NEW RECORDS OF THE PANTODONT *ARCHAEOLAMBDA* FROM THE PALEOCENE OF SOUTHERN CHINA

by

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ABSTRACT

Two new finds of pantodont materials from southern China, assigned to *Archaeolambda*, are described in this paper. One, a new species from the Nanxiong Basin, Guangdong Province, is similar to *Alcidedorbignya inopinata* from the early Paleocene of Tiupampa, Bolivia in size. It provides reliable evidence of the occurrence of *Archaeolambda* in the early-middle Paleocene of southern China. The second find includes specimens of *Archaeolambda* sp. cf. *A. planicanina* from the ?late Paleocene of Hengyang Basin, Hunan Province, which are the first record of a fossil mammal from the area near Hengyang city. The only vertebrate fossils previously found here were two genera of crocodiles discovered in 1938. This find sheds new light on the local biostratigraphy.

RESUME

Deux nouveaux restes de pantodontes, trouvés dans le Sud de la Chine, sont attribués à *Archaeolambda*. Le premier, une nouvelle espèce du Bassin de Nanxiong, Province de Guangdong, a la même taille qu'*Alcidedorbigna inopinata* du Paléocène inférieur de Tiupampa en Bolivie. Celle-ci met en évidence la présence d'*Archaeolambda* dans le Paléocène inférieur-moyen du Sud de la Chine. La seconde trouvaille, *Archaeolambda* sp. cf *A. planicanina* du Paléocène supérieur (?) du Bassin de Hengyang, Province du Hunan, constitue la première découverte de mammifères fossiles aux alentours de la ville de Hengyang. Les seuls vertébrés fossiles trouvés là auparavant étaient deux genres de crocodiles, découverts en 1938. Ces fossiles apportent de nouveaux éléments à la biostratigraphie locale.

INTRODUCTION

Pantodont fossils have been found in Asia, North America, and Europe, ranging from the early or middle Paleocene to middle Oligocene (Simons1960) and in South America in the early Paleocene (Marshall & Muizon 1988, 1992, Muizon & Marshall 1987, 1991, 1992). The Asian Paleocene pantodonts are important in discussions of the origin and early evolution of this order. About 28 Asian pantodont species belonging to 14 genera in 6 families (Archaeolambdidae, Bemalambdidae, Harpyodidae, Pantolambdodontidae, Pastoralodontidae, and Phenacolophidae) have been described.

Pantodonts first appeared in Asia during the early-middle Paleocene, represented by two species of the genus *Bemalambda*, *B. nanhsiungensis* and *B. pachyoesteus*, from the lowest part of the Shanghu Formation, Nanxiong Basin, Guangdong Province, China. *Bemalambda* is considered the least derived genus of the order Pantodonta (Zhow *et al.* 1977, Lucas 1982). It is indicative of an early-middle Paleocene faunal age in Asia (Li & Ting 1983).

The appearance of *Archaeolambda* usually marks the beginning of the late Paleocene in Asia. Late Paleocene species include *A. dayuensis*, *A. planicanina*, *A. tabiensis*, and *A. yangtzeensis*. An uncertain species, *Archaeolambda* indet. (Tong 1979), represented by a fragmentary left dentary with an incomplete M_3 from the Shizikou Formation, Jiangxi Province, China, indicates the possible occurrence of *Archaeolambda* in the early-middle Paleocene.

This paper reports two new Paleocene pantodonts from southern China. One is a new species, herein named *Archaeolambda micron* from the early-middle Paleocene, Shanghu Formation, Nanxiong Basin, Guangdong Province, which represents the first unambiguous occurrence of the genus *Archaeolambda* in the early-middle Paleocene. The second pantodont, *Archaeolambda* sp. cf. *A. planicanina* from the ?late Paleocene, Hengyang Basin, Hunan Province, is the first fossil mammal from the area near Hengyang city, where the only vertebrate fossils known previously were specimens of two genera of crocodiles found in 1938 (Young *et al.* 1938, Young 1944). It provides a valuable datum in defining the age of the strata and unraveling regional stratigraphy.

Abbreviations: IVPP, Institute of Vertebrate Paleontology and Paleoanthropology, Academia Sinica, Beijing.

SYSTEMATIC PALEONTOLOGY

Order **PANTODONTA** COPE, 1873
Family **ARCHAEOLAMBDIDAE** FLEROV, 1952
ARCHAEOLAMBDA FLEROV, 1952

Archaeolambda micron sp. nov.

(Plate 1, fig. 1A, B; Table 1, 3)

Holotype and only known specimen: Posterior part of right mandible with M_{1-3} and fragmentary dentary with left M_{1-3} (IVPP V5784).

Horizon and **locality**: Upper part of the Shanghu Formation, early-middle Paleocene; northeast of Jingtang village, Nanxiong Basin, Guangdong Province, China (IVPP Locality Field Number 73058d).

Etymology: The species name is derived from the Greek *mikros* and refers to the animal's small size.

Diagnosis: Molars of *Archaeolambda micron* are about one-half the size of those of *Archaeolambda tabiensis*. They differ from other species of *Archaeolambda* in the following features: mandible thin, with a deep horizontal ramus and a vertical anterior edge of the coronoid process; talonids of M_1 and M_2 closed, with smaller talonid notches at the anterolingual sides; entoconids of M_1 and M_2 more distinct; M_3 with a relatively larger talonid, less developed entoconid, and more developed hypoconulid.

Description

The horizontal ramus of the mandible extends about 10 mm under M_3 and becomes shallower under M_1. The ascending ramus is perpendicular to the dorsal edge of the horizontal ramus at a position just behind M_3. The angle of the mandible extends ventrally and posteriorly below the lower edge of the horizontal ramus.

The trigonids of M_{1-3} are much higher than the talonids, with subequal paraconids and metaconids. M_2 and M_3 show a slight swelling on the paracristid. The trigonids of

M_1 and M_2 are wider transversely and longer anteroposteriorly than the talonids, and about equal in length in M3. The metaconids have a strong posteriorly directed metastylid, which is most strongly developed on M_2.

The talonids of M_{1-2} differ from those of M_3. The cristid obliqua of M_{1-3} intersects the posterior wall of the trigonid slightly lingual to the midline. M_1 and M_2 have a distinct hypoconid and entoconid, and a small entoconulid. Talonid notches are sharp and narrow on all three molars. M_1 and M_2 have the hypoconulid smaller than the entoconid. The posterior talonid rim is higher between the hypoconulid and entoconid than between the hypoconid and hypoconulid. A faint vertical cristid runs down the posterior side of the talonid from the hypoconulid. The elongated talonid of M_3 makes it by far the largest lower molar. The talonid of M_3 is a transversely narrow and anteroposteriorly elongated oval-shaped basin, which is oriented anterolingually and terminates against the metastylid. The metastylid thickens at its base. On the left M_3, an elliptical cuspule lies in the floor of the basin lingual to the hypoconid and paralleling the trough floor. However, no cuspule is present on the right M_3. This is the only difference visible between the two M_3s. A strong hypoconulid is present in both. A large, oval wear facet cuts the tooth between the hypoconid and hypoconulid, removing the anterolabial face of the hypoconulid. On M_1 and M_2, a more diffuse facet is seen on the posterolabial side of the hypoconid. There is no distinct entoconid on M_3, but there is a slight swelling on the loph immediately posterior to the talonid notch, similar but smaller than the entoconulid of M_2.

Discussion

We consider the elongated-oval, cup-like talonid of M_3 to be a derived character distinguishing *Archaeolambda* from other genera of pantodonts. The presence of an elongate oval talonid on M_3 of *A. micron* is the major reason for assigning it to the genus.

A. micron is similar to *Archaeolambda tabiensis* (HUANG, 1977) and *Archaeolambda yangtzeensis* (HUANG, 1978), the most closely comparable pantodonts from the late Paleocene of China in morphology, but is much smaller. However, *A. micron* differs from them in having the horizontal ramus of the mandible very thin and deep, with the anterior edge of the ascending ramus vertical and the angle of the jaw sharply projecting downward below the ventral edge of the mandible. Furthermore, the talonid of M_{1-2} in *A. micron* has a distinct entoconid, and the talonid of M_3 is relatively longer. Compared to the other Asian pantodonts, *A. micron* might be similar in size to *Harpyodus decorus*, a late Paleocene species (Wang 1979, Qiu & Li 1977); unfortunately, the lower teeth of the latter are not known. *A. micron* is smaller than the smallest *Altilambda*, *A. minor*, a late Paleocene species. Its mandible is shallower and thinner than that of *A. minor* (Chow & Wang 1978, 1979, Tong 1982). The lower molars of *A. micron* differ from those of *Altilambda* in being lower crowned, having the trigonid more open lingually, and having well-developed entoconids. *Archaeolambda micron* resembles the recently published early Paleocene species *Alcidedorbignya inopinata* from Tiupampa, Bolivia (Marshall & Muizon 1988, Marshall 1989, Muizon & Marshall 1987, 1992), in size. They are the only known pantodonts of such small size. Besides size, they share similarities in having the same

degree of development of the metastylid, well-developed entoconids, cupped talonids on M_1 and M_2, and a similar cristid obliqua. However, *A. micron* differs from *Alcidedorbignya inopinata* in having the trigonids of M_{1-3} more open on the lingual side and having a relatively longer and oval-shaped talonid of M_3.

We show the photograph of the paratype specimen of "*Dysnoetodon minuta*", a left M^2 (V5838; Zhang 1980), in this paper (Pl. 1, fig. 1C) because it has been compared to the M^2 of *Alcidedorbignya inopinata* (TING & ZHENG, 1989) without a published picture, and it shows some similarities to the M^2 of *Alcidedorbignya inopinata*. The M^2 of "*Dysnoetodon minuta*" was collected in the same bed, from the same quarry, as *A. micron*. We doubt that the M^2 of "*Dysnoetodon minuta*" represents the upper molar of *A. micron* or any other small pantodont because it has a "W"-shaped ectoloph.

Based on currently known materials worldwide, the stratigraphically lowest occurring pantodont genera include: *Bemalambda* and *Archaeolambda* from the early-middle Paleocene (Shanghu Formation) of Asia, and *Alcidedorbignya* from the early Paleocene of South America. *Bemalambda* has been considered to be the least derived pantodont since it was first described. Compared with two newly discovered small pantodonts, *Alcidedorbignya inopinata* and *Archaeolambda micron*, the lower molars of *Bemalambda* appear more derived in having the paraconids much more reduced than those of the other two. The upper molars of *Bemalambda*, however, retain primitive features, including a weak development of the centrocrista, and having the paracone and metacone close together. We now think the basal pantodonts lie within *Alcidedorbignya*, *Archaeolambda*, or *Bemalambda*.

Archaeolambda sp. cf. *A. planicanina* FLEROV, 1952

(Plate 1, fig. 1D, E; Table 2, 3)

Material: A fragmentary right dentary with P_4–M_2 (IVPP, V5785) and an isolated left M_3 (IVPP, V5786).

Horizon and **locality**: ?late Paleocene. Northeast of Yuzitang village and southeast of Chengjiachong village, Hengyang Basin, Hunan Province, China (IVPP Locality Field Number 87001, Fig. 1).

Description

P_4 is the least worn tooth, but it has undergone some lateral crushing and distortion. Its trigonid is a high U-shaped crest without clearly differentiated cusps. The cristid obliqua curves posteriorly, then posterolabially to form a small flat shelf of a talonid with no trace of a hypoconid. M_1 and M_2 have a pronounced double "V" pattern with a broadly open trigonid and broad talonid notch. Metastylids are prominent and steep, originating immediately on the posterior side of the metaconid. The cristid obliqua joins the posterior wall of the trigonid roughly two-thirds of the way lingually. A pattern of low vertical striae, which fade and anastomose, is present on the lingual surface of the P_4 trigonid and thinly present on the lingual surface of M_1.

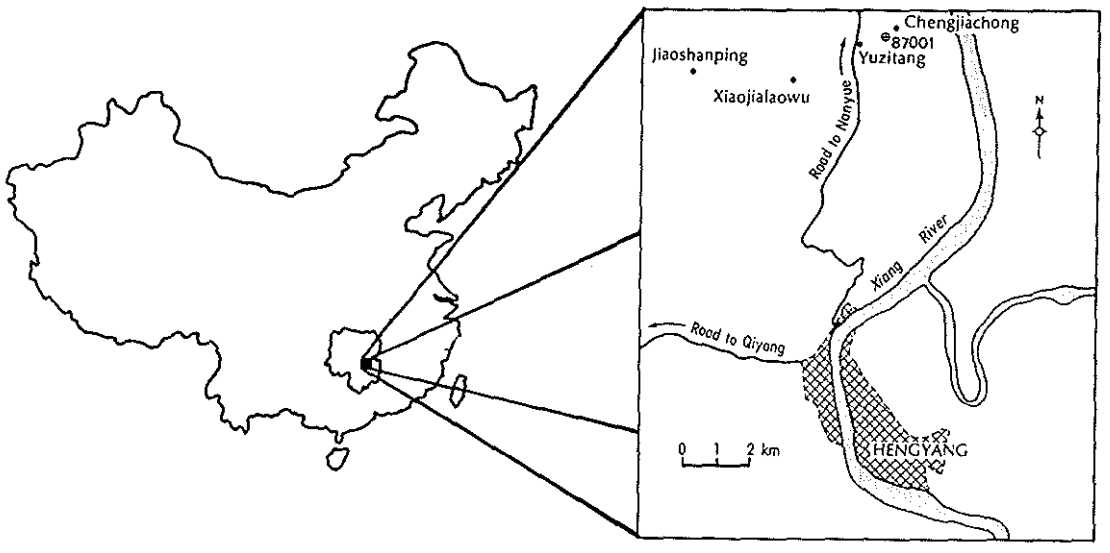

Figure 1.— Map of the Hengyang region showing IVPP Locality Field Number 87001.

Discussion

Among the known archaeolambdids, *Archaeolambda* sp. cf. *A. planicanina* is most similar to *Archaeolambda planicanina* in both size and morphology (Flerov 1952, Kielan-Jaworowska 1968). *A.* sp. cf. *A. planicanina* is slightly larger than *Archaeolambda tabiensis* and differs from the latter in having a simpler talonid on P_4, the metastylid of M_1 more developed, no entoconid on M_2, the talonid of M_2 more open lingually, and the cristid obliqua of M_2 intersecting the trigonid low on its posterior wall (Huang 1977). *A.* sp. cf. *A. planicanina* is much larger than *A. yangtzeensis* and differs from the latter in having a well-developed metastylid on M_1. *A.* sp. cf. *A. planicanina* is close to *A. dayuensis* in size, but differs from the latter in that the talonid of P_4 is relatively larger (Tong 1978, 1979).

The M_1 and M_2 of *A.* sp. cf. *A. planicanina* differ from those of *A. micron* in several features. The trigonids of M_{1-2} of *A.* sp. cf. *A. planicanina* are wider than in *A. micron*. Both animals have pronounced metastylids. The M_2 of *A. micron* has a faint anterior cingulum, which is absent on *A.* sp. cf. *A. planicanina*. The talonids of M_{1-2} of *A.* sp. cf. *A. planicanina* differ from those of *A. micron* in being completely open on the lingual side and having no entoconid.

A. sp. cf. *A. planicanina* was the first fossil mammal discovered from the area near Hengyang city, where the only fossil specimens reported have been two genera of fossil crocodiles (Young *et al.* 1938, Young 1944). Based on the presence of *A.* sp. cf. *A. planicanina*, the age of this site is most likely late Paleocene (Li *et al.* 1979, Zheng & Huang 1984). A nearby site had been considered to be Eocene on the strength of crocodilian specimens (Young 1944). Cultivation of the crocodilian site and pantodont-bearing site make their exact stratigraphic relationship difficult to determine at this time.

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LEGEND OF THE PLATE

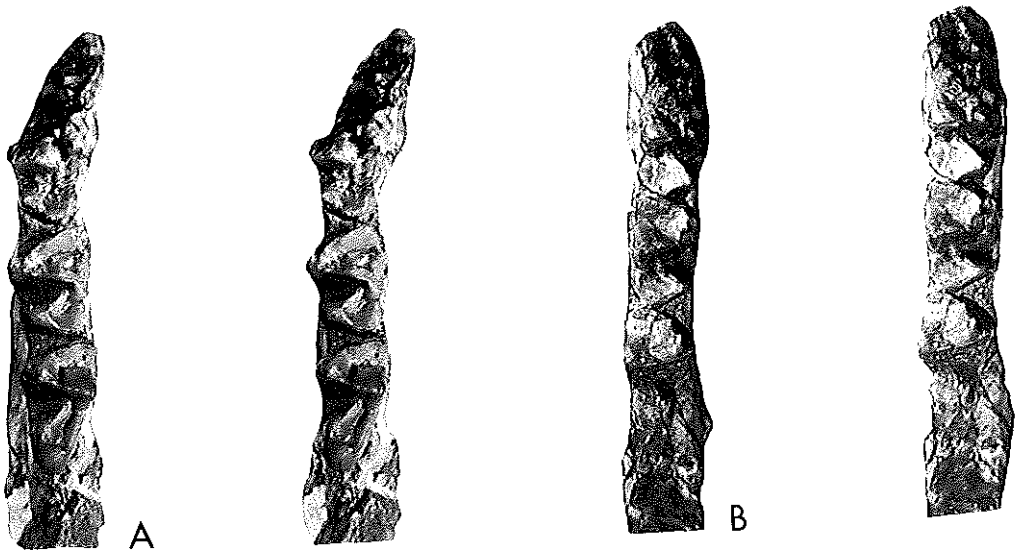
PLATE 1

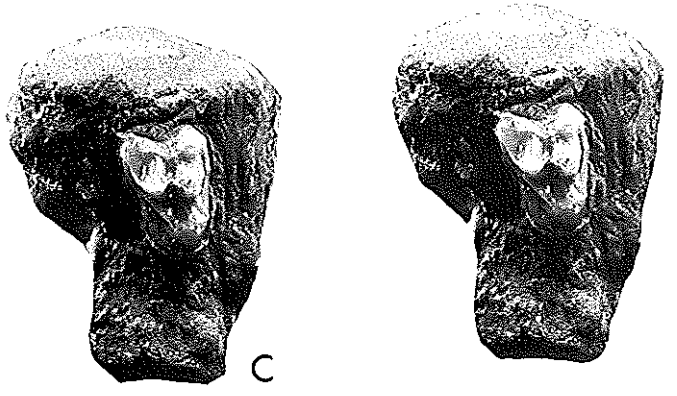
Fig. 1.— A-B: *Archaeolambda micron* n. sp. (IVPP V-5784). A: left ramus with M_1–M_3, occlusal view. B: right ramus with M_1–M_3, occlusal view.

Fig. 1.— C: "*Dysnoetodon minuta*", paratype (IVPP V-5838). Left M^2, occlusal view.

Fig. 1.— D-E: *Archaeolambda* sp. cf. A. *planicanina*. D: right P_4–M_2 (IVPP V-5785), occlusal view. E: left M_3 (IVPP V-5786), occlusal view.

Bar = 1 cm


A
B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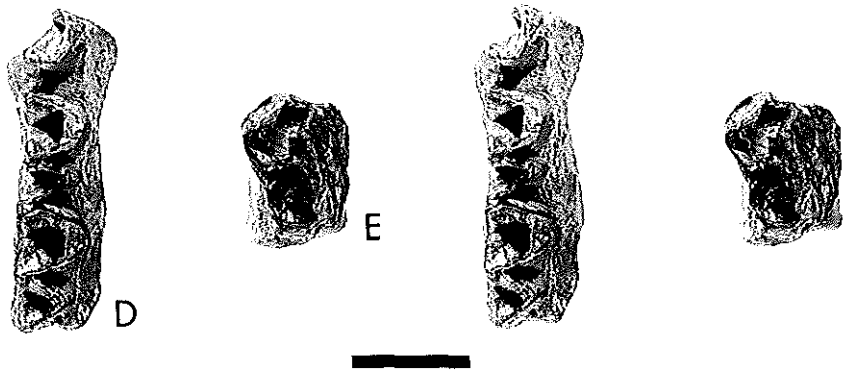
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