

ON SOME FOSSIL MAMMALS FROM YÜNNAN

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Mr. Y. L. Wang, geologist of the Geological Survey of China, has kindly brought to me for determination some fossil mammals from Yünnan province which he collected during his last long survey trip at that region. There are two fossiliferous sites: one lies 360 li east from Kunming (昆明), the Capital of Yünnan, in the district Chütsinghsien (曲靖縣); the other about 100 li N. W. from Kunming in the district Fuminhsien (富民縣). The fossils collected from both localities, especially from the former, are quite fragmentary. But since we have so little knowledge concerning the Cenozoic deposits of S. W. China and their fauna, it will be of interest to give a short account of Mr. Wang's finds.

I. FOSSILS FROM CHÜTSINGHSIEN.

The fossiliferous site was found at a place called Tsaichiach'ung (蔡家冲) the geological interest of which had struck Dr. V. K. Ting during his former trip in this region. According to the last observation of Mr. Wang, the geological conditions are such as reported in the section Figure 1. The fossils were collected exclusively from the marl and are scattered over the surface. The bones are greenish gray in color, evidently due to the coloration of the matrix of green marl, and are highly fossilized. Together with these bones there are many tubular concretions, both small and large.

Only few broken pieces of bone were obtained from this locality. They can be determined as follows:

CARNIVORA indet. One proximal end of a metacarpal in the size of a wolf.

RHINOCEROTIDÆ indet. Only one piece of upper molar (external side). Closer determination of it is not possible.

* Received for publication in June, 1932.

Merycopotamus sp. The anterior half, perfectly fresh, of a lower molar (Figure 2) suggests the presence in Yünnan of this interesting form, highly characteristic of the middle Siwaliks of India (*Hipparion* beds). The specimen differs from the corresponding teeth of *Merycopotamus* as figured by Lydekker¹ by the not rounded but triangular shape of the metaconid: the inner side of this cusp is marked by a strong edge, which separates the internal area of the trigonid in two isolated pits. Judging by the broken surface of the tooth, the hypoconid was crescentic as in *Merycopotamus*, the anterior wing of the cusp being connected with the metaconid. The anterior cingulum is strong. If the specimen is a *M*₁, the size would be approximately the same as in *M. dissimilis* Falc. and C. The length of the preserved part is 9.5 mm, breadth 13 mm.

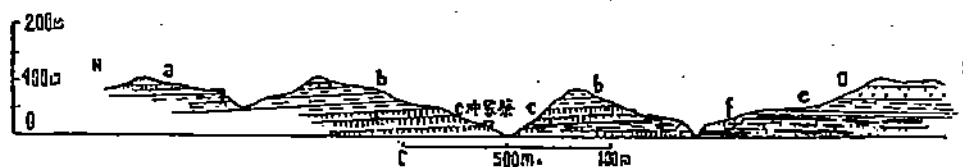


Figure 1. Geological section of Tsailachung showing the upper Tertiary formations.
 a. Red and white calcareous clay. b. white and grey marl with mammalian remains. c. Brown and yellow sandy clay. d. Sandy clay and soft sandstone with occasional gravels. e. Yellow, brown and grey fine clay with plant remains. f. Grey and black clay with several beds of lignite and gastropods.

If our determination is correct, the date of the Chütsinghsien lake deposits would fall approximately in the Pontian. Similar formations of this age in Yünnan have already been determined by several geologists and specially by Dr. V. K. Ting (personal communication), on the basis of various tectonic, physiographic and palæontological² considerations.

¹ Lydekker, R., Siwalik mammalia—Supplement 1, Mem. Geol. Surv. Ind., Pal. Indica. Ser. X, Vol. IV, Part I, 1886, pp. 16-18, Pl. V-VI.

cf. Matthew, W. D., Critical observations upon Siwalik mammals, Bull. Amer. Mus. Nat. Hist., Vol. LVI, Art. VII, 1929, pp. 437-560.

² See for instance, for plant remains, Colani M., Etude sur les flores tertiaires de quelques gisements de lignite de l'Indochine et du Yünnan, Bull. d. Serv. Geol. Indoch., Vol. VIII, Fasc. 1, 1920; and for shells (Paludina), Mansuy, H., Etude geologique du Yünnan Oriental, Mem. du Serv. Geol. Indoch., Vol. I, Fasc. II, 1912, ibid.

Young:—Some Fossil Mammals from Yunnan

2. CAVE FAUNA OF FUMINHSIEN.

(a) Mode of occurrence.

According to the observations made by Mr. Wang, this fossil site was located in a true cave named Hoshangtung (河上洞) about 10 li S. W. from Fumin and on the west bank of the P'u-tu river. The surrounding rock of the cave is Permian limestone. The entrance of the cave has a height about 4 m and a breadth of 5 m and lies about 50 m above the present level of the river. It branches in a rather irregular manner and

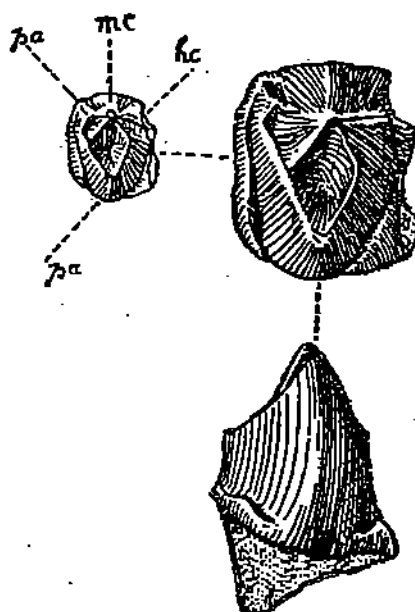


Figure 2. *Marycopotamus* sp. Broken piece of ?M1, natural size from the top and 2 times from top and from outer side.

the sediments were only found in the floor. Some of the branches are longer, some are shorter. The longest one is about 150 m. Whether it is secondarily excavated artificially or was originally so, is difficult to determine.

The mammal fossils were collected near the innermost end of one branch. At this place Mr. Wang has made a small excavation of about 2 m breadth, 3 m width and 1 m depth, without reaching the bottom of the formation. The sediments consist of clay and sand mixed with limestone fragments, of a gray, sometimes faint reddish, coloration.

The bones themselves are well fossilized and light yellow in color. Nearly all the determinable pieces consist in isolated teeth; the limb-bones are too fragmentary for study. Most of the limb-bones and the teeth have been gnawed by *Hystrix*.

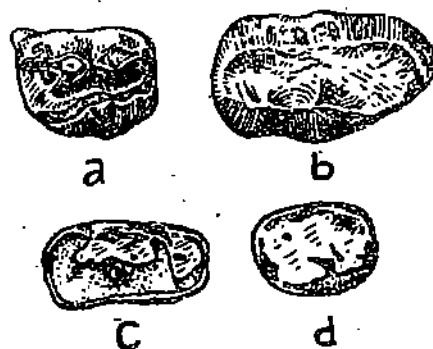


Figure 3. *Ursus cf. hokeni* Matthew and Granger. a, M^1 ; b, M_2 ; c, M_2 and d, M_3 , all from above and in natural size.

(b) Description of fossils.

CARNIVORA

Ursus cf. hokeni Matthew and Granger. Represented by one M^1 , two M^2 , 1 M_1 and one M_3 . Judging from the picture given by Matthew and Granger, M_1 agrees essentially both in structure and in dimensions with the *U. hokeni*¹. This species is considerably smaller than *U. arctos* and very close to *Ursus angustidens* from Choukoutien². More specimens would be necessary for a closer comparison.

¹ Matthew, W. D. and W. Granger, 1923. New fossil mammals from the Pliocene of Szechuan Province, China. Bull. Amer. Mus. Nat. Hist., Vol. XLVIII, p. 563.

² Zdansky, O., 1928., Die Säugetiere der Quartärfauna von Chou-K'ou-Tien. Pal. Sin. Ser. C, Vol. V, Fasc. 4, pp. 3-146.

Dimensions:

	P ⁴	M ¹	M ² (sp.A)	M ² (sp.B)	M ₁	M ₂
Length	13.5 mm	18.5 mm	30 mm	28 mm	22.5 mm	16 mm
Breadth	9 mm	14.5 mm	16 mm	15.5 mm	12 mm	12 mm
			(max.)	(max.)		

?*Aeluropus* sp. To this genus we refer tentatively a last lower molar which seems to differ from a M₂ of *Ursus* by its more rounded shape and a peculiar wrinkling of the crown (Figure 4,b). Judging from the pictures given by Matthew and Granger (loc. cit. p. 579) this tooth would be a

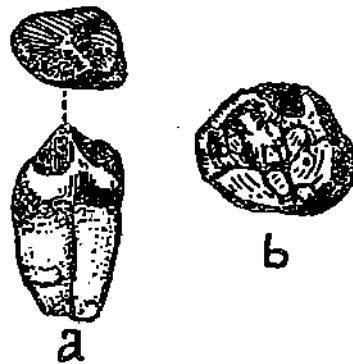


Figure 4. ?*Aeluropus* sp. a, P¹, top and lateral view and b, M₂ from the top, all natural size.

little larger than in *Aeluropus fovealis* from Yenchingkao. Its length is 18.5 mm, breadth 19 mm. To this form we refer also tentatively one incisor, one upper canine and the curious massive tooth illustrated by our Figure 4,a. This tooth, possibly a P¹, has three robust completely fused roots.

Hyaena cf. *sinensis* Owen. Some upper and lower teeth (P⁴, P₂) are referable to this commonly found species. 1

Felis sp. A large *Felis* is indicated by 9 isolated upper and lower teeth, chiefly premolars. The most characteristic is a lower carnassial tooth, remark-

able for its size, larger than in the *Felis acutideus* Zdansky of Choukoutien¹, and in the *Felis* aff. *tigris* collected by Dr. Granger in the fossiliferous clefts of Wanhsien. Its length is 28 mm, breadth 15 mm. (24 and 14.1 in *F. acutideus*, 25 and 13 in a specimen of *F. aff. tigris* sent by Dr. Granger to the Geological Survey). As generally in *M.* of *F. tigris*, the metaconid of the tooth is still distinct.

RODENTIA

Hystrix sp. This form is represented by upper and lower incisors, together with isolated upper and lower teeth. A specific determination would require a material for comparison (living forms) which is not at present in our hands. The length of *P.* is 10 mm, breadth of the same is 8 mm.

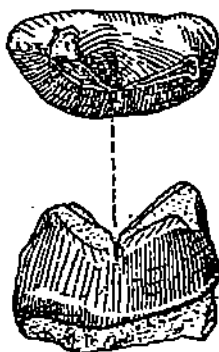


Figure 5. *Felis* sp. A. Lower carnassial tooth from above and from outer side, natural size.

UNGULATA

Rhinoceros sp. There are five isolated lower teeth, none of them complete. These are probably referable to the Yenchingkao (Wanhsien) form.

Tapirus sinensis. This form is only represented by the crown of a molariform tooth (*P.*?) (Figure 5) which agrees in dimensions and in general structure very well with the picture given by Koken² (Pl. V, Figure 3). It differs

¹ Zdansky, *ibid.* p. 48.

² Koken, E., Über fossile Säugetiere aus China. *Paläontol. Abh.* Bd. 3, Heft 2, 1885, p. 34.

from *Tapirus* (*Megalapirus*) *augustus* Matthew and Granger¹ not only by its much smaller size, but also by the considerable narrowing of the fore-portion of the tooth². In *T. augustus* the corresponding tooth is of almost similar breadth throughout the whole tooth. Its length is 24 mm; breadth of the fore-part 15 mm; of the posterior part 18 mm. According to Matthew and Granger, *Tapirus sinensis* is also found in the deposits of Yenchingkao. (ibid. p. 573.)

Sus sp. Traces of *Sus* are indicated by four very fragmentary pieces of teeth. A closer study is not possible.

Cervus sp. A. Abundantly represented by isolated lower and upper teeth. The molars are very characteristic on account of the strong transverse expansion of the outer upper and inner lower cusps, which on a worn out



Figure 6. *Tapirus sinensis* Owen. ?P₂ from above, natural size.

specimen have a decided *Bos*-like appearance. With a sufficient material for comparison, the form would be probably determinable specifically. The average length and breadth of the upper molars is 20 and 21 mm respectively, of the lower molars 23 and 15 mm.

Cervus sp. B. A still smaller type of deer (smaller than *Capreolus*, and larger than *Moschus*) is represented by three upper teeth, two premolars and one molar. The length and breadth of the upper molar is 12 and 5 mm respectively.

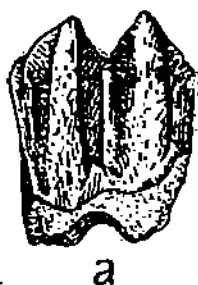
1 Matthew and Granger, ibid. p. 588.

2 Of course, these differences would fail, if our specimen proved to be a milk tooth,—a hypothesis not to be excluded.

Ovidæ indet. A. Eleven isolated teeth were recovered chiefly upper molars of the size of those of *Capricornis*. A specific determination is not possible.

Ovidæ indet. B. Another group of isolated (twenty) teeth of somewhat small dimensions being about the size of those of *Gazella*. The occurrence of these specimens proves that this form is rather abundant in the fauna of Hoshangtung.

Bovidæ indet. Indicated by eleven isolated teeth of medium size (length of M_2 43.5 mm), moderately cemented. On account of the well known difficulty of distinguishing the Bovidæ by the shape of their teeth, even a generic determination would be unsafe.



a



b

Figure 7. *Cervus* sp. A. a, M_2 from inner side; b, another M_2 from the top, all in natural size.

Elephas sp. indet. Represented only by one root part of a lamella of a tooth. Its thickness is 10 mm, suggesting that we have to do with a very advanced *Elephas*. Probably *E. namadicus* found in similar deposits in Indo-China.

?*Macacus* sp. Represented by one left M^3 (Figure 8). The posterior half of the tooth is narrower than the anterior one. Both protocone and

hypocone are clearly crescentic. The paracone and metacone are much higher than the other cusps and are connected with the corresponding inner cusps by transverse ridge. A small cusp (parastyle) is to be observed in front of the paracone. The length of the tooth is 7 mm, breadth at fore-portion 6.3 mm, at the posterior portion 5.3 mm. This tooth is much smaller than in *M. anderssoni*¹ and *Macacus* of Choukoutien.



Figure 8. ?*Macacus* sp. Lower last molar in natural size and enlarged two times.

(c) *Comparison between the Hoshangtung fauna and the fauna of
other cave deposits in South China.*

The fauna of Hoshangtung, by the presence of *Ursus hokensi*, *Hyaena* sp., and *Tapirus sinensis* is decidedly pre-Loessic in character and shows a close affinity with the fissure-fauna of Yenchingkao (Szechuan) described by Matthew and Grainger.

¹ Schlosser, M., 1924, Fossil primates from China, Pal. Sin., Ser. C, Vol. I, Fasc 2, pp. 1-16.

Hoshangtung	Yenchingkao
<i>Ursus cf. kokeni</i>	<i>Ursus kokeni</i>
<i>Aeluropus</i> sp.	<i>Aeluropus fovealis</i>
	<i>Arclonyx rostratus</i>
	<i>Cyon antiquus</i>
	<i>Viverra</i> sp.
<i>Hyæna cf. sinensis</i>	<i>Hyæna sinensis</i>
<i>Felis</i> sp.	<i>Felis aff. tigris</i>
<i>Hystrix</i> sp.	<i>Rhizomys troglodytes</i>
	<i>Lepus</i> sp.
<i>Rhinoceros</i> sp.	<i>Rhinoceros sinensis</i>
<i>Tapirus sinensis</i>	<i>Tapirus sinensis</i>
	<i>Chalicotherium sinense</i>
	<i>Tapirus augustus</i>
<i>Sus</i> sp.	<i>Sus cf. lydekkeri</i> (cf. <i>hyotherioides</i>)
<i>Cervus</i> sp. A.	<i>Cervus</i> sp.
<i>Cervus</i> sp. B.	? <i>Proboscaphus watasai</i>
<i>Ovidæ</i> indet. A.	? <i>Antelope</i>
<i>Ovidæ</i> indet. B.	<i>Gazella</i> sp.
<i>Bovidæ</i> indet.	? <i>Bos cf. grunniens</i>
<i>Elephas</i> sp.	<i>Bibos geron</i>
? <i>Macacus</i> sp.	
	<i>Stegodon orientalis</i>
	<i>Bunopithecus sericus</i>
	<i>Rhinopithecus tingianus</i>

Its age seems therefore to be Lower Pleistocene (or Polycene in the classification of Dr. Grabau).

With the cave deposits fauna described recently by Dr. K.M. Wang from the Cheklang¹, and myself from the Kwangsi² a comparison is more difficult to establish on account of the fragmentary condition of the fossils collected.

¹ Wang, K. M., Die Höhlenablagerungen und Fauna in der Drachenmaul-Höhle von Kiangsen, Cheklang. Contributions from the National Research Institute of Geology, Academia Sinica, No. 1, p. 41, 1931.

² Young, C. C., On some mammalian remains from Kwangsi. Bull. Geol. Soc. China, Vol. VIII, No. 2, 1929, pp. 125-130.

in those two insufficiently excavated sites¹. It seems fairly probable, nevertheless, that the geological age of these two localities has to be held also as approximately Lower Pleistocene. And such is, still more clearly, the case of the Langson breccias in which *Elephas namadicus*, *Stegodon*, *Tapirus*, etc. are reported years ago by Mansuy².

It seems more and more probable consequently, that from N. China (Tangshan, Choukoutien, etc.) to Indochina there extends a long series of fossiliferous deposits, suggesting a general period of caves or fissure filling, at the close of Pliocene time.

GENERAL CONCLUSION

The numerous mammal remains from Yünnan described by Koken³ and Schlosser⁴ from Richthofen's and Haberer's material respectively were only secured from shops. By the recent discovery of Y. L. Wang, we know for the first time, where to collect them *in situ*.

Both finds of Yünnan are very interesting, because it not only gives us some new sites of Cenozoic deposits but also adds to our knowledge of the distribution of some interesting animals in S.W. China.

¹ It is to be regretted that in his paper, Dr. Wang does not give any reliable information on the mentioned occurrence of *Stegodon* in his material (loc. cit. p. 44).

² Mansuy, H., Sur quelques mammifères fossiles récemment découverts en Indochine. Mem. Serv. Geol. de l'Indochine, Vol. V, Fasc. 2, 1916, pp. 1-26.