一命名。德日进、湯道平 (1937) 把德永氏象归入原齿象 *Archidiskodon* 这一属内, 名为 *Archidiskodon tokunagai* 显然是不恰当的。

納瑪象 *Palaeoloxodon namadicus* Matsumoto 与德永氏象 *Palaeoloxodon tokunagai* Matsumoto 的重要区别在于:

1. 前者齿板的数目較多, M_3 , 17—19 个齿板, 而后者較少, M_3 , 仅有 14 齿板; 2. 前者臼齿中部的中間突不显著, 当磨蝕后常具有菱形构造, 而后者具有显著的中間突; 3. 德永氏象的臼齿較小。

古菱齿象 *Palaeoloxodon* 与象 *Elephas*

古菱齿象 *Palaeoloxodon* 属于菱齿象亚科 *Loxodontinae* 而象 *Elephas* 属于象亚科 *Elephantinae*。这两类在系統分类上根本不同。因为它们無論在头骨或牙齿的构造形态上都有显著的区别。以現代的印度象 (*Elephas maximus* 也名 *E. indicus*) 为例, 它的齿型比較寬, 齿板排列比較紧密, 齿板的頻率为 7—8。齿板与齿板間的谷比較窄。釉质层的前后两面具有极密的, 比較显著的褶皱。磨蝕后齿板上常具有点、横、点(·—·)或者点、

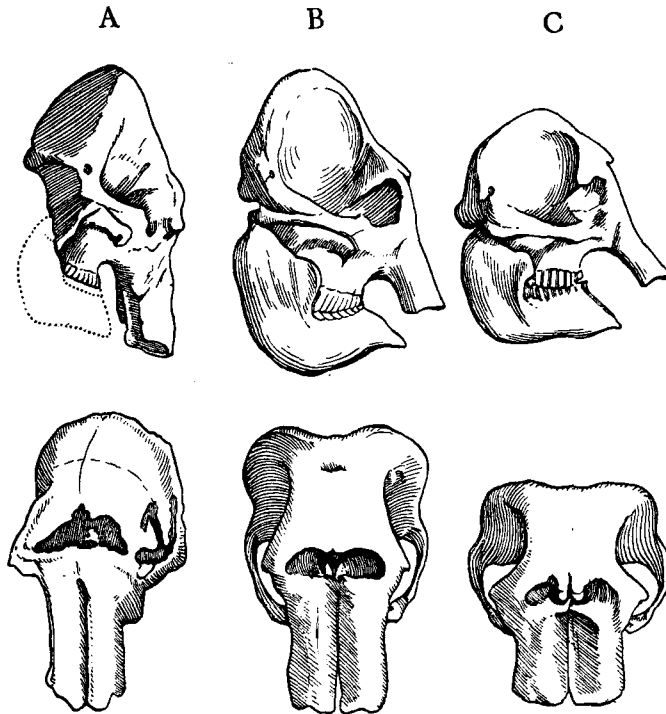


图 3 A. 猛犸象 *Mammuthus primigenius* B. 印度象 *Elephas indicus* (*Maximus*) C. 非洲象 *Loxodonta africana*

上行 側面視
下行 前面視
 $\times \frac{1}{20}$ 到 $\frac{1}{37}$

据奧斯朋, 1942, 1121 頁或 1173 頁(原据 Cuvier, 1806)

点、点、点(····)的图型,与古菱齿象所显示的图型相似,但是古菱齿象的菱形构造在印度象是不存在的。

就头骨的构造形态而言,印度象的头骨比较窄,中等长,顶较高。古菱齿象与非洲象的头骨相近似。头骨宽,比较长,顶较低平(图3)。

在上述认识的基础上,提出两个问题进行讨论。

第一个问题是,根据现代一般古生物学家采用的分类标准,纳玛象的学名应用 *Palaeoloxodon namadicus*, 不应该仍用 *Elephas namadicus* 的老名,换句话说,就是纳玛象应归于古菱齿象这一属,而不应归于象 *Elephas* 这一属。德日进、汤道平(1937)的山西东南部的象类化石一书中和裴文中(1958)山西襄汾县丁村旧石器时代遗址发掘报告中仍用 *Elephas cf. namadicus* 之名。根据笔者的看法,应该予以更正。胡步伍(1935)中国象类化石一书中,用 *Palaeoloxodon cf. namadicus* 之名是恰当的。

第二个问题是,裴文中(1958)所鉴定的丁村的印度象 *Elephas cf. indicus* L. (1958, p. 57, Fig. 28 V. 1582, V. 1239, V. 1001), 根据臼齿的构造形态,特别是齿形较窄和齿板排列疏松,应属于纳玛象,不是印度象。

古菱齿象 *Palaeoloxodon* 和猛犸象 *Mammuthus*

古菱齿象属于菱齿象亚科 Loxodontinae, 而猛犸象属于 Mamonontinae 亚科。这两类的重要区别点在于: 古菱齿象的头骨宽,低,比较长,平顶; 猛犸象的头骨窄,短,特别高,具有尖顶。古菱齿象臼齿的齿板排列疏松,数目较少(最多 19 个),齿板中部具有菱形构造或不显著的中间突; 猛犸象的齿板薄,平直,排列紧密,齿板数目多(27—30)。齿板频率是 8—12。就目前所知是真象科中齿板频率最高的一类。

标准纳玛象、诺氏纳玛象与矢部氏纳玛象

这几个纳玛象亚种从外表上看起来,有时似乎难以区分。但是经过了详细地对比和研究的结果,它们之间仍然是可以区分开的。它们的重要区别点如下表所示:

齿型	标准纳玛象	诺氏纳玛象	? 矢部氏纳玛象
齿形大小	宽齿型	窄齿型	窄齿型
全长	比较大	比较小	中等
咀嚼面长	M ₃ { 330 毫米	M ₃ { 280 毫米	Dm ₃ { 145 毫米
宽度	280 毫米	200 毫米	145 毫米
齿板数目	85毫米(第八脊)	65 毫米(第八脊)	45 毫米(第七脊)
齿板频率	17	15	10
	5	5—6	8

5. 结 束 语

这篇文章根据近年来从中国各地采集的纳玛象的新材料(北京怀柔、河南白龟山、山西万荣和江苏新沂)作了详细地对比和研究,并参考了前人的研究成果,把这些材料鉴定为三类纳玛象亚种: 标准纳玛象(宽齿类型) *Palaeoloxodon namadicus namadi* (typicus)

Matsumoto、诺氏纳玛象(窄齿类型) *Palaeoloxodon namadicus naumanni* (Makiyama)和? 矢部氏纳玛象(窄齿类型) *Palaeoloxodon namadicus yabei*? Matsumoto。根据臼齿的构造形态, 齿形的大小和齿板频率等性质, 指出了这几类纳玛象亚种的重要区别点。

在这个基础上更进一步将纳玛象和其他在中国的更新统常见到的象类化石, 例如原齿象、德永氏象和猛犸象进行了研究对比。对于在我国分布极其广泛的更新世的象类化石作了初步系统分类的研究, 希望今后对于象类化石的研究鉴定上能尽量避免混淆。但是本文所依据的研究材料尚不够多, 又限于作者的知識水平, 难免有错误之处, 尚望读者予以指正。

在编写本文期间, 古脊椎动物研究所高等古脊椎动物研究室的同志们对我的工作给以各方面的支持和帮助, 绘图室和照象室的同志们为本文照象绘图, 作者对他们表示感谢。

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ON NEW MATERIAL OF *PALAEOLOXODON NAMADICUS* OF CHINA, WITH DISCUSSION ON THE CLASSIFICATION OF SOME PLEISTOCENE ELEPHANTS OF CHINA

CHANG HSI-CHIH

(Peking Geological Institute; Institute of Vertebrate Paleontology and Paleoanthropology, Academia Sinica)

(Summary)

The content of this paper includes the following 5 parts:

- I. *Palaeoloxodon namadicus namadi* (typicus) Matsumoto
- II. *Palaeoloxodon namadicus naumanni* (Makiyama)
- III. *Palaeoloxodon namadicus yabei?* Matsumoto
- IV. Discussion on the systematic classification of *P. namadicus* and some other Pleistocene elephants of china
- V. Conclusion

I. *Palaeoloxodon namadicus namadi* (typicus) Matsumoto

(Pl. I, II, III, IV)

Materials: 1) Left mandible with M_3 *in situ* and one right M_3 belonging to the same individual. Only the anterior two ridge plates of both M_3 slightly damaged. Registered No. V.2948, V.2948.1, Locality: Wo-Lung-Kong in the district Huaijow, Peking.

2) Left mandible with M_3 *in situ*. Registered No. V.2949. Locality: Pei-Kwei-Shan, Honan province.

3) One left upper third molar (M^3), Registered No. V.2950. Locality: Chiu-Chia-Chuang, Wan Jung District, Shansi Province.

Description: Molars rather large, chewing surface of the crown long oval shaped and with 17 ridge plates; the chewing surface of tooth consists of 13 plates and one talonid. Lammelar frequency is 5, rarely 5.5. The ridge plate often shows different patterns after wearing, for instance: point, dash, point (·—·) or points only (····). The middle part of the 2nd, 3rd and 4th ridge-plate show rhomboidal pattern (or Lozenge shape). Without distinct median sinus. Enamel layer about 3 mm in thickness, with small plications or wrinkles.

Measurements: the total length of M_3 is 330 mm; Length of the crown surface of M_3 280 mm; the greatest width of M_3 85 mm (8th ridge plate); height of the plate 160 mm (11th plate).

The lower mandible is robust, its lower border is straight and flat. Thickness 210 mm (at the anterior border of the ascending branch of the lower jaw).

Comparison: The specimen just described is much alike that of *Palaeoloxodon namadicus namadi* of Matsumoto (1929—1930), i.e. the so-called broad-toothed type of Osborn.

The left mandible with 3rd molar *in situ* of Pei-Kwei-Shan, Honan Province and

one Left upper third molar (M^3) of Wan-Jung District of Shansi Province belong to the same type of the just described *P. namadicus namadi* (typicus) Matsumoto and no further description is required.

II. *Palaeoloxodon namadicus naumanni* (Makiyama)

(Pl. V, VI)

Material: One complete palate with last two molars (M^2 , M^3) on both sides *in situ*. The anterior of the second molar is a little damaged. Third molar on both sides perfectly preserved. Registered No. V.2951.

Horizon and Locality: Middle or upper Pleistocene. Wa-Jao-Cheng, Hsin-I District, N. part of Kiangsu province.

Description: One complete palate with M^2 and M^3 on both sides *in situ*, molars of moderate size. Number of lammelar frequency is 6. M^2 much worn, with only 5 ridge plates and all of them show a pattern of a straight line. The 3rd, 4th and 5th plates of M^2 with rhomboidal pattern after wearing. The total number of ridge plates of the 3rd molar is 19; only 6 plates exist on chewing surface of the crown. All ridge-plates are much worn. Enamel layer of moderate thickness and with delicate plications or wrinkles.

Measurement of the plate (in mm): Length of the palate 275 mm; Width on the posterior border 135; width on the anterior border 55 mm. Length of M^2 75 mm; the greatest width of M^2 65 mm (4th ridge plate). The greatest length of M^3 265 mm; Length of M^3 on the chewing surface 113 mm; greatest width of M^3 67 mm (2nd ridge plate). Height of the plate 175 mm (12th plate).

According to the structure, size and the number of lammelar frequency of the molar, the described palate from Kiangsu belongs unquestionably to *Palaeoloxodon namadicus naumanni* (Makiyama).

III. *Palaeoloxodon namadicus yabei?* Matsumoto

(Pl. VII Fig. 1, 2)

The material consists of a lower mandible of young individual with the last deciduous molar, 6 vertebrae and limb fragments. Registered No. V.2952.

Horizon and locality: Upper? or middle Pleistocene. Wa-Jao-Cheng Hsin-I District, Kiangsu Province.

Description: The last deciduous molar consists of 10 plates and a talonid; moderately worn. Length of the molar 145 mm; Width 45 mm (7th ridge plate). The form and structure of the molar is somewhat different either from *P. namadicus naumanni* (Makiyama) or from *P. namadicus namadi* (typicus) Matsumoto. The anterior end of the molar is narrower, the posterior end broader. The number of lammelar frequency is 8; this figure is much higher than in both subspecies, *N. namadi* and *N. naumanni*. Without more material for comparison, the specimen is preliminarily determined as *P. namadicus yabei* Mats.

IV. Discussion on the Systematic classification of *namadicus* with other Pleistocene elephants of China

Since Linné (1735—1768, "Systema Naturae") to the middle of the 19th century various elephant types of the family Elephantidae (with the exception of *Stegodon*) in

the Pleistocene were all included in the genus *Elephas*. Judging from the cranial- and molar structure of various forms of the so-called *Elephas* group, they are, however, quite distinct from one another and belong also to quite different systematic types. In the present stage of development of the biological science, it does not seem to be justifiable as still to keep the usage of generic name *Elephas* in a broad sense. For example, *Elephas namadicus* Falc. witness the same history as stated as follows:

Elephas namadicus was first named by Falconer, H. and Cautley, P. T. in 1846. The material was originated from Nerbada (Narbada) river in middle India. In the following years Lydekker, R. (1886) and Pilgrim, G. E. (1905) collected more material from the same locality and made continued study.

The namadicus group of elephants are in wide spread and well known in Japan. Japanese Palaeontologists especially Makiyama and Matsumoto had done a great deal of research on the namadicus fossils. Matsumoto (1924) first erected a new genus *Palaeoloxodon* and established the species *Palaeoloxodon namadicus naumanni* (Makiyama).

Osborn (1918) established a subfamily Loxodontinae based upon the structures of molars and cranium of the elephant fossils. The subfamily Loxodontinae are well separated from the subfamilies Elephantinae and Mammontinae also by distinct molar and cranial characters. And further he grouped both genus *Palaeoloxodon* and *Loxodonta* to the subfamily Loxodontinae.

The namadicus fossils are also widely distributed in China. Young, C. C. and Pei, W. C. have had the opportunities to study those fossils from China, but a long time the fossils known are very poor and fragmentary, of which a closer study is impossible. Recently Chow, M. C. (1959) published a paper "On a mandible of *Palaeoloxodon* from Peking, with discussion on the fossil elephants of namadicus of China". The specimen described in that paper is perfect and well preserved and many interesting problems regarding *Palaeoloxodon* and *namadicus* group of fossils have been discussed by Chow.

In the above statements a brief history of the genus *Palaeoloxodon* and *Elephas* was given and for the sake of avoiding difficulty and confusion in fossil determination, the writer now hopes to make a comparison on the molar and cranial characters between *Palaeoloxodon* and other elephants in the Pleistocene of China in the following:

Distinctions between *Palaeoloxodon* and *Archidiskodon*

Molars of *Archidiskodon* are subhypsodont; surface of the crown broad; number of ridge plates is few, M_3 , 9—10. Lammelar frequency, 3.5—4. Without distinct median sinus. Enamel layer thick with fine plications or wrinkles.

Skull short and high, similar with that of *Mammuthus primigenius*. Osborn includes *Archidiskodon* to the subfamily Mammontinae. *Archidiskodon* is the most primitive type of that subfamily.

Based upon the cranial and molar structures of *Archidiskodon* there are marked distinctions between them and those of *Paleoloxodon* (see Textfig. in Chinese text).

Most authors generally accepted that the elephant type "*tokunagai*" of the early Pleistocene belongs to the genus *Palaeoloxodon* and the subfamily Loxodontinae, such as Hopwood, A. T. (1935) and Pei, W. C. (1958) designated it as *Palaeoloxodon tokunagai* Matsumoto. In his paper on "Some Pleistocene Mammalian Fossils from Shantung" Chow Minchen discussed the generic relations of "*Elephas*" *tokunagai* and he, finally

agreed with the name *Palaeoloxodon tokunagai*. That, the designation as *Archidiskodon* cf. *tokunagai* by Teilhard de Chardin, P., and Trassaert, M. (1937) is obviously in a state of confusion, as well as in wrong systematic relation.

The distinctions between *P. namadicus* Mats. and *P. tokunagai* Mats. are as follows: (1) The number of lammellae of *P. namadicus* is 17—19 (M_3) that of *P. tokunagai* is only 14; (2) Without distinct median sinus but with distinct rhomboid pattern (or Lozenge structure); (3) molar of *P. tokunagai* is small and that of *P. namadicus* is rather large.

Distinctions between *Palaeoloxodon* and *Elephas*

Palaeoloxodon belongs to the subfamily Loxodontinae, while *Elephas* to the subfamily Elephantinae. The systematic relation of them is quite different, because their cranial and molar structures are quite distinct. For example, the crown of the molar of *Elephas maximus* is broad with closely appressed ridge plates. The number of the lamellar frequency is from 8 to 10 or more. Valley between the ridge plates is rather narrow. Enamel layer rather thick with distinct plications or wrinkles. When worn the ridge plates are with point, dash, point ($\cdot - \cdot$) or ($\cdot \cdot \cdot \cdot$) patterns, which are somewhat similar with that of *Palaeoloxodon*, but without rhomboid pattern.

The cranium of *Elephas* is narrow, short, high and with a rounded roof. The tusks are short, straight and directed more downward than forward from the sockets. The cranium of *Palaeoloxodon* is more like that of *Loxodonta africana*, which is broad, long and flat (see textfigure in Chinese text).

With the above understood there rise the following questions:

First: At the present state of our knowledge concerning the Elephantidae, we had better use the name *Palaeoloxodon namadicus* Mats. instead of *Elephas namadicus* F. & C. In other words, it would be more logical to group the fossil elephant *Namadicus* to the genus *Palaeoloxodon* instead of the genus *Elephas*. Hopwood, A. T. (1935) applied the name *Palaeoloxodon* cf. *namadicus* Matsumoto, while Teilhard de Chardin, P. and Trasseart, M. (1937) and Pei, W. C. (1958) applied the name *Elephas* cf. *namadicus* F. and C. The proper usage of the generic name is in a confused state.

From Tingsun of Shansi province Pei, W. C. (1958) described a great number of elephantine teeth, including the following species: *Palaeoloxodon* cf. *tokunagai*, *Elephas* cf. *namadicus* and *Elephas* cf. *indicus*. After examing those specimens, the writer has the following opinion: most of the teeth belong to *Palaeoloxodon namadicus* (Pei's *Elephas* cf. *namadicus* F. & C.), some of them belong to *Palaeoloxodon* cf. *tokunagai*. Judging from the form and structure of the molars, those specimens (1958, p. 57, Fig. 28, V.1582, 1239, 1001.) described by Pei as *Elephas* cf. *indicus* belong very probably also to *Palaeoloxodon namadicus*.

Distinctions between *Palaeoloxodon* and *Mammuthus*

The important distinctions between *Palaeoloxodon* and *Mammuthus* are: cranium of *Palaeoloxodon* is broad, long with flat roof while the cranium of *Mammuthus* is narrow, short, high with pointed roof. The ridge plates of *Paleoloxodon* are loosely arranged with comparatively small number of plates (greatest number, 19). After wearing the plates often show rhomboid pattern but without distinct median sinus. Molars of *Mammuthus* are thin, straight, closely appressed and with more plates (27—30). The

number of lammelar frequency is from 8—13, which is the greatest number of the family Elephantidae.

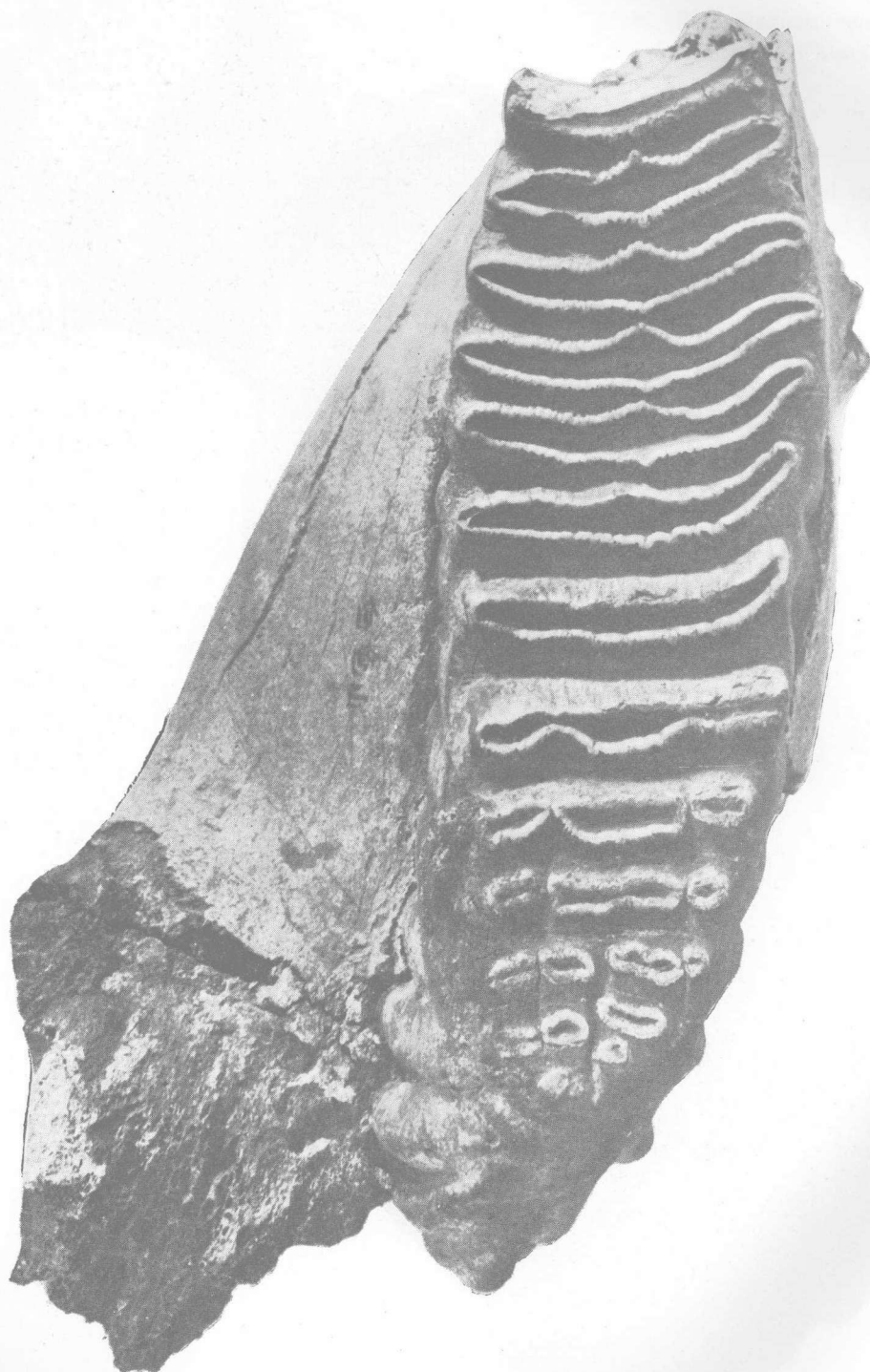
Distinctions among *Palaeoloxodon namadicus namadi* Mats., *P. namadicus naumanni* (Makiyama) and *P. namadicus yabei?* Mats. may be shown by the table (see Chinese text, P. 276).

V. Conclusion

Based upon the new material collected from different parts of China and with references of research of other palaeontologists, 3 different subspecies are described in this paper, they are *P. namadicus namadi* (typicus) Mats., *P. namadicus naumanni* (Makiyama), and *P. namadicus yabei?* Mats.

In the hope of avoiding difficulty and confusion in the determination of elephant fossils of the Pleistocene of China, the writer intends to show a preliminary systematic arrangement and a comparative study of the cranial and molar structures of *P. namadicus* and other elephant fossils found in the Pleistocene of China.





标准纳玛象 *Palaeoloxodon namadicus namadi* Matsumoto

左下颌及 M_3 ，嚼面视， $\times 1/2$ 编号：V. 2948.1



1

1a

标准納瑪象 *Palaeoloxodon namadicus namadi* Matsumoto

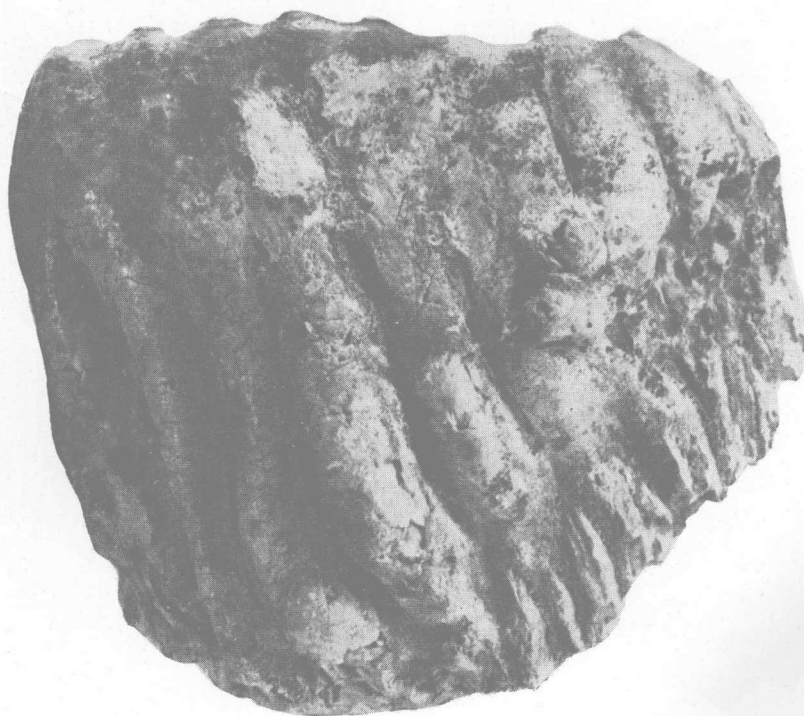
右 M₃ 1. 嚼面視, 1a. 外側面視, ×1/2

編号: V. 2949

1



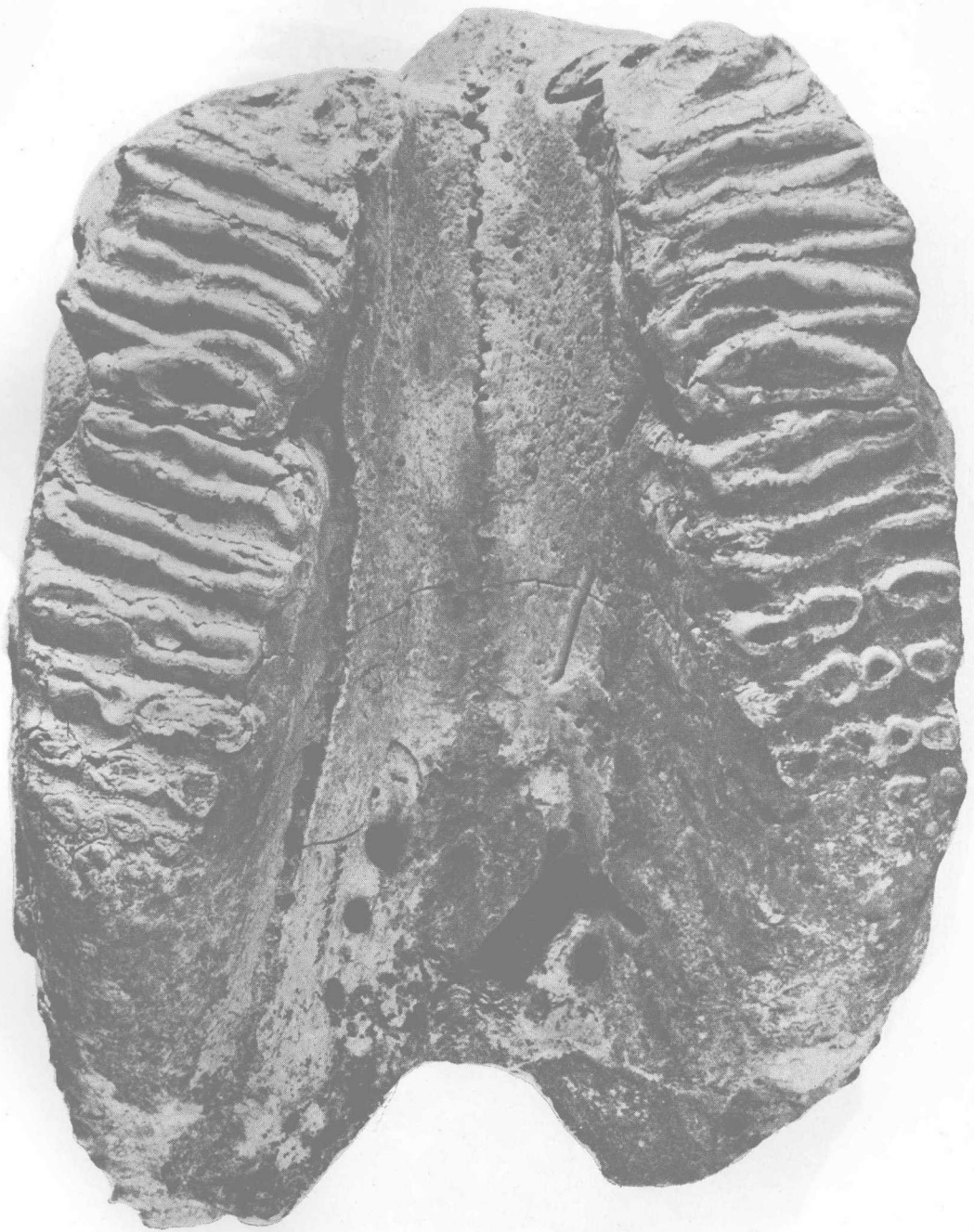
1a



标准纳玛象 *Palaeoloxodon namadicus namadi* Matsumoto

左上 M³, 1. 嚼面视, 1a. 外侧面视, ×1/2

编号: V. 2950

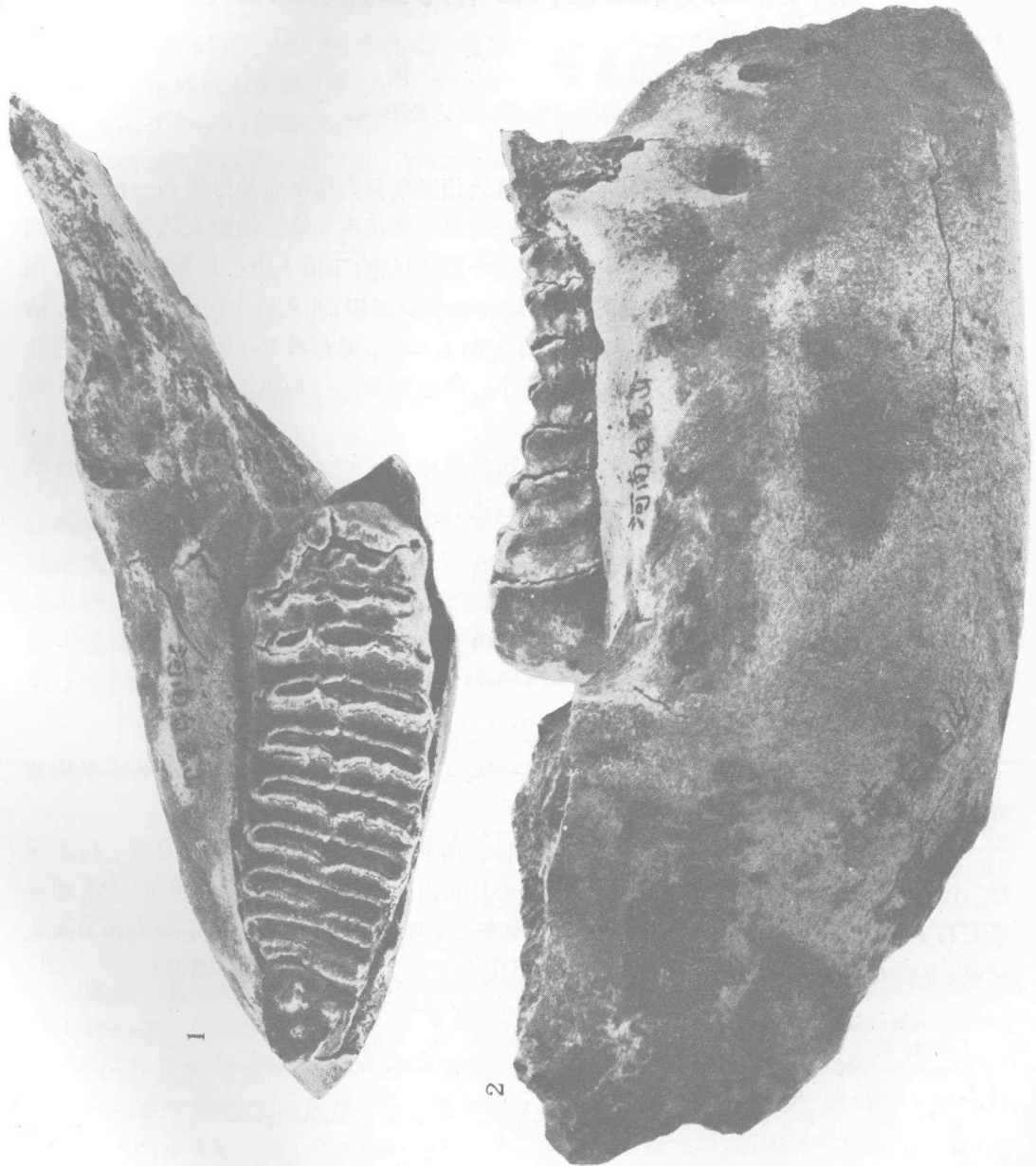


諾氏納瑪象 *Palaeoloxodon namadicus naumanni* (Makiyama)

上頷骨及左、右 M², M³, 嚼面視, ×1/2 编号: V. 2951



諾氏納瑪象 *Palaeoloxodon namadicus namanni* (Makiyama)
上頷骨及 M², M³, 外側面視, ×1/2 編號: V. 2951



? 矢部氏纳玛象 *Palaeoloxodon namadicus yabei*? Matsumoto

幼年右下颌及最后乳齿一个 1. 嚼面视, $\times 1/2$

2. 侧面视, $\times 1/2$ 编号: V. 2952