

江苏泗洪发现的石炭兽

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关键词 江苏 泗洪 中新世 石炭兽

内 容 提 要

本文描述了在江苏泗洪发现的石炭兽类一新属和新种 *Sihongotherium sihongense* (gen. et sp. nov.) 并讨论了它的亲缘关系和地质时代。

江苏省泗洪县图书馆在文物普查中从峰山乡王套村采砂农民那里收集到两块带有比较完整齿列的大型哺乳动物下颌骨化石。标本是从峰山乡小红山东北端狼窝岗砂矿底部一个深约两米的探井中挖出的。笔者赴化石产出的地点观察了产化石的地层, 其为一套有褐铁矿结核的棕褐色含砾粗砂层。两块化石为同一个体的左、右下颌骨碎块, 它们代表石炭兽类一新属和新种。中国东部沿海地区尚未发现过此类化石, 这次在江苏泗洪的发现对石炭兽的地理分布提供了新的材料。因为化石是在一个新的地点发现的, 所以对本地区复杂的新生界地层的划分和时代确定也提供了重要的化石证据。本文在此加以简要记述。

泗洪县图书馆将标本借给笔者研究; 中国科学院古脊椎动物与古人类研究所翟人杰、邱占祥和李传夔三位先生在研究中给了热情而重要的指导; 中国科学院南京地质古生物研究所照相室宋之耀师傅为标本摄制了清晰的照片; 笔者在此一并致谢。

偶蹄目 *Artiodactyla* Owen, 1848

石炭兽科 *Anthracotheriidae* Gill, 1872

沟齿兽亚科 *Bothriodontinae* Scott, 1941

泗洪炭兽属(新属) *Sihongotherium* gen. nov.

模式种 *Sihongotherium sihongense* gen. et sp. nov.

属的鉴别特征 个体大; 牙齿粗壮; P_1 和 P_2 不连续; 前臼齿主尖 V-形脊前支末端向后褶曲, 其外侧和齿带之间形成月形凹陷; 臼齿的下原尖和下后尖连接的横脊垂直齿列中线, 且下后尖前部圆而无脊; M_3 跟座的下次小尖外侧发育一细脊。

Sihongotherium sihongense gen. et sp. nov.

(图版 I, 图 1; 图版 II, 图 1, 2)

模式标本 同一个体的残破的左、右下颌骨, 其中右下颌骨带有完整的颊齿齿列(编号: 洪图化 5)。

产地和层位 江苏省泗洪县峰山乡小红山东北端狼窝岗; 中新统。

种的鉴别特征 同属的鉴别特征。

描述 右下颌骨中间一段长 260 毫米, 具有连续而较完整的 P_2-M_3 齿列。联合部和上升支均未保存。下颌骨相对较细长, 水平支底缘呈弧形弯曲, 内、外侧平直。在 M_2 和 M_3 之间颌骨最高(87 毫米); P_2 之下最低(66 毫米); M_3 跟座之下, 颌骨底缘有一小而明显的向上拱曲, 其后发育有隅突。颊孔大, 位于 P_2 前下方; 联合部位于 P_2 以前。在 P_2 之前保存有一厘米长呈刃状的齿虚脊, 其下的颌骨明显变薄。齿虚脊之前似有一小根窝痕迹, 由此推断, P_1 若存在也是很小而与 P_2 相分离。 P_2-M_3 齿列紧密连续(长 240 毫米)。牙齿粗大, 齿冠较低, 釉质层表面有很细的枝状纹饰。 P_4-M_3 保存完好, 很少磨蚀, 齿冠构造特征清楚。

下前臼齿从 P_2 到 P_4 逐渐增大。

P_2 齿冠破损, 仅保存齿根。双根, 等大。

P_3 齿冠主尖顶部破损丢失, 但整个齿冠形态仍清晰可见。 P_3 与 P_4 的形态构造基本相同, 仅跟座比 P_4 窄狭。

P_4 完整, 由具 V-形脊的主尖和跟座两部分组成。齿带发育而连续, 舌面齿带尤为高大, 呈倒 V 字形。主尖 V-形脊的前支(前内脊)细长, 其末端在很低的位置向后褶曲并与舌面齿带连接, 形成一规则的脊封闭主尖 V-形脊向内前方的开口; 褶曲外侧和齿带之间形成一个显著的月形凹陷; 主尖 V-形脊的后支(后内脊)较短, 与舌面高大倒 V-字形齿带的顶部连接, 在未磨蚀时两者之间有一小沟分开。跟座宽大, 且很低, 其后缘及内、外侧为发育的齿带所环绕, 使跟座呈盆状, 其中近舌面部位发育一小纵脊。

下臼齿从 M_1 到 M_3 逐渐增大, 除 M_3 有一个由下次小尖发育的长大跟座以外, 齿冠的其他构造特征几乎完全相同, 差别仅大小而已。

M_1 轮廓长方形, 轻微磨蚀, 齿冠构造特征清楚。它由四个大小和高度近相等的齿尖组成。外侧两尖(下原尖和下次尖)具 V-形脊; 内侧两尖(下后尖和下内尖)近锥形, 前部圆, 后部有短脊发育。下原尖的 V-形脊向内前方开口而不封闭。V-形脊的前支细长, 向内前方延伸; 后支粗短, 与下后尖向外(唇面)延伸的短脊在齿冠中部相互连接成一垂直于齿列中线的横脊; 下次尖 V-形脊的前、后支与下内尖后部发育的两短脊相互连接封闭成一菱形谷。前、后齿带发育, 后内侧尤强。

M_2 比 M_1 大, 齿冠尚未磨蚀, 其构造特征与 M_1 几乎完全相同, 仅后齿带比 M_1 更为发育。

M_3 比 M_2 更为长大, 齿冠前部四个齿尖的构造特征与 M_1 和 M_2 完全相同, 后部的下次小尖发育为一长大的跟座。从下次小尖的顶端向前、内前和外前方发育了三条脊。向前和内前方的两脊长而粗强, 它们分别与连接下次尖和下内尖的横脊的中点及下内尖

的后部连接,封闭成一很长的跟座谷,它与中部的菱形谷不相通。

表 1 泗洪炭兽下颊齿测量数据及对比表(单位:毫米)

Tab. 1 (Measurements of lower cheek teeth of *Sihongotherium sihongense* and some Bothriodontinae species)

	P ₂	P ₃	P ₄	M ₁	M ₂	M ₃	P ₂ -M ₃	M ₁ -M ₃
<i>S. sihongense</i> gen. et sp. nov.	$\frac{29}{21}$	$\frac{32}{24}$	$\frac{34}{24}$	$\frac{39}{26.27}$	$\frac{43}{31.32}$	$\frac{63}{33.30.24}$	<u>240</u>	<u>145</u>
<i>B. aequatorialis</i>	$\frac{24}{15}$	$\frac{26}{16}$	$\frac{25}{17}$	$\frac{25}{21}$	$\frac{32}{23}$	$\frac{50}{21.21.10}$	<u>180</u>	<u>106</u>
<i>B. onoideus</i>	$\frac{23}{15}$	$\frac{25}{19}$	$\frac{26}{20}$	$\frac{31}{17}$	$\frac{37}{25}$	$\frac{50}{27.25.16}$	<u>192</u>	<u>118</u>
<i>B. africanus</i>	$\frac{22}{13}$?	$\frac{27}{17}$	$\frac{25}{17}$	$\frac{36}{24}$	$\frac{51}{25.24.15}$	<u>186</u>	<u>112</u>

比较与鉴定 上面描述的泗洪的标本,从其下臼齿四尖,内侧两尖锥状,外侧两尖具V-形脊,下次尖和下内尖发育的脊相互连接封闭成菱形谷以及 M₃ 的下次小尖发育的跟座长大等特征来看,它显然应归入石炭兽科的沟齿兽亚科之中。泗洪的标本在个体大;下颌骨细长,底缘弯曲;前臼齿主尖的V-形脊前支末端向后褶曲与舌面齿带连接;臼齿外侧两尖的V形以及牙齿釉质表面有细的纹饰等特征与 *Brachyodus* 有许多相似之处。但泗洪的标本个体之巨大,牙齿粗壮;P₂ 之前有齿虚脊;前臼齿主尖V-形脊前支末端向后褶曲,其外壁与齿带之间形成月形凹陷;下原尖和下后尖互相连接的横脊垂直齿列中线,下后尖的前部圆而无脊;M₃ 的下次小尖外侧发育一细脊等特征明显地不同于 *Brachyodus*。

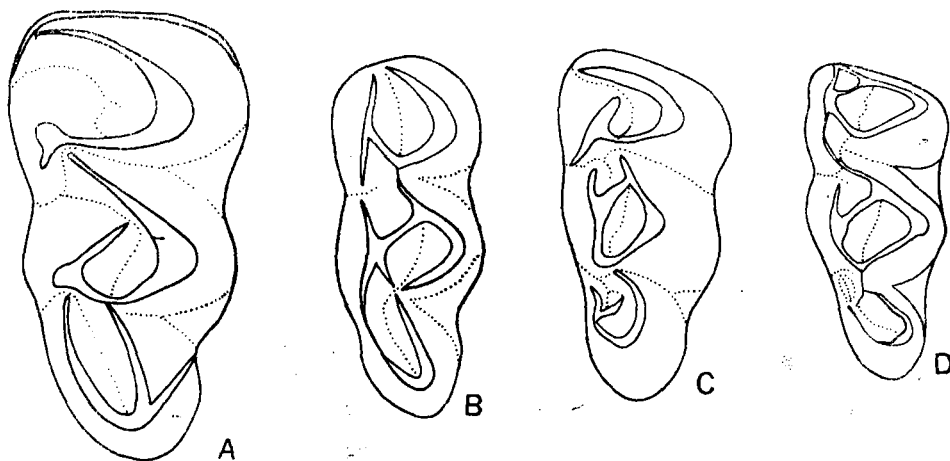


图 1 泗洪炭兽和几个沟齿兽类属种下第三臼齿形态特征比较

A-*Sihongotherium sihongense* ×1; B-*Brachyodus onoideus* ×1; C-*Brachyodus africanus* ×1; D-*Bothriodon bovinus* about ×1. (B. C. D 依 Forster-Cooper, 1924)

Fig. 1 Morphological character of lower third molars of some Bothriodontinae genera and species

泗洪的标本在牙齿特征方面与 *Bothriodon* 也有一些相似之处, 如 P_1 和 P_2 不连续, 臼齿的下次尖和下内尖的脊相互连接形成菱形谷, M_3 的跟座谷不与其前面的菱形谷相通等。但两者的个体大小相差很大, 而且下颌的形态也明显的不同。因此, 上面描述的泗洪标本也不同于 *Bothriodon* (图 1)。与沟齿兽亚科其他的属相比较, 差别则就更大了。泗洪的标本在下颌骨形态及牙齿特征方面与 *Brachyodus* 和 *Bothriodon* 的许多相似特征表明它们有比较近的亲缘关系。但泗洪的标本个体很大, 而在臼齿齿冠特征方面还显示了一定的原始性, 如内侧齿尖的脊不甚发育, 呈锥状, 下后尖尤为明显。这表明它不是由 *Brachyodus* 和 *Bothriodon* 进化而来, 而可能是代表一个与它们平行进行化的分支。

在沟齿兽亚科已知的属种之中, 只有产于东非肯尼亚中卡维隆杜 (Central Kavirondo) 鲁辛加岛 (Rusinga island) 的 *Brachyodus aequatorialis* Macinnes 的一些形态特征与泗洪的标本最为接近, 如下颌骨大, 且底缘弯曲; P_2 之前有齿虚脊; P_4 的跟座宽大、低矮和盆状, 其内发育一小纵脊; 臼齿的下原尖和下后尖互相连接的横脊垂直齿列中线等。但是, *B. aequatorialis* 的下颌骨大而牙齿相对很小, 前臼齿主尖 V-形脊前支末端在很高的位置向后褶曲与舌面齿带连接成不规则的脊, 前内角无月形凹陷等与泗洪的标本有明显的不同。泗洪的标本和鲁辛加岛的标本在下颌骨形态, 齿列特征及齿冠形态的某些相似性表明它们有相近的共同祖先, 而它们的下颌骨大小相近, 牙齿相对下颌骨的大小比例则明显不同以及齿冠特征的差异表明它们可能为共同祖先的居群在地理隔离之后分别进化了各自的特征。因此, 泗洪炭兽 *Sihongotherium sihongense* (gen. et sp. nov.) 和 *Brachyodus aequatorialis* 可以视为很接近的两个种。根据上述的分析对比和认识, 在此为泗洪的标本提议了一个新的属 *Sihongotherium* (gen. nov.)。 *Brachyodus aequatorialis* Macinnes, 1951 似乎也可归入该属之中。

讨论 我国新第三纪大型石炭兽类化石发现极少, 东部沿海地区尤缺, 仅 1960 年周明镇教授等记述过贵州施秉下侏罗统炭层中发现的一枚 P^4 和半枚 M^2 , 归入 *Brachyodus* 之中, 未做种的鉴定。周明镇教授等当时指出: 贵州施秉的标本 P^4 特别壮大 (30×22.5 毫米), 远超出沟齿兽类相近种的变异范围, 可能是一比较特化的新的种类。泗洪的标本所显示的个体之大及牙齿之大也是远超出已知沟齿兽类相近各种的。有意义的是泗洪的标本 P_4 (34×24 毫米) 及前臼齿也特别壮大, 其大小完全可以与施秉的 P^4 相适应。这或许不是偶然的巧合。从个体大小及分布在同一地理区内, 且它们生存的地质时代也大致相当来看, 当不排除贵州施秉的标本和江苏泗洪的标本有归入同一属, 乃至同种的可能, 但令人踌躇的是施秉的标本为两枚上颊齿, 而泗洪的标本为下颌骨和下颊齿, 两者无法直接进行比较。因此, 我们尚不敢贸然地把它们归入同一属种之中。这一问题有待将来更多新材料的发现和研究的加以解决。

关于 *Sihongotherium sihongense* (gen. et sp. nov.) 的地质时代, 因无共生的化石, 仅能根据其自身特征所反映的进化阶段和欧洲、东非相近属种的对比来加以推断。欧洲相近种 *Brachyodus onoides* 的地质时代为早中新世 Burdigalian 早期。根据 1989 年 J. W. Cowie 等在第 27 届国际地质大会上所建议的地层年代表的资料, Burdigalian 是早中新世晚期。东非相近种 *Brachyodus aequatorialis*, 其地质时代也为早中新世。*Sihongotherium sihongense* 的地质时代与欧洲和东非相近的种应大致同时。考虑到泗

洪炭兽新种个体巨大,其地质时代或许可能为 Burdigalian 的晚期,或中中新世早期,即相当于 Langhian,大致相当于欧洲哺乳动物化石分带的 MN₄ 或 MN₅ 带,与我国的山旺期大致相当。

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ANTHRACOTHERE FOUND IN SIHONG, JIANGSU

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Key words Jiangsu; Sihong; Miocene; Anthracothere

Summary

The writer's of the present paper recently secured two fragments of fossil mammalian mandible belonging the same individual, with well preserved P₄-M₃ and partially damaged P₂ and P₃, from Sihong of Jiangsu Province. The discovery is of great interest and important from the palaeontological as well as stratigraphical points of view, because it has provided not only the first fossil proof of the presence of anthracothere in Sihong district, but represents a nep form. Therefore we like to give the following notes of this interesting specimen.

Family Anthracotheriidae Gill, 1872

Subfamily Bothriodontinae Scott, 1941

Genus *Sihongotherium* gen. nov.

Type-species *Sihongotherium sihongense* gen. et sp. nov.

Diagnosis Individual very large; cheek teeth robust; a diastema in front of P₂; a crescent concave at antero-internal corner of lower premolar; anterior parts of metaconid of lower molar round, without any crests transverse; ridge joining protoconid and meaconid of lower molar perpendicular to median line of toothrow; a fine crest from cusp of talonid developed on external side.

Sihongotherium sihongense gen. et sp. nov.

(Plate I, fig. 1; Plate II, fig. 1, 2)

Holotype A middle part of right lower jaw, with P₂-P₃ partially broken and P₄-M₃

well preserved.

Locality and Horizon Xiaohongshan of Sihong, Jiangsu; Miocene.

Diagnosis for species *A₃* for the genus given above.

Description The lower jaw is relatively more slender and its lower border bowed. The symphysis and the ascending ramus are lost, the preserved horizontal ramus is about 260 mm long. There is a diastema about 10mm long before P_2 , it seems that a small alveolus is present in front of the diastema. Therefore if P_1 exist, it must be very small and separated from P_2 .

The lower premolars become progressively larger from P_2 to P_4 . The crown of P_2 is not preserved, remaining alveolus with two sub-equal roots. The apex of main central cusp of P_3 is broken away, P_3 shows the same arrangement as P_4 , except that the talonid is more narrower. P_4 is complete and unworn, it consists of a main central cusp with the antero-internal and postero-internal crests, or we called them a V-shaped crest, and a large talonid. The cingulum is well developed and continuous on anterior, internal and posterior sides. The internal cingulum rises sharply in the form of an inverted V. The antero-internal crest from the main central cusp folds backwards from a very low level and unites the internal cingulum, as a result of forming a small regular ridge closed the open of V-shaped crests of the main central cusp. At the antero-internal corner there is a distinct crescent concave between the cingulum and the folded part of antero-internal crest. The postero-internal crest is shorter than antero-internal one and descends almost directly to the median apex of the internal cingulum. The talonid is large and very low, basin-like, on it a small longitudinal crest is developed.

The molars become progressively larger from M_1 to M_3 . M_1 and M_2 are like in shape and structure, they consist of anterior and posterior lobes, each comprising an outer and inner cusps. The outer cusps(protoconid and hypoconid) are sharply crescent; whilst the inner ones(metaconid and entoconid) are conical. The anterior parts of metaconid is round, without any trace of crests, two short crests are developed on their posterior parts. The anterior crest of the protoconid curves across the front end of the tooth, to join with the cingulum of the antero-internal corner. The transverse ridge uniting the anterior pair of cusps is perpendicular to the median line of toothrow; the crests of the posterior pair of cusps join each other, forming a rhombic valley. The cingulum is well developed anteriorly and posteriorly, but weak externally. and absent internally. M_3 is large and long, its first two lobes are same as M_1 and M_2 in shape and structure, a long talonid projects backwards for a distance of 24mm. It appears to have consisted of a main central cone (hypoconulid), from which an anterior crest extends forwards to the median point of the posterior lobe, a second crest curves inwards and forwards to meet the postero-internal point of the entoconid, as a result of forming a long talonid valley, a fine third crest is also developed outwards and forwards.

Comparison and remark The above described features show that the new form should be unquestionably referred to the subfamily Bothriodontinae and nearer to *Brachyodus*, but differs distinctly from *Brachyodus* in being very large in size and in having a diastema in front of P_2 and a transverse ridge perpendicular to the median line of toothrow, which join the protoconid and the metaconid of the lower molar. We have therefore to propose a new genus *Sinongotherium*, from Sihong, the name of the type locality. Comparing with all the known genera and species of Bothriodontinae, only *Brachyodus aequatorialis* described by Macinnes in 1951, from Rusinga Island of Kenya, is comparable to our new form in size

and shape of mandible and some features of lower teeth, but there is some difference between them, for example, in *B. aequatorialis* the lower teeth are relatively smaller, the anterior limb of V-shaped crests from the main central cusp of the lower premolar folds backwards from a higher level and there is no crescent concave at the antero-internal corner of the lower premolar.

Discussion Two isolated upper teeth described by Chow and Chang in 1960 under the name of *Brachyodus*, from the Miocene lignite beds of Sibing, Guizhou Province, have probably to be referred to the new form, because the Sibing's upper teeth are completely fit to the Sihong's lower teeth in size and they are of pretty much the same geological age and existed region.

The new form is devoid of associate fossils, therefore in regard to its geological age we judge merely from the history of *Brachyodus* closely related to it. As far as we know now, *Brachyodus* appeared from the Early Oligocene and had become extinct in the Middle Miocene. The new form is larger than all the known species of *Brachyodus*, thus it is more probably of the late period of Early Miocene or the early period of Middle Miocene, corresponding generally to Shanwangian, European MN4 or MN5 zone.

图版 I 说明

(Explanation of Plate I)

图 1 (Fig. 1) *Sihongotherium sihongense* (gen. et sp. nov.)

图 1a (Fig. 1a) 带 P_2-M_3 的一段右下颌骨 (a part of right mandible with P_2-M_3); 冠视 (crown view); $\times 3/4$ 。

图 1b (Fig. 1b) 同上 (same as above), 外视 (exterior view); $\times 3/4$ 。

图版 II 说明

(Explanation of Plate II)

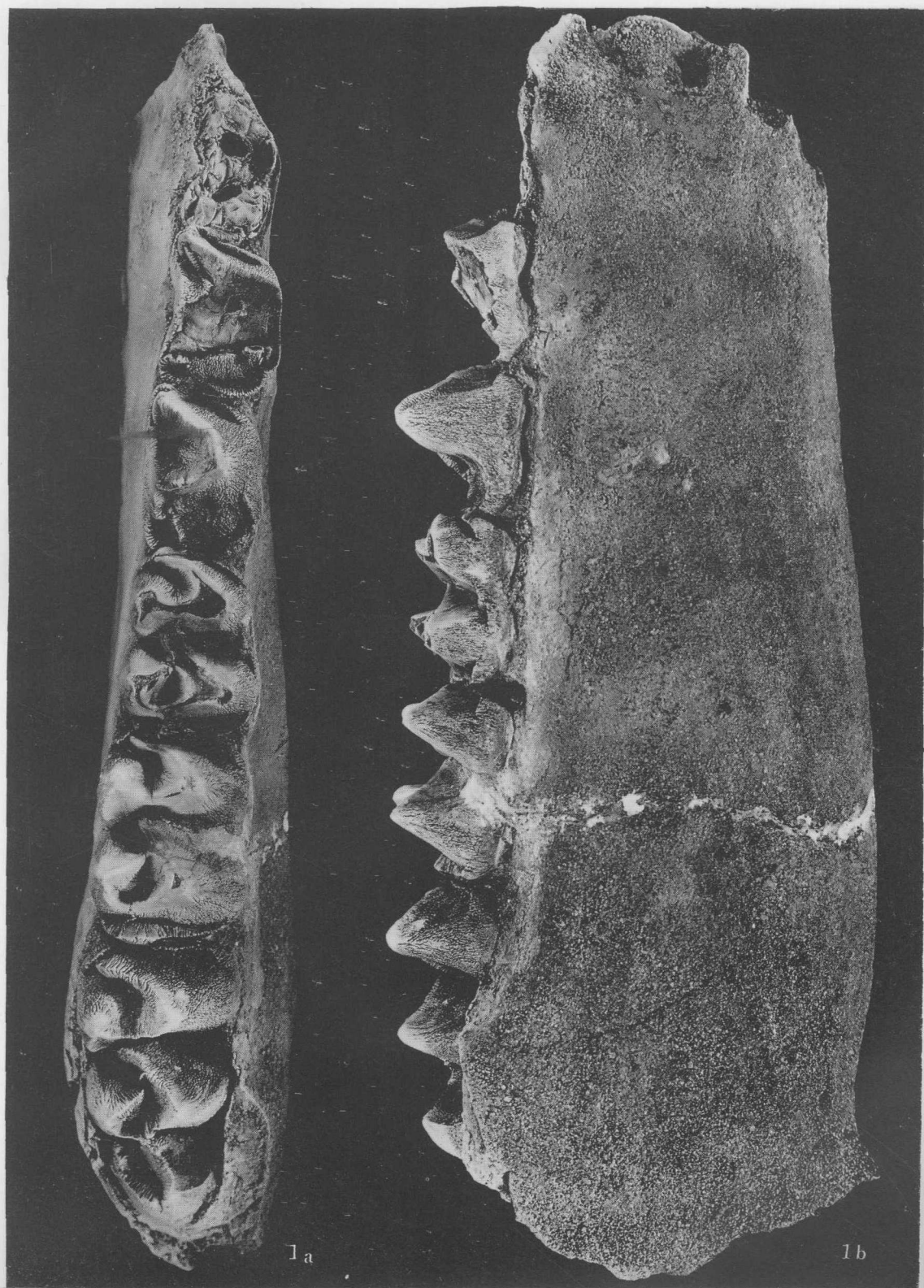
图 1 (Fig. 1) *Sihongotherium sihongense* (gen. et sp. nov.)

图 1a (Fig. 1a) 带 P_2-M_3 的一段右下颌骨 (a part of right mandible with P_2-M_3); 内视 (interior view); $\times 3/4$ 。

图 1b (Fig. 1b) 图 1a 的 P_3-M_1 (P_3-M_1 of Fig. 1a); 内视 (interior view); $\times 1$

图 2 (Fig. 2) 带 M_1 和 M_2 的左下颌骨碎块 (a fragment of left mandible with M_1 and M_2); 冠视 (crown view); $\times 1$ 。

(标本保存在泗洪县图书馆)



1a

1b

