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MIDDLE SIWALIK PACHYPORTAX FROM DISTRICT JHELUM, PUNJAB, PAKISTAN

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Abstract: Well preserved last molars of a right and left Mandibular ramii and an isolated left last MS of mandible belonging to different individuals have been described from Hasnot, Jhelum district, the Punjab province, Pakistan. All described specimens have basic features of the genus *Pachyportax* and the species *Pachyportax latidens* and give additional information about the species.
Keywords: Molar, Hasnot and *Pachyportax.*

INTRODUCTION

The term Siwalik group denotes the Neogene terrestrial sediments, which are found in widely separated areas all along the foot hills of Himalaya. The most unique and distinct feature of the Siwalik group is the abundance of mammalian fauna, which attracted many researchers both within the country and from abroad. Important among these are Cautley (1836), Falconer (1845), Lydekker (1876, 1878), Pilgrim (1913, 1937, 1939) Matthew (1929), Bakr (1969, 1986), Hussain (1971), and Sarwar (1977, 1991). Among mammalian fauna bovids are abundant in the Siwalik Hills.

Bovids belong to class Mammalia, family Bovidae, super order Paraxonia and order Artiodactyla. Artiodactyls are named for even numbers of manual and pedal digits found on each hand and foot in extant taxa. Ankle or tarsal bones are the most diagnostic elements of the artiodactyle skeleton. Artiodactyla relationship at various taxonomic levels has attracted considerable attentions (Beintema *et al*., 1977; Miyamoto *et al*., 1993; Douzery and Scatzeflis., 1995; Kleineidan *et al.*, 1999) and the relationship between the artiodactyls and cetaceans (whale, dolphins and porpoises) has been the subject of number of muscular studies (Graud and

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Higgins, 1994; Arnason and Gullberg, 1996; Shimamura *et al*., 1997; Gingerich *et al*., 2001).

Bovidae family is highly diverse with numerous extinct species, and an extensive fossil record with species in Africa, Eurasian and North America. The bovids appear to have had three major adaptive radiations at 14, 7.5 and 2 Ma (Gentry, 1966, 1970; Solounias 1982a; Ye, 1989) but few fossils are known from sediments older than 14 Ma (Solounias *et al.,* 1995).

The genus *Pachyportax* was erected by Pilgrim (1937), when he applied the generic term *P.* to all the specimens, which were described and figured by Lydekker (1876) under the name of *Cervus latidens*, *Capra* (1878) and *Oreas* (1884). He added two species *P. latidens* Lydekker and *P. nagrii*, one subspecies *P. latidens dhokpathanesis* and one variety *P. latidens* var. *dhokpathanesis* to this genus. The genus *P.* is not known from outside the Siwaliks. Akhtar (1995) synonymized the subspecies *P. latidens dhokpathanesis* and variety *P. latidens* var. *dhokpathanesis* with the species *P. latidens* (Lydekker) Pilgrim and added a new species *P. gignateus.*

The comparative studies of the specimens under study have revealed that they belong to the genus *Pachyportax* and the species *P. latidens.* The Classification is based upon Simpson (1945).

Abbreviations

AMNH, American Museum of Natural History, New York. USA; BMNH British Museum of Natural History, London. UK; GSI, Geological Survey of India, Kolkata India; GSP, Geological Survey of Pakistan; Islamabad. Pakistan; Myr, million years; ma million years ago; PUPC, Punjab University Palaentological Collection; stored in the Department of Zoology, University of the Punjab Lahore. Pakistan; L, maximum preserved anteroposterior crown length of tooth; W, Maximum preserved crown width of tooth; H, maximum preserved crown height of tooth; M3, Third lower molar

SYSTEMATICS

Order	Artiodactyla Owen, 1848
Suborder	Ruminantia Scopoli, 1777
Family	Bovidae Gray, 1821
Subfamily	Bovinae Gill, 1872
Tribe	Boselaphini Simpson, 1945
Genus	*Pachyportax Pilgrim*, 1937

Species *Pachyportax latidens*
(Figsures 1, 2 and 3)

Holotype

A right upper M^3 (GSI on B219)

Type Locality

Hasnot, Jhelum district, the Punjab province, Pakistan.

Stratigraphic Range

Middle Siwaliks

Diagnosis

Large sized Bovid, quadrate upper molars with a strong median basal pillar much extended transversely; relatively strong styles and ribs, enamel moderately thick and rugose with traces of cement. The parastylid moderately developed, central cavities with simple outline and poor development of mesostylids.

Material Studied

PUPC NO. 83/640 (Figure. 1)
An isolated last molar of left mandibular ramus.
PUPC NO. 87/90 (Figure. 2)
An isolated third left last molar of mandible.
PUPC NO. 86/213 (Figure. 3)
An isolated last molar of right mandibular ramus.

Locality

PUPC NO. 83/640 Dhok Pathan, Chakwal district, the Punjab Province, Pakistan.

PUPC NO. 87/90 Hasnot, Jhelum district, the Punjab Province, Pakistan.

PUPC NO. 86/213 Markhal, Chakwal district, the Punjab province, Pakistan.

Horizon

Middle Siwaliks

Material

PUPC 83/640 (Figure 1): Locality, Dhok Pathan; PUPC 87/90 (Figure 2): Locality, Hasnot; PuPc 86/213 (Fig.3):

Locality.

Markhal

DESCRIPTION

PUPC 83/640 is an isolated last molar of left mandibular ramus. It is in an excellent state of preservation. It is in an early stage of wear. It is extremely hypsodont and narrow crowned tooth. The median basal pillar is present between the protoconid and hypoconid. It is broad at the base while narrow towards the apex of the crown. Its upper part is probably missing. The enamel is moderately thick and rugose. The major cusps and talonid are well developed. The protoconid is roughly V-shaped and pointed in the middle with two strongly sloping ridges. The anterior ridge is greater than the posterior one. The metaconid is pointed in the middle with two running ridges anteroposteriorly. The entoconid is also pointed in the middle with two ridges running anteroposteriorly. The hypoconid is crescentic in shape with two ridges. The talonid is well developed and long. The ribs and stylids are moderately developed. The anterior central cavity is broad anteroposteriorly while narrow in the middle. The posterior central cavity is narrow anteriorly while broad and deep posteriorly.

PU PC 87/90 is an isolated left last molar of mandible. It is well preserved except the inner portion of heel and some parts of major cusps are slightly damaged. It is in an early stage of wear. It is extremely hypsodont and narrow crowned tooth. The enamel is moderately thick and wrinkled. The median basal pillar is probably missing. The major cusps and talonid are well developed. The protoconid is crescentic in its general appearance with two running ridges anteroposteriorly. The metaconid is higher vertically than protoconid. It is pointed in the middle with two running ridges. The anterior ridge is greater than the posterior one. The entoconid is slightly damaged. The hypoconid is roughly V-shaped with two running ridges. The talonid is also well developed and some part of it is missing posteriorly. The median ribs and stylids are moderately developed. The central cavities are narrow and filled with sandstones. The posterior central cavity is narrow anteriorly while broad posteriorly.

PUPC 86/213 is an isolated last molar of the right mandibular ramus. It is well preserved while anteriorly the protoconid and metaconid are missing. It is in an early stage of wear. It is extremely hypsodont and narrow crowned tooth. The enamel is moderately thick and rugose. The hypoconid, entoconid and talonid are well preserved except the protoconid and metaconid, which are missing. The entoconid is crescentic in its general appearance with two running ridges. The hypoconid is roughly V-shaped and pointed in the middle. The talonid is well preserved and long. It is broad at the base while narrow towards the summit of the crown. The wear is more confined to anterior ridge than the posterior one. The posterior median rib is prominent while anterior one is missing. The metastylid and mesostylid are weakly developed.

(i)

(ii)

(iii)

Figure 1: *Pachyportax latidens* (Lydekker) Pilgrim, an isolated last molar of left mandibular ramus (PUPC 83/840), collected from the Dhok Pathan, Chakwal district, the Punjab Province, Pakistan: (i) Inner View, (ii) Crown View,(iii) Outer View.

(i)

(ii)

(iii)

Figure 2: *Pachyportax latidens* (Lydekker) Pilgrim, an isolated last the molar of left mandibular ramus (PUPC 87/90), collected from Hasnot, Jhelum district, the Punjab Province, Pakistan: (i) Inner view, (ii) Crown view, (iii) Outer view.

(i)

(ii)

(iii)

Figure 3: *Pachyportax latidens* (Lydekker) Pilgrim, an isolated last molar of right mandibular ramus (PUPC 86/213), collected from Markhal, Chakwal district, the Punjab Province, Pakistan: (i) Inner View, (ii) Crown View,(iii) Outer View.

Table I: Dental measurements (mm) of the check teeth referred to *Pachyportax latidens* (Lydekker) Pilgrim.

	PUPC No. 83/640	PUPC No. 87/90	PUPC No. 86/213
L	33	36.3	23.6
W	14.8	16	14.5
W/L Index	44.8	44	61.4

DISCUSSION

The Siwalik mammalian fauna stored in the American Museum of Natural History were studied by Colbert (1935). The Siwalik Bovidae in the American Museum of Natural History, New York, has been systematically studied by Pilgrim (1937, 1939). He named several new genera and species of the Siwalik bovids. The fossil remains under study are being described for the first as they have not been reported before this study. These specimens show all the basic characters of the genus *Pachyportax* (Lydekker) Pilgrim and species *P. latidens* (Lydekker) Pilgrim. The type species comes from the Late Miocene, possibly extending into the Pliocene. The type specimen of *P. latidens* is an upper molar, but it is the best represented by a cranium described by Pilgrim (1939) and stored in Kolkata museum (India) of which there is a cast in London (BMNH), BMNH M26573.

In some specimens the enamel is rough and in others it is smooth owing to weathering. In the studied specimens, all the structural details like cusps, styles, and median ribs show that they probably belong to the genus *P.* and species *P. latidens.* To date, the third lower molars of *Pachyportax latidens* had not been reported and these are being reported here for the first time. The dental measurements of the specimens are shown in table.

REFERENCES

AKHTAR, M., 1995. *Pachyportax giganteus,* new species (Mammalia, Artiodactyla: Bovidae) from the Dhok Pathan, district Chakwal, Punjab. Pakistan. *Pakistan J. Zool.,* **27** (4): 337-340.

ARNASON, U and GULLBERG, A., 1996. Cytochrome b nucleotide sequence and the identification of five primary lineages of extant cetaceans. *Molecular Biology and Evolution,* **13**: 407-417.

BAKR, A., 1969. A new genus of large cat from Upper Siwaliks. *Pakistan J. Zool.,* **1** (2): 135-140.

BAKR, A., 1986. On a collection of Siwalik Carnivora. *Biol. Soc. Pakistan Monograph:* 11-64.

BEINTEMA, J.J., GAASTRA, W., LENSTRA, J. A., WELLING, G.W. AND FITCH, W.M., 1977. The molecular evolution of pancreatic ribonuclease. *Molecular Biology and Evolution,* **10**:49-71.

CAUTLEY, P.T., 1836. Note on the teeth of the Mastodon a dents etroities of Siwalik Hills. *J. Asiat. Soc. Bengal,* **5**: 294-296.

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

DOUZERY, E. and SCATZEFLIS, P.M., 1995. Molecular evolution of the mitochondrial 12S rRNA in Ungulata (Mammalia). *Molecular Biology and Evolution,* **41**: 622-636.

FALCONER, H., 1845. Description of some fossil remains of *Dinotherium, Giraffa* and other mammalia from the Gulf of Cambay, Western Coast of India. *J. Geol. Soc. London,* **1**:356-372.

GENTRY, A.W., 1966. Fossil Antilopini of East Africa. *Bull Brit. Mus. Nat. Hist.* (Geol.), **12**:45-106.

GENTRY, A.W., 1970. The Bovidae (Mammalia) of the fort ternan fossil fauna; pp. 243-323 in L.S.B. Leakey and R.J.G. Savage (eds.). *Fossil Vertebrates of Africa,* Vol. 2. Academic Press, London.

GINGERICH, P.K., HAQ, M, ZALMOUNT, I.S., KHAN, I.H., MALKANI, M.S., 2001. Origin of whales from early artiodactyla. Hands and feet of Eocene Protocetidae form Pakistan. *Science,* **293**: 2239-2242.

GROUD, D, & HIGGINS, D.G., 1994. Molecular evidence for the inclusion of cetaceans within the order Artiodactyla. *Molecular Biology and Evolution,* 11: 357-364.

HUSSAIN, S.T., 1971. Revision of *Hipparion* (Equidae, Mammalia) from the Siwalik Hills of Pakistan and India. *Verlag Bayer Akad. Swiss, n.s.,* **147**:1-68.

KLIENIDAM, **R.G**., PESOLE, G., BREUKELMAN, **H.J**., BEINTEMA., **J.J.** AND KASTELEIN, R.A., 1999. Inclusion of cetaceans within the order Artiodactyla based on phylogenetic analysis of pancreatic ribonuclease genes. *Molecular Biology and Evolution,* **48**: 360-368.

LYDEKKER, R., 1876. Molar teeth and other remains of Mammalia from Indian Tertiaries. *Pal. Ind*, **1** (2): 19-87.

LYDEKKER, R., 1878. Crania of Ruminants from the Indian Tertiaries and Supplement. *Pal. Ind.,* **10**(1): 88-181.

LYDEKKER, R., 1884. A sketch of the history of the fossil vertebrata of India. *J. Asiatic.Soc. Bengal,* XLIX, Pt.2, pp. 8-40, from Colbert, 1935.

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

MIYAMOTO, M.M., KRAVS, F., LAIPIS, P.J., TANHAUSER, S.M. AND WEBB, S.D., 1993. Mitochondrial DNA phylogenies within artiodactyla. In: F.S. SZALAY, M.J., NOVACEK. AND M.C. MCKENNA Mammal phylogeny Springer Verlag New York Inc. pp. 268-281.

PILGRIM, G.E., 1913. Correlation of the Siwaliks with mammal horizons of Europe. *Rec. Geo. Surv. India,* **43** (4): 264-326.

PILGRIM, G.E., 1937. Siwalik antilopes and oxen in the American Museum of Natural History. *Bull. Am. Mus. Nat. Hist.,* **72**: 729-874.

PILGRIM, G.E., 1939. The fossil Bovidae of India. *Pal Ind. (n.s.),* 26(l):l-356).

SARWAR, M., 1977. Taxonomy and distribution of the Siwalik Proboscidea. *Bull. Dept. Zool. Univ. Punjab* **10**: 1-172.

SARWAR, M., 1991. Living and fossil Mammals of Bhandar Bone Beds. *Acta Sci.,***1** (2): 121-140.

SHIMAMURA, M., YASUE, H., OHSHIMA, K., ABE, H., KATO, H., KISHIRO, T., GOTO, M And MUNECHIKA, I., 1997.Molecular evidence from retroprosons that whales form a clade within even-toed Ungulates. *Nature,* 388: 666-670.

SIMPSON, G.G., 1945. The principles of classification and a classification of Mammals. *Bull. Am. Mus. Nat. Hist.* **85**: 1-350.

SOLOUNIAS, N., 1982 where is 1982b. Evolutionary Patterns of the bovidae (Mammalia). Proceeding of North American Palaeontology convention III. 2: 495-499.

SOLOUNIAS, N., BARRY, J.C., BERNOR, R.L., LINDSAY, E.H. and RAZA, S.M., 1995. The oldest Bovid from the Siwaliks, Pakistan *J. Verteb. Palaeon.* **15** (4): 806-814.

YE, J., 1989. Middle Miocene artiodactyla from the northern Junggar Basin. *Vertebrate Pal. Asiatica,* **27**: 37-52

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