Ind. J. Phys. Anthrop. & Hum. Genet. Vol. 34. No. 1, (2015) : 131-139

LEPTOBOS (BOVIDAE, ARTIODACTYLA) FROM THE TATROT FORMATION OF THE UPPER SIWALIKS OF THE INDIAN SUBCONTINENT

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ABSTRACT

Fossil material of *Leptobos falconeri* is reported here from the Tatrot Formation of the Upper Siwaliks of the Indian Subcontinent. The material consists of right and left maxillary fragments of *Leptobos falconeri*. This material was collected from the outcrops exposed in the northeast of Mandlar Village and in the south of Baldwala Village near Naraingarh Town of Haryana State of northwest India.

Key words: *Leptobos*, Bovidae, Upper Siwaliks, Tatrot Formation

INTRODUCTION

The Upper Siwaliks exposed near Naraingarh Town of Haryana State of northwest India, has resulted in a rich collection of fossil mammals (Gaur, 1987). *Leptobos* was a large grackle bovine that was widespread during Middle Pliocene to the Early Pleistocene of Eurasia, China and India (Koufos *et al.*, 2005).The genus *Leptobos* was proposed by Rütimeyer (1878).Until now; there is only one known species, namely *Leptobos falconeri,* of the genus *Leptobos* from the Siwaliks of the Indian subcontinent. The genotype *Leptobos falconeri* was first described by Rütimeyer (1878) on the basis of cranial remains collected from the Pliocene-Pleistocene (Villafranchianage) deposits of the Upper Siwaliks in the northeast of Chandigarh (Gaur, 1983).

Pilgrim (1939) described many fossil bovines from the Indian Siwaliks. In the past, only a few workers, namely Sahni and Khan (1968), Nanda (1979), Vashishat et al. (1980), Gaur (1983, 1987) and Kumar and Gaur (2013) have described fossil bovids from the Upper Siwaliks of India. An earlier report of *Leptobos falconeri* was made by Gaur (1983) from the Tatrot Formation of Upper Siwaliks near Chandigarh. We report here two maxillary fragments (PUA/SK- 09/23 and PUA/SK/ -07/ 63),

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collected *in situ*, from the Tatrot deposits exposed near Baldwala and Mandlar Villages of Naraingarh area of Haryana (Figure 1).

SYSTEMATIC PALAEONTOLOGY

Order	Artiodactyla	Owen, 1848
Family	Bovidae	Gray, 1821
Subfamily	Bovinae	Gill, 1872
Tribe	Bovini	Simpson, 1945
Genus	*Leptobos*	Rutimeyer, 1878
Species	*Leptobos falconeri*	Rutimeyer, 1878

Material: PUA/SK- 09/23, a right maxillary fragment with M^2 and M^3.

PUA/SK/ -07/ 63, a left maxillary fragment with M^1 and M^2.

Horizon: Upper Siwaliks, Tatrot Formation.

*Locality:*PUA/SK- 09/23,about 1.0 km south of Baldwala Village

PUA/SK/ -07/ 63, about 0.55km northeast of Mandlar Village.

DESCRIPTION

PUA/SK-09/23

The specimen is a right maxillary fragment with well-preserved M^2 and M^3. It was recovered *in situ* from yellowish grey sandstone of Tatrot Formation near Baldwala Village (Figure 2). In this specimen only a small portion of alveolar part of the maxilla is preserved. The posterior lobe of M^3 is slightly narrower than M^2. A well-developed median basal pillar is present in both molars. The pre-fossette is smaller than post-fossette and, unlike in M^2, it does not show a deep fold. The lingual enamel is slightly rugose on both the molars.The molars are moderately worn.

PUA/SK-07/63

The specimen is a left maxillary fragment with well preserved M^1 and M^2. The specimen was recovered *in situ* from brownish yellow mudstone of Tatrot Formation near Baldwala Village (Figure 3).Only a small portion of alveolar part of the maxilla is preserved in this specimen.The preserved portion of the alveolar part is eroded on the buccal side thereby exposing the roots of the molars. The molars are high crowned and show high rounded styles. M^1 is slightly smaller than M^2. A well-developed median basal pillar is present in both the molars.The lingual enamel is slightly rugose on the molars. The fossettes are filled with cement.The dentine of M^1 and M^2 shows some fine cracks, which could have been caused by pre-burial weathering. The molars are moderately worn.

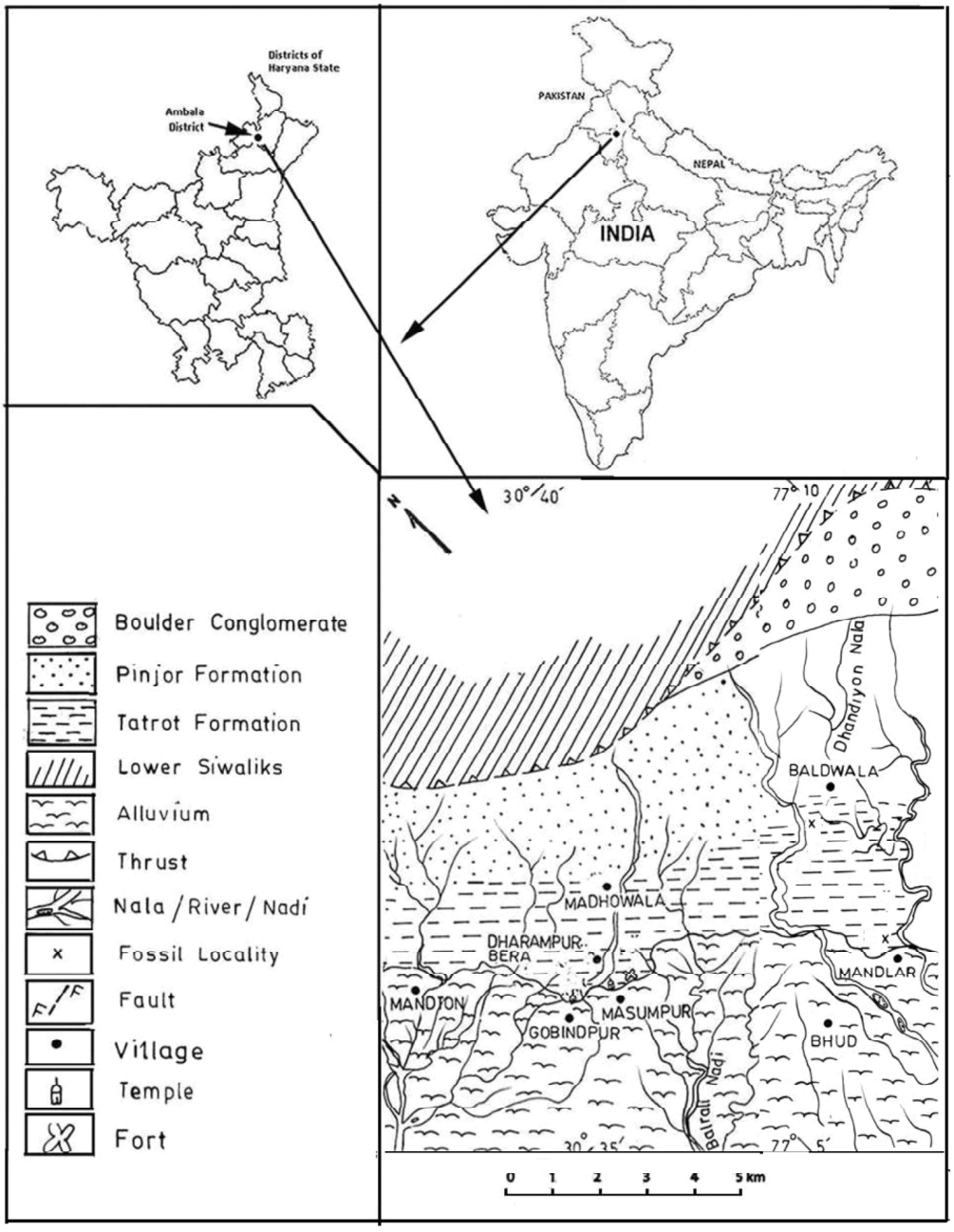

Figure 1: Generalised locality map of the area

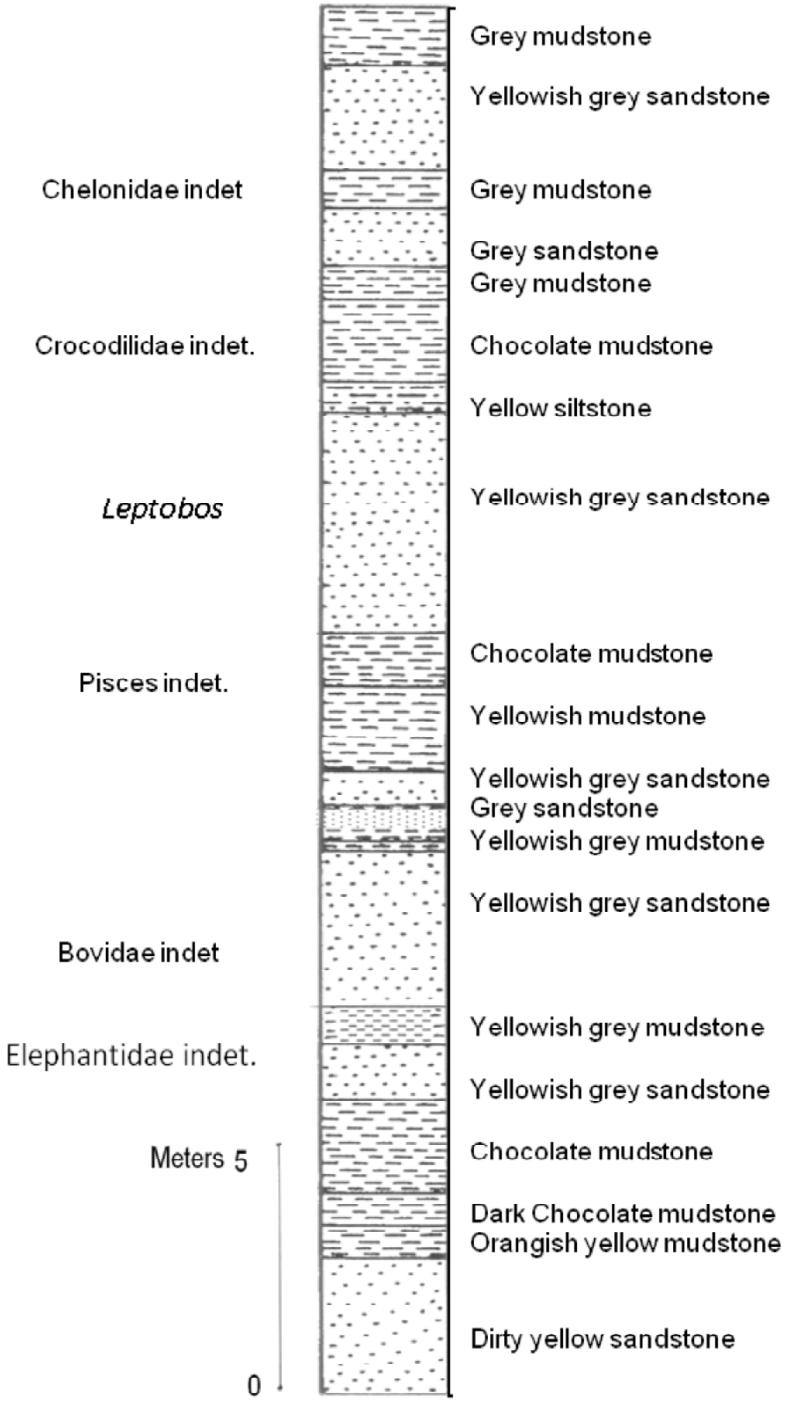

Figure 2: Local stratigraphic section of the Tatrot Formation near Baladwala

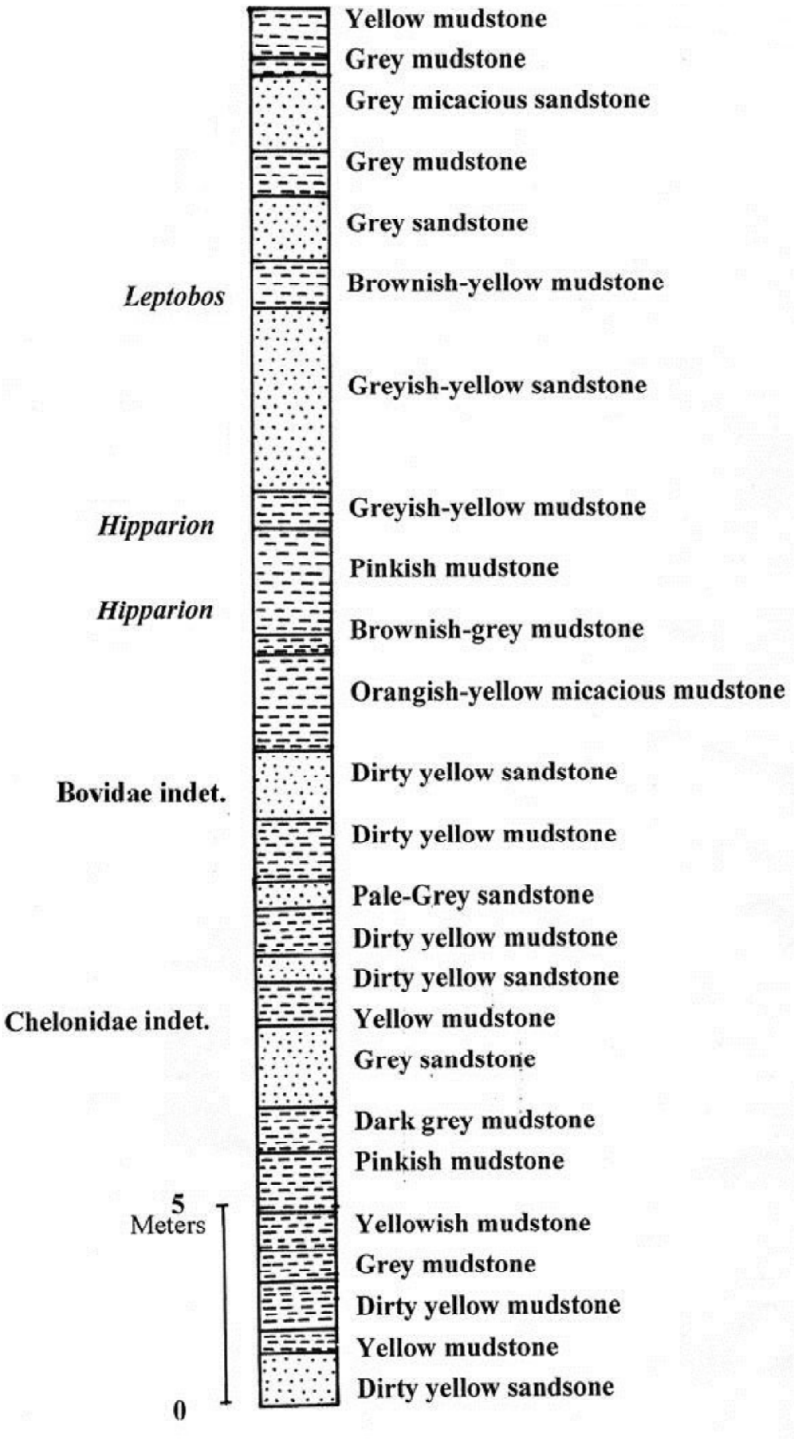

Figure 3: Local stratigraphic section of the Tatrot Formation near Mandlar

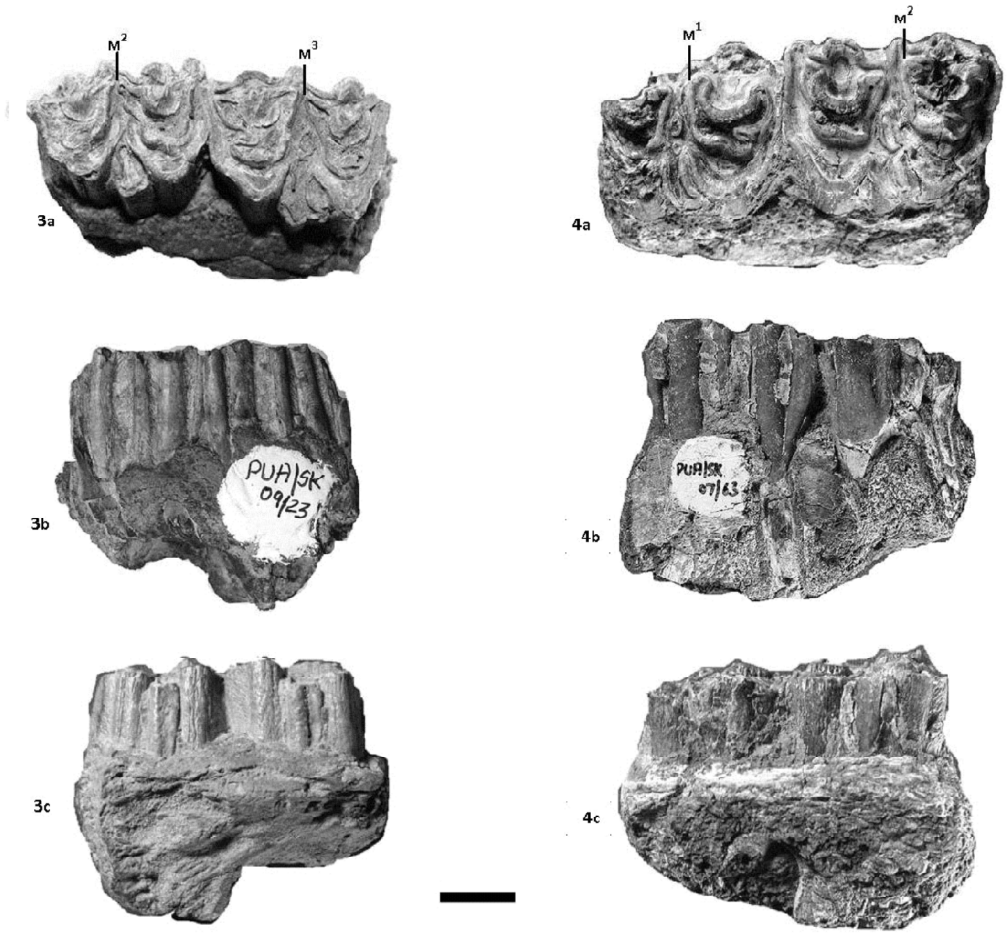

Fig.4.PUA/SK 9/23, a right maxillary fragment of *Leptobos falconeri* with M^2 and M^3. 3a) occlusal, 3b)buccal, 3c) lingual
PUA/SK-07/63, a left maxillary fragment of *Leptobos falconeri* with M^1 and M^2. 4a) occlusal, 4b)buccal, 4c) lingual

Figure 4: PUA/SK-9/23, a right maxillary fragment of *Leptobos falconeri* with M^2 and M^3 (3a. occlusal view; 3b. buccal view; 3c. lingual view); PUA/SK-07/63, a right maxillary fragment of *Leptobos falconeri* with M^1 and M^3 (4a. occlusal view; 4b. buccal view; 4c. lingual view). Bar represents 1 cm

In the present specimens (Figure 4), all the molars are high crowned and show strongly developed ribs and high rounded styles. Well-developed median basal pillars are present in the molars of both specimens. The fossettes are filled with cement and are of typical bovinae type. A layer of cement covers the buccal and lingual sides of the molars.

COMPARISONS

The dental remains of the present specimens (PUA/SK-09/23; PUA/SK-07/63) show strong morphological and metrical resemblance to *Leptobos falconeri*

(Table 1). The presence of broad upper molars, high crowns, well-developed ribs, rounded styles, strong basal pillars and presence of cement on molars (Pilgrim, 1939) are typical characters of the genus *Leptobos.* The morphological features as well as metrical details of the present specimens also fall well within the range of *Leptobos falconeri*. Thus, the present fossil specimens are assigned here as *Leptobos falconeri*.

DISCUSSION

The fossil taxon *Leptobos* is known by a single species, viz. *Leptobos falconeri* from the Siwaliks. The holotype of this Asian speciesis known from the Pinjor Formation of Upper Siwaliks of Indian subcontinent. Earlier, the genus*Leptobos* was reported by Sahni and Khan (1964) from the 'Quaranwala Zone' which falls in the top of Tatrot Formation. Subsequently, *Leptobosfalconeri* was reported by Gaur (1983), from the top of Tatrot Formation of Upper Siwaliks exposed around Masol Village, near Chandigarh. Thus, all previously reported specimens are known from the top of Tatrot Formation. The present authors have also collected the fossil material of the genus *Leptobos* from the top of Tatrots. As yet, there is no published report of South Asian species *Leptobos falconeri* from the basal Tarots of the Upper Siwaliks of the Indian subcontinent.

The genus *Leptobos* is regarded as a diagnostic taxon for the Villafranchian faunas. The faunal group *Equus-Leptobos-Elephas* was regarded as marker of the Plio-Pleistocene boundary in Europe (Tobien, 1970). But, the first appearances of these three genera were suggested as asynchronous by Kurten (1968) and Deng and Xue (1997).The problem of the boundary between the Pliocene and the Pleistocene is still very doubtful both from geological and from a faunal viewpoint.

According to Gaur (1983), the genus *Equus* and *Elephas* from the Indian Siwaliks are restricted to Pinjor and younger Formation while *Leptobos* is also recorded from earlier beds, i.e., top of Tatrots. Azzaroli (1977) suggested that the early occurrence of *Leptobos* in the Siwaliks is consistent with their European equivalent where *Leptobos* appears prior to *Equus* and Elephants. The Plio-Pleistocene (Villafranchian age) South Asian form *Leptobos falconeri* is regarded as an important taxon for marking stratigraphic boundaries in the Upper Siwaliks. However, due to paucity of fossil material and incomplete information, it is not possible to comment about the first appearance of the genus *Leptobos* in the Siwaliks. Hence, it is necessary to extensively explore the Siwaliks to solve this problem.

Table 1: Comparative measurements (mm) of the maxillary molars of *Leptobos falconeri*

Measurement		*Present specimen*		*Leptobos falconeri Gaur, 1987*	*Leptobos falconeri CASG*	
		PUA/SK-07/63	*PUA/SK-09/23*	*PUA 79/3*	*B/14*	*G/378*
Max. mesio-distal diameter (L)	M^1	27.38	—	26.00	21.00	28.50
Max. bucco-lingual diameter (B)	M^1	22.60	—	23.00	21.00	24.00
Index (B/L X 100)	M^1	81.29	—	88.46	100.00	84.21
Max. mesio-distal diameter (L)	M^2	30.40	33.4	29.00	28.00	32.00
Max. bucco-lingual diameter (B)	M^2	23.20	25.6	24.00	22.50	23.20
Index (B/L X 100)	M^2	76.31	76.6	82.75	80.35	72.50
Max. mesio-distal diameter (L)	M^3	—	33.9	31.0	31.00	33.50
Max. bucco-lingual diameter (B)	M^3	—	24.5	23.2	21.50	22.00
Index (B/L X 100)	M^3	—	72.2	74.83	69.35	65.67

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