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# PRELIMINARY DESCRIPTION OF A BONE-DEPOSIT AT CHOW-KOU-TIEN IN FANG-SHAN-HSIEN, CHILI PROVINCE.

By J. G. ANDERSSON.

In February this year I was told by Mr. J. McGregor Gibb, Professor of Chemistry at the Peking University of the Methodist Episcopal Mission, of the occurrence of a deposit of fossil bones near Chow-Kou-Tien, the terminus of the Liu-Li-Ho—Chow-Kou-Tien branch line of the Peking-Hankow railway.

According to Mr. Gibbs's relation the deposit is situated about 2 li SW from Chow-Kou-Tien railway station, and forms a pillar-like outcrop some few feet in height on the hill slope. Mr. Gibb had brought with him several specimens of the deposit, which he kindly showed to me. They were rather big pieces of the well-known red clay filling crevices in the limestone of Chow-Kou-Tien. In this clayey matrix there were numerous small bones, many of them well preserved and apparently mostly belonging to birds, to judge from the hollow fociles. The name of the place, Chi-Ku-Shan, was interpreted by Mr. Gibb as referring to the accumulation of birdbones in this deposit, that he considered as the refuse-heap of some species of birds of prey, which have been living at this place.

As Mr. Gibb's description sounded very interesting, I went the 22—23 instant to Chow-Kou-Tien to examine the deposit, accompanied by my wife who rendered very good assistance in collecting material of the fossil bones.

Mr. Gibb's description proved to be in every respect instructive and the place was easily found.

The bone-deposit is situated at the west side of a hill consisting in its western, lower part of limestone dipping in one place E 30° S 35° and at the bone-deposit E 17° S 30°. At the top of the hill there are scattered big slabs and numerous small pieces of yellowish greengrey slate. Some obscure and broken outcrops of this slate seemed to indicate a gentle dip towards N.

The bone-deposit is situated in a slight depression of the ground, a depression which is evidently only an abandoned limestone-quarry with foundations of old lime-kilns, situated N.W., as well S.E. from the bone-deposit. The said depression (or old quarry) is in N. and E. limited by vertical limestone escarpments, but is

towards W. and S. relatively open with smaller outcrops of limestone, partly covered by red clay and refuse from the lime-industry. In the high limestone walls N.E. from the bone-deposit there are several fissured fillings of red clay. The biggest of these, about one meter in width, is a good illustration to the original shape and mode of formation of the bone-deposit.

Between this limestone-cliff and the bone-deposit there is a steep slope exhibiting a reddish, distinctly bedded sandy clay, the bedding planes of which are covered with minute particles of the soft slate, above mentioned. This bedded clay evidently



*Fig. 1.*

The bone-deposit formed as an isolated pillar. Seen from S.W.

is a deposit formed principally by washing out and redepositing the ordinary unstratified red clay occurring mostly as fissure-fillings in the limestone, as above described.

The bone-deposit forms in its present state an isolated pillar standing upon a small limestone ridge dividing the old quarry in two parts. Evidently the limestone has been quarried and carried away all round the present pillar, as marks of old workings are visible upon the limestone everywhere except on the southwestern side of the pillar where two natural joint-planes, which converge

and meet downwards, are seen forming the foundation of the clay-pillar (comp. fig. 2).

The shape and dimensions of the pillar are illustrated by figure 1. It appears from N.E. only 3.1 M high, whereas the views from W., S. and E. exhibit other 2.4 M downwards hidden in the crevice between the two joint-planes just described.

It can hardly be doubted that the clay-mass once formed the filling of a small cave or crevice in the limestone, and that this mass has been isolated by the quarrying of the limestone. It is not possible to reconstruct the exact dimensions of the cave, but it seems probable that its dimensions were small and roughly

indicated by the present shape of the clay-pillar. It is evident that the lime-burners have taken special care to leave this rather delicate structure untouched, and it is even apparent that the limestone-ridge has been left simply for the purpose of supporting the clay-pillar.

The pillar consists all through of the ordinary red clay, which is so common everywhere at Chow-Kou-Tien filling fissures and hollows in the limestone. A noticeable feature is here the common occurrence in the clay of small pieces of soft greenish yellow slate. At first these pebbles puzzled me, as only limestone was seen in the immediate surroundings. But when examining the top of the hill I found there outcrops of the slate, and it is evident that its occurrence as pebbles in the bone-clay (and in the stratified clay described above) is due to waste-creep down the hill-slope.

The most conspicuous feature of the clay in the pillar is the abundance of small bones occurring in fact so frequently that the mass can be said to form a kind of bone-breccia en miniature. The bones are very common from the base of the deposit to a height of more than 3 meters but the uppermost part of the pillar seems to be rather barren. The lower, fossiliferous part of the pillar exhibits a rather distinct stratification, as shown by the figures. When seen from S. and S.E. these beds look horizontal, but on the west side they show a southward dip, as illustrated by fig. 1. This dip is apparently due to the steep southwestward slope of the limestone-fissure forming the foundation of the pillar.

An approximate calculation gives the result that the volume of clay contained in the pillar is 5—6 cubic meters. During our visit we excavated only a small part of the mass (perhaps 2 % of the whole) in the middle part of the pillar (the part projecting to the left in fig. 2). Here we found the following kinds of bones:

*Birds,*

*Rodentia*, probably two different species,

*Carnivora*, a smaller species and a bigger one, represented by an isolated canine tooth.

It seems pretty safe to suggest that the cave was inhabited by some kind of carnivorous mammal, which carried its prey into it, where the refuse from the meals

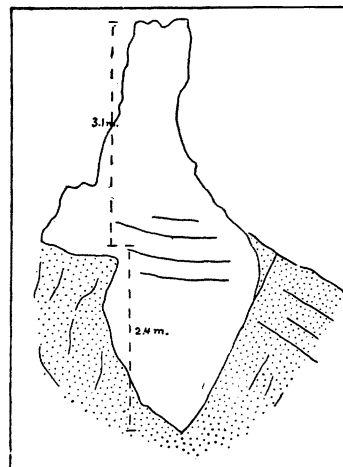


Fig. 2.

The same pillar as on fig. 1.  
Seen from S.W.

accumulated together with clay washed into the cave from the slope above. It seems probable that the stratification of the clay is due to the action of the animals inhabiting the cave.

The age of the fauna cannot be ascertained with certainty until the material collected has been specifically determined. The general type of the fauna is rather modern, and its occurrence in a kind of cave points in direction of pleistocene age. From geological and climatological premises I have arrived at the conclusion that the red clay is older than the loess and formed during a warm-humid climate. These considerations rather indicate pliocene age of the red clay. But it is possible that in this case the deposit is secondary, formed by redeposition at a much later date than the formation of the main mass of the red clay.

The name of the place, Chi-Ku-Shan certainly refers to this bone-deposit which evidently has attracted the interest of the local population.

A man who visited the place when we were working there told the following story:

"Here was more than hundred years ago a cave inhabited by foxes who caught all chicken in the neighbourhood. In the course of time some of the foxes became fairies. Once a man went to kill the foxes, but the fairies made him mad."

It seems not improbable that the lime-burners carefully avoided the bone-deposit from fear of the ghosts attached to it.

Peking, March 1918.

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