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NEW REMAINS OF *CHILOTHERIUM INTERMEDIUM* FROM THE CHINJI FORMATION OF THE SIWALIKS

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Abstract: The material collected from the Chinji Formation includes one upper premolar; two upper molars and a third lower molar. All the teeth are partially damaged but preserved enough to show the morphological characters of *Chilotherium* s*ps*. The lower dentition follows the general rhinocerotid pattern with two contiguous crescents open lingually. In the studied specimens, the labial cingulum is absent in upper molars, which is the characteristic of *Chilotherium sps.*
Keywords: *Chilotherium,* Chinji formation, Lower Siwaliks, Molars.

INTRODUCTION

Ringstrom (1924) established the genus *Chilotherium,* referred two species from the Siwalik into the genus *Chilotherium, i.e., C. blanfordi* (Lydekker, 1884) and *C. fatehjangense* (Pilgrim, 1910). Foster-Cooper (1934) changed *Aprotodon* smith-woodwardi, a new genus and species established by him in 1915 to *Chilotherium* smith-woodwardi. Heissig (1975) attributed *C. blanfordi* and *C. fatehjangense* to the genus *Aprotodon*. Qiu and Xie (1997) reassigned *Chilotherium* smith-woodwardi to its original name *Aprotodon* smith-woodwardi. There are essential differences between *Aprotodon* and *Chilotherium. Aprotodon* has a proportionally larger and wider symphysis than *Chilotherium*; the horizontal ramus of *Aprotodon* is curved not only in side view (lower border curved) but also in dorsal view (both extremities deflect outward), which is seldom seen in rhinocerotids; *Aprotodon* has semi molariform premolars, while *Chilotherium* fully molariform (Qiu and Xie, 1997). Matthew (1929) revised *Rhinoceros sivalensis* var. *intermedius* described

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by Lydekker (1884) from Siwalik into *C. intermedium*, and Heissig (1975) placed *C. intermedium* in the new subgenus *Subchilotherium*. Heissig (1989) raised the subgenus *Subchilotherium* to the genus rank, so the species became *S. intermedium*. The mandibular symphysis of *Subchilotherium* is narrow, and different from the widely expanded one of *Chilotherium*. Matthew first suggested that this species, assigned by Lydekker to the genus *Rhinoceros* and by Pilgrim to the genus *Aceratherium*, should be properly classified in the genus *Chilotherium*.

So, there is confusion on the validity of the genus *Chilotherium* in the Siwalik faunas (Deng, 2006). Although *Chilotherium intermedium* is typically of Lower Siwalik age, there are several specimens from the Middle Siwaliks in the American Museum collection that would seem to be referable to this species. The differences between these specimens and the typical *C. intermedium* do not seem to be enough to warrant their separation as a distinct form, so they are included within the species under discussion, and this species is thereby considered as ranging through the Chinji and the Middle Siwalik beds.

SYSTEMATIC PALAEONTOLOGY

Family: Rhinocerotidae Owen, 1845
Subfamily: Rhinocerotinae Owen, 1845
Tribe: Chilotheriini Qiu *et al*., 1987
Genus: *Chilotherium* Ringstrom, 1924

Chilotherium Intermedium (Lydekker, 1884)
(Plate 1, Figures 1-5)

Type species

Chilotherium anderssoni Ringstrom.

Type Specimen

GSI C34, a second right upper molar.

Diagnosis

A chilotherium of medium size. Upper incisor absent; cheek teeth hypsodont; parastyle fold indistinct or lacking; protocone constricted, ectoloph greatly elongated, mandibular symphasis transversely expanded. Lower incisor directed up and outwardly, slight constriction of protocone. The trigonid is angularly V-shaped. On the lower molars the lingual and labial cingula are absent, the hypolophid reclines backward and the entoconid have a flat lingual margin.

Included Species

Chilotherium intermedium, Chilotherium blanfordi.

Distribution

Lower to Middle Siwaliks.

Referred Material

PUPC 97/84 a left fourth upper premolar, PUPC 86/146 a damaged first upper molar, PUPC 02/150 a damaged left first upper molar, PUPC 02/153 a damaged right upper second molar, PUPC 02/155 a right third lower molar (PUPC-Punjab University Palaeontolgical Collection).

Locality

Chinji (Lower Siwaliks).

DESCRIPTION

PUPC 97/84 is a left fourth upper premolar. The specimen is poorly preserved and even some part of the root is also preserved. The specimen is in middle wear and hypsodont. The less backward extension of the protoloph and the length width index confirms it to be an upper fourth premolar of the cheek teeth series. The parastyle is well developed and have a vertical groove, which is called parastyle fold. Protocone is constricted slightly. The protocone and paracone are fused to form protoloph. Parastyle and metastyle are present in the ectoloph. The ectoloph is flat in appearance and there is no median rib or mesostyle. Crista is absent in the premolar, however crochet is present which extends toward the median valley. The metacone and hypocone are fused to form

metaloph, which is present posteriorly of the premolar. The cingulum is also present in the metaloph and projects upward to form a postfossette. The median valley is narrow in the premolar but open transversely towards the crochet. The antecrochet is present along the inner wall of the protocone. The slight traces of cement are present posteriorly (along the metaloph). Due to the backward extension of the protoloph internal pass of the median valley is very much shallower. The protocone gradually increases in thickness from the apex to the cingular level. The metaloph like the protoloph is also in the form of sharp blade and from the metaloph a strong and pointed crochet projects in the median valley. Posteriorly the cingulum is being much raised and closes in the deep posterior valley. The hypocone is completely bound in with the metaloph. The premolar is quadrate hypsodont with the outer wall rather upright and being compressed considerably broader than long. The protoloph and metaloph are parallel.

PUPC 86/146 and PUPC 02/150 are damaged and partially broken first upper molars. The protocone anterior groove is very well developed. Lingual and anterior cingulum is well developed but posteriorly it is absent. Parastyle is present and the parastyle fold is not much prominent. The postfossette is triangular in outline and isolated. Ectoloph is rather flat and have traces of cement. Mesostyle and metacone rib are absent whereas metastyle is present which is broken at the apex of the crown. The specimen is in late wear and rugose. The enamel is thin all around the crown. The ectoloph is somewhat convex.

PUPC 02/153 is in middle wear and somewhat broken labially. The anterior cingulum is well developed and the enamel is rugose. The crochet and antecrochet are developed. The median valley is open. The protoloph and metaloph are well developed and run parallel.

PUPC 02/155 is the last molar and well preserved. It is in the middle stage of wear. Thick enamel is present. Both the anterior and the posterior valleys are located, and united. The trigonid is angularly V-shaped with the narrow and short paralophid and a right-angled metalophid with a slightly constricted metaconid. The talonid is U-shaped with the hypolophid and the entoconid with the posterior groove. No trace of

cement. There is neither lingual nor labial cingulum, but posteriorly the ectolophid groove is marked to the base of the crown. The molar is anteriorly suppressed but posteriorly not suppressed which shows it is the last molar. The paralophid is present and crushed. Hypolophid is oblique but transverse in occlusal view. The ectolophid groove is developed.

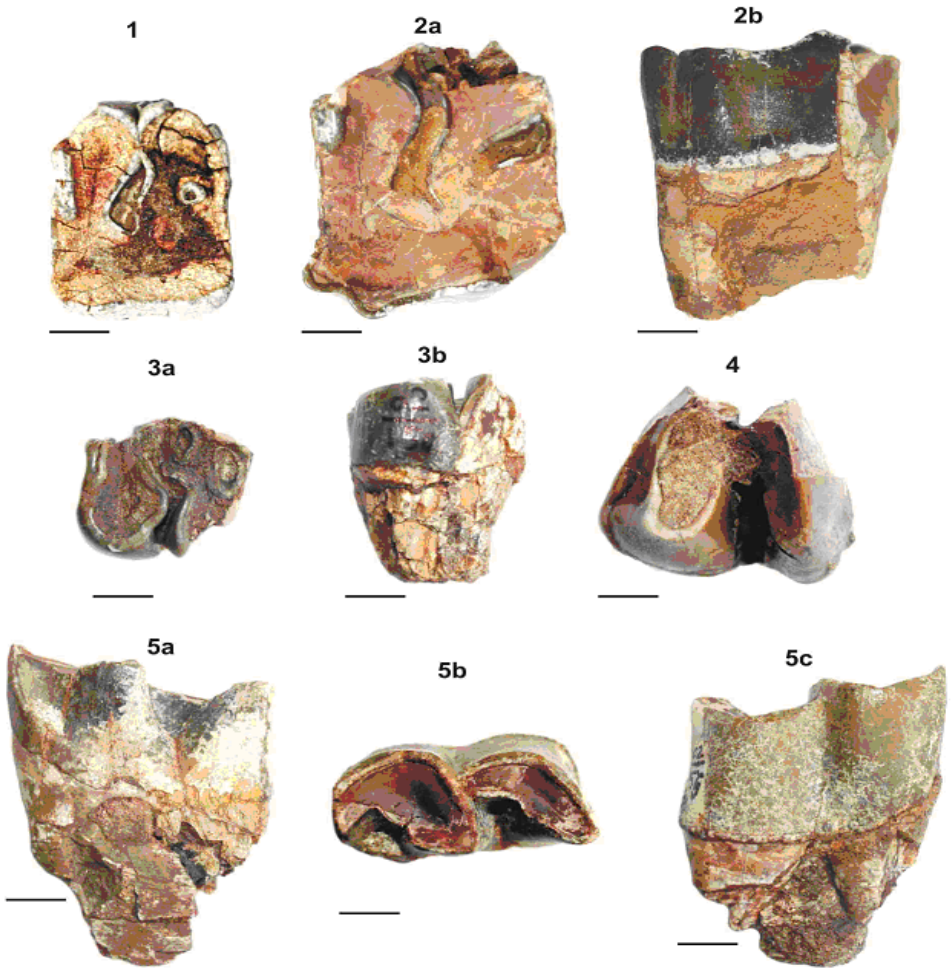

Plate 1: *C. intermedium* from the Chinji Formation. **1:** PUPC 97/84, occlusal view. **2:** PUPC 86/146, a = occlusal view, b = buccal view. **3:** PUPC 02/150, a = occlusal view, b = lingual view. **4:** PUPC 02/153, occlusal view. **5:** PUPC 02/155, a = lingual view, b = occlusal view, c = buccal view. Scale bar 10 mm.

DISCUSSION

The premolar has a constricted protocone, which is the characteristic of genus *Chilotherium*. The upper premolars are in late wear and many morphological features are not observed in this stage. However the presence of crochet and antecrochet, the constriction of protocone and bulbus hypocone allows us to identify the genus *Chilotherium*. In the upper molars the ectoloph is flat and broad with a strong parastyle and the protocone is much less constricted off from the protoloph (Colbert, 1935). In the lower dentition all the characters are observed like, V-shaped trigonid, absence of lingual and labial cingulum, the hypolophid reclines backward and the entoconid have a flat lingual margin. All the characters are observed in the studied lower dentition, which clearly identify the specimens belong to genus *Chilotherium* and species *Chilotherium intermedium.*

The specimens morphologically and metrically resemble to the species *Chilotherium intermedium* and the studied material is assigned to *Chilotherium intermedium*.

REFERENCES

COLBERT, E.H., 1935. Siwalik mammals in the American Museum of Natural History. *Trans. Amer. Phil. Soc., n.s.*, **26**: 1-401.

DENG, T., 2006. A primitive species of *Chilotherium* (Perissodactyla, Rhinocerotidae) from the Late Miocene of the Linxia Basin (Gansu, China). *Cainozoic Research*, **5**(1-2): 93-102.

FOSTER-COOPER, C. 1934. The extinct rhinoceroses of Baluchistan. *Philosophical. Trans., Royal Soc, of London*, Series B, **223**: 569-616.

HEISSIG, K. 1975. Rhinocerotidae aus dem jungtertiär Anatoliens. *Geologisches Jahrbuch*, Reihe B, **15**: 145-151.

HEISSIG, K., 1989. The Rhinocerotidae. In: D. R. Prothero and R. M. Schoch. *The Evolution of Perissodactyls*., Oxford University Press, New York: 399–417.

LYDEKKER, R. 1884. Additional Siwalik Perissodactyla and Proboscidea. *Memoirs Geological Survey of India, Palaeontologia Indica*, Series **10**, 3: 1-34.

MATTHEW, W. D. 1929. Critical observations upon Siwalik mammals. *Bull. Am. Mus. Nat. History*, **56**: 437-560.

OWEN, R., 1845. *Odontography*. Vols I-II. London: H. Baillise Publisher.

PILGRIM, G. E. 1910. Notices of new mammalian genera and species from the Tertiaries of India. *Records of the Geological Survey of India*, **15**: 63-71.

QIU, Z.X. and XIE, J. Y. 1997. A new species of *Aprotodon* (Perissodactyla, Rhinocerotidae) from Lanzhou Basin, Gansu, China. *Vertebrata Palasiatica*, **35**: 250-267.

QIU, Z.X., XIE, J.Y., YAN, D.F., 1987. A new chilothere skull from Hezheng, Gansu, China, with special reference to the Chinese "*Diceratherium*". *Scientia Sinica*, B (**5**): 545-552.

RINGSTROM, T.J., 1924. Nashorner der *Hipparion*-Fauna Nord-China. *Palaeontologica Sinica*, C, **1**: 1-159.

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