

NEW MATERIALS OF THE EARLIEST PRIMATE KNOWN IN CHINA

— *Hoanghoniuss stehlini* —

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Fossil primates of Early Tertiary age are very rarely found in China. The earliest possible primates are *Anagalopsis kansuensis* Bohlin, *Adapidium huanghoense* Young and *Hoanghoniuss stehlini* Zdansky. *Anagalopsis* was based on the excellent material of a nearly complete skull with the lower jaw and part of the skeleton from the Shih-chr-ma-ch'eng in the Hui-hui-p'u area of Western Kansu. It is probably of Early Tertiary age and is generally referred to the tupaoids which are recently regarded by some authors to be a group of Primates instead of Insectivora. *Adapidium* was based on a fragment of right lower jaw bearing the last two molars collected from the supposedly uppermost Eocene or Lower Oligocene lacustrine Yuanchu formation occurred in the middle Hoangho Valley. But Simpson has expressed the view that it is definitely not a primate. Better materials are needed to give a definite answer.

Hoanghoniuss is only imperfectly known from a left mandibular fragment with the last two molars and an isolated right upper molar. The type specimens collected and described by Zdansky were from the same horizon and localities as *Adapidium*. It bears some resemblances to the early tasioids, but its affinities are wholly uncertain. Therefore, no early fossil primate from China can be so far put on record with certainty.

During the 1953 Expedition of the Institute of Vertebrate Paleontology headed by one of the authors (Chow) to the Early Tertiary Yuanchu Basin in Southern Shansi and Northern Honan, several fragmentary jaws with some well preserved cheek teeth which may be referred to *Hoanghoniuss* were collected. Based on these materials, its primate status can be established.

The Early Tertiary Yuanchu formation of the Yuanchu Basin of the Lower Middle Hoangho (or Yellow River) is located on the boundary of the districts of Yuanchu, Southern Shansi, and of Mienchi, Honan. Two main mammals-bearing horizons are known in the series. The lower horizon is represented by the locality (Jentsen) on the south bank of the Hoangho in Mienchi about one kilometer west of the village Jentsen (Locality 7 of Zdansky) and was considered to be of latest Eocene (Ludien) in age according to Zdansky. The upper horizon represented by the locality on the north bank of the Hoang-

ho (Locality 1 of Zdansky or "River Section" of Andersson) was considered to be most probably of early Oligocene (Sannoisien) according to the same author. The fossils of *Adapidium* as well as those of *Hoanghoni* described by Zdansky are from upper zone of the formation, while all the new materials of *Hoanghoni* described here are from the lower zone of the series. Besides, one of the leading form, *Cricetodon schaubi*, from the upper zone which was thought to be diagnostic of early Oligocene age has also been found in the lower horizon of the formation. Thus from the mammalian fossils now known from the formation as a whole, the fauna is most probably of the latest Eocene comparable with those of Sharamurum and Irdin Manha of Inner Mongolia in North China.

DESCRIPTION

The material consists of (1) a right mandibular fragment with M_1 and M_2 (No. 1), (2) a left mandibular fragment with P_4 , M_1 and M_2 (No. 2), (3) an isolated left M_1 (No. 3) and (4) a right maxillary fragment with P^4 and M^1 (No. 4). Nos. 2 and 4 are probably of one individual, so the materials belong to at least to three individuals.

The measurements of the teeth together with Zdansky's are given in the following table. The lengths are only approximate because the structure of the teeth prohibits accurate placing of caliper points. The depth of No. 1 jaw on internal side below M_2 is 6.9 mm. Judged from its greater breadth than the present specimen, Zdansky's upper molar is probably the second one, as the second lower molar is also wider than the first.

All the upper cheek teeth are very wide transversely while all the mandibular teeth are flattened from side to side. The inner cusps of the upper series and outer cusps of the lower series set well in from the margin. A brief description of the morphological characters of different teeth is given below.

1. The upper fourth premolar (fig. 1; Pl. I, 1 and 2)

The upper last premolar is very wide transversely with a large and high external cusp or deutercone and a smaller and much lower internal cusp or protocone. The

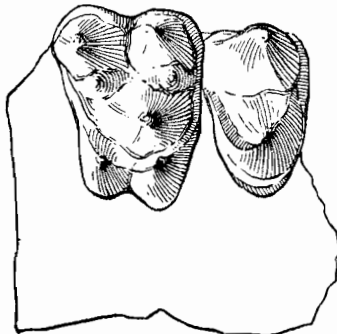


Fig. 1 Crown view of right maxillary fragment with P^4 and M^1 .

prominent apex of the deuterocone rises a little higher than the cusps of M¹.

The crown is oval in contour. When viewed from the lingual side, it is clearly seen that both the external and internal cusps are inclined anteriorward. On the anterior side, sharp ridges running from the tips of the two cusps downward and toward the intermediate incisure. The slope of the external cusp faces lingualward and backward, while that of the internal cusp, buccalward and backward. Both slopes are even.

The cingulum is slightly marked on the buccal side and vestigial on all other sides. It has three separated roots.

2. The upper first molar (fig. 1; Pl. I, 1 and 2)

This tooth has the primitive tritubercular crown bearing one internal cusp, protocone, and two external cusps, paracone and metacone. The external cusps are of similar size, but larger than the internal one. The cusps are joined by sharp ridges. It is wide transversely, and has large protoconule and metaconule and two small accessory cusps (protostyle and hypostyle) on the internal cingulum.

As described by Zdansky, the anterior side of the tooth is convex and the posterior side, concave. The buccal side is longer than the lingual one. The sharp hind edge of the paracone meets the sharp anterior edge of the metacone in forming a sharp incisure. The hind edge is shorter and ends in the outer cingulum which extends forward along the basal parts of the two external cusps and turns rapidly lingualward at the antero-external angle of the paracone where a small swelling or parastyle is formed. The external cingulum after turning lingualward at the parastyle runs along the anterior basal portion of the paracone and gradually disappears.

The paracone and metacone are equally developed. The protocone is larger than the two external cusps but is slightly lower. The protocone is of regular semilunar shape with its two limbs extending antero-buccalward and postero-buccalward. The two limbs are attached to the protoconule anteriorly and to the metaconule posteriorly which situate just on the lingual side of the paracone and metacone.

Measurements (in mm)

	P4	M1	? M2	P4	M1			M2			M3
Specimen	No. 4	No. 4	Zdansky's	No. 2	No.1	No.2	No.3	No.1	No.2	Zdansky's	Zdansky's
Length	3.0	4.0	4.0	3.9	4.2	4.2	4.5	4.1	4.0	4.1	4.7
Breadth	3.9	5.2 5.2	5.4(ant.) ?6.5(post.)	2.3	2.9	2.8	2.9	3.8	3.4	3.6	2.7

The posterior cingulum begins from the hind side of the metacone. It extends lingualward along the metaconule and becomes wider and higher at the inner side of the protocone to form two prominent accessory cusps, hypocone or hypostyle and protostyle, after which the cingulum again decreases and disappears at the junction of the protocone and the protoconule. It is three-rooted.

3. The lower fourth premolar (fig. 2; Pl. I, 3-5)

The last premolar bears one external and one internal cusps and a short heel. It is slightly enlarged. The external cusp or deuterocoid is much larger and higher than the internal one which lies a little posterior to the former. The external cusp is slightly higher than the level of the molars. The crown is triangular in cross-section, presenting anterior, medial and lateral borders. The basal cingulum surrounds the crown on all sides and it rises slightly at the anterior edges of both cusps and at the posterior end of the heel.

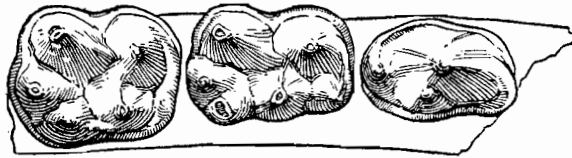


Fig. 2 Crown view of left mandibular fragment with P₄, M₁ and M₂.

It has two separate roots placed one in front and one behind.

4. The lower first and second molars (fig. 2; Pl. I, 3-5, Pl. II, 6-9)

The molar teeth are provided with five or six cusps. The trigonid is only slightly above the level of the talonid. The latter has larger and deeper basin than the former. The trigonid has the complete set of three cusps, protoconid, paraconid and metaconid. The protoconid is connected with the metaconid by an oblique, weakly developed ridge. The paraconids of both M₁ and M₂ are lingual in position. It is still largely independent from the metaconid on M₁, but is vestigial and mostly connate with the metaconid on M₂. The protoconid and metaconid are of similar size. The talonid also has three cusps. The hypoconid is more robust and opposite the entoconid, its anterior edge is continued towards protoconid. On both M₁ and M₂, hypoconulids are as large as entoconids and somewhat connate with each other. Both molars become gradually broader from before backward. The cingulum is well marked on the buccal side and on the buccal half of the anterior and posterior borders. The second molar is slightly larger than first one. The lower third molar is missing in the present specimen. According to Zdansky, M₃ has stronger hypoconulid, placed more to the lingual side, forming a relatively narrow third lobe. Its cingulum on the anterior two lobes is restricted.

AFFINITIES

The affinities of the *Hoanghoni* are so far unknown. Recently, it was treated for convenience in the subfamily Omomyinae Wortman by W. C. Osman Hill (1955). However, from the description of the morphological characters of the cheek teeth mentioned above, the present specimen is clearly referable to subfamily Anaptomorphinae Simpson as it has its paraconids lingual in position, and more or less connate with metaconids. It is more comparable to the American Eocene tarsioids *Tetoni* than the other genera. However, the American specimens of *Tetoni* were found in Lower Eocene deposits while the present specimen is assigned from the evidences of mammalian fossils to the horizon of Upper Eocene. This provides a clue to the possible relationship between the earliest primates in America and Asia.

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中国已知的最早灵長類——黄河猴——的新發現

(中文摘要)

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在中国发现的、可能是最早的灵長类的化石，計有甘肅安格勒兽、黄河古狐猴和斯氏黄河猴。安格勒兽属于树鼯类，以前一般都把树鼯类列入食虫类，最近有人主張归入灵長类。

黄河古猿猴是否为灵长类，目前还难确定，辛浦生以为肯定不是灵长类。至于山西垣曲的黄河猴，以前仅发现有左下颌骨的一碎块，带有最后两个臼齿以及一个单独的上臼齿，经师丹斯基研究后，认为与古眼镜猴有若干相似之处，但其系统地位不能确定，因此至今还没有能肯定在中国发现的最早灵长类。

1953年中国科学院古脊椎动物研究所工作队在作者之一（周明镇）领导下在山西南部和河南北部的第三纪初期垣曲盆地又发现了黄河猴的新材料，计有（1）右下颌骨碎块，带有 M_1 和 M_2 ；（2）左下颌骨碎块，带有 P_4 、 M_1 和 M_2 ；（3）一个单独的 M_1 ；（4）右上颌骨碎块，带有 P^4 和 M^1 。根据这些新发现，可以肯定黄河猴在灵长类系统中的地位。发现化石的地层，确定是始新统上部。

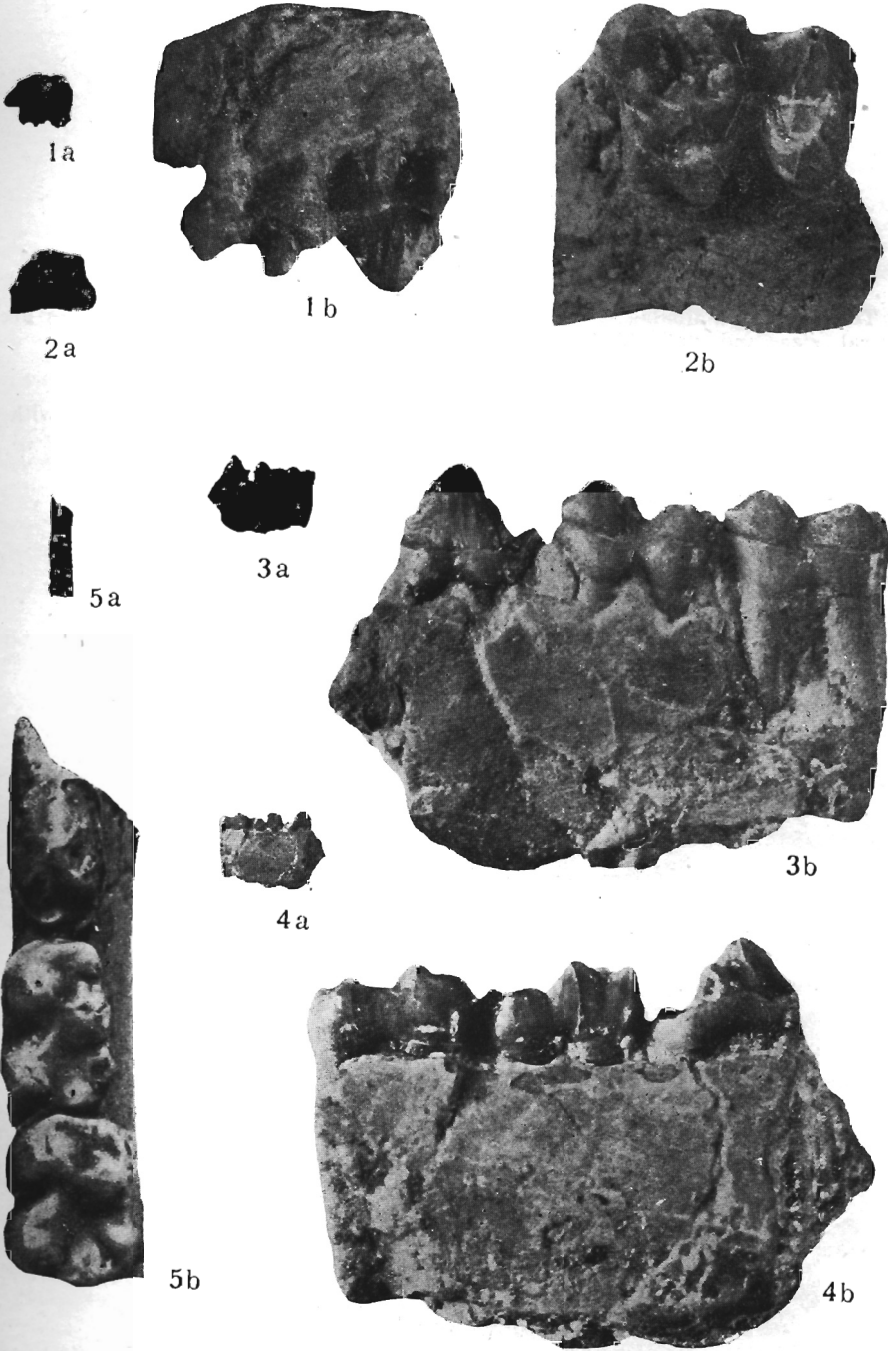
本文对这些材料，进行了测量和描述。结论指出黄河猴可归入 *Anaptomorphinae* 亚科，而与美洲发现的 *Tetonius* 属较为相近。对美洲和亚洲最早的灵长类之间可能存在的关系提供了线索。

Explanation of Plate I

Jaw fragments of *Hoanghonius stehlini*

(All "a" figures are of natural size and "b" figures, magnified about five times)

1. Outer, and 2. crown views of right maxillary fragment with P^4 and M^1 .
3. Outer, 4. inner and 5. crown views of left mandibular fragment with P_1 , M_1 and M_2 .



Explanation of Plate II

Tooth and mandibular fragment of *Hoanghonius stehlini* (All "a" figures are of natural size and "b" figures, magnified about five times).

6. Isolated left M_1 , crown view.

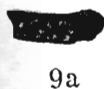
7. Outer, 8. inner and 9. crown views of right mandibular fragment with M_1 and M_2 .



7b



8b



9b