

NEW SUID REMAINS OF GENUS *HYOTHERIUM* FROM THE SIWALIKS OF PAKISTAN

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خلاصہ

نئے موجودہ سویڈ ڈینٹل مواد کو پاکستان کی سیوالک پہاڑیوں سے اکٹھا کیا گیا تھا، جو صوبہ پنجاب میں واقع ہیں اور شمالی پاکستان تک پھیلی ہوئی ہیں۔ پاکستان کے صوبہ پنجاب میں چکوال کے علاقے میں واقع چنچی کا قصبہ کو ان نمونوں کے لیے "ٹائپ لوکیٹیٹی" کا درجہ دیا گیا ہے۔ یہ خاص نمونے چھوٹے سویڈ جنینس کے دانت ہیں جسے ہائیو تھیریم کہا جاتا ہے، اور یہ جنینس سیوالک پہاڑیوں کے لیے منفرد ہے۔ جن دونوں نمونوں کا مطالعہ کیا گیا ہے وہ ہائیو تھیریم جنینس کے دانتوں کی بنیادی اور سادہ تشکیل پر بہت زیادہ روشنی ڈالتے ہیں جو اس جنینس کی خصوصیت ہے۔ یہ معاملہ اس لیے ہے کہ دونوں نمونے ایک جیسے ہیں اور اپنی موجودہ شکل میں بالکل سادہ ہیں۔

Abstract

The present new Suid dental material was collected from the Siwalik hills of Pakistan, located in Punjab and extending into Northern Pakistan. The town of Chinji, located in the province of Punjab in Pakistan's Chakwal region, has been given the status of "type locality" for these specimens. These specimens are members of the diminutive suid genus known as *Hyotherium*, unique to the Siwalik Mountains. Both of the specimens that have been studied shed a great deal of light on the fundamental dentition characteristic of this genus. This is the case in the present study, as both specimens are identical and quite simple in their morphology.

Keywords: Siwalik hills; Artiodactyla; Suidae; *Hyotherium*; Miocene

Introduction

Suids are known as even-toed ungulates and can be found in large numbers in the Siwalik region of Northern Punjab and other parts of these hills (Figure 1). Beginning in the nineteenth century and continuing onward, numerous scholars excavated diverse locations on the hills of the subcontinent, where they found many fossils. Amongst many others (Falconer, 1868; Lydekker, 1884; Stehlin, 1899; Pilgrim, 1926; Colbert, 1935; Pickford, 1988; Made, 1996, 1998; Batool *et al.*, 2015) are among the most well-known paleontological researchers that have conducted studies in this region. Despite this, a significant number of other paleontological experts have carried out research in this region. A few millennia ago, the family Suidae was among the most ubiquitous families in the Siwaliks of the Indo-Pak region and was represented by a significant number of genera. It was due to the family's ability to produce many offspring (Pickford and Obada, 2016; Spassov *et al.*, 2018; Mörs *et al.*, 2019). However, despite the fact that many species from that period had a significant number of fossil records discovered over and over again, others had exhibited significantly fewer fossils that represented them. As a result, the discovery of any additional examples of these ancient species is of utmost significance for gaining an accurate comprehension of the part they played and where they stood during the evolution of this particular group. Each of the five component formations—Kamlial Formation, Chinji Formation, Nagri Formation, Dhok Pathan Formation, and Soan Formation—is visible around Hasnot (Ghaffar and Akhtar, 2012).

Materials and Methods

The specimens currently being described were gathered in the Chinji Formation in Punjab, Pakistan, in the general region of the Hasnot hamlet (Figure 1). They are currently being stored in the collections of the Palaeontology Laboratory at the Department of Zoology at Government College (now known as GC University) in Lahore, Pakistan. The measurements were performed with a metric Vernier caliper and were recorded in millimeters (mm). The morphometric features of the specimens under investigation are examined. The specimens have a serial catalog number, the denominator of which is the year of collection and the numerator of the specimen's serial number. For example, Government College Palaeontological Collection Number 372/2001 (where "Government College Palaeontological Collection Number" is abbreviated as "G.C.P.C. No."). The

terminology used to describe the parts of the dental crown and the measurement methods are based on (Pickford, 1988).

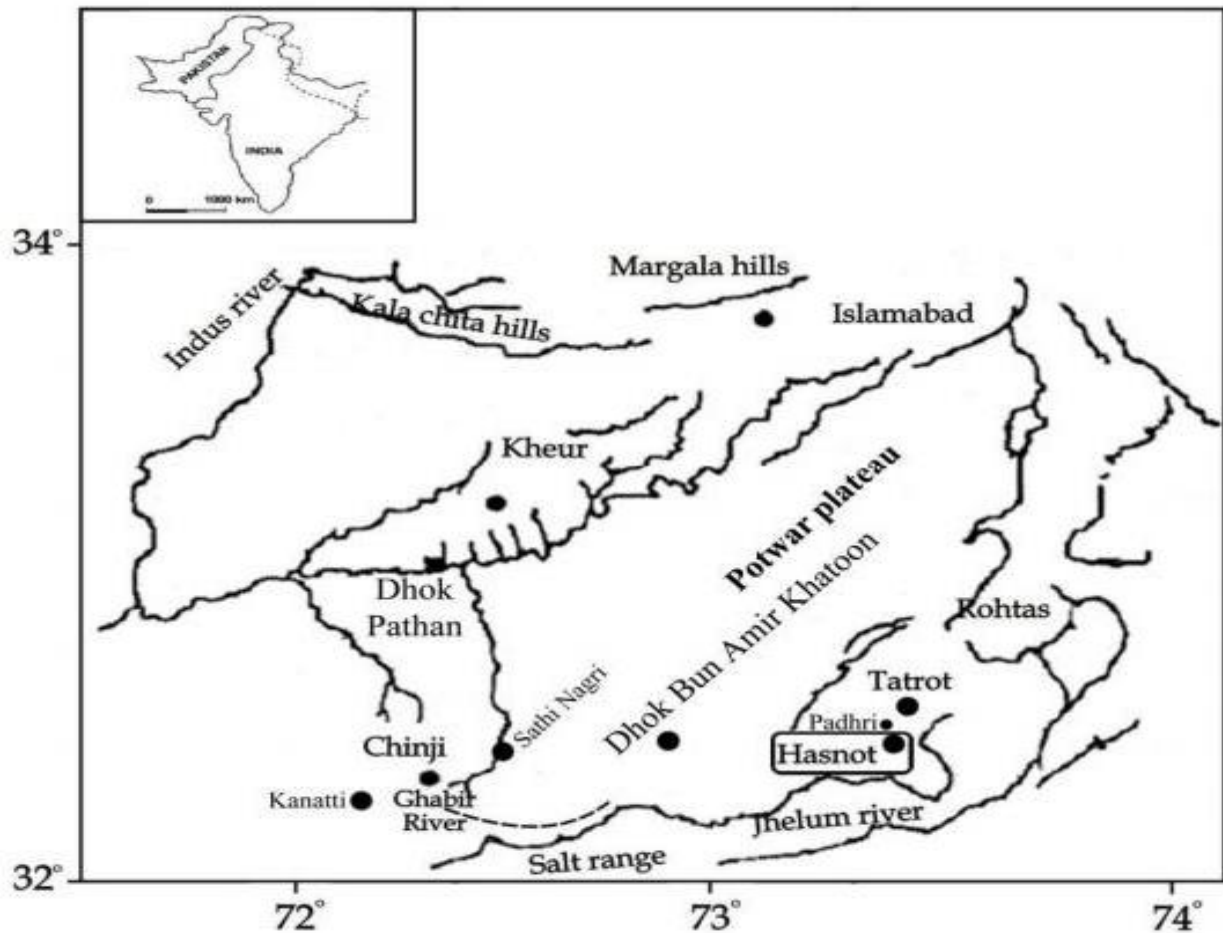


Fig. 1. The studied area is highlighted by a map showing different fossil-bearing localities of the Potwar Plateau of Punjab and northern Pakistan (Barry *et al.*, 2002).

Results and Discussion

The following results are drawn after the detailed study of these recovered specimens from the study site, which is Hasnot of district Jhelum, Punjab, Pakistan.

Systematic Palaeontology:

| | | |
|---------|-----------------------------|-----------------|
| Order | Artiodactyla | Owen, 1848 |
| Family | Suidae | Gray, 1821 |
| Genus | <i>Hyotherium</i> | von Meyer, 1834 |
| Species | <i>Hyotherium chisholmi</i> | (Pilgrim) |

Specimens under study:

1. G.C.P.C. No. 375/2001 is a right-sided isolated upper first molar from Hasnot, District Jhelum, Punjab, Pakistan.
2. G.C.P.C. No. 372/2001, a piece of the right-sided isolated upper second molar's anterior half, collected from Hasnot, District Jhelum, Punjab, Pakistan

Description:

The morphological description of both specimens under study is as follows:

Specimen 375/2001 (First Molar) (Fig. 2):

The specimen G.C.P.C. No. 375/2001 is a right-sided isolated upper first molar from Hasnot, District Jhelum, Punjab, Pakistan. The tooth is well preserved. Its height-to-width index shows it as a brachyodont, bunodont type of dentition. This tooth has a crown that is considerably more elongated than it is wide. The tooth is largely worn out, perhaps due to the process of weathering. The vertical height of the lingual cones of the tooth, also known as the protocone and hypocone, is significantly less than that of the labial cones, also known as the paracone and metacone. The tooth's front surface has a faint mark that appears to have been caused by pressure. The specimen is almost squarish in its general contour. Enamel coating has a substantial thickness and a shiny appearance all over the sample's crown with a somewhat corrugated pattern. All the principal cusps of the tooth are well-preserved and easily recognizable.

Because an excessive amount of the tooth's protocone has been worn away, the surface of the tooth becomes significantly flatter as it descends from its apex. It has all three of the typical suid grooves, which are known as the anterior, posterior, and median suid grooves. In the anterior direction, it is continuous with the anterior cingulum, labially to the paracone, and lingually to the multituberculated thin lingual cingulum. The tooth's paracone, which can be found on the anterior labial side, has also suffered significant wear and tear over the years. In addition, it has all three of the typical suid grooves, known as the anterior, the posterior, and the median suid grooves. The thick anterior cingulum and the paracone are joined together anteriorly to form a continuous structure. Both the anterior cones of the tooth, i.e., protocone and paracone, show a similar sloping appearance towards the median valley of the tooth.

The hypocone of the tooth is also well preserved. It is largely worn out and is provided with characteristic suid grooves. It also shows a clear, thin cingulum at its lingual and postero-lingual sides. The metacone of the tooth is the fourth principal cusp. It is present at the posterior labial side of the tooth. It is provided with the characteristic suid grooves, which are incipiently visible. In addition to that, the metacone has a significant amount of wear and is associated with the tooth's posterior cingulum from its posterior side. As a characteristic of the genus, the valley of the tooth is wide. The median accessory conule is incipiently developed. At the transverse valley's labial entrance, there is a strong basal pillar contiguous with the labial cingulum. It is also contiguous with the paracone of the tooth anteriorly while posteriorly to that of the metacone. The tooth's transverse valley has an opening that is both deep and shallow at its lingual point.

The longitudinal valley of the tooth is wavy in its appearance. On the posterior end of it, there is a large posterior accessory conule almost of the same vertical height as that of the lingual cusps of the tooth, i.e., protocone and hypocone. The posterior cingulum and this posterior auxiliary conule are joined to form one continuous structure. It does this in the back of the tooth, where it divides the valley that runs longitudinally. Overall, the structure of the tooth is straightforward and has a conical shape with a narrow crown.

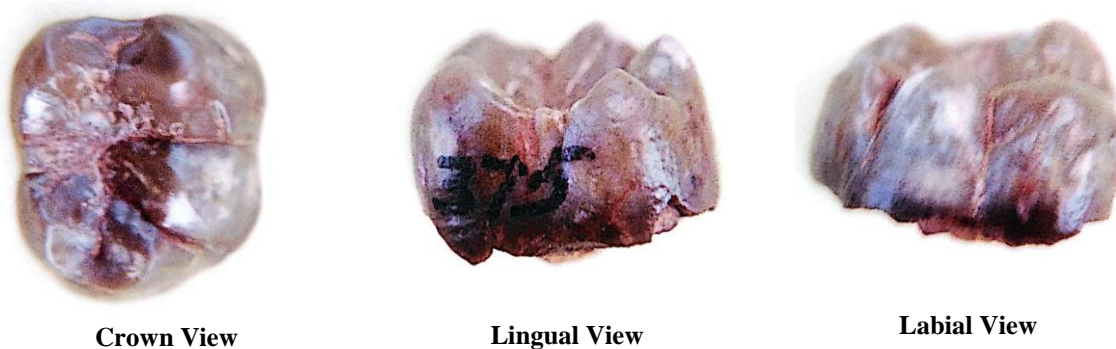


Fig. 2. G.C.P.C. No. 375/2001 is an isolated upper first molar of the right-side, recovered from Hasnot, District Jhelum, Punjab, Pakistan

Specimen 372/2001 - Second Molar (Fig. 3):

The portion of the right-sided isolated upper second molar that makes up the anterior half of the specimen G.C.P.C. No. 372/2001 was found at Hasnot, which is located in the district of Jhelum in the province of Punjab in Pakistan. On the front surface of the tooth, there is a pressure mark that can be seen very clearly. In its original, undamaged form, the tooth may have a quadrangular shape, but it is much broader than longer in its present damaged form. The height-to-width index of the tooth shows that it's of bunodont-brachyodont nature. The layer of enamel around the protocone and paracone of the tooth is particularly thick, smooth, and glossy. The posterior two cones, i.e., hypocone and metacone, are missing. It is a low and narrow crowned tooth.

A weak cingulum is observed on the tooth's anterior side, which is multituberculated and contiguous with the anterior cones. On the anterior side of the tooth, contiguous with that of the anterior cingulum, there is also a very

tiny anterior accessory conule, which is compressed anteroposteriorly due to the pressure of the first molar. The tooth is moderately worn out.

The vertical height of the protocone located on the lingual side of the tooth is significantly less than that of the paracone on the labial side. As it is moderately worn-out hence, it forms a rounded dentinal islet. It is possible to make out the protocone's three recognisable suid grooves, which are labeled anterior, posterior, and median, respectively. The protocone is connected by its anterior lobe to the anterior accessory conule and connects with the median accessory conule on the posterior side of its body.

Additionally, the median accessory conule shows significant signs of wear and tear. Its present shape shows only median and anterior suid grooves, while its posterior suid groove is missing due to damage.

The paracone is the second main preserved cusp of the anterior side of the tooth. It is higher than the protocone in vertical height and is also largely worn out. Like protocone, it also shows all of its characteristic suid grooves, which are incipiently developed. The multituberculated anterior cingulum forms a frill-like structure supporting both anterior cones, i.e., protocone and paracone anteriorly.



Fig. 3. G.C.P.C. No. 372/2001, a piece of the right-sided isolated upper second molar's anterior half, collected from Hasnot, District Jhelum, Punjab, Pakistan

Table 1. Measurements of upper dentition of *Hyotherium chisholmi* (Pilgrim) and its comparison with the already recovered material.

| Specimen No. | Position | Length (mm) | Width (mm) | W/L Index |
|-----------------------|----------------|-------------|------------|-----------|
| G.C.P.C. No. 375/2001 | M ¹ | 15 | 13.5 | 90 |
| Ind. Mus. B.711 | M ¹ | 17.0* | 15.0* | 88 |
| Ind. Mus. B.681 | M ¹ | 17.0* | 15.0* | 88 |
| Ind. Mus. B.96A | M ¹ | 16.3** | 16.3** | 100 |
| P.U.P.C. No. 68/40 | M ¹ | 16.8*** | 15.3*** | 91 |
| G.C.P.C. No. 372/2001 | M ² | 22 | 17.5 | 79.5 |
| Ind. Mus. B.711 | M ² | 21.0* | 16.0* | 76 |
| Ind. Mus. B.681 | M ² | 22.0* | 18.0* | 82 |

* Taken from illustrations made by (Pilgrim, 1926),

** Taken from (Lydekker, 1884),

*** Taken from (Ahmad, 1995).

Hyotherium material has often been recorded from the Siwaliks by different workers under different names. When (Lydekker, 1883) classified many fossils under the genus *Hyotherium*, he was the first person to adopt the name *Hyotherium*. Almost all the specimens were from the Sind except one found in Perim Islands, India (Falconer and Cautley, 1847). After that, the name *Hyotherium* was also applied to a variety of specimens (Pilgrim, 1926; Colbert, 1935). The vast majority of these specimens possessed the *Conohyus sindiensis* holotype and could be assigned to the *Conohyus* genus. As a result of the fact that *Hyotherium* and *Conohyus* were not accepted as belonging to separate genera until 1926, when (Pilgrim, 1926) established *Conohyus* as a separate genus, this overlapping occurred between the two groups of organisms. The collection of specimens that (Lydekker, 1884, 1887) refers to as the "*Hyotherium*" includes taxa belonging to not just one but three distinct genera: *Hyotherium*, *Conohyus*, and *Listriodon*.

According to (Zittel, 1925), *Hyotherium* can be identified by its transversely compressed lower premolars. In contrast, the molars of *Hyotherium* have minute median accessory conules, with simple and rounded cusps and an absence of characteristics suid grooves. The bunodont shape of the tooth is a shred of evidence that it belongs to the order primate or the pigs. The Primate dentition is devoid of accessory grooves, which are present in *Hyotherium*. Therefore, the dentition of primates and pigs can be distinguished from one another by the presence of supplementary grooves. The bunodont pigs come in a variety of types, which correspond to a range of sizes. Because of the size of the present specimens, it is possible that they will be housed with pigs of a lesser size. The *Conohyus*, the *Hyotherium*, and the *Palaeochoerus* are the genera that are responsible for the little or small sized bunodont pigs. According to (Pickford, 1988), the accessory conule is clearly delineated in the genus *Conohyus*, but the suid grooves are just beginning to form. In the genus *Palaeochoerus*, the accessory conule does not exist, but in the genus *Hyotherium*, it is relatively reduced in size (Pilgrim, 1926). Since the material under study has a simple molar structure. The upper molar is transversely broad and has a median transverse valley that is open to a great extent. However, the median accessory conule does not prevent access to the median transverse valley because it is uncomplicated, very small, and transversely extended. All of these are the typical characteristics of the species *Hyotherium chisholmi*. According to (Pilgrim, 1926), *Hyotherium chisholmi* resembles *Propotamochoerus salinus* and *Propotamochoerus hydeni*.

Conclusion

The specimens under study possess the same morphological characters described in the species *Hyotherium chisholmi*. Therefore, based on all the above-cited facts, the material under study may be referred to as the species *Hyotherium chisholmi*.

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