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Abstract

We describe here a mammalian assemblage originating from the locality of Chaungtha (Irrawaddy Formation, Myanmar). It represents one of the rare descriptions of a precisely located, in space, vertical section and time, fossil mammal fauna from the Irrawaddy Formation. Classically the fossil record of Irrawaddy Formation is essentially known from isolated fossils of imprecise or unknown provenance, especially concerning the stratigraphic position of the fossils along several hundred meter thick sections. The Chaungtha faunal association consists of the rhino *Brachypotherium fatehjangense*, the pig *Conohyus thailandicus*, the ruminants cf. *Siamotragulus sanyathanai*, cf. *Siamotragulus* sp. and a gomphotheriid proboscidean. This assemblage indicates that the locality is Miocene in age, and not Late Eocene as previously claimed, and roughly contemporaneous with the Chinji Formation of India-Pakistan (ca. 14 to 11 Ma) and with the Mae Moh Group of northern

Thailand. The Chaungtha fauna, even if it displays regional characteristics, shows a strong resemblance to those of the Middle Miocene of India-Pakistan and of Thailand and reinforces the idea that South-East Asia and Pakistan were part of the same biogeographical province during the Middle Miocene.

Keywords: Mammal Fauna; Middle Miocene; Irrawaddy Formation; Myanmar; Biochronology; Paleobiogeography.

1. Introduction

The fossil locality of Chaungtha is situated close to the Irrawaddy river at about 130 km north of Mandalay, central Myanmar and 5 km Southwest of the city of Male (Fig. 1). It is located on the west bank of the Irrawaddy river, near the wrench zone of the Sagaing fault (e.g. Vigny et al., 2003). Regionally, the area is situated in the northern part of the central basin of Myanmar. The section from which all the fossils were excavated is about 120 meters thick and consists of shales and siltstones with sandstone intercalations (Fig. 2). The sediments of the sequence are mostly sub-horizontal and traceable over a few kilometers around the fossiliferous spot. They contain numerous silicified wood fragments. The sandstone levels of the upper part of the sequence, from which the vertebrate fossils were collected (Fig. 2), exhibit a clear fining upward, conglomeratic elements being found at their base. These levels have been deposited as cross-beds with significant lateral variation and represent a typical point bar sequence of fluvial sedimentation which is also supported by the presence of crocodile teeth and fragmentary turtle plates. The sandstones of the lower part of the sequence are finer and display ripple-marks, indicating that these sediments were deposited in shallower and lower energy water than the sandstones of the upper part of the sequence. The sedimentology therefore shows that the depositional environment of the Chaungtha sequence was a migrating fluvial channel. The sediments of the sequence of Chaungtha were most probably deposited by a proto-Irrawaddy river, which was geographically very close to the extant Irrawaddy's flood plain.

Fig. 1. Map of Myanmar showing the city of Male on the west bank of the Irrawaddy. The box indicates the approximate location of the Middle Miocene sites of northern Thailand belonging to the Mae Moh Group. The locality of Mae Moh is positioned.

The Chaungtha area was mapped by Myint Thein et al. (1982) for the purpose of a geological study of the central basin of Myanmar. These authors argued, mainly on the basis of fossil mammals, that the sediments of the Chaungtha area were contemporaneous with those of the Late Middle Eocene Pondaung Formation. This paper presents the study of some new fossil material from the Chaungtha area collected in 2001 and 2002 by the 'French-Myanmar Team' formed by the Paleontology Departement of the University Montpellier 2 (France) and the Geology Department of the Yangon University (Myanmar). All the fossils described in this paper are housed at the Paleontological Collection of the National Museum of Myanmar (Yangon).

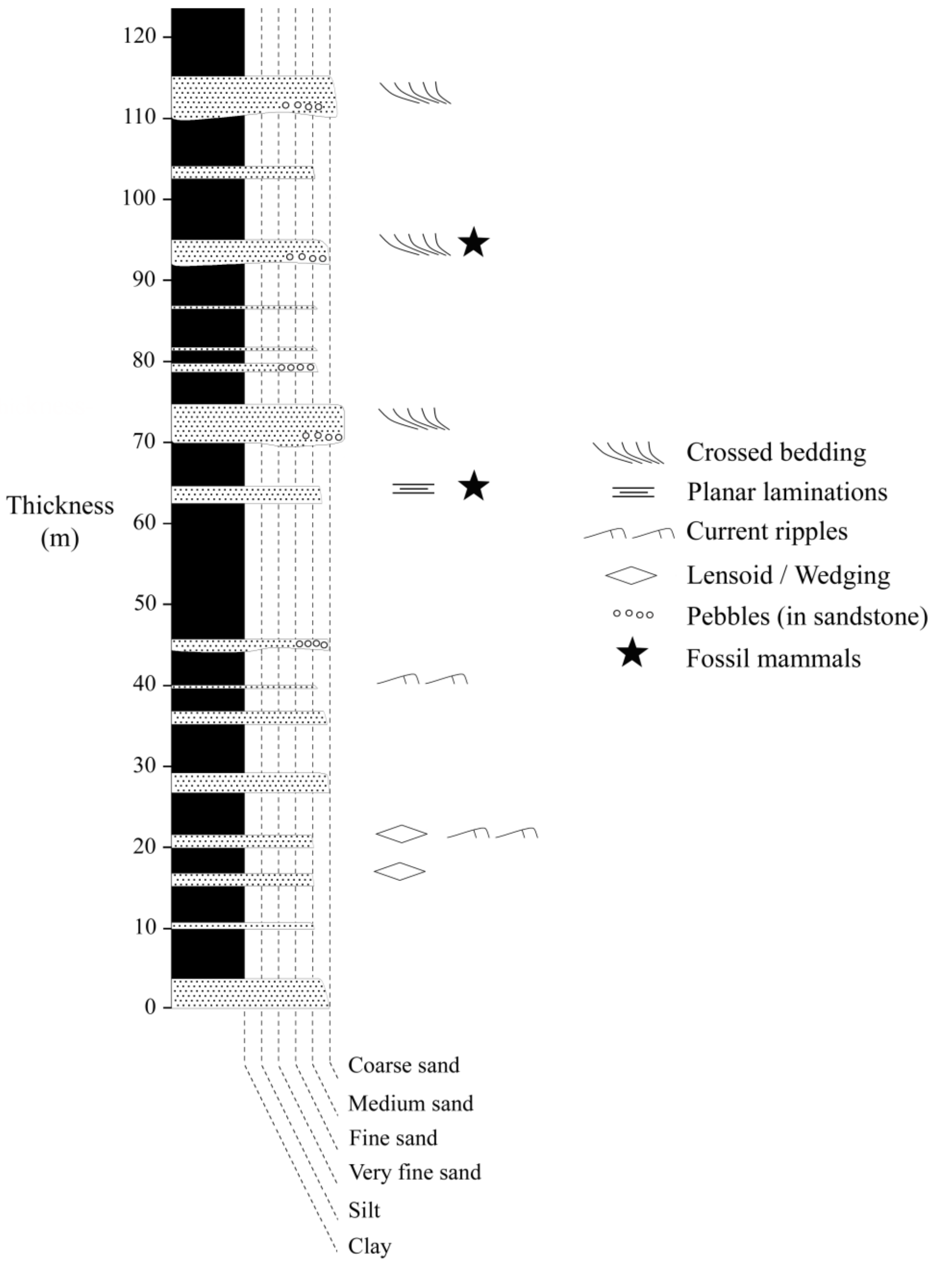

Fig. 2. Section of the vertebrate-bearing locality of Chaungtha, Central Myanmar.

2. Systematic Paleontology

Order PERISSODACTYLA Owen, 1848
Superfamily RHINOCEROTOIDEA Gray, 1825
Family RHINOCEROTIDAE Gray, 1821
Tribe RHINOCEROTINI Gray, 1821
Subtribe TELEOCERATINA Hay, 1902
Genus *Brachypotherium* Roger, 1904
syn. *Indotherium* Kretzoi, 1942: 315

Brachypotherium fatehjangense Pilgrim, 1910 (Fig. 3A-C)

Material: CTA 55-1 right P/2 (Fig. 3A); CTA 55-2 left P/3 (Fig. 3B); CTA 55-3 left dP/3 (Fig. 3C).

The P/2 CTA 55-1 is moderately worn and slightly broken on the posterior side. It displays a reduced paraconid and an open posterior valley. The anterior cingulum is low (less than half of the apparent height of crown) and asymmetrical, most of it being situated labially to the anterior crest. The posterior cingulum extends until the posterior groove of the ectolophid. Its height is important on the posterior side and decreases anteriorly until the level of the anterior cingulum.

The P/3 has an angulous trigonid. The anterior valley is V-shaped in occlusal view. It is reduced and shallow. The talonid is more rounded than the trigonid. The posterior valley is shallow, narrow and V-shaped in lingual view. No cingulid is visible on the P/3.

The left dP/3 referred to *Brachypotherium fatehjangense* is rectangular in occlusal view, the trigonid being rounded and nearly as important as the talonid. The hypolophid is directed transversely. The posterior valley is rectangular in occlusal view and possesses a V-shaped profile in lingual view. There is no groove on the lingual face of the entoconid. The ectolophid groove is U-shaped and smooth. No cingulid is present.

A reduced paraconid, as observed on the P/2 (Fig. 3A), is an autapomorphy of *Brachypotherium* (Antoine, 2002). The morphological features are consistent with *B. fatehjangense*, known from the early Miocene to the late Miocene in South Asia (Pakistan, India, Thailand; Heissig, 1972; Antoine and Welcomme, 2000; Welcomme et al., 2001; Antoine, pers. comm., 2004). The size and proportions of the Burmese specimens match those observed in the specimens originating from the Middle Miocene Chinji Formation of Pakistan (Heissig, 1972) (Table 1).

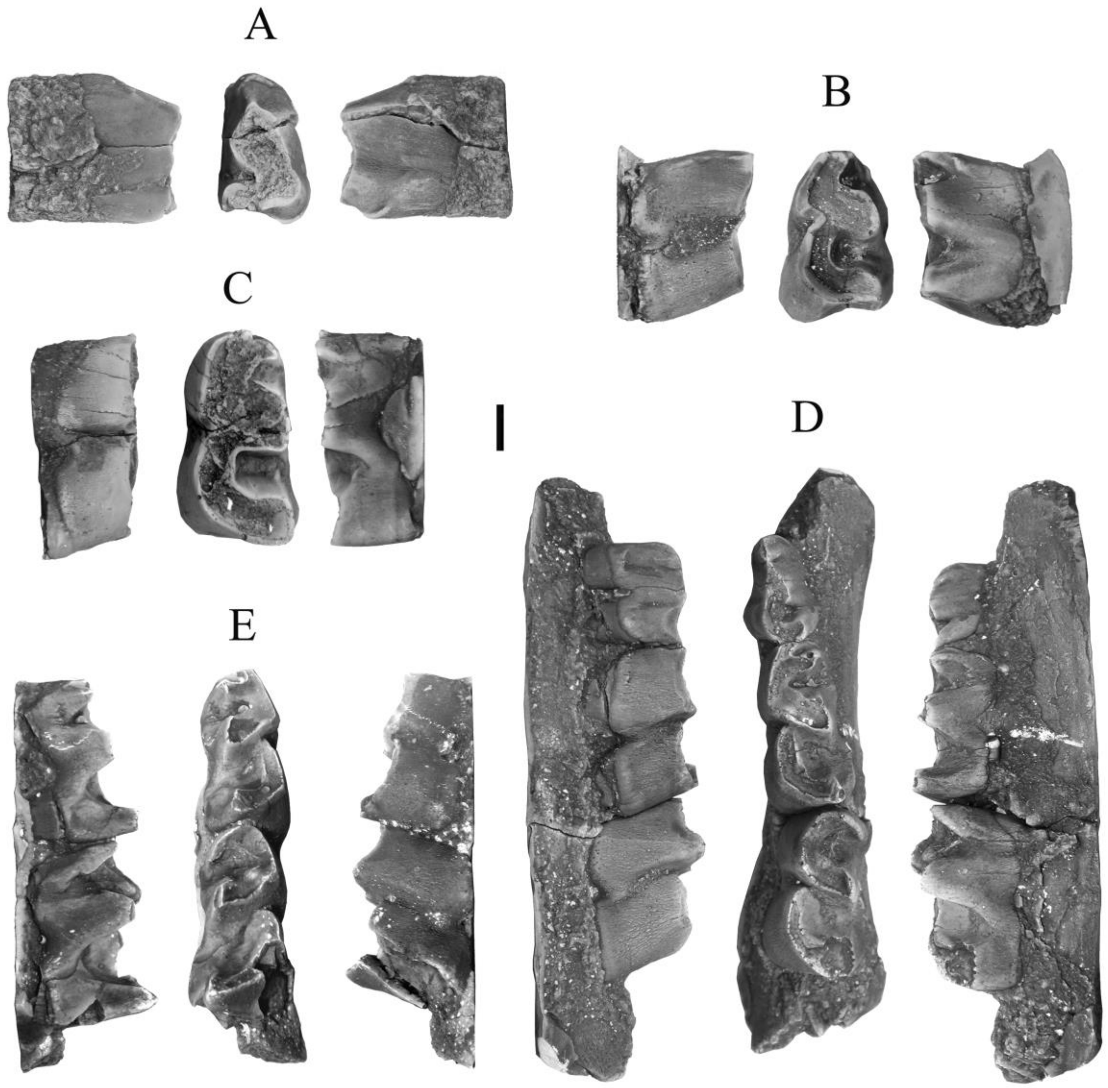

Fig. 3. The rhinocerotids of Chaungtha. A, B and C: *Brachypotherium fatehjangense*. A, right P/2 CTA 55-1; B (in lingual, occlusal and labial views); left P/3 CTA 55-2 (in lingual, occlusal and labial views); C, left dP/3 CTA 55-3 (in lingual, occlusal and labial views). D and E: Rhinocerotidae indet.. D, left series with dP/2-dP/4 CTA 54-1 (in lingual, occlusal and labial views),; E, right series with dP/3-dP/4 CTA 54-2 (in lingual, occlusal and labial views), from the same individual as CTA 54-1. Scale bar: 1 cm.

Rhinocerotidae indet. (Fig. 3D and E)

Material: CTA 54-1, left hemimandible with dP/2, dP/3, dP/4 and a fragment of M/1 erupting (Fig. 3D); CTA 54-2, right hemimandible with dP/3, dP/4 (Fig. 3E).

The second rhinocerotid of Chaungtha is represented by two mandible fragments belonging to a single juvenile individual. The dP/2 has a furcated and spur-like paralophid and a well-developed paraconid. The posterior valley is opened lingually. A groove is present on both the anterior and posterior parts of the ectolophid. They do not reach the base of the crown, a low and reduced cingulid interrupting them. There are no vertical rugosities on the labial wall. The dP/3 is much larger than the dP/2. It has a rectangular outline due to rounded trigonid and talonid. The paralophid is double. The hypolophid is oblique. The posterior valley is widely opened lingually and is U-shaped in lingual view. There is no groove on the lingual side of the entoconid. A reduced cingulid is present on the anterior half of the trigonid on both dP/3s. The dP/4 is slightly larger than the dP/3. The paralophid extends disto-lingually so that it slightly closes the anterior valley. The hypolophid is oblique. The posterior valley is much deeper and wider than the anterior one. As on the dP/3, it is widely opened and U-shaped in lateral view. There is no cingulid.

The taxonomic information brought by the decidual teeth described above is low (as discussed by Antoine (2002)). Consequently, we assign this material to an indetermined genus and species of rhinocerotid. Further material (i.e. permanent cheek teeth) would allow a more precise identification of the second rhinocerotid from Chaungtha.

Taxon	Specimen	Locus/level	Age	Length	Anterior width	Posterior width
Brachypotherium fatehjangense	CTA 55-1 right P/2	Chaungtha, Myanmar	Middle Miocene	(32.3)	17	19.6
B. fatehjangense	CTA 55-2 left P/3	Chaungtha, Myanmar	Middle Miocene	37.1	24.2	27.5
B. fatehjangense	CTA 55-3 left dP/3	Chaungtha, Myanmar	Middle Miocene	46.1	26.8	27.5
B. fatehjangense [1]	P/2 (3 specimens)	Level 4 (Bugti Hills, Pakistan)	Early Miocene	24-27	15.5-17	20.5-21
B. fatehjangense [2]	1956 2 428 right P/2	Middle Chinji (Lower Siwalik, Pakistan)	Middle Miocene	27	13	16
B. fatehjangense [1]	P/3 (3 specimens)	Level 4 (Bugti Hills, Pakistan)	Early Miocene	40	23-26.5	30
B. fatehjangense [1]	dP/3 (3 specimens)	Levels 4 to 6 (Bugti Hills, Pakistan)	Early Miocene	45	20.5-25.5	25-26.5
B. fatehjangense [1]	dP/3	Dhok Pathan (Middle Siwalik, Pakistan)	early Late Miocene	33	17	21
Rhinocerotidae indet.	CTA 54-1 left dP/2	Chaungtha, Myanmar	Middle Miocene	22.4	11	16
Rhinocerotidae indet.	CTA 54-1 left dP/3	Chaungtha, Myanmar	Middle Miocene	36.4	17.2	20
Rhinocerotidae indet.	CTA 54-1 left dP/4	Chaungtha, Myanmar	Middle Miocene	37	19.7	23.2
Rhinocerotidae indet.	CTA 54-2 right dP/3	Chaungtha, Myanmar	Middle Miocene	36.5	17.1	20
Rhinocerotidae indet.	CTA 54-2 right dP/4	Chaungtha, Myanmar	Middle Miocene	(37)	19.5	23.6

Table 1. Dimensions of the rhinocerotid material from Chaungtha and of *Brachypotherium fatehjangense* from the Miocene of Pakistan. [1] from Antoine (unpublished data); [2] from Heissig (1972). All measurements are expressed in millimeters.

Order ARTIODACTYLA Owen, 1848
Family SUIDAE Gray, 1821
Subfamily TETRACONODONTINAE Lydekker, 1876
Genus *Conohyus* Pilgrim, 1926

Conohyus thailandicus Ducrocq et al., 1997 (Fig. 4A-C)

Material: KPG-1, right lower jaw fragment with P/4-M/3.

The specimen KPG-1 is a medium-sized suid that displays an enlarged P/4. This tooth is dominated by an inflated main cusp which presents a complete fusion between the protoconid and the metaconid. The main cusp of the P4 is connected by two mesio-distally directed crests to the paraconid and the hypoconid. These cusps have heights close to that of the main cusp. A very faint cingulum seems to join the paraconid and the hypoconid on the labial side of the tooth. The P/4 of KPG-1 is asymmetrical, the labial wall being more convex and higher. The M/1 shows a typical suid morphology with four main cusps and anterior, central and posterior accessory cusps. A mesostylid is present at the buccal end of the median valley. The M/2 represents a larger version of the M/1 with more developed mesostylid and posterior accessory cusp. The bucco-lingual width of the M/2 decreases from the trigonid to the talonid. The M/3 of KPG-1 is reduced compared to the P/4 and the anterior molars. Moreover, it has a narrow and buccally-oriented expansion of talonid.

The inflated P/4 of KPG-1 indicates that the suid of the locality of Chaungtha belongs to the Tetraconodontinae. The medium size of the specimen, the complete fusion between the metaconid and the protoconid and the moderate degree of hypertrophy observed on the P/4 demonstrate that KPG-1 belongs to the genus *Conohyus*. Moreover, the tooth proportions and the small and curved M/3 are identical to that of *Conohyus thailandicus*: figure 5 shows the relative dimensions of the teeth of the Chaungtha suid, compared with those of the holotype of *Conohyus thailandicus* (Ban San Klang, Thailand) and of *Conohyus sindiensis* of the Siwaliks of Pakistan. The profile of the holotype of *C. thailandicus* is very similar to that of KPG-1, the two suids sharing a P/4 larger than the three molars. In both cases the M/3 is equal in size or even smaller than the corresponding M/2 (see also Table 2). The P/4 of KPG-1 has a larger relative area than the P/4 of the holotype of *C. thailandicus*. The profile of *C. thailandicus* differs from that of *C. sindiensis* in its larger premolars, smaller M/2 and proportionally reduced M/3.

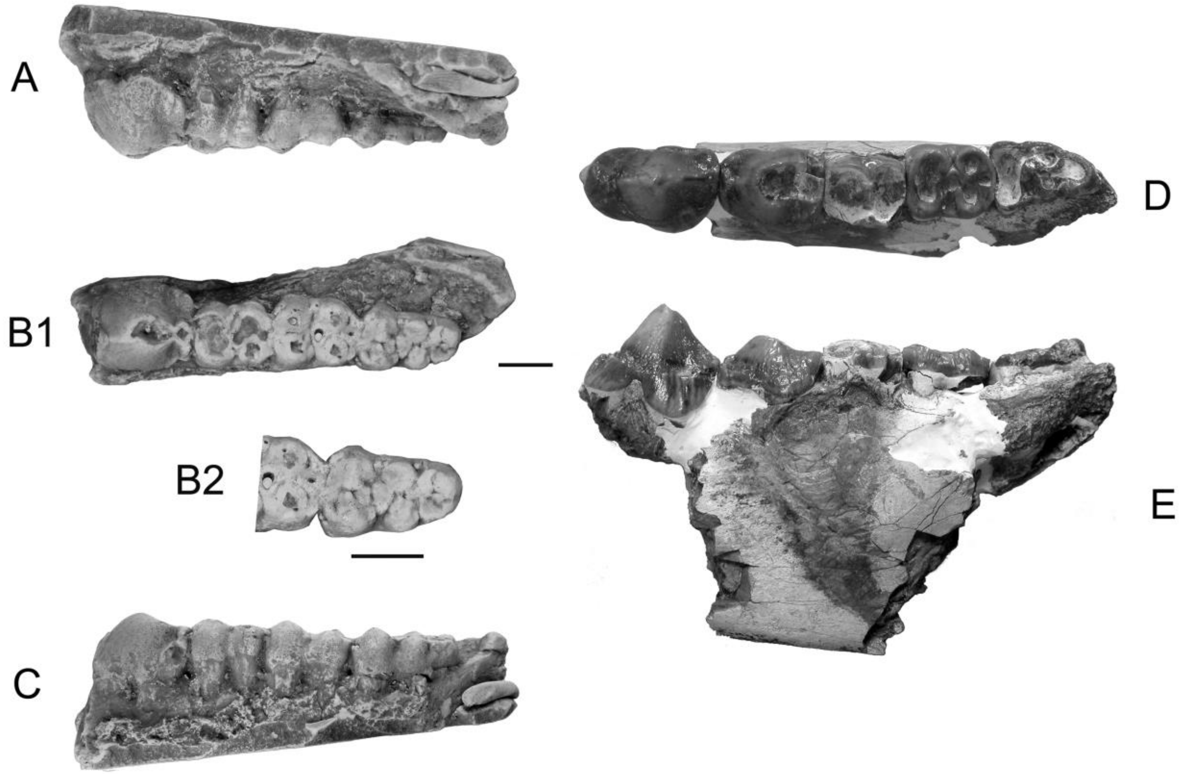

Fig. 4. The suid *Conohyus thailandicus*. A-C: right lower jaw with P/4-M/3 KPG-1 of *Conohyus thailandicus* from Chaungtha. A, labial view; B1, occlusal view; B2, enlarged occlusal view of the M/3; C, lingual view. D and E, left lower jaw with P/4-M/3 TF 2577 from Ban San Klang (Thailand), holotype of *C. thailandicus*: D, occlusal view; E, labial view. Note that the M/2 and the posterior part of the P/4 of the holotype of *C. thailandicus* were not represented in the original publication of Ducrocq et al. (1997). Scale bars: 1cm.

Previously, some authors (Pickford and Gupta, 2001) have interpreted *C. thailandicus* as a junior synonym of *Conohyus indicus* on the basis of some new material from Jammu (India). These fossils from Jammu include lower jaw fragments with premolars similar to those of *C. thailandicus* in morphology and size. Pickford and Gupta (2001) concluded that the association of enlarged premolars and reduced M/3, also present in the specimen GSI B 553 published by Pilgrim (1926), was a feature of the species *C. indicus* and demonstrated the synonymy between *C. thailandicus* and *C. indicus*.

However, Jammu fossils do not preserve M/2 or M/3, rendering the inference of Pickford and Gupta (2001) speculative. As the small size of the M/3 represents an important character of the diagnosis of *C. thailandicus*, the fossils from Jammu cannot be used to demonstrate synonymy between the species *C. thailandicus* and *C. indicus.* Moreover, the molars of *C. thailandicus* are very small compared to the measurements of *C. indicus* given by Pickford (1988). The specimen GSI B 553 is the smallest in Pickford's sample with M/3 length of 25 mm. Compared to a similar length of only 19 mm shown by *C. thailandicus* (Table 2), this difference seems highly significant. According to these observations, we retain *C. thailandicus* and *C. indicus* as distinct species of *Conohyus*.

Ducrocq et al. (1997) argued that *C. thailandicus* might have been a direct ancestor of *C. sindiensis* because they considered the dentition of *C. thailandicus* as being slightly more primitive than that of the Siwalik species. This hypothesis was based on the reduced M/3 and M3/ of *C. thailandicus*, interpreted as plesiomorphic features by Ducrocq et al. (1997). However, these characters are probably apomorphic and potentially linked to the enlargement of the posterior premolars, primitive suids displaying much larger M/3s than *C. thailandicus* (e.g. Ducrocq et al., 1998; Hellmund, 1991; Liu et al., 2002). It seems thus that *C. thailandicus* may not be *C. sindiensis*' ancestor as suggested by Ducrocq et al. (1997) because it would imply a double reversion in the tooth proportions. *C. thailandicus* might either be a descendant of *C. sindiensis* or represent a distinct *Conohyus* lineage contemporaneous to that of *C. sindiensis.* The latter hypothesis would imply that *C. thailandicus* shares with *C. sindiensis* a close common ancestor, the two species displaying strong morphological resemblances (Ducrocq et al., 1997).

Taxon	Tooth	Length (mm)	Width (mm)	Surface (mm^2)
C. thailandicus from Ban San Klang (holotype TF 2577)	P/3	24	16,3	300
	P/4	19,5	15,8	247
	M/1	14,5	13,3	190
	M/2	16,6	13	211
	M/3	19,3	13,5	191
C. thailandicus from Chaungtha	P/4	19	16	294
	M/1	15	11	183
	M/2	16	13	214
	M/3	19	11	214

Table 2. Linear and surface area measurements of the specimens of *Conohyus thailandicus*.

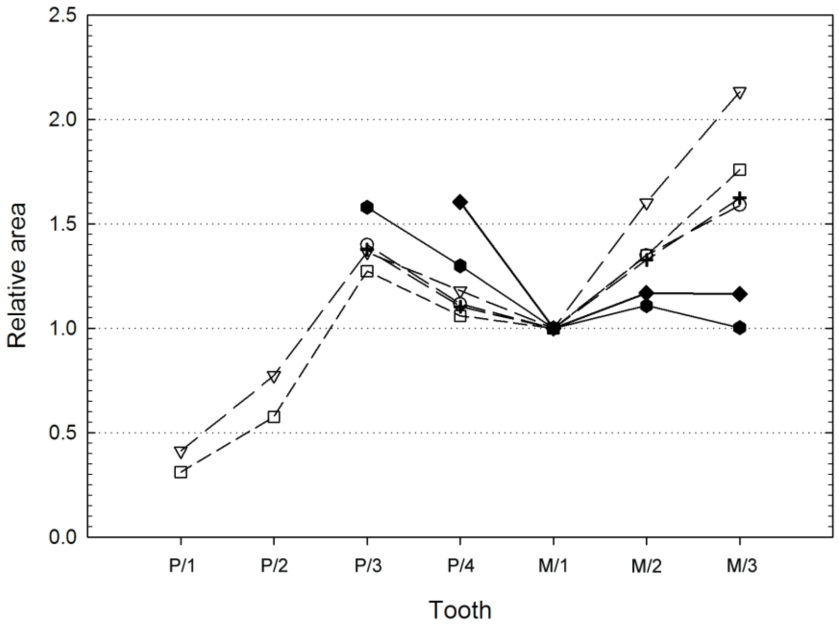

Fig. 5. Relative occlusal area diagram of the teeth of *Conohyus thailandicus* from Chaungtha (solid line with diamonds) and the type of *Conohyus thailandicus* from Ban San Klang (Thailand) (solid line with hexagons).The relative areas of *Conohyus sindiensis* are figured as dashed lines: GSP 31725 (triangles pointing downwards), GSP 12587 (squares), GSP 46845 (crosses), GSI B 537 from Pilgrim (1926) pl. 2 fig. 10 (circles). All the relative areas are occlusal areas measured from pictures with the software Optimas 6.51 and expressed as a proportion of the area of the M/1. The pictures of *C. sindiensis* were taken at the Peabody Museum of Harvard University where the specimens are housed (except the specimen GSI B 537 which occlusal areas were estimated from the picture of Pilgrim (1926)).

Suborder RUMINANTIA Scopoli, 1777
Family TRAGULIDAE Milne-Edwards, 1864
Genus *Siamotragulus* Thomas et al., 1990

cf. *Siamotragulus* sp. (Fig. 6A-E**)**

Material: CTA 51-1, left M1/-M2/ or M2/-M3/ (Fig 6A); CTA 51-2, isolated upper left molar (Fig. 6B); CTA 51-3, left M/1 or M/2 (Fig. 6C); CTA 51-4, left M/1 or M/2 (Fig. 6D); CTA 51-5, right P/3 (Fig. 6E).

The upper molars have a shelf-like lingual cingulum, heavy styles, and a distinct rib on the labial face of the metacone. The P/3 has a long, anteriorly directed preprotocristid terminating in a small, centrally located paraconid. The hypoconid is low, with a crest that runs directly posterior to the edge of crown where it joins a very short transverse entostylid. There is no furrow on the posterolingual face of the protoconid. The lower molars have well developed "*Dorcatherium*" and "*Tragulus*" folds, and a weakly concave anterolingual face on the entoconid, with a rounded posterior face.

The trenchant morphology of the P/3, together with the structure of the molar entoconid, is different from *Dorcatherium* and similar to *Siamotragulus* (Thomas et al., 1990). The taxon is, however, larger than any described species of the latter genus.

cf. *Siamotragulus sanyathanai* Thomas et al., 1990 (Fig. 6F)

Material: CTA 52, right M/3.

The single specimen is small (length: 13 mm, width: 5 mm), with well developed "*Dorcatherium*" and "*Tragulus*" folds. The weakly concave anterolingual face and rounded posterior part of the entoconid are different from species of *Dorcatherium* and suggest to us affinities with *Siamotragulus* (Mein and Ginsburg, 1997). Because of the size of the tooth, we refer this single M/3 to the species cf. *Siamotragulus sanyathanai*.

Family BOVIDAE Gray, 1821
?Bovidae indet. (Fig. 6G)

Material: CTA 53, left M/1 or M/2.

The single specimen is a worn and apparently bunodont tooth. It has a small metastylid, transversely compressed lingual cusps, and distinctly selenodont protoconid and hypoconid. The wear figure of the postmetacristid connects with those of the postprotocristid and the preentocristid, while the prehypocristid remains separate. There is a suggestion of a "*Palaeomeryx*-fold" on the protoconid.

Except for the possible "*Palaeomeryx*-fold", the structure of this tooth conforms closely to the molars of early bovids.

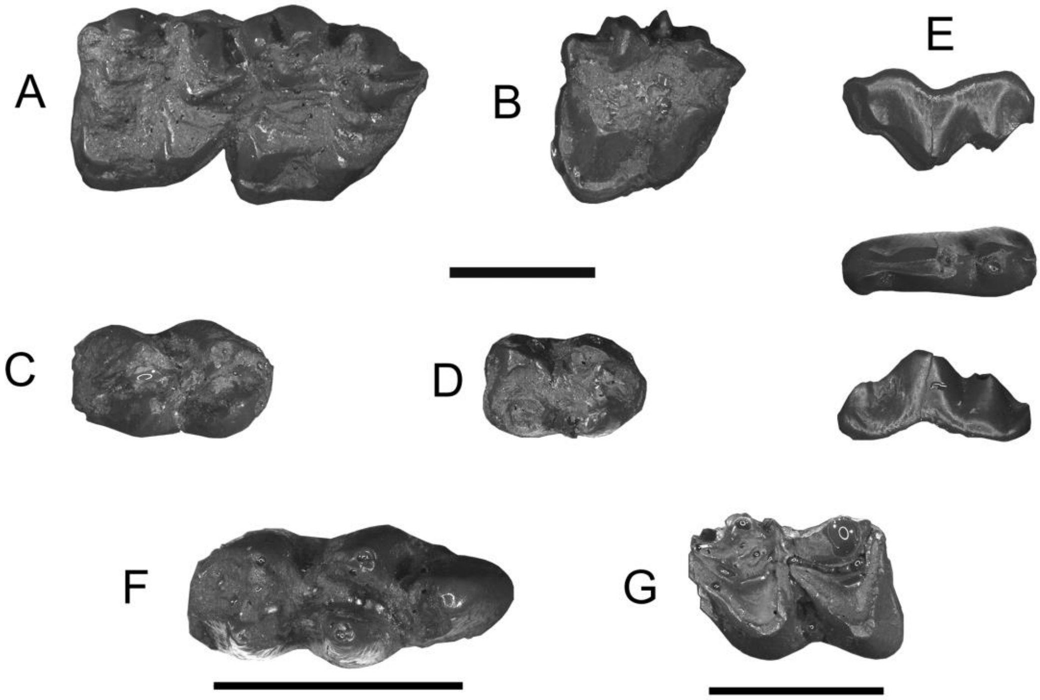

Fig. 6. The ruminants of Chaungtha. A-E: cf. *Siamotragulus* sp.. A, left M1/-M2/ or M2/-M3/ CTA 51-1 in occlusal view; B, left upper molar CTA 51-2 in occlusal view; C, left M/1 or M/2 CTA 51-3 (occlusal view); D left M/1 or M/2 CTA 51-4 (occlusal view); E, right P/3 CTA 51-5 in lingual, occlusal and labial view (from top to bottom); F, right M/3 of cf. *Siamotragulus sanyathanai*; G, right M/1 or M/2 of ?Bovidae indet. in occlusal view. Scale bars: 1cm.

Order PROBOSCIDEA Illiger, 1811
Superfamily ELEPHANTOIDEA, Gray 1821
Family GOMPHOTHERIIDAE Hay, 1922

Gomphotheriidae indet. (Fig. 7)

Material: CTA 56, right M1/ or M2/.

The specimen CTA 56 is a bunodont, brachyodont and apparently trilophodont tooth. This tooth is very worn and broken on the posttrite side from the anterior extremity to the half of the second loph. There is an important contact between the pretrite halves of the second and third lophs. In contrast, the posttrite half-lophs two and three are separated by a narrow valley. No accessory cusps are present between the second and the third lophs. The third loph is less worn than the others and consists of few cusps. Its posttrite half is reduced compared with the pretrite half-loph. The latter is bedded by a thick cingulum composed of five cusps.

A large posterior accessory cusp is situated between the cingulum and the pretrite half of the third lobe.

The brachyodonty, the simple bunodonty and the reduced number of lophs observed on CTA 56 indicate that the proboscidean of the locality of Chaungtha is a member of the Gomphotheriidae *sensu lato*. The state of preservation of CTA 56 and the lack of material does not allow us to propose an alpha taxonomy for this proboscidean.

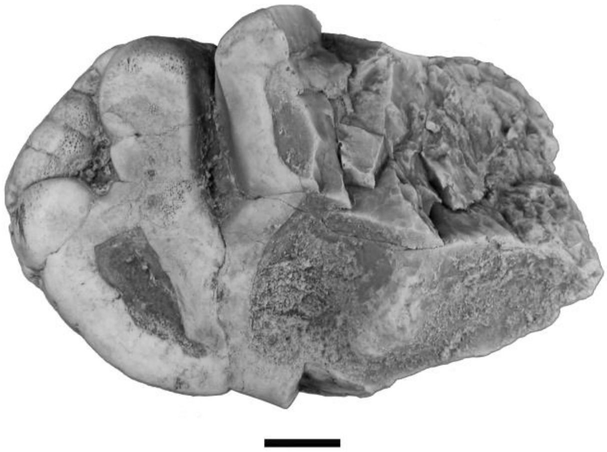

Fig. 7. Occlusal view of CTA 56, a right M1/ or M2/ of an unassigned species of Gomphotheriidae from Chaungtha. Scale bar: 1cm.

3. Discussion

The association at Chaungtha of the rhinocerotid *Brachypotherium fatehjangense***,** the suid *Conohyus* cf. *thailandicus*, two tragulids referable to the genus *Siamotragulus*, and a gomphotheriid proboscidean indicates that this locality is Miocene. Moreover, the size and proportions of the teeth of *Brachypotherium fatehjangense* are similar to specimens from the Chinji Formation of the Potwar Plateau dated between 14.2 to 11.2 Ma (Barry et al., 2002). The suid *Conohyus* is also a common taxon from the Chinji Formation of the Siwalik Group. The species *Conohyus thailandicus* was originally described from the Middle Miocene sites of northern Thailand (Mae Moh Group; Fig. 2) (Ducrocq et al., 1997) as well as the tragulid *Siamotragulus* (Thomas et al., 1990). Gomphotheriid proboscideans are also represented in the Middle Miocene sites of northern Thailand. The locality of Chaungtha is therefore probably Middle Miocene and contemporaneous with the Chinji Formation and several localities of the Mae Moh Group (e.g. Mae Moh (Benammi et al., 2002) and Chiang Muan (Chaimanee et al., 2003)). The Middle Miocene age of the locality of Chaungtha demonstrates that the sediments of the Chaungtha area do not belong to the Late Middle Eocene Pondaung Formation as previously thought by Myint Thein et al. (1982). This erroneous age assignment was based on incorrect identification of fossil mammals.

The Irrawaddy Formation has often been regarded as being late Miocene to Pliocene in age (Chhibber, 1934; Krishnan, 1968). However, the base of the Irrawaddy Formation is probably Middle Miocene in northern Myanmar: the Mingin Gravels (South Chindwin basin) are lithologically similar to the gravels of the Irrawaddy Formation and contain a Middle Miocene mammal fauna, according to Bender (1983) and Pascoe (1962). The presence of older Irrawaddy Formation rocks in Upper Myanmar has been explained by a progressive change of facies from the marine Oligocene to Miocene Pegu Formation to the overlaying fluviatile Irrawaddy Formation (Bender, 1983; Pascoe, 1962). The transition between the two formations may have occurred during the Middle Miocene in Upper Myanmar (Pascoe, 1962) and more recently in Lower Myanmar so that the locality of Chaungtha could be referred either to the Pegu Formation or the Irrawaddy Formation. Several factors, such as the abundance of terrestrial mammals and silicified wood fragments, suggest that the sequence of Chaungtha belongs rather to the Irrawaddy Formation because the Pegu Formation only rarely contains terrestrial vertebrates and wood remains (e.g. Pascoe, 1962). For these reasons, we refer the locality of Chaungtha to the Lower Irrawaddy Formation, following Bender’s and Pascoe’s interpretations of that formation (Bender, 1983; Pascoe, 1962). The locality of Chaungtha appears to be, along with the Middle Miocene locality of Taungbyinnge in the Mingin Gravels (Bender, 1983), the oldest mammal fauna described from the Irrawaddy Formation.

Several taxa described from the locality of Chaungtha also occur in the Chinji Formation of the Siwaliks and the Mae Moh Group of northern Thailand. This brings new pieces of evidence to the claim by Ducrocq et al. (1994) that South-East Asia and Pakistan belonged to the same biogeographical province during the Middle Miocene. However, the fauna of the locality of Chaungtha also possesses certain regional characteristics: the two tragulids referred to the genus *Siamotragulus* are different from those of the Middle Miocene of Pakistan and the species *Conohyus thailandicus* is regarded here as endemic to South-East Asia. Therefore, the fauna from Chaungtha seems to share more similarities with the fauna of the Mae Moh Group than with that of the Chinji Formation of the Siwaliks.

The mammal fauna of the Irrawaddy Formation is very diversified and comprises

Miocene, Pliocene and even Pleistocene taxa (Bender, 1983; Chhibber, 1934; Pascoe, 1962; Krishnan, 1968). The new material from Chaungtha indicates that a revision of the Irrawaddy Formation fossils could provide more precise information on the biochronology of South Asia and the biogeographic relationships between and within South Asian mammalian communities during the Neogene.

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