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第三册

中國象類化石

英國胡步伍著

中華民國二十四年二月

實業部地質調查所
國立北平研究院地質學研究所印行

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BY

A. TINDELL HOPWOOD

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中國象類化石

胡步五著
楊鍾健節要

此書所依據之材料，亦爲安特生師丹斯基在中國所採者。但作者並將其他方面之象類化石亦列入，計已記述者有下列之種屬：

* *Trilophodon connexus* 新種，青海西寧（按原文歸甘肅今改正），時代中新統。

* *Trilophodon wimani* 新種，甘肅永登（平番），時代不明，但與原始之猪共生，或爲中新統。

* *Trilophodon spectabilis* 新種，地點與時代不明。

Serridentinus mongoliensis 察哈爾，中新統。

Serridentinus gobiensis 察哈爾，中新統。

Serridentinus florescens 外蒙，上新統。

Platybelodon grangeri 察哈爾，中新統。

* *Tetralophodon exoletus* 新種，山西保德，上新統與三趾馬化石羣共生。

Tetralophodon (?) *sinensis* 雲南，時代不明。

以上歸古始祖象科 *Palæomastodontidæ*

* *Mastodon americanus* 山西保德武鄉陝西府谷等地，時代上新統，與三趾馬化石共生。

* *Mastodon borsoni*　山西和順，時代上新統。

* *Mastodon* sp.　均爲肢骨。

以上歸始祖象科　*Mastodontidæ*

* *Pentalophodon sinensis*　新種，山西榆社，上新統？

* ? *Pentalophodon sinensis*　手骨，地點仝上。

以上歸瘤齒科　*Dibunodontidæ*

此外有系統不明之若干肢骨，均歸上述各科。

* *Stegodon officinalis*　新種，由漢口藥肆買來或自四川，時代不明。

* *Stegodon zdanskyi*　新種，購自上海藥舖，時間與地點不明。

* *Stegodon orientalis*　地點（按原文所載不大可靠）與年代不明。

* *Stegodon orientalis grangeri*　四川萬縣，下更新統。

Stegodon sinensis

Stegodon aff. *bombifrons*

以上歸劍齒象科　*Stegodontidæ*

* *Archidiskodon* cf. *planifrons*　山西沁縣，下更新統。

* *Palæoloxodon tokunagai*　第五十地點及自藥舖購來之件，時代或爲下更新統。

* *Palæoloxodon cf. namadicus*　河南葉縣新安縣，時代更新統。

* *Mammuthus primigenius*　內蒙及河南彰德，更新統。

以上歸象科　*Elephantidæ*

以上所述各種，雖有一部其地質年代由其共生化石鑑定，可無疑問，但尙有不少因地點不明，時代不確，有待于以後之補充者尙夥。上表附*者有依據材料之種，其他則只節前人所述而已。

目下可得之結論，即爲自中新統後印度即與中國分離，直至上新統末期，其北方交通之道不通。自上新統末期後，兩地又有交通，但其道尙不明，或係經暹羅安南而互易其種類也。

按胡君此文發表後，吾人在山西榆社等地採得若干象類化石，其研究結果已發表，（古生物誌丙，九·二·）於地質年代及記述上可補此文不足，又德日進研究周口店第九地點之化石，于象類亦有新見，可以參看。

楊鍾健附記

PREFACE.

THE PALÆONTOLOGY OF CHINA WAS UNKNOWN UNTIL 1853 WHEN Davidson wrote a short note on some fossils obtained in Shanghai by W. Lockhart. The specimens were sent to Daniel Hanbury who gave them to the British Museum. They were mostly invertebrate but among them were a few teeth. One of these teeth (regd. 29007) was in later years described by Busk as a tooth of *E. armeniacus* Falc. (Busk, 1868). Thus from the very first, fossil Proboscidea have been known to occur in China.

Sir Richard Owen, who had referred to Lockhart's specimen in his address to the British Association in 1858, was able in 1870 to describe a collection of fossil mammals received from Mr. R. Swinhoe, at that time British Consul in Formosa. He described two new species of *Stegodon, S. orientalis* and *S. sinensis,* which later authors have referred to the Indian species *S. insignis* and *S. cliftii* respectively.

In the following year, Gaudry, when dealing with the collection made by the famous French Missionary Père David, recorded a toothless jaw of an undetermined species of elephant. Schlosser (1903, p. 42) showed that the specimen was probably of the Mammoth, and remarked that although remains of Mammoth had often been said to occur in China, no scientific study had yet been published. Even today, thirty years later, this still seems to be the case, and the broken tooth described below is, so far as I know, the first Mammoth molar to be recorded from China proper.

The first collection of any size was that taken back to Germany by Ferdinand, Freiherr von Richthofen, and described by Professor Ernst Koken in 1885. This collection contained specimens from several horizons, but they were all sufficiently close together broadly to justify Koken's description of the whole as Upper Tertiary. The Proboscidea were described under the names *Mastodon perimensis* var. *sinensis* nov., *M.* aff. *pandionis, Stegodon cliftii, S. insignis,* and *S.* aff. *bombifrons* (Koken, 1885, pp. 6—16).

The next collection was that made by Dr. K. A. Haberer, who, during his journey through China in 1899—1901, purchased great quantities of "dragons' bones and teeth" from the native druggists. Professor Max Schlosser described the specimens in 1903.

There were very few remains of Proboscidea among the mammalian teeth, but, in so far as they were represented, Professor Schlosser was able to identify *Stegodon insignis, Mastdon* aff. *latidens, M. lydekkeri* nov., and *Mastodon* sp. ex aff. *pandionis* (Schlosser, 1903, pp. 42—49).

Twenty years after Haberer, Dr. J. G. Andersson in conjunction with the Geological Survey of China, and assisted by Dr. Otto Zdansky, made extensive collections in various provinces of China. These collections, which are now preserved in the Palæontological Institute of Upsala University, were the first to be made under modern conditions by which the localities were noted with scrupulous accuracy. They contain a varied assortment of bones and teeth of Proboscidea which represent a dozen or so species, most of them new.

Later collections were made by the Central Asia Expeditions of the American Museum of Natural History. From this material five new forms have been described, namely, *Serridentinus gobiensis, S. mongoliensis, S. florescens, Platybelodon grangeri,* and *Stegodon orientalis grangeri* (Osborn, 1924, 1929; Osborn & Granger 1931, 1932).

Additional collections have been made by the Geological Survey of China, as well as by semi-private expeditions working in conjunction with the Survey, but the Proboscidean remains have not been described in full, though certain authors (e. g. Boule & Teilhard de Chardin, 1928) have referred to them incidentally when dealing with a fauna.

In the present work species described by previous authors, and not represented in the collections made by Dr. Andersson, are inserted. As a rule the original descriptions are quoted and, where necessary, short comments added. Owing to the uncertainty which attends efforts to deal with descriptions unaccompanied by specimens, sections have been added on such previous records as "*Stegodon insignis*". This has been done in preference to making definite redeterminations based on insufficient knowledge of the specimens concerned. The object in making these additions has been to gather all the available information into one place. Advantage has also been taken of the presence of a few specimens in the collections of the Geological Department of the British Museum (Natural History) to supplement the material available for study. In this manner it has proved possible to add sections on *Stegodon orientalis,* and on the Mammoth. Any specimen of which the registered number is quoted is in the British Museum, all the others are in the Palæontological Institute of Upsala University.

In conclusion I wish to express my thanks to Professor Carl Wiman for his never-

failing courtesy and patience in face of the many delays to which this paper has been subjected, as well as for his kindness in entrusting me with the material for description; to Dr. Birger Bohlin, through whose mediation the specimens were sent to me; and to Dr. Otto Zdansky for many publications on the Tertiary and Quaternary mammals of China. To all three I am also indebted for their hospitable welcome to Upsala some years ago. Acknowledgements and thanks are also due to Dr. W. D. Lang, F. R. S. Keeper of Geology in the British Museum (Natural History), for permission to undertake this work, as well as to Dr. Guy E. Pilgrim, formerly of the Geological Survey of India, for the opportunity to study the Indian species referred to in the following pages. Finally I have to thank Father Teilhard de Chardin for discussing the age of the various deposits with me when he was in London in 1932.

A. Tindell Hopwood.

Department of Geology, British Museum (Natural History), London.

INTRODUCTION.

I. The Morphology of the Mastodon Tooth.

Any tooth referable to the old collective genus *Mastodon* has certain characters which are common to all other teeth classified under that head. Each tooth belonging to the "intermediate molar" series consists of three or more transverse ridges composed of two cusps apiece, an anterior cingulum, and a heel. It has long been the custom to number the ridges from before backwards, and so we find references to the first, second, or third ridge as the case may be. Another character is that the inner cusps of the upper teeth, and the outer cusps of the lower, receive more wear than their fellows. For this reason they are more strongly built, and in the course of evolution are the first to be provided with additional strengthening structures. These stronger cusps are known as the *pretrite* cusps, whereas the weaker ones are known as the *post-trite* cusps.

A system of notation for the different cusps was arrived at by combining the idea of strong and weak cusps, with that of strong and weak numbers. In this system the strong, *pretrite*, cusps are distinguished by *odd numbers*, and the weaker, *post-trite*, cusps by *even numbers*. The first cusp is the pretrite cusp of the first ridge, and the second is the post-trite cusp of the same ridge; similarly the third and fourth cusps are the pretrite and post-trite cusps of the second ridge, and so on in sequence.

This system has the great advantage of being entirely free from theory. It is purely empirical, and capable of indefinite extension. For example, if a species were to be discovered with twenty cross-ridges, the cusps of the seventeenth ridge would be indicated by the numbers 33 and 34. Moreover, given the number (N) of the cusp the ridge may be determined by employing the formula $\frac{N+1}{2}$ for petrite cusps, and $\frac{N}{2}$ for post-trite cusps. Thus in the imaginary species just mentioned, cusp 39 belongs to the twentieth ridge since $\frac{39+1}{2} = 20$ and cusp 14 belongs to the seventh ridge since $\frac{14}{2} = 7$.

Another convention which is not without its uses is this. Ordinarily a simple cusp consists of two cones, and is separated from its fellow by a fairly deep cleft. This means that the ridge consists of four cones arranged in two pairs, thus, CC:CC. In this formula 'C' stands for one of the "primary cones" and the colon for the cleft. Later species have the cones variously divided. This, too, can be represented by means of a formula in which 'c' stands for one secondary cone, and the representatives of each primary cone are enclosed in brackets. For example, a tooth of the Indian species *Synconolophus corrugatus* (Pilgrim) has the formula

CC : (cc) (cc)
C (cc) : C (cc)
(cc) C : C (cc)

which indicates that the first cusp has the two primary cones, the second has both cones divided; the third cusp has the inner cone divided, whereas in the fourth cusp the outer cone is divided and in the fifth and sixth cusps the outer cones alone have undergone division.

An extension of this method is used when dealing with the teeth of *Stegodon*. In these animals the ridges are made up of a succession of elements, each of which consists of a varying number of large and small mammillæ; the latter are represented by M and m respectively, and suitable combinations placed within brackets indicate the composition of each element. Examples of formulæ of this type are given in the account of *Stegodon orientalis*.

II. **Systematic Arrangement.**

The modern systematic treatment of the Proboscidea is due very largely to Professor Henry Fairfield Osborn aided by a small band of assistants. Up to the present, the results of their labour have been published only in part, mostly in the form of summaries with very little evidence adduced in support. So far as possible, I have made full use of the information already published, and also of much that is not yet generally available. Professor Osborn has most generously kept me fully informed of the progress of his studies, and has also given me the further advantage of being able to read advance copies of his chapters as soon as page proofs were available.

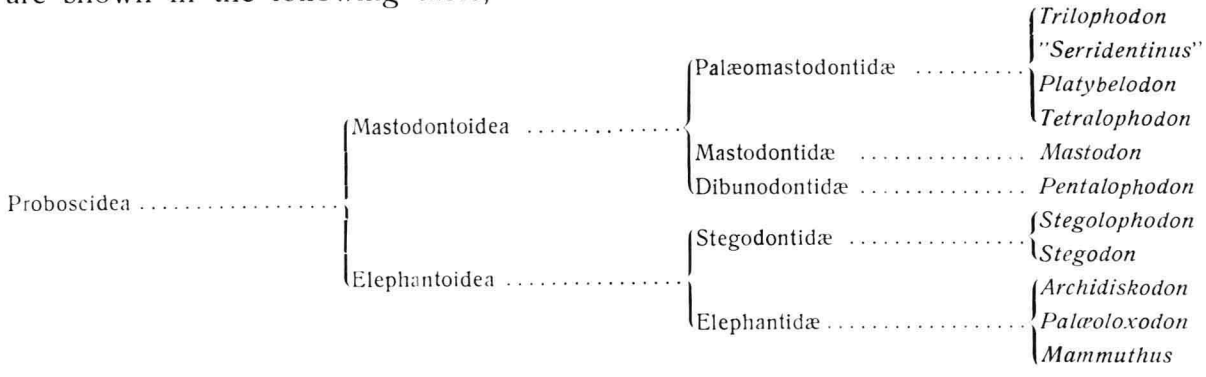
It was inevitable under these conditions that the present paper should owe much to Professor Osborn, and I wish to express to him my very real gratitude for all the help given me in this way. At the same time, it must not be assumed that he is responsible for any of the opinions given concerning the relationships of the different

species or groups unless such an opinion is definitely quoted as being his. Throughout, I have tried to make it quite clear when I have adopted his views, and, in justice to him, any statement made without his name being attached should be attributed to me. Statements attributed to Osborn without reference to a published paper are from letters, or from the proofs already mentioned. It is another instance of Professor Osborn's generosity that he has allowed me to make this use of them.

Broadly speaking, the outcome of all this work has been the establishment of the fact that not all elephants belong to the genus *Elephas,* any more than all mastodonts belong to *Mastodon*. This, of course, was known to Dr. Hugh Falconer, and to those who succeeded him, but Professor Osborn was the first to place it on a firm systematic basis. Recognition of this fact has necessitated the making of many new genera, and the resuscitation of many others long forgotten. In considering the problems involved, the International Rules for Zoological Nomenclature have been adhered to only so far as it seemed advisable. For example, *Mastodon* is used for the American Mastodon despite the prior claims of *Mammut;* on the other hand, the generic name *Mammuthus* is used for the Mammoth because it appears to be the first genus to have *Elephas primigenius* specified as the genotype, whereas Professor Osborn uses *Mammonteus,* a modification of *Mamonteum* which he claims to be Camper's generic name for the same animal. By so doing I have attempted to make of the Rules a useful servant, rather than to allow them to become a blind, unreasoning, master.

In the general systematic arrangement of the work, I have made use of other authors' results but chiefly of Osborn's. The names for the families, however, have been constructed on orthodox lines by adding the termination-*idæ* to the name of the typical genus. Osborn employs descriptive names such as 'Longirostrinæ', 'Brevirostrinæ', and 'Rhynchorostrinæ', but they do not seem to have any advantage over names formed in the usual way.

The genera used in this work, and their approximate relationships to each other, are shown in the following table,



DESCRIPTION OF SPECIES.

Family PALÆOMASTODONTIDÆ Andrews.

1906. Cat. Tert. Vert. Fayûm, p. 130.

Diagnosis. — "In the skull the nasals shortened and the external nares somewhat shifted back from the end of the snout. Mandibular ramus with elongated spout-like symphysis, projecting beyond the skull. A single pair of tusks *(i.2.)* in both upper and lower jaws. Upper incisors in form of downwardly directed tusks, with a band of enamel on their outer side; lower incisors procumbent and continuing the upper surface of the spout-like symphysis. Premolars replacing milk-molars in both upper and lower jaws; molars with not less than three transverse ridges." (Andrews, *loc. cit*).

Remarks. — This family, which is often spoken of as the Trilophodontidæ, is the equivalent of Osborn's sub-family, the Longirostrinæ.

Genus TRILOPHODON Falconer & Cautley.

1817. *Mastodon* Cuvier, Règne Animal, I, p. 232.
1837. *Gomphotherium* Burmeister, Handb. Naturg., II, p. 795. *Genus cælebs.*
1841. *Gamphotherium* Gloger, Gemeinnütz. Naturg., I, p. 119.
1846. *Trilophodon* Falconer & Cautley, Fauna Antiqua Sivalensis, pt. i, p. 54.
1884. *Tetrabelodon* Cope, *Proc. Amer. Phil. Soc.*, XXII, p. 5.
1895. *Gamphotherium* Gloger, Thomas, *Ann. Mag. Nat. Hist.*, (6), XV, pp. 191, 192.

Diagnosis. — "Dentium molarium 3, utrinque intermediorum coronis colliculis 3." (Falconer, 1857, p. 316)..

This needs amendment as follows.

Longirostrine, bunolophodont, angusticoronate mastodonts with three transverse ridges in the intermediate molars. Lower tusks flattened from above downwards, but not expanded at their tips.

Genotype. — *Mastodon angustidens* Cuvier.

Remarks. — Burmeister's genus *Gomphotherium* was originally diagnosed thus, "Stosszähne in beiden Kiefern besass die gleichfalls untergegangene Gatt. *Gomphotherium*". (Burmeister, *loc. cit.*), but he mentioned no species as belonging to this genus. The late Dr. O. P. Hay (Hay, 1923, p. 109), regarded this as coming under