

FOSSIL MAMMALS AND THE AGE OF THE CHANGXINDIAN FORMATION, NORTHEASTERN CHINA

by

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ABSTRACT

Re-evaluation of the small collection of mammal fossils from the Changxindian Formation near Beijing, China indicates the following taxa are present: Eutheria, *Hypsimilus beijingensis*, cf. *Miacis* sp., Anthracotheriidae and *Forstercooperia grandis*. The presence of *Forstercooperia grandis* indicates an Irdinmanhan age and does not support previous assignment of a Sharamurunian age to the Changxindian Formation.

RESUME

Le réexamen de la petite collection de mammifères fossiles de la Formation Changxindian près de Pékin, Chine, indique que les taxa suivants y sont présents: Eutheria, *Hypsimilus beijingensis*, cf. *Miacis* sp., Anthracotheriidae et *Forstercooperia grandis*. La présence de *Forstercooperia grandis* indique un âge irdinmanhien et ne s'accorde pas avec l'âge sharamurunien attribué précédemment à la Formation Changxindian.

INTRODUCTION

In northeastern China, Eocene fossil mammals occur at an outcrop just southeast of Changxindian, a suburb of Beijing located 20 km southwest of the city (Fig. 1).

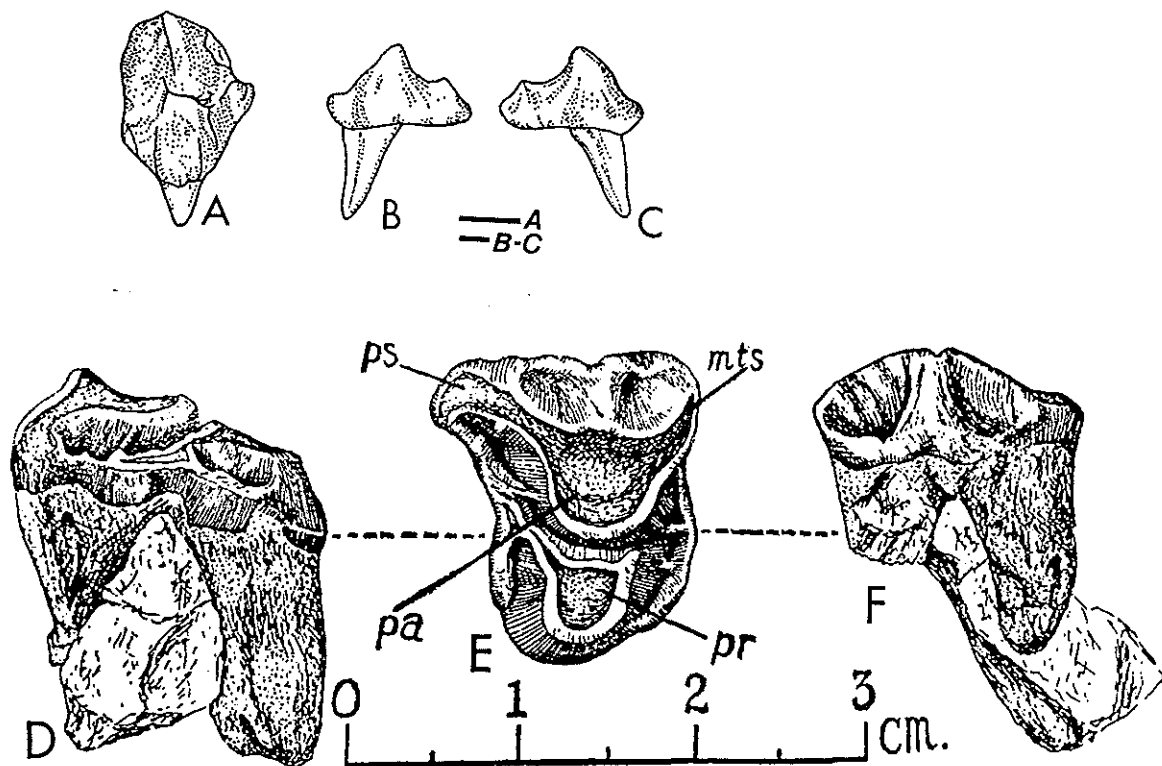


Figure 2.— Isolated teeth of fossil mammals from the Changxindian Formation that have apparently been lost. A-C, Eutheria, incomplete right M² or M³, occlusal (A), anterior (B) and posterior (C) views, bar scales = 1 mm; D-F, Anthracotheriidae, left P⁴, anterior (D), occlusal (E) and labial (F) views. A-C redrawn from Chow (1953); D-F from Young (1934).

IVPP V 5245 has a very small cingular parastyle cusp and a small protocone, features that identify it as a member of the *Caniformia sensu* Flynn & Galiano (1982). It closely resembles the P⁴ of *Miacis* (Matthew 1909, fig. 7) but is much larger. I identify it as cf. *Miacis* sp.

Zhai (1977) identified V 5244 as a left M₁ of *Miacis* sp. This tooth is the right size and morphology to represent a species of *Miacis* as large as is represented by V 5245, so I also identify V 5244 as cf. *Miacis* sp.

Forstercooperia grandis (PETERSON, 1919)

Zhai (1977) identified the most abundant fossil mammal from the Changxindian Formation, a hyracodontid, as *Imequincisoria*. The fossils are IVPP V 5241, an incomplete right P² (Pl. 1, fig. 8), left M₁ (Pl. 1, fig. 7), left M¹ (Pl. 1, fig. 9), left M³ (Pl. 1, fig. 10) and right M¹⁻³ (Pl. 1, fig. 11). Significant features of these teeth are the nonmolariform (*sensu* Radinsky 1967) P², distinct but small M³ metacone and the

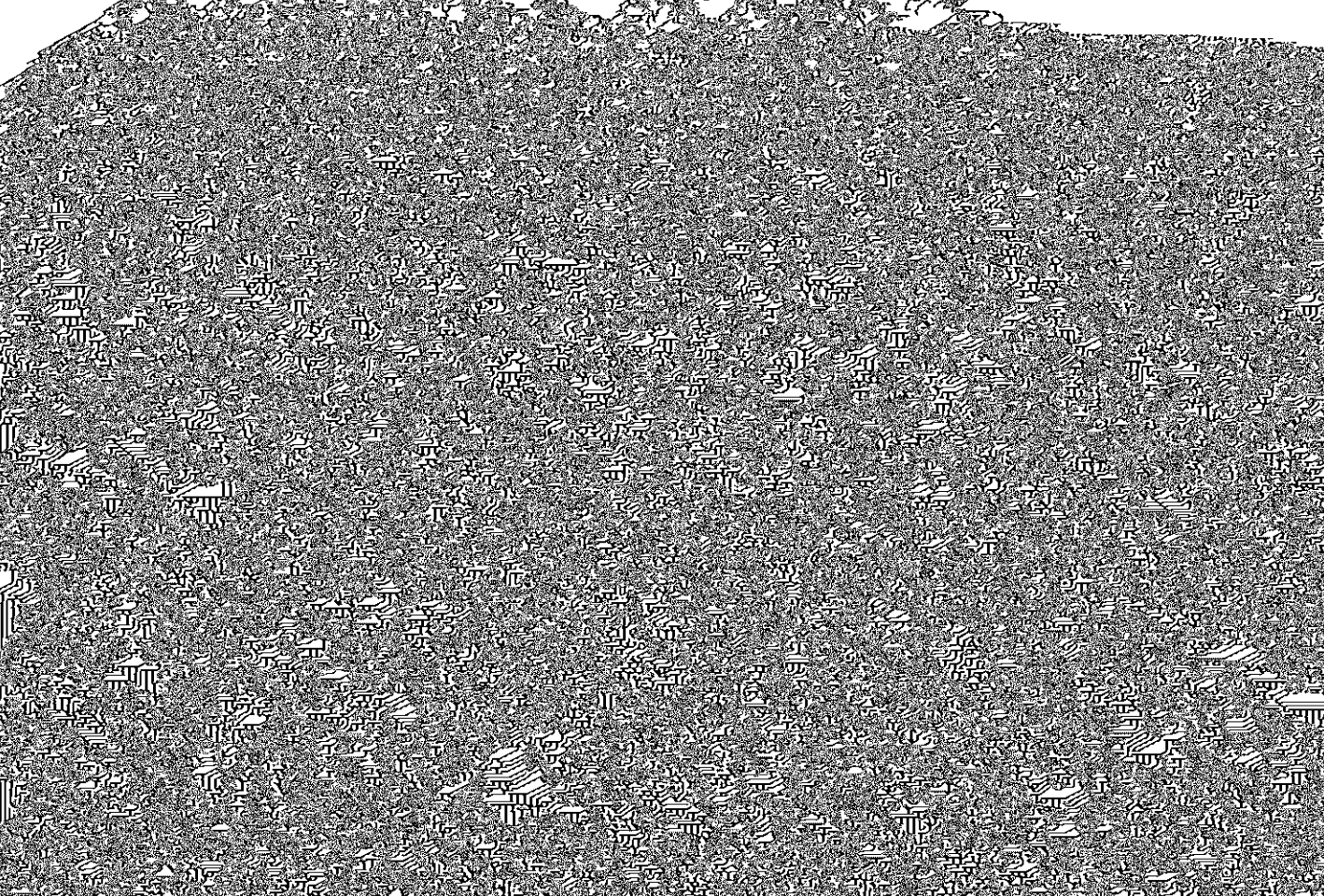
well-developed lingual cingula on P² and M¹⁻². Length of M¹ is 30 mm, and width is 35 mm. Length of M³ is 31 mm and width is 34 mm.

Imequincisoria is a junior subjective synonym of *Juxia*, known only from the type species *J. sharamurunense* (Lucas *et al.* 1981, Lucas & Sobus 1989). However, the Changxindian specimens are much smaller than the corresponding teeth of *Juxia* (also see Zhai 1977, p. 174), and the distinct metacone on the Changxindian M³ is not a characteristic feature of *Juxia*. Instead, the Changxindian teeth are metrically and meristically indistinguishable from teeth of *Forstercooperia grandis* (PETERSON, 1919), to which they are referred.

Anthracotheriidae

Young (1934) described and illustrated an upper cheek tooth that he identified as a left P³ or P⁴ of the coryphodontid pantodont ?*Eudinoceras* sp. indet. This specimen apparently has been lost, so I evaluate it from Young's illustration reproduced here (Fig. 2D-F). This evaluation indicates that the tooth Young illustrated is of an anthracothere, not a pantodont.

The Changxindian premolar shares the following features with upper premolars of anthracotheres: (1) ectoloph is broad and shallow and bears a distinct median ridge (style); (2) parastyle is longer than metastyle and projects anterior to the transverse line of the protocone and paracone; and (3) paracone very closely appressed to the protocone, and both cusps wear on their apices. None of these features are present on the upper premolars of *Eudinoceras* (see Osborn & Granger 1931), and I am thus confident the tooth Young illustrated is a left P⁴ of an anthracothere.



PREVIOUS IDENTIFICATION	REVISED IDENTIFICATION
<i>Tupaiodon</i> ? sp.	Eutheria
<i>Hypsimilus beijingensis</i>	<i>Hypsimilus beijingensis</i>
<i>Miacis</i> sp.	cf. <i>Miacis</i> sp.
Canidae	cf. <i>Miacis</i> sp.
<i>Imequincisor</i> sp.	<i>Forstercooperia grandis</i>
<i>Eudinoceras</i> ? sp.	Anthracotheriidae

Table 1.— Previous (from Russell & Zhai 1987) and current (this paper) identifications of the fossil mammals from the Changxindian Formation.

support this age assignment. Instead, the mammalian fauna of the Changxindian Formation appears to be slightly older, of Irдинmanhan age

The small Changxindian eutherian is of no biochronological significance other than to not contradict an Eocene age. Its earlier tentative and incorrect identification as *Tupaiodon* was biochronologically anomalous because this taxon is of early Oligocene (Shandgolian) age (Russell & Zhai 1987).

Hypsimilus beijingensis is endemic to the Changxindian Formation. It is one of the youngest known eurymylids if the Changxindian mammals are of Irдинmanhan age because an indeterminate eurymylid is also known from Irдинmanhan-age strata of the Sargamys svita in the Zaissan basin of northeastern Kazakhstan (Russell & Zhai 1987).

Miacis is well known from Irдинmanhan-age faunas of Asia, but its only supposed Sharamurunian-age occurrence is in the Changxindian Formation (Russell & Zhai 1987). The specimens of cf. *Miacis* sp. from the Changxindian Formation thus are more consistent with an Irдинmanhan than with a Sharamurunian age.

Anthracotheres are very abundant in Sharamurunian-age strata of Asia (Russell & Zhai 1987). However, they are also present in Irдинmanhan-age strata (Zhang *et al.* 1978). Therefore, the presence of an anthracothere in the Changxindian Formation is consistent with an Irдинmanhan age assignment. Nevertheless, this anthracothere is not an obviously Irдинmanhan form. It is most similar to a form described by Xu (1977) from the Gongkang Formation in the Bose basin of Guangxi, a unit that produces a composite mammalian fauna of middle-late Eocene (Irдинmanhan?-Ergilian) age (Russell & Zhai 1987). The precise age of the Gongkang anthracothere thus is not clear, so the biochronological significance of the Changxindian Formation anthracothere also is uncertain.

Assignment of an Irдинmanhan age to the Changxindian mammals rests primarily on the occurrence of *Forstercooperia grandis*. This hyracodontid is restricted to Irдинmanhan-age strata in Asia (Russell & Zhai 1987). It provides strong evidence, not contradicted by the other mammalian taxa, that the Changxindian mammal fossils are of Irдинmanhan age.

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LEGEND OF THE PLATE

PLATE 1

Figures 1-3.— cf. *Miacis* sp., IVPP V 5245, right P⁴, posterior (1), labial (2) and occlusal (3) views.

Figures 4-6.— cf. *Miacis* sp., IVPP V 5244, incomplete left M₁, lingual (4), labial (5) and occlusal (6) views.

Figures 7-11.— *Forstercooperia grandis*, IVPP V 5241, occlusal views of left M₁ (7), incomplete right P² (8), left M¹ (9), left M³ (10) and right M¹⁻³ (11)

