

ON THE FISSURE DEPOSITS OF CHINGHSINGHSIEN (井陘縣)
WITH REMARKS ON THE CENOZOIC GEOLOGY
OF THE SAME AREA*

By

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In August 1933, the writers of the present paper were sent by the Geological Survey to Chinghsingshsien along the Chengtai Railway, on the Hopei and Shansi border, to examine the long known but not sufficiently surveyed fissure deposits of that country.

The geology of this area has repeatedly been studied by V. K. Ting, T. O. Chu, C. Li¹, and C. C. Wang² and needs no further explanations. The presence of fossil mammals was first recognized by Dr. J. G. Andersson in the course of his research on the Cenozoic deposits of North China.

1. NOTES ON THE FOSSILIFEROUS FISSURE.

Up to the present date only two sites with fossil mammals have been found, namely, Chingshihling (Chingshihling Loc. 32)³, and Kutitsun (Loc. 33).

* Received for publication September 1933.

1 Geology and Ore Deposits of Ching Hsing District, Chihli Province. Bull. Geol. Survey, China, No. 6, 1924.

2 A study on the Hsuehhuashan Basalt Lava and its underlying fossiliferous sediments in the Chinghsing District. Bull. Geol. Survey of China, No. 15, 1930.

3 The enumeration of the localities is in continuation of the fossil Vertebrate sites of the Cenozoic Research Laboratory since 1929. (For Loc. 1-19 cf. Teilhard and Young, Preliminary Observations on the pre-Loessic and post-Pontian Formations in Western Shansi and Northern Shensi. Mem. Geol. Surv. Ser. A, no 8; for 20 to 31 cf. Teilhard and Young, On the late Cenozoic formations of S. E. Shansi. Bull. Geol. Soc. China. Vol. XII, no. 2.)

A. CHINGSHIHILING (青石嶺 LOC. 32)

The Chingshihling site, corresponding to Andersson's Locality 66, lies about 300 meters north of the Chingshihling village and 4 kilometers northeast from the Chingsing Coal Mines. The deposits consist of sandy breccia and are located on the half slope of a limestone hill of Ordovician age. On account of the luxuriant growth of grass and corn at the time of our visit, the exact boundary of the former with the limestone was difficult to trace. The exposed part indicates that the deposits form a long stretch about 30 meters long and 4 meters high. The sediments appear to be quite uniform; no clear stratification was observed.

The fauna of this locality is rather poor; all the specimens were found in fragmentary and scattered condition, but they indicate a large number of species. Up to now 14 forms have been recorded as follows:

Amphibia

Bufo sp.—A broken tibio-fibula.

Mammalia

Carnivora:

Canis sp.—The presence of *Canis* is possibly indicated by one isolated M_1 .

Ursus sp.—Isolated P^4 , M^1 , M_1 and canines. Size comparable with *U. arctos* L.

Hyæna cf. *sinensis* Owen—Isolated premolars and greatly worn M_1 . Referable to "*Hyæna sinensis*" (Owen) Zdansky¹.

Felis sp.—An isolated lower canine; size similar to *F. pardus* L.

Rodentia:

Hystrix sp.—One isolated tooth, possibly P_1 ; specific identification impossible.

Microtinae indet.—One isolated M_1 (or M^2).

¹ Pei, W. C.—On the Carnivora from the *Sinanthropus* site at Choukoutien. Pal. Sin., Ser. C. Vol. VIII, Fasc. 1, 1933 (in press).

Perissodactyla:

Equus sp.—Isolated upper and lower teeth and foot bones. Size large; probably closely related with *E. sanmeniensis* Teilhard and Piveteau.

Rhinoceros sp.—Isolated upper and lower molar. According to their size and feature, they may be referred to the Choukoutien *R. cf. mercki*, but not *R. tichorhinus*.

Artiodactyla:

Sus cf. lydekkeri Zdansky—Isolated upper and lower premolars and molars. They are identical with the Choukoutien *Sus*.

Pseudaxys grayi Zdansky—Two complete lower jaws, numerous isolated teeth and broken foot and limb bones. According to their tooth structure, they are identical with the Choukoutien *Pseudaxys*.

Cervus (Euryceros) pachyosteus Young—Two lower jaws (but without teeth preserved), one broken upper jaw, many isolated teeth and limb and foot bones. The shape of the lower jaws is exactly the same as in the Choukoutien thick-jawed deer.

Primate:

Macacus sp.—One isolated M_1 ; size and structure similar to the Choukoutien *Macacus robustus* Young, and much smaller than *Procynocephalus* which is found at Kutitsun, not far from the present locality.

From the same locality two forms had previously been collected by Dr. Andersson. One is a deer, *Cervus* sp. described by Zdansky¹, the other referred to the Pontian *Sus (Propotamochoerus) hyotherioides* Schloesser by Pearson². The determination of Miss Pearson was based on the broad, short and triangular shape of M^3 . But the rich materials of *Sus lydekkeri* of Choukoutien shows that such a type of molar is most probably due to a sexual difference and

1 Weitere Bemerkungen über fossile Cerviden aus China. Pal. Sin., Ser. C, Vol. V, Fasc. 4, p. 12.

2 Chinese fossil Suidæ. Pal. Sin., Ser. C, Vol. V, Fasc. 5, p. 61.

has no specified value. The fragmentary teeth of deer described by Zdansky are most probably referable to *Cervus pachyosteus*.

Age of the Deposits.

The fragmentary state of the fossils does not allow a thorough determination, but there is sufficient to give a general idea of the fauna. All the species are known in the Choukoutien deposit. The *Hyæna*, *Sus* and the thick-jawed deer are probably identical with those found in this latter locality. In full accord with the general geology of the deposits, these palæontological evidences prove that the Chingshihling breccia is a fissure deposit similar to and contemporary with that of Choukoutien.

B. KUTITSUN (固坻村 LOC. 33)

This new locality was found by one of our technicians about 3 kilometers east of Chingshihling. The geological conditions of the site are indicated in

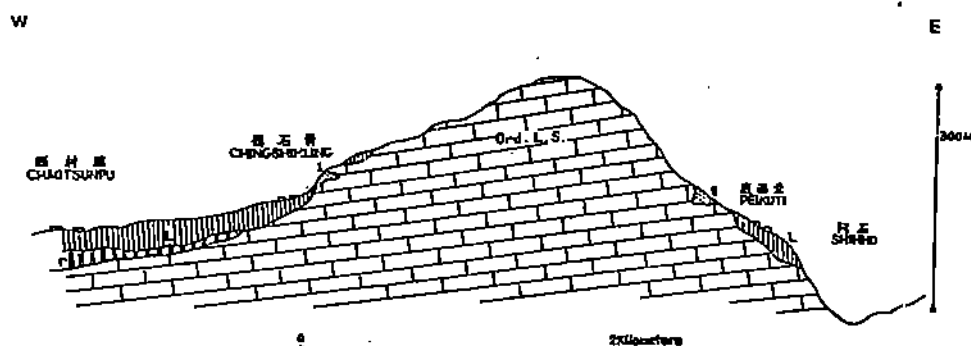


Fig. 1. Geological Section between Chaotsunpu and Peikuti. Ord. L. S., Ordovician limestone; r, reddish clays; L, loess; 1 and 2, fissure deposits of Chingshihling (Loc. 32) and Kutitsun (Loc. 34) respectively.

Text-figure 1. The fissure is smaller, but occurs at a lower level than the former one; the sediments are decidedly redder and more sticky.

The fossils collected from Kutitsun are poor, and consist of the following species.

Carnivora:

Hyæna sp.—One isolated P^3 ; specific determination impossible.

Felis sp.—One broken canine; size slightly larger than *Lynx*.

Perissodactyla:

Equus sp.—Two fragmentary lower molars and a large incisor.

Rhinocerotinae indet.—Fragmentary teeth and foot bones of a rather small size.

Artiodactyla:

Cervus sp.—A few isolated teeth and broken foot bones belonging to a large form. Specific determination impossible.

Gazella sp.—One incomplete horn core, a few isolated teeth, and foot bones.

Bovidae indet.—Three broken teeth and several astragali. Closer determination not possible.

Primate:

Procynocephalus cf. *wimani* Schlosser (vide Fig. 2).—One broken upper jaw with M^2-M^3 (M^1 broken). Length M^2-M^3 , 27 mm; length and breadth of M^2 , 13 and 13.5 mm. The teeth differ from *Macacus* teeth by their larger size, more corrugated enamel, and also by their shape: inner cusps stronger than the outer ones; crown broader anteriorly than posteriorly. All these characters correspond closely with *Procynocephalus wimani* Schlosser.

Age of the Deposits.

As proved by the presence of a Bovid (and probably of *Equus*) the Kutitsun fissure deposits cannot be earlier than the Sanmenian. On the other hand, the absence of such forms as *Euryceros*, does not permit us to synchronize them surely with the Choukoutien formation. The possibility therefore is open that they may represent a formation of a post-Pontian and pre-Choukoutien (that is of a true Sanmenian or Nihowan) age. This latter hypothesis is supported by the following facts:

1. Special character and staining of the deposits.
2. Existence in the vicinity of the possibly pre-Choukoutien Nanyeli fissure.
3. Occurrence in such localities as Tangshan of pre-Choukoutien fissure deposits.¹
4. Occurrence in the fissure of *Procynocephalus wimani*. This form is most probably wrongly referred by Schlosser to the Pontian; but there are

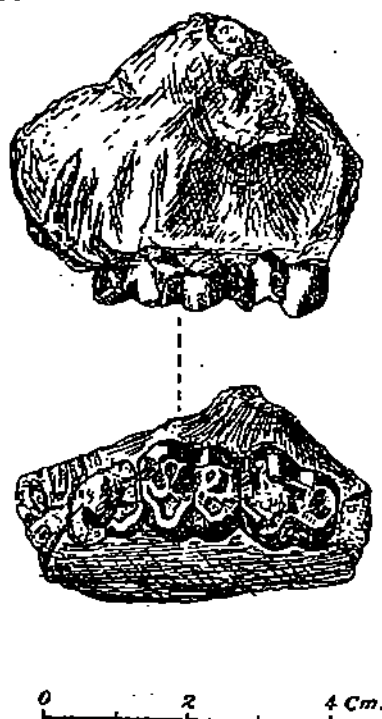


Fig. 2. Upper left jaw of *Procynocephalus wimani* as the $M^2=M^3$. nat. size.

some reasons for believing that it was found in some of the Sanmenian deposits (*Siphneus tingi* beds) so widely represented in W. Honan. Recently remains

1 Pei, W. C.—On a collection of mammalian fossils from Chiechiashan near Tangshan. Bull. Geol. Soc. China, Vol. IX, No. 4, 1930.

of the same *Procynocephalus wimani* have been recovered from the oldest parts of the Choukoutien formation.

2. OTHER NON-FOSSILIFEROUS DEPOSITS

Just as in Choukoutien, many pockets and fissures filled by red clay are frequently found along the Chengtai railway, from Houluh sien to Chinghsinghsien wherever the Ordovician limestone is exposed. They stop at an elevation of about 70 meters above the present river bed. As an example of such filling we give a section (Fig. 3) taken near the Nanchen Village along the branch railway of the Chinghsing Coal Mines. The fissures are entirely filled by clay-like, sometimes brecciated sediments. Capping the limestone

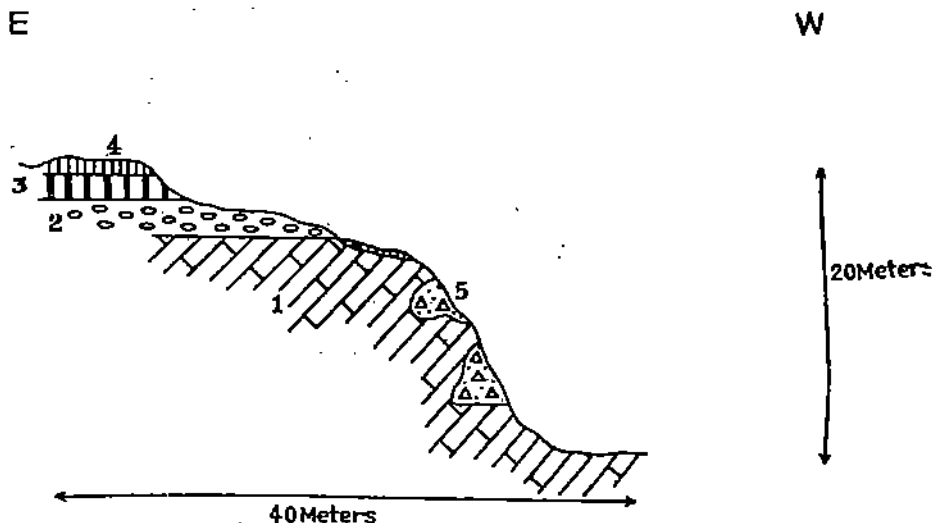


Fig. 3. Section near Nanchen. 1. Ordovician limestone 2. Basal gravel of reddish clays. 3. Reddish clay. 4. Loess, 5. Fissure deposits.

hill there is a large layer of gravel, sometimes very extensive, representing the basal gravel of the reddish loam so well developed in that area. The loess forms only as a thin mantle covering the country.

The gravel and reddish loam are well exposed along the southern bank of the river near the station Nanhotou (南河頭), and Shihchiaotou (石橋頭) etc. (Fig. 4).

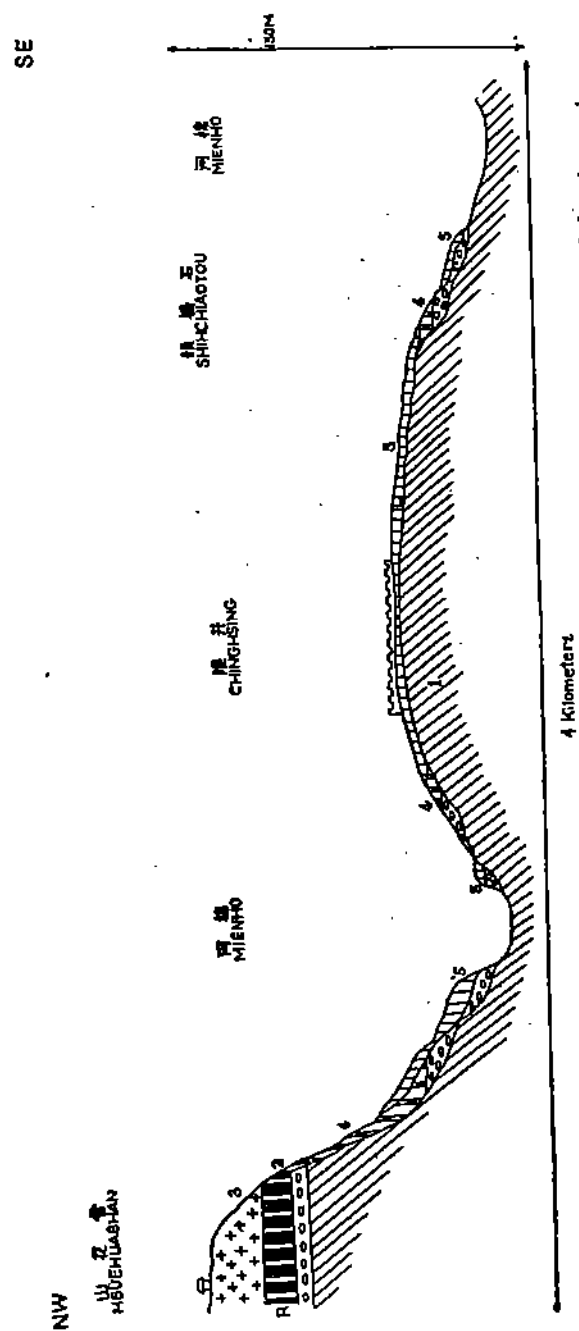


Fig. 4. Sketch section between Hauehuashan and Shihchiatou. 1. Old floor; 2. Red clay with basal gravels; 3. Basalt; 4. Reddish clays with basal gravels; 5. Loess with basalt gravels.

It might be observed that these conditions are closely similar to the conditions of the Choukoutien area: the upper gravels corresponding broadly to the Choukoutien "Upper Gravel" and the brecciated fissures to the true Choukoutien formation¹.

3. ON THE AGE OF THE RED CLAY FORMATION BELOW THE HSUEHHUASHAN BASALT

The problem of the basalt flow of Hsuehhuashan and its relations with the underlying sediments has been clearly discussed by C. C. Wang². Basing chiefly on physiographical evidences Mr. Wang concludes that the basalt flow is Upper Pliocene (post-Pontian) in age. Our observations have substantially verified Mr. Wang's conclusion.

The generalized section from Hsuehhuashan to Shihchiaotou given in Fig. 4 shows the relationship observed between the various late Cenozoic deposits in the area. Below the basalt the red clay with its underlying basal conglomerates is clearly recognisable. From this formation we did not find any trace of the fossil landsnails recovered by Mr. Wang³; nor, of course, of any basalt fragment. On the other hand, along the slopes of the hill there extends a reddish loam containing concretions, fossil *Helix*, and fragments of basalt. From these facts we are inclined to think that two different red formations occur in these localities. The old one just below the basalt is of Pontian age as dated by the physiographical stage; and the second one of a later, most probably, Choukoutien age, as indicated by the elevation of its basal gravel, by the light staining of the clay and by the fresh appearance of the fossil shells. If so, this later red loam would represent the open air sediments contemporary with the fissure deposits described above and the age of the basalt would be definitely fixed as intermediate between the Lower Pliocene (Pontian) and the Lower Pleistocene (Choukoutien).

1 Teilhard de Chardin, P. and C. C. Young—Preliminary report on the Chou Kou Tien fossiliferous deposit. Bull. Geol. Soc. China, Vol. VIII, No. 3, 1930.

2 Wang, C. C. *ibid.*

3 Described by Dr. Ping. Pal. Sin., Ser. B, Vol. VI, Fasc. 5, pp. 7-13, 1930. According to Mr. C. C. Wang the Gastropoda remains collected by him were found surely from the clay just below the basalt, so that there remains but little doubt in admitting a Pontian age for these fossils, although in many respects (preservation and coloration etc.), they might just as well be derived from a later deposit.