▼ Journal of Research (Science), Bahauddin Zakariya University, Multan, Pakistan.
Vol.13, No.2, December 2002, pp. 139-144 ISSN 1021-1012

A NEW *INDRATHERIUM* FOSSIL GIRAFFE *INDRATHERIUM COMPRESSUS* SP. NOV. FROM SIWALIK FORMATIONS OF PAKISTAN

Aleem Ahmed Khan[1] and Muhammad Sarwar[2]
[1]Zoology Division, Institute of Pure and Applied Biology, Bahauddin Zakariya University, Multan, Pakistan. [2]Zoology Department, University of the Punjab, New Campus, Lahore, Pakistan.

Abstract: The specimen P.U. P.C. No.87/13 is excellently preserved upper third premolar of the upper right side and is found from Sardhok, district Gujrat, Punjab, Pakistan. It belongs to the Pinjorian of the upper Siwalik formations. The P^3 is very large, transversely elongated, triangular and with pronounced para- and mesostyles. The upper premolars of the species under study were extremely compressed and the parastylic fold was highly pronounced. *Indratherium* is distinguished from other genera due to the striking excess of breadth over length in the molars. This feature must have been shown by its premolars as well. In other larger genera of the giraffidae, this feature is not exhibited. The specimen under study is fairly wider transversely than longer. The specialized characters of P.U.P.C. No. 87/13 warrant the erection of a new species *Indratherium compressus* sp. nov.

Keywords:- Giraffidae, *Indratherium*, para- and mesostyles, Siwaliks.

INTRODUCTION

First scientific mention of the Siwalik giraffes goes back to 1836 when Falconer and Cautley described a large massive giraffe, *Sivatherium giganteum* from the Upper Siwaliks. Since that time, a number of genera and species have been recorded from various formations of the Siwaliks by different workers such as Lydekker [1876, 1878], Pilgrim [1910] and Matthew [1929]. Biostratigraphical status of the Siwalik giraffids was first reviewed by Matthew [1929] and then by Colbert [1935]. The great variety of forms found in the Pliocene Asiatic shows the rapidity of evolution in the family giraffidae. The Siwalik giraffes may be placed in three subfamilies i.e. Palaeotraginae, Sivatheriinae and Giraffinae. Palaeotraginae comprises the genus *Giraffokeryx*. Paleotragines are also known elsewhere in the world. Sivatheriinae includes the genera *Sivatherium, Bramatherium, Hydaspitherium* and *Helladotherium.* Genus *Giraffa* is placed in the subfamily Giraffinae. *Giraffokeryx*, *Bramatherium* and *Helladotherium* are also found elsewhere. These 3 subfamilies emerged simultaneously but their migration to the Siwalik region occurred at different times. Palaeotragines and Giraffines came earlier than the Sivatheriines [Akhtar *et al*. 1991].

Siwalik Giraffes are of two types, one including smaller while the other comprising larger forms. The larger ones include the genera *Bramatherium*, *Indratherium*, *Hydaspitherium*, *Helladotherium*, *Sivatherium* and *Vishnutherium*. All of these are known from Upper and Middle/Upper Siwaliks. In the Potwar plateau, the upper Siwaliks are the

best exposed in Pabbi hills situated east of River Jhelum. Village Sardhok is situated in these low altitude hills, south of Lahore-Islamabad G.T. road (Fig. 1). The area surrounding this village offers the best exposure of the upper Siwaliks and is famous for the presence of larger Giraffids typical of the lower Pleistocene age i.e., Pinjorain [Khan 1987, Khan and Sarwar 2002].

MATERIAL AND METHODS

The specimen studied was collected in the upper Siwaliks, village Sardhok, district Gujrat, Punjab, Pakistan. Subsequently the specimen was thoroughly washed in the Palaeontological Laboratory of the Zoology Department, University of the Punjab. To remove the unwanted siliceous or clay material, light hammers, chisels and fine needles were used [Falconer 1845]. Various types of adhesives were used during preparation of the material. Photographs were taken with the help of Minolta 135 Camera. To obtain maximum contrast, the ratio of potassium bromide was changed during the preparation of developer for printing. The specimen collected during or after 1965 show the collection year and the serial of that year, i.e., P.U.P.C. 66/24. The upper figure denotes the collection year and the lower one, the serial number of the respective year collection.

ABBREVIATIONS

P.U.P.C	Punjab University Palaeontological Collection
H	Maximum preserved crown height
W	Maximum preserved crown width
L	Maximum preserved anteroposterior crown length
H/W Index	H/W x 100 (considering reconstructed measurements)
W/L Index	W/L x 100 (considering reconstructed measurements)

RESULTS

SYSTEMATIC PALEONTOLOGY

Order ARTIODACTTYLA Owen, 1848
Suborder RUMINANTIA Scopoli, 1777
Infraorder PECORA Linnaeus, 1758
Superfamily CERVOIDEA Goldfuss, 1820
Family GIRAFFIDAE Gray, 1821
Subfamily SIVATHERIINAE Zittel, 1893
Genus *INDRATHERIUM* Pilgrim, 1910

INDRATHERIUM COMPRESSUS

Indratherium compressus sp. nov.

TYPE
P.U.P.C. No. 87/13, an upper third premolar of the right side. The specimen is housed at Paleontology Laboratory, Department of Zoology, University of the Punjab, Lahore, Pakistan.

TYPE LOCALITY
Sardhok, district Gujrat, Punjab, Pakistan (Fig. 1).

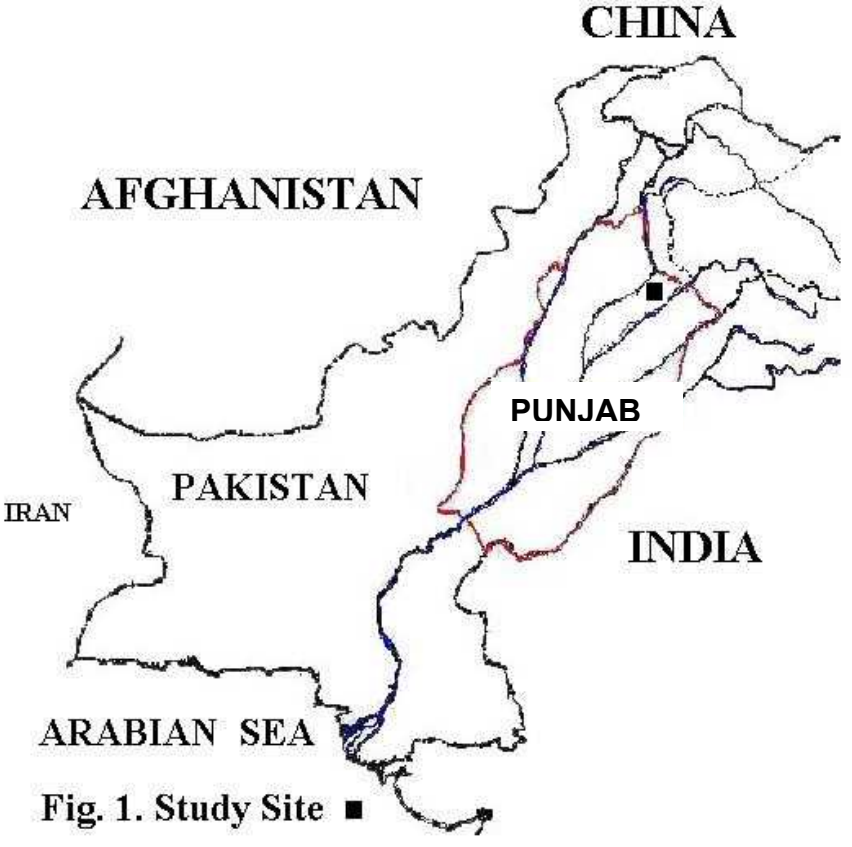


Fig. 1. Study Site ■

HORIZON
Pinjorian (early Pleistocene) of the Upper Siwaliks.

DIAGNOSIS
P^3 very large, transversely elongated, triangular and with pronounced para- and mesostyles.

ETYMOLOGY
Extremely compressed upper premolars and well pronounced parastylic fold is the significant feature for characterizing it as new species of the genus *Indratherium* (Table 1).

Table 1: Measurements (in mm) of P^3 (P.U.P.C. 87/13) in *Indratherium compressus*, new species.

L (Fig. 3B)	30.85
W	32.30
W (anterior half)	30.65
W (posterior half)	19.00
W / L index	104.70
H	23.35
H (r.)*	29.00
H / W index	89.78
Enamel thickness**	01.00

*Reconstructed crown height, **Average enamel thickness.

DESCRIPTION

The specimen P.U.P.C. No. 87/13 (Fig. 2 A-C) is excellently preserved upper third premolar. Its overall contours show that the metaconule is absent from the tooth. The pressure mark towards anterior side and its overall size contours show that it is a 3rd premolar in numerical seriation. Keeping in view the anterior pair of cusps, it is clear that tooth belongs to right upper maxilla. It is a subhypsodont tooth and is half worn. There is a weak cingulum at the lingual side. A thick enamel layer with rugose surface all around the tooth can be observed. The layer of the enamel is almost uniform.

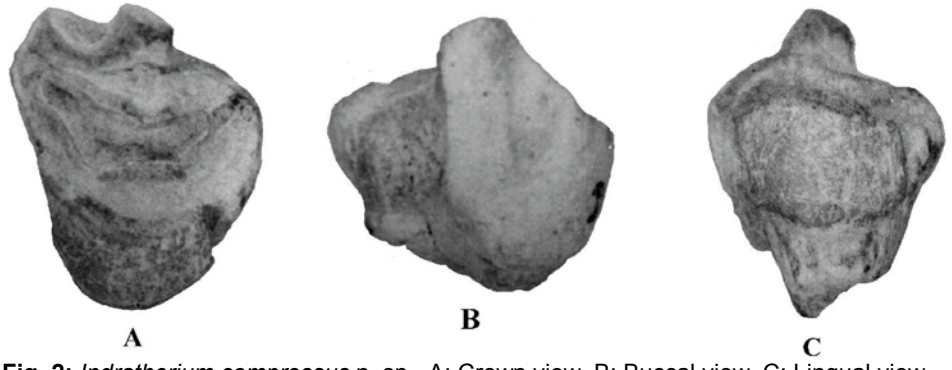
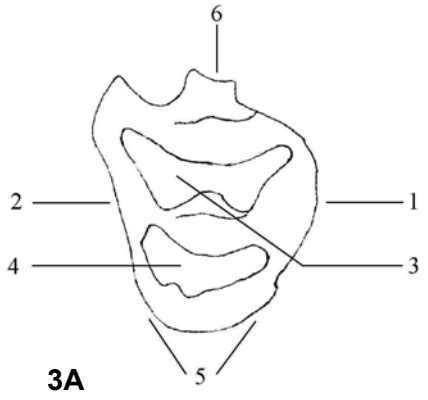


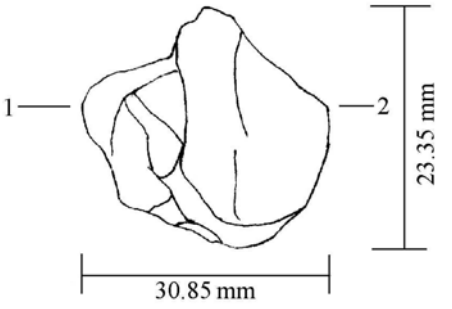
Fig. 2: *Indratherium compressus* n. sp. A: Crown view, B: Buccal view, C: Lingual view.

Protocone is crescentic in shape with anterior limb that is shorter than the posterior limb. Dentinal material is continuous with paracone through their anterior limbs and with metacone through their posterior limbs. Median lobe is thickest in the middle. Enamel layer is making an inclined angle towards the crown base ending over the weak cingulum.

Paracone is different in shape from the protocone in the top view. Parastyle is a well-developed broad folded structure. Posterior limb is contiguous through mesostyle of the metacone and showing a common median lobe of the external pair of cusps. Metastyle of the, metacone is damaged so nothing could be stated about it. The inner enamel layer of the both external cones is contiguous with external layer of the protocone forming a longitudinal valley that is not so much deep. Three root fangs are also visible (Fig. 3).



3A



3B

Fig. 3A: Crown view of *Indratherium compressus* n. sp. 1. Anterior side, 2. Posterior side, 3. Paracone, 4. Protocone, 5. Lingual side, 6. Buccal side.
Fig. 3B: Buccal view of *Indratherium compressus* n. sp. 1. Anterior side, 2. Posterior side.

Table 2: Comparative measurements (in mm) of the P^3 in various genera of large giraffids and *Indratherium compressus*, sp.nov.

Species	L	W	H	W/L index	H/W index
Hydaspitherium	34	44	42	129	95
Helladotherium	30-35	31	-	89-155	-
Vishnutherium	-	-	-	-	-
Sivatherium	39	47	-	121	-
Bramatherium	-	-	-	-	-
Indratherium compressus (P.U.P.C. 87/13)	30.85	32	23.35	105	90

DISCUSSION

Being a squared and tetratuberculated tooth, it can be referred to some herbivorous mammalian group. Since the cusps are crescentic in outline, it can safely be included in the sub-order Ruminantia of the order artiodactyla [Zittel 1925, Romer 1974]. Tooth being very large in size, it can be referred to the superfamily Cervoidea. Since the enamel layer is strongly rugose, the tooth can be referred to the family giraffidae [Zittel 1925, Romer 1974]. Regarding size, giraffes can be placed in two groups i.e., smaller and larger. Smaller forms include the genera *Giraffokeryx, Progiraffa* and *Giraffa* while all others are the larger forms. The larger forms comprise the following genera: *Sivatherium*, *Hydaspitherium*, *Helladotherium*, *Bramatherium* and *Vishnutherium*. However, an additional larger form, *Indratherium*, is usually distinguished from all species because of the striking excess of breadth over length in the molars [Pilgrim 1910]. This feature must have been shown by its premolars as well. In other larger genera of the giraffidae, this feature is not exhibited. The specimen under study is fairly wider transversely than

longer. The specialized characters of P.U.P.C. No. 87/13 warrant the erection of a new species *Indratherium compressus* sp. nov.

References

Akhtar, M., Sarwar, M., Saeed, M. and Khan, A.A. (**1991**) "Vertical distribution of Siwalik Giraffids", *Acta. Sci.*, 1, 145-152.

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

Falconer, H. (**1845**) "Description of some fossil remains of *Deinotherium*, Giraffe, and other mammalia, from Perim Island, Gulf of Cambay, Western Coast of India", *J. Geol. Soc.*, 1, 356-372.

Falconer, H. and Cautley, P.T. (**1836**) "*Sivatherium giganteum,* a new fossil Ruminant genus from the valley of the Markanda in the Siwalik branch of the Sub-Himalayan Mountains", *Asiatic Researches,* 19, 1-24.

Khan, A.A. (**1987**) "Giraffids of Sardhok Area", M. Sc. Thesis, University of the Punjab, Lahore, Pakistan, p. 72.

Khan, A.A. and Sarwar, M. (**2002**) "A new large Giraffe *Bramatherium giganteus* sp. nov. from Siwalik formations, Punjab, Pakistan", *Pak. J. Biol. Sci.*, 5(3), 348-351.

Lydekker, R. (**1876**) "Molar teeth and other remains of Mammalia", *Pal. Indica*, 10, 19-87.

Lydekker, R. (**1878**) "Notices of Siwalik Mammals", *Rec. Geol. Surv. India*, 11, 64-104.

Matthew, W.D. (**1929**) "Critical observations upon Siwalik mammals (exclusive of proboscidea)", *Bull. Amer. Mus. Nat. Hist.*, 56, 473-560.

Pilgrim, G.E. (**1910**) "Notices of new mammalian genera and species from the Tertiaries of India", *Rec. Geol. Surv. India*, XL(1), 63-71.

Romer, A.S. (**1974**) "Vertebrate Palaeontology", Chicago University Press Chicago, p. 468.

Zittel, K.A.V. (**1925**) "Text Book of Paleontology", McMillan and Co. Ltd. London, p. 310.