



Human Palaeontology and Prehistory

Age and taxonomic status of the Chiang Muan  
(Thailand) hominoids

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**Abstract**

The age of the recently created hominoid species from Thailand, cf. *Lufengpithecus chiangmuanensis* Chaimanee et al., 2003 [2], was originally estimated to be ca 13–13.5 Ma, based on faunal and palaeomagnetic correlations. Previous studies of the Chiang Muan fauna (including hominoids) and palaeomagnetism suggest that the deposits are appreciably younger than this, being closer in age to Xiaolongtan (China) (ca 12–11 Ma) rather than to the Chinji fauna of Pakistan. The similarities between hominoids from the Thai and Chinese localities are clear, and we conclude that cf. *L. chiangmuanensis* should be treated as a synonym of ?*Lufengpithecus keiyuanensis* Wu, 1957. **To cite this article:** M. Pickford et al., C. R. Palevol 3 (2004).

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**Résumé**

**L'âge et taxonomie des hominoïdes de Chiang Muan (Thaïlande).** L'âge de la nouvelle espèce d'hominoïdes thaïlandais, cf. *Lufengpithecus chiangmuanensis* Chaimanee et al., 2003 [2], a été estimé à environ 13–13.5 Ma, à partir des corrélations fauniques et paléomagnétiques. Des études antérieures de la faune de Chiang Muan (incluant les hominoïdes) et du paléomagnétisme ont suggéré que les dépôts sont plus jeunes, d'un âge proche de celui du gisement chinois de Xiaolongtan (ca 12–11 Ma), plutôt que de celui des faunes de Chinji au Pakistan. Les similarités entre les hominoïdes des localités chinoises et thaïlandaises

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sont évidentes et nous en concluons que cf. *L. chiangmuanensis* devrait être considéré comme un synonyme de ?*Lufengpithecus keiyuanensis* Wu, 1957. **Pour citer cet article : M. Pickford et al., C. R. Palevol 3 (2004).**

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**Keywords:** Thailand; Miocene; Hominoidea; Biochronology; Palaeomagnetism; Taxonomy

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## Version française abrégée

### 1. Introduction

Chaimanee et al. [2] ont comparé les faunes de Chiang Muan à celles des Siwaliks du Pakistan et ont conclu que les dépôts étaient contemporains de ceux de la formation de Chinji [1]. Ils ont identifié un des suidés de Chiang Muan comme *Hyootherium pilgrimi*, dont l'âge se situe entre 14 et 11,3 Ma. Toutefois, cette espèce étant rare dans les Siwaliks [14], son intérêt biostratigraphique s'avère faible. Cette espèce n'est pas représentée dans les très importantes collections réalisées à Chiang Muan par la Japan–Thailand Palaeontology Expedition, suggérant que l'identification n'est peut-être pas exacte. Les autres mammifères signalés par Chaimanee et al. [2] consistent en un stégolophonte, et les ruminants *Eotragus*, *Dorcatherium*, et *Siamotragulus*. Sans identification au niveau spécifique, ces déterminations ne fournissent pas d'indications sur l'âge des dépôts.

### 2. Biochronologie

Nous avons comparé les mammifères de Chiang Muan (Table 1) avec la faune des lignites de Xiaolongtan (District de Kaiyuan, Chine) [3, 4], un site qui est géographiquement beaucoup plus proche de celui de Chiang Muan que le dernier ne l'est des Siwaliks. Le proboscidiien de Chiang Muan est rapporté à *Tetralophodon* cf. *xiaolongtanensis* [13] (Fig. 1). Les suidés de Chiang Muan comprennent quatre taxons, deux d'entre eux sont connus à Xiaolongtan : *Parachleustochoerus sinensis* (dont la localité-type est Xiaolongtan) (Figs. 2 et 3) et *Hippopotamodon* cf. *hyotherioides*, plus petit que *H. sivalensis* [7, 9, 14]) (Fig. 4). Les deux autres sont signalés dans le Miocène moyen terminal des dépôts des Siwaliks au Pakistan : *Conohyus sindiensis* (Fig. 2) et le tayassuidé *Pecarichoerus*

*sminthos* [7]. L'âge Miocène moyen de Xiaolongtan a été estimé sur la présence d'un *Listriodon* [3], mais le spécimen considéré s'avère être une I2 supérieure d'*Hippopotamodon* cf. *hyotherioides* [9]. Pickford & Liu [14] ont avancé un âge de 10 Ma environ pour le gisement de Xiaolongtan, mais ce dernier pourrait être légèrement plus ancien, 11 à 12 Ma.

### 3. Stratigraphie paléomagnétique

La stratigraphie paléomagnétique de la séquence de Chiang Muan réalisée par Suganuma et al. [16] (Fig. 5) est identique à celle proposée ultérieurement par Chaimanee et al., [2], mais elle a été interprétée comme représentant les chronos C5A à C5, plutôt que le chrono plus ancien C5ABn. Chaimanee et al. [2] ont proposé quatre corrélations avec la zone supérieure de polarité normale (N2), mais ils ont préféré la plus ancienne (C5ABn = ca 13.5 Ma). Si les corrélations de Suganuma et al. [16] sont correctes, alors le *Lower Lignite Member* appartiendrait au Miocène moyen terminal (environ 12 Ma) et le *Upper Lignite Member* au Miocène moyen de base (environ 10 Ma), ce qui est en accord avec nos données biochronologiques. À partir des données combinées du paléomagnétisme et de la faune, nous concluons que les hominoïdes de Chiang Muan ont un âge de 11 à 12 Ma.

### 4. L'hominoïde de Chiang Muan

Dans ses travaux antérieurs, Kunimatsu et al. [7–9] ont signalé des hominoïdes dans les deux horizons de lignite du gisement de Chiang Muan. Nous les avons comparés [2, 10–12] à ceux de Xiaolongtan [18–21].

Lorsque Woo Rukang [18] a décrit pour la première fois, en 1957, le matériel de Xiaolongtan (connu à l'époque sous le nom de Kaiyuan), celui de Lufeng n'était pas encore connu et il avait raison de conclure que ce dernier était plus proche de celui des Siwaliks

que de l'euro péen (tous les deux, à l'époque, avaient été rapportés au genre *Dryopithecus*). Plus tard, lorsque Woo et d'autres collègues chinois [21] étudièrent le matériel de Lufeng, ils y reconnurent deux genres, *Sivapithecus* et *Ramapithecus*. Puis, en 1987, Wu [20] attribua l'ensemble du matériel à un nouveau genre, *Lufengpithecus*. La même année, Zhang [21] rapporta les pièces de Kaiyuan et de Lufeng à *Ramapithecus* (et *Sivapithecus*).

La majorité des caractères utilisés par Wu [20] pour distinguer *Lufengpithecus* de *Sivapithecus* sont présents dans la face et le palais. Il ne signala que deux différences dentaires : des cuspides plus hautes et des replis d'émail plus nombreux sur la surface occlusale de *Lufengpithecus*. La hauteur des cuspides est difficile à évaluer précisément, en particulier sur des dents usées. Les ridulations d'émail peuvent être très vite gommées par l'usure mais, sur les photos publiées des dents de Chiang Muan [2], on voit très nettement l'émail crénelé sur quelques molaires. Une autre différence possible entre les deux genres signalée par Ward [17] est la localisation plus centrale des cuspides sur les molaires de *Sivapithecus* et plus périphérique chez *Lufengpithecus* et les orangs-outans. Pour ce caractère, *Lufengpithecus* semble intermédiaire entre *Sivapithecus* et l'orang-outan. Bien qu'elle soit difficile à estimer, la morphologie dentaire des hominoïdes de Chiang Muan et de Xiaolongtan semble intermédiaire entre *Sivapithecus* et *Lufengpithecus*. Zheng et Zhang [22] signalent que les cuspides sont disposées plus centralement chez les hominoïdes de Yuanmou que sur ceux de Lufeng. La région interorbitaire est étroite chez *Sivapithecus*, mais le crâne juvénile de Yuanmou montre que cette région était large comme chez *Lufengpithecus lufengensis*. Les hominoïdes de Chiang Muan conservent un cingulum faible aux molaires, mais pas *Sivapithecus*, et à la différence des grands singes de Lufeng, ils présentent un cingulum mésio-lingual aux molaires supérieures.

La taxonomie et la phylogénie des hominoïdes miocènes de Thaïlande et de Chine sont donc problématiques, et le nom générique qui devrait être donné aux fossiles de Chiang Muan reste incertain. Les caractères discriminants de cf. *Lufengpithecus chiangmuanensis* [2] sont la morphologie de l'incisive centrale inférieure et de la canine inférieure ; mais ces régions ne sont pas conservées sur le matériel de Xiaolongtan. La question de l'espèce est plus facile à résoudre, comme nous

n'avons pas observé de différence morphologique ou métrique significative dans les régions anatomiques communes aux fossiles des deux sites (en particulier les molaires et les prémolaires (Tableau 2)). Nous en concluons que ?*Lufengpithecus chiangmuanensis* Chaimanee et al., 2003 [2] devrait être considéré comme un synonyme de ?*Lufengpithecus keiyuanensis* Woo, 1957 [18].

## 5. Conclusions

À partir des corrélations faunique et paléomagnétique, la séquence fossilifère de Chiang Muan (Thaïlande) est comprise entre la fin du Miocène moyen et la base du Miocène supérieur (12–10 Ma environ). Elle apparaît presque contemporaine de celle des dépôts chinois de Xiaolongtan (Kaiyuan District), qui est la localité type de *Dryopithecus keiyuanensis* Woo, 1957 [18] récemment ré-attribué au genre *Lufengpithecus* [6, 22]. La similitude morphologique et métrique entre les dents de ?*L. keiyuanensis* et celles de cf. *Lufengpithecus chiangmuanensis* sont évidentes et la dernière devrait être considérée comme synonyme de la première. Pour quelques caractères, les dents attribuées à ?*L. keiyuanensis* sont intermédiaires entre celles de *Sivapithecus* des Siwaliks du Pakistan et de l'Inde et celles de *Lufengpithecus lufengensis*. L'attribution générique des hominoïdes de Chiang Muan et de Xiaolongtan ne pourra être déterminée avec certitude que lorsque de meilleurs échantillons seront connus dans les gisements thaïlandais et chinois. Toutefois, ces découvertes fournissent un lien potentiellement important entre les Sivapithecinae du sous-continent indien et les hominoïdes de grande taille du Miocène terminal de Thaïlande et de Chine.

## 1. Introduction

Chaimanee et al. [2] compared mammalian fossils from Chiang Muan lignite mine (Thailand) with the Siwalik faunas of Pakistan, and concluded that the Thai assemblage is similar to that of the Chinji Formation [1] principally on the basis of the proboscideans, suids and ruminants. A combination of the faunal, palaeomagnetic and tectonic data prompted the authors to propose a wider range of ages for the hominoids (13.5–10 Ma) spanning the Middle Miocene/

Late Miocene boundary. However they considered that the best fit for their palaeomagnetic data was chron C5ABn for the upper normal zone (13.3–13.5 Ma) from which the hominoid fossils were collected. This would place them squarely in the Middle Miocene. However, previous results of the Japan–Thailand team suggest that the deposits are somewhat younger, the lower lignite being about 12 Ma and the upper lignite about 11 Ma. The aim of this paper is to re-examine the question of the age and taxonomic status of the Chiang Muan hominoids.

## 2. Biostratigraphy and biochronology

Chaimanee et al. [2] compared the Chiang Muan fauna with that from the Siwaliks of Pakistan and concluded that the deposits were equivalent in age to the Chinji Formation [1]. In particular they identified one of the Chiang Muan suids as *Hyootherium pilgrimi*, which is said to range from 14–11.3 Ma. However, because this species is rare in the Siwaliks (only six specimens known from two localities, Chinji, Perim Island [14]), its value for biostratigraphy is minimal. The species appears not to be present in more extensive fossil samples collected at Chiang Muan by the Japan–Thailand Palaeontology Expedition, suggesting that the identification may be suspect. Other mammals listed by Chaimanee et al. [2] consisted of a stegolophodont, and the ruminants *Eotragus*, *Dorcatherium*, and *Siamotragulus*. Without identifications at the species level, these determinations do not yield any valuable indications of the age of the deposits.

We have compared mammals from Chiang Muan (Table 1) with fauna from the lignites of Xiaolongtan (Kaiyuan District, China) [3, 4] a site that is geographically considerably closer to Chiang Muan (650 km) than the latter is to the Siwaliks (ca 3000 km). The proboscidean from Chiang Muan is *Tetralophodon cf. xiaolongtanensis* [13] (Fig. 1). The suoids from Chiang Muan comprise four taxa, two of which occur at Xiaolongtan (*Parachleuastochoerus sinensis* (type locality, Xiaolongtan) (Figs. 2 and 3) and *Hippopotamodon cf. hyotherioides* (smaller than *H. sivalensis*) [7, 9, 14] (Fig. 4), and two of which are known from latest Middle Miocene Siwalik deposits in Pakistan (*Conohyus sindiensis* (Fig. 2) and the tayassuid *Pecarichoerus sminthos* [7], the latter also known from

Table 1

Faunal list, Chiang Muan, Thailand.

Liste faunique du gisement de Chiang Muan, en Thaïlande

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OSTEICHTHYES
AVES
REPTILIA
Testudines
Squamata
Serpentes
Crocodylia
MAMMALIA
Primates
Hominoidea
? <i>Lufengpithecus keiyuanensis</i>
Proboscidea
Gomphotheriidae
<i>Tetralophodon cf. xiaolongtanensis</i>
Perissodactyla
Rhinocerotidae
<i>Chilotherium (Subchilotherium) intermedium</i>
Artiodactyla
Tayassuidae
<i>Pecarichoerus sminthos</i>
Suidae
Suinae
<i>Hippopotamodon cf. hyotherioides</i>
Tetraconodontinae
<i>Parachleuastochoerus sinensis</i>
<i>Conohyus sindiensis</i>
Tragulidae
<i>Dorcatherium sp.</i>
Bovidae

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Xiaodian (Hubei Province) China, but under the name *Macaca youngi* [5]). A record of *Listriodon* from Xiaolongtan [3] which was taken as providing evidence of a Middle Miocene age, is incorrect, being based on an upper second incisor of *Hippopotamodon cf. hyotherioides* [9]. Pickford and Liu [14] estimated an age of ca 10 Ma for Xiaolongtan, but it could be slightly older, perhaps between 12 and 11 Ma.

In Chinese mammalian zone terminology, the Chiang Muan sediments correlate closest with the Uppermost Tunggurian and Basal Baodean, appreciably older than Lufeng, the type locality of *Lufengpithecus lufengensis* [15, 20]. In terms of the Siwalik succession the Thai and Chinese deposits correlate most closely to late Chinji and basal Nagri levels [7] and they equate with the top of Mammalian Zone MN 8 and the base of MN 9 of the European sequence [1, 8] (Fig. 5). Neither Xiaolongtan nor Chiang Muan have yielded the equid

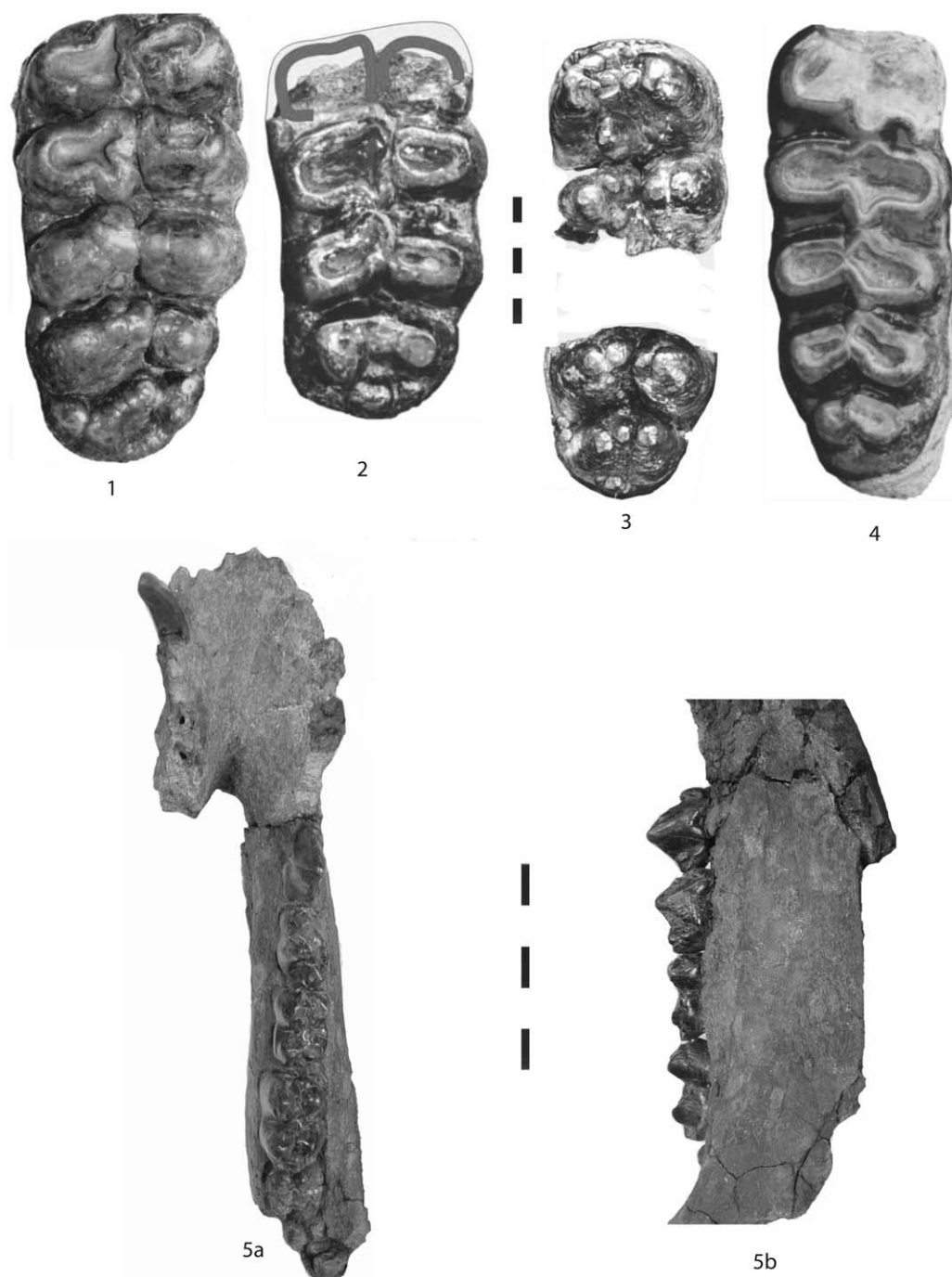


Fig. 1. 1–4, CMu 2–1, *Tetralophodon cf. xiaolongtanensis*; 1–2, left M3/s; 3, broken left m/3; 4, right m/3; 5a–6b, CMu 10 l’01, *Hippopotamodon cf. hyotherioides*, right mandible, occlusal and buccal views (scale intervals, 1 cm).

Fig. 1. 1–4, CMu 2–1, *Tetralophodon cf. xiaolongtanensis*; 1–2, M3 supérieures gauches; 3, M3 inférieure gauche cassée; 4, M3 inférieure droite; 5a–6b, CMu 10 l’01, mandibule droite d’*Hippopotamodon cf. hyotherioides*, vues occlusale et buccale (échelles : 1 cm).



*Hipparion*, but, being lignite deposits, this absence could be due to ecological factors rather than to the deposits being older than the *Hipparion* datum. However, the presence of *Conohyus sindiense* at Chiang Muan tilts the balance towards a latest Middle Miocene age, perhaps between 12 and 11 Ma, and part of the succession could indeed be pre-*Hipparion* in age. In view of the faunal similarity and geographic proximity of Chiang Muan to Xiaolongtan, we conclude that the two sites are of similar age.

### 3. Palaeomagnetic stratigraphy

Palaeomagnetic stratigraphy of the Chiang Muan sequence by Sukanuma et al. [16] (Fig. 5) yielded the same normal–reversed–normal succession subsequently reported by Chaimanee et al. [2], but which was interpreted to represent chrons C5A to C5 rather than the older chron C5ABn. Out of four correlations of the upper normal polarity zone (N2) proposed by Chaimanee et al. [2], they preferred the earliest one (C5ABn = ca 13.5 Ma). This is unlikely on the grounds that, in the Siwaliks of Pakistan, this polarity zone falls within the Kamliyal faunal zone (Fig. 5), not only at odds with the faunal correlations of Chaimanee et al., but also with those of the Japan–Thailand team, both of which noted similarities to Chinji and basal Nagri faunas. If the correlations of Sukanuma et al. [16] are correct, then the Lower Lignite Member would be terminal Middle Miocene (ca 12 Ma) and the Upper Lignite Member basal Late Miocene (ca 10 Ma), which accords with our biochronological estimate and would indicate that the Chiang Muan succession spans the Middle Miocene/Late Miocene boundary.

Considering the combined faunal and palaeomagnetic data, we conclude that the Chiang Muan hominoids are unlikely to be as old as 13.3–13.5 Ma, the

preferred age of Chaimanee et al. [2], but are more likely to be ca 12–11 Ma (uppermost Middle Miocene to basal Late Miocene).

### 4. The Chiang Muan hominoid

In previous reports, Kunimatsu et al. [10–12] recorded hominoids from both of the Chiang Muan lignite horizons. We have compared the Chiang Muan hominoid fossils [2, 10–12] with those from Xiaolongtan [18–21].

When Woo Rukang [18] first described the Xiaolongtan (at the time referred to as Kaiyuan) material in 1957, the Lufeng material was not yet known, and he was right in saying that the Kaiyuan fossils were more similar to the Siwalik hominoids than to European ones, both of which were at that time attributed to the genus *Dryopithecus*. The Siwalik specimens were subsequently re-attributed to *Sivapithecus*. Later, when Woo and other Chinese researchers [21] studied the Lufeng material, they first considered that it included *Sivapithecus* and *Ramapithecus* according to the taxonomic fashion of those days. It is in his 1987 article that Wu [20] formally gave a new generic name *Lufengpithecus* to the Lufeng hominoid. In 1987, Zhang [21] referred to the Kaiyuan and Lufeng materials as *Ramapithecus* (and *Sivapithecus*). However, in his conclusion, he said that “*the Kaiyuan Ramapithecus is similar to Ramapithecus wickeri from Kenya, and it shares more features with the Lufeng Ramapithecus that is geographically closer (ca. 180 km). Considering the geological age, geography, and morphological features, the author concludes that the Kaiyuan Ramapithecus may be the ancestor of the Lufeng Ramapithecus*” [21 (p.85, original text in Chinese)].

The majority of features that Wu [20] used to distinguish *Lufengpithecus* from *Sivapithecus* occur in the

Fig. 2. 1–6, CM 201, *Parachleuastochoerus sinensis* from Chiang Muan, Thailand, 1–3, left mandibular cheek teeth, labial, stereo occlusal and lingual views of tooth row; 4–6, lingual views of premolars; 7–9, CM 205, *Hippopotamodon* cf. *hyotherioides*, right m/3, buccal, stereo occlusal and lingual views; 10–11, CM 208, *Parachleuastochoerus sinensis*, upper canine, buccal and lingual views; 12–14, CM 202, *Conohyus sindiense* right m/3, lingual, stereo occlusal and buccal views.

Fig. 2. 1–6, CM 201, *Parachleuastochoerus sinensis* de Chiang Muan, Thaïlande, 1–3, dents jugales mandibulaires gauches, vues labiale, occlusale stéréoscopique et linguale de la rangée dentaire ; 4–6, vues linguales des prémolaires ; 7–9, CM 205, *Hippopotamodon* cf. *hyotherioides*, M3 inférieure droite, vues buccale, occlusale stéréoscopique et linguale ; 10–11, CM 208, *Parachleuastochoerus sinensis*, canine supérieure ; vues buccale et linguale ; 12–14, CM 202, *Conohyus sindiense*, M3 inférieure droite, vues linguale, occlusale stéréoscopique et buccale.

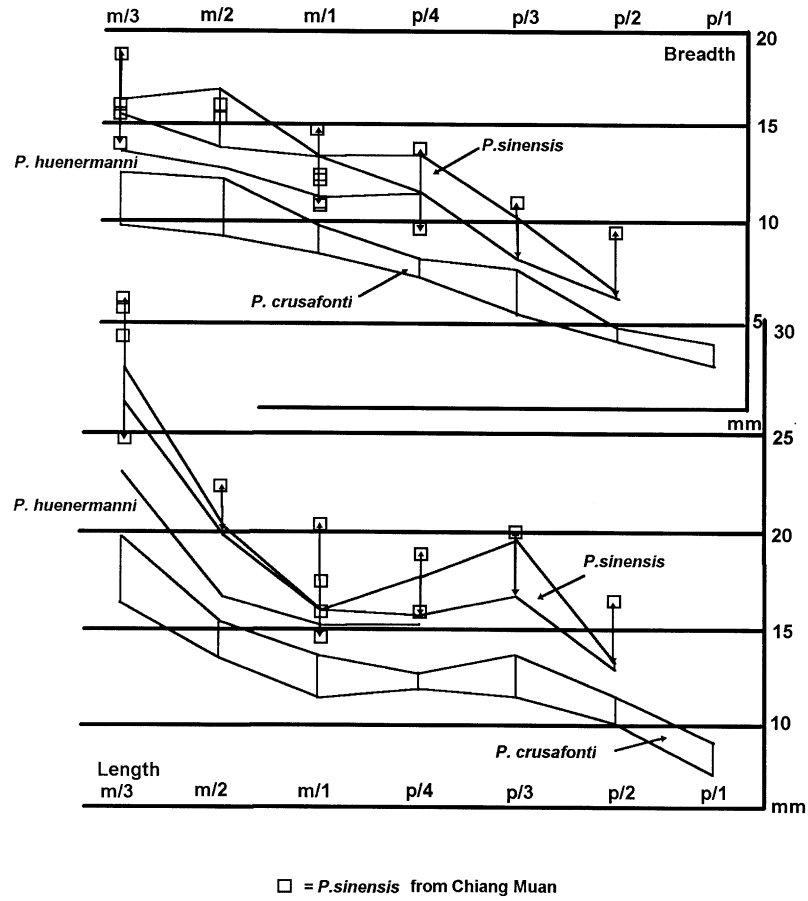


Fig. 3. Univariate metric comparisons of Chiang Muan (Thailand) *Parachleuastochoerus sinensis* with the type material from Xiaolongtan, China.  
 Fig. 3. Comparaisons métriques univariées de *Parachleuastochoerus sinensis* Chiang Muan (Thaïlande) avec le matériel type de Xiaolongtan (Chine).

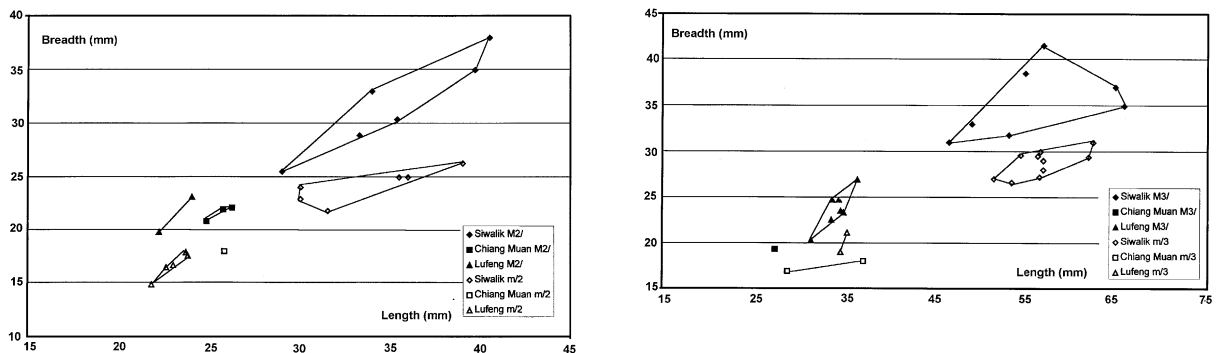


Fig. 4. Bivariate metric comparison of Chiang Muan (Thailand) Suinae with *Hippopotamodon* species from the Siwaliks (Pakistan) and Lufeng (China).  
 Fig. 4. Comparaisons métriques bivariées du Suinae de Chiang Muan (Thaïlande) avec l'espèce d'*Hippopotamodon* des Siwaliks (Pakistan) et Lufeng (Chine).



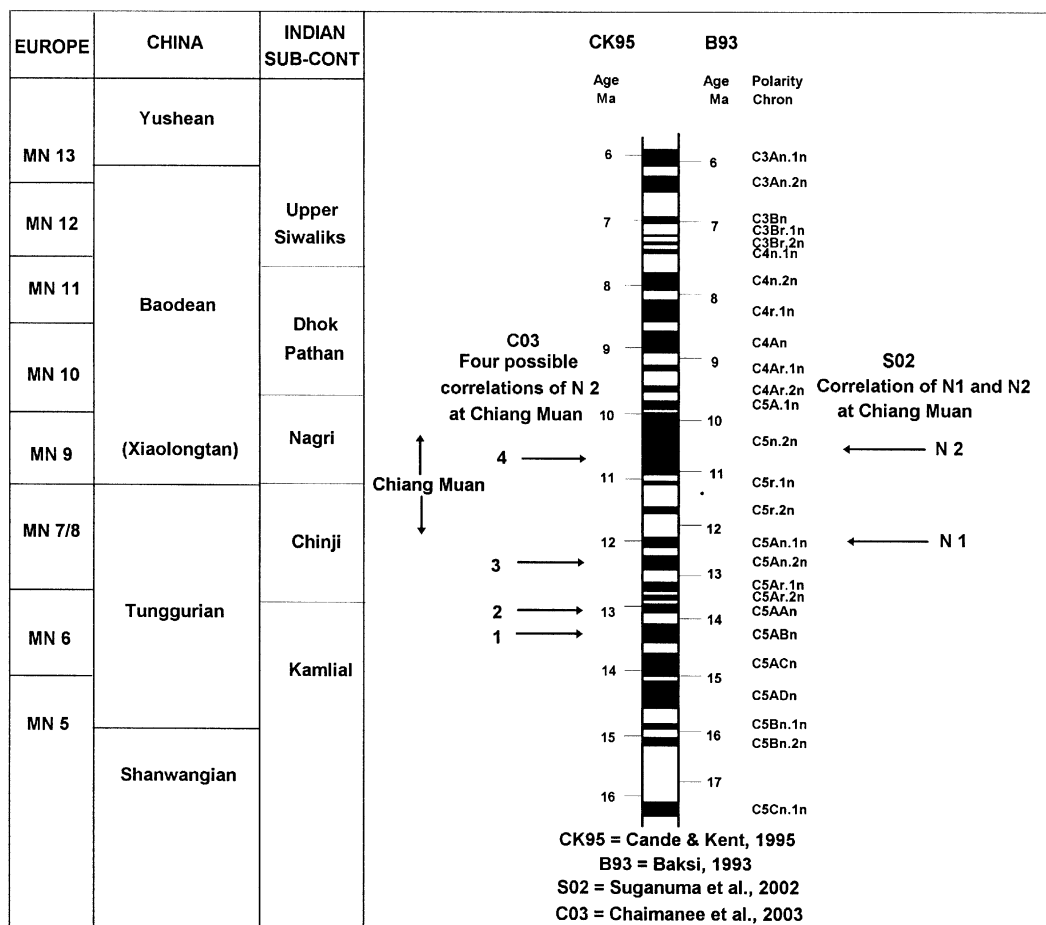


Fig. 5. Biochronology and palaeomagnetic stratigraphy of Chiang Muan (Thailand) and the Siwaliks (Pakistan) and correlation to Xiaolongtan (Kaiyuan District, China).

Fig. 5. Biochronologie et stratigraphie paléomagnétique des gisements de Chiang Muan (Thaïlande) et des Siwaliks (Pakistan) et corrélation avec le gisement de Xiaolongtan (Chine).

face and palate. He pointed out only two dental differences: higher cusps and more wrinkles on the occlusal surface in *Lufengpithecus*. Cusp height is difficult to assess precisely, especially in worn teeth. Wrinkles on the occlusal surface can be obscured quickly by wear, but the photos of the Chiang Muan hominoid teeth published by Chaimanee et al. [2] show considerably crenulated enamel on some molars. Another possible difference between the genera pointed out by Ward [17] is the more centrally located molar cusps in *Sivapithecus* versus more peripherally located cusps in *Lufengpithecus* and orangutans. In this feature *Lufengpithecus* seems intermediate between *Sivapithecus* and orangutans, and there may be intrataxon variations. Even though it is difficult to assess, it appears that the

condition in the Chiang Muan and Xiaolongtan dental material is intermediate between *Sivapithecus* on the one hand, and *Lufengpithecus* on the other. Zheng and Zhang [22] say that the cusps are more centrally located in hominoids from Yuanmou than they are in the Lufeng ones, but the juvenile skull from Yuanmou suggests a broad interorbital region, as in *Lufengpithecus lufengensis*. The Chiang Muan hominoids still retain weak molar cingula, whereas *Sivapithecus* does not. According to Zheng and Zhang [22], the Yuanmou hominoids differ from the Lufeng ones in retaining the mesio-lingual cingulum on the upper molars.

The taxonomy and phylogeny of the Thai and Chinese Miocene hominoids are problematic, and what generic name should be attributed to the Chiang Muan

material is uncertain. The distinguishing characters of cf. *Lufengpithecus chiangmuanensis* are the morphology of the lower central incisor and lower canine, but these parts are not preserved in the Xiaolongtan material. The question of species is easier to resolve, as we have observed no significant morphological or metric differences in the parts common to the two sites (molars, premolars) (Table 2) – they are extremely similar to each other. On this basis and considering their similar age and geographic proximity, we conclude that *?Lufengpithecus chiangmuanensis* Chaimanee et al., 2003 [2] should be treated as a junior synonym of *?Lufengpithecus keiyuanensis* Woo, 1957 [18].

## 5. Conclusions

On the basis of faunal correlation and interpretation of palaeomagnetic stratigraphy, the Chiang Muan (Thailand) fossiliferous sequence spans the end of the Middle Miocene and the base of the Late Miocene epochs (ca 12–10 Ma). It is close in age to the Chinese deposit at Xiaolongtan (Kaiyuan District), which is the type locality of *Dryopithecus keiyuanensis* Woo, 1957 [18] recently re-assigned to the genus *Lufengpithecus* [6, 22]. The morphological and metric similarity between the teeth of *?L. keiyuanensis* and those of cf. *Lufengpithecus chiangmuanensis* are manifest, and it is concluded that the latter should be treated as a synonym of the former. In some respects, the teeth of *?L. keiyuanensis* are intermediate between those of *Sivapithecus* from the Siwaliks of Pakistan and India, and those of *Lufengpithecus lufengensis*. The question of the generic status of the Chiang Muan and Xiaolongtan hominoids can only be satisfactorily determined when better samples of the Thai and Chinese species become available. However, these discoveries provide a potentially important link between the sivapithecines of the Indian Subcontinent and the Late Miocene large hominoids of Thailand and China.

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Table 2

Measurements (in mm) of the teeth of *?Lufengpithecus keiyuanensis* and cf. *Lufengpithecus chiangmuanensis*, (a, Woo, 1957 [18]; b, Woo, 1958 [19]; c, Zhang, 1987 [21]; d, Chaimanee et al., 2003 [2]; e, Kunimatsu [original data] (measurements are to one significant figure).

Mesures (en mm) des dents de *?Lufengpithecus keiyuanensis* et de celles de cf. *Lufengpithecus chiangmuanensis*, (a, Woo, 1957 [18]; b, Woo, 1958 [19]; c, Zhang, 1987 [21]; d, Chaimanee et al., 2003 [2]; e, Kunimatsu [données originales])

Tooth	Xiaolongtan	Chiang Muan
I1/		12 × 8.9 (d)
I2/	5.8 × 6.5 (c) 5.9 × 6.3 (c)	5.1 × 4.6 (d)
Cm/	10.5 × 8.7 (c) 9.9 × 8.5 (c)	10.6 × 10.5 (d)
Cf/		9.1 × 8.5 (d)
P3/	7.9 × 10.4 (c) 8.1 × 9.7 (c)	7.2 × 9.9 (d)
P4/	7.2 × 11.1 (c) 6.4 × 10.5 (c)	10.3 × 11 (d)
M1/	10.0 × 11.3 (c) 10.0 × 10.5 (c)	
M2/	11.3 × 12.8 (c) 10.5 × 11.2 (c)	10 × 10.4 (d) 11.4 × 14.0 (e)*
M3/	11.0 × 12.1 (c) 10.3 × 10.7 (c)	8.8 × 10.2 (d)
i/1		5.1 × 5.3 (d)
i/2		
c/m		
c/f		
p/3	10.9 × 9 (b)	>12.0 × 8.6 (d) -- × >8.0 (d)
p/4	9.0 × 9.5 (b) 8.1 × 9.3 (b)	12.6 × 13.5 (d) 8.7 × 7.9 (d)
m/1	11.8 × 10.5 (b) 11.0 × 9.3 (c)	-- × 9.8 (e)*
m/2	11.8 × 10.0 (a) 11.8 × 10.2 (a) 13.5 × 12.1 (b) 12.7 × 11.5 (c)	14.4 × 12.8 (d) 14.0 × 11.8 (d) 11.6 × 9.4 (d)
m/3	12.0 × 10.0 (a) 14.2 × 11.9 (b) 13.0 × 11.5 (c)	15.8 × 12.8 (d) -- × 12.7 (d)

\* these teeth could be M1/ and m/2 rather than M2/ and m/1.

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