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

by

Suyin TING ***, Judith A. SCHIEBOUT ** & Jiajian ZHENG *

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* Institute of Vertebrate Paleontology and Paleoanthropology, Academia Sinica, P.O. Box 643, Beijing, the People's Republic of China.

** LSU Museum of Natural Science, Louisiana State University, Baton Rouge, Louisiana 70803, USA.

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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


INTRODUCTION

Pantodont fossils have been found in Asia, North America, and Europe, ranging from the early or middle Paleocene to middle Oligocene (Simons 1960) 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 M3 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. pianicanina* 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. novo.  
(Plate 1, fig. 1A, B; Table 1, 3)

**Holotype and only known specimen:** Posterior part of right mandible with M1-3 and fragmentary dentary with left M1-3 (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 M1 and M2 closed, with smaller talonid notches at the anterolingual sides; entoconids of M1 and M2 more distinct; M3 with a relatively larger talonid, less developed entoconid, and more developed hypoconulid.

**Description**

The horizontal ramus of the mandible extends about 10 mm under M3 and becomes shallower under M1. The ascending ramus is perpendicular to the dorsal edge of the horizontal ramus at a position just behind M3. The angle of the mandible extends ventrally and posteriorly below the lower edge of the horizontal ramus.

The trigonids of M1-3 are much higher than the talonids, with subequal paraconids and metaconids. M2 and M3 show a slight swelling on the paracristid. The trigonids of
M₁ and M₂ 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 M₂.

The talonids of M₁₋₂ differ from those of M₃. The cristid obliqua of M₁₋₃ intersects the posterior wall of the trigonid slightly lingual to the midline. M₁ and M₂ have a distinct hypoconid and entoconid, and a small entoconulid. Talonid notches are sharp and narrow on all three molars. M₁ and M₂ 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 M₃ makes it by far the largest lower molar. The talonid of M₃ 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 M₃, 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 M₃. This is the only difference visible between the two M₃s. 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 M₁ and M₂, a more diffuse facet is seen on the posterolabial side of the hypoconid. There is no distinct entoconid on M₃, but there is a slight swelling on the loph immediately posterior to the talonid notch, similar but smaller than the entoconulid of M₂.

Discussion

We consider the elongated-oval, cup-like talonid of M₃ to be a derived character distinguishing Archaeolambda from other genera of pantodonts. The presence of an elongate oval talonid on M₃ 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 M₁₋₂ in A. micron has a distinct entoconid, and the talonid of M₃ 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, \(A. \text{micron}\) 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 \(A. \text{micron}\). We doubt that the \(M^2\) of “\(Dysnoetodon\ minuta\)” represents the upper molar of \(A. \text{micron}\) 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 \(Bemalambda\).

\textit{Archaeolambda} sp. cf. \(A. \text{planicanina}\) FLEROV, 1952

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

\textbf{Material:} A fragmentary right dentary with \(P_4-M_2\) (IVPP, V5785) and an isolated left \(M_3\) (IVPP, V5786).

\textbf{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).

\textbf{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 \(M_1\).
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 P₄, the metastylid of M₁ more developed, no entoconid on M₂, the talonid of M₂ more open lingually, and the cristid obliqua of M₂ 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 M₁. *A. sp. cf. A. planicanina* is close to *A. dayuensis* in size, but differs from the latter in that the talonid of P₄ is relatively larger (Tong 1978, 1979).

The M₁ and M₂ of *A. sp. cf. A. planicanina* differ from those of *A. micron* in several features. The trigonids of M₁₋₂ of *A. sp. cf. A. planicanina* are wider than in *A. micron*. Both animals have pronounced metastylids. The M₂ of *A. micron* has a faint anterior cingulum, which is absent on *A. sp. cf. A. planicanina*. The talonids of M₁₋₂ 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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REFERENCES


**LEGEND OF THE PLATE**

**PLATE 1**

Fig. 1.— A-B: *Archaeolambda micron* n. sp. (IVPP V-5784). A: left ramus with M₁-M₃, occlusal view. B: right ramus with M₁-M₃, occlusal view.

Fig. 1.— C: “*Dysnoetodon minuta*”, paratype (IVPP V-5838). Left M₂, occlusal view.

Fig. 1.— D-E: *Archaeolambda* sp. cf. A. *planicanina*. D: right P₄-M₂ (IVPP V-5785), occlusal view. E: left M₃ (IVPP V-5786), occlusal view.

Bar = 1 cm