

## **NEW COLLECTION OF *CONOHYUS SINDIENSIS*, A MIDDLE MIOCENE SUID, FROM CHAKWAL, PAKISTAN.**

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### **ABSTRACT**

New fossils of *Conohyus sindiensis* have been collected from Middle Miocene localities of Lawa, Kallar Kahar and Dhok Bun Ameer Khatoon in district Chakwal. *Conohyus sindiensis* is very common suid in the Chinji type area of Pakistan. Its biostratigraphic range varies between Kamliyal type areas to the base of Nagri Formation. The probable time range of *C. sindiensis* is from 15 to 11 million years. The sample comprises isolated molars. The morphometric description of these specimens will add new information regarding molar morphology as well as the biogeographic distribution of *Conohyus sindiensis*.

**Key words:** Lower Siwaliks; Chinji; Lawa; Dhok Bun Ameer Khatoon; Suidae; Mammalia.

### **INTRODUCTION**

Lower Siwaliks of Pakistan yields earliest suid fauna of the world. Suid fossils from Kamliyal Formation are oldest but are poorly known (Pickford, 1988). Three genera of suids i.e., *Listriodon*, *Conohyus* and *Hyotherium* are known from Lower Siwaliks of Pakistan probably ranging in age from about 12.5Ma to about 10Ma. *Listriodon pentapotamiae* and *Conohyus sindiensis* have broad biostratigraphic range in these zones but *Hyotherium pilgrimi* is very rare and has restricted biostratigraphic range. A somewhat larger species of *Conohyus* known as *C. indicus* appears late in Chinji zone and it has been recorded from the same strata as *Hipparion*. It probably ranges about 11Ma to 9Ma (Pickford, 1988). *C. sindiensis* is common at all levels in the Chinji zone. Probable time range of *C. sindiensis* is from 15Ma to 11Ma (Pickford, 1988). Colbert (1933) described in details the skull and mandible of *Conohyus sindiensis*. Cheek teeth were described by Pilgrim (1926) Lydekker (1884) and Colbert (1935). The closest relative of *Conohyus* is *Hyotherium*, a typical Miocene pig of Europe. *Conohyus* has a direct inheritance from *Palaeochoerus* (Colbert, 1933).

#### **Geographic and Stratigraphic context of Study Area:**

Dhok Bun Ameer Khatoon contains continuous geological record ranging approximately 18.5Ma- 4.5Ma (Johnson *et al.* 1982). DBAK consists of five lithostatigraphic units i.e., Kamliyal, Chinji, Nagri, Dhok Pathan and Soan formation (Figure-1). Among these Chinji, Nagri and Dhok Pathan are well exposed for fossil collection (Cheema, 2003; Khan *et al.* 2008; Khan *et al.* 2011). Site locality DBAK is a village in district Chakwal

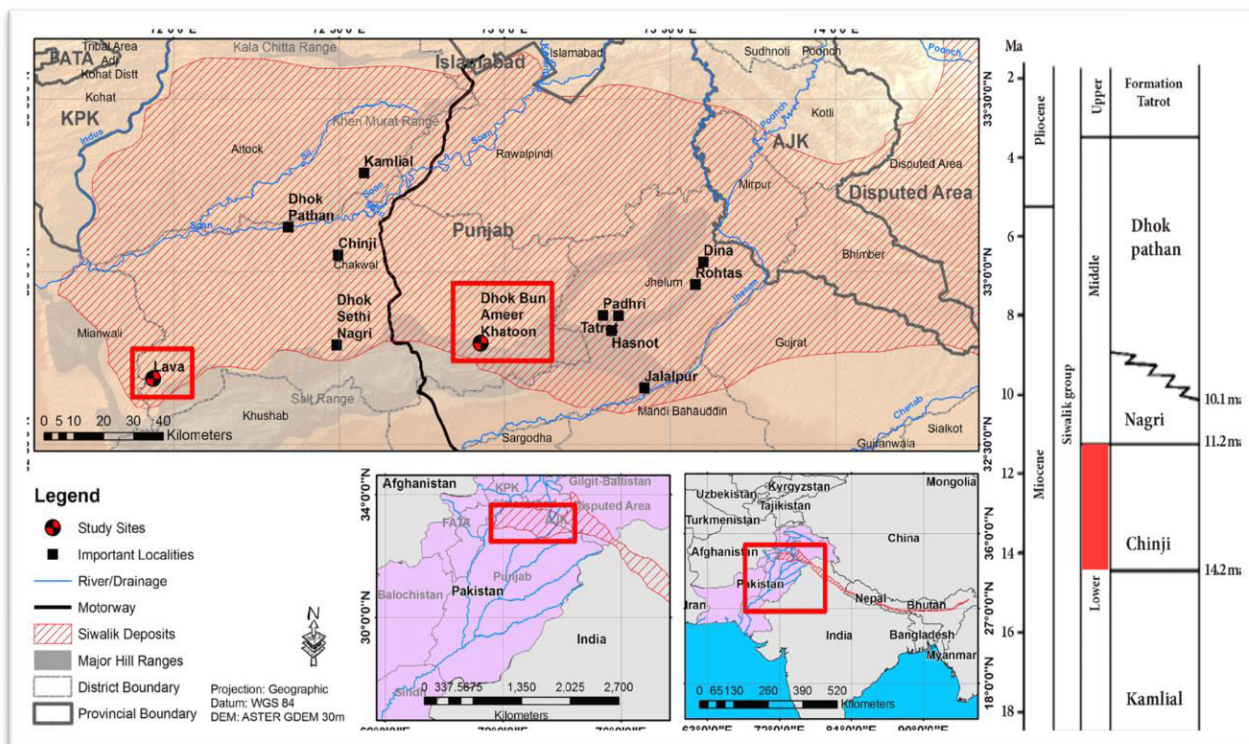
surrounding the Miocene deposits. Geographical coordinates of DBAK are 32° 47' 26.4'', 72° 55' 35.7 E. The fossiliferous section consists of shale, siltstone and sandstone (Khan *et al.* 2008). Its fossiliferous section consists of shale, siltstone and sandstones.

The site locality lava is 11km southeast of lava village with geological coordinates of 32° 62' N, 71° 98' E. fossiliferous deposits consists of sandstone and reddish shale (Khan *et al.* 2011). Kallar Kahar is located 25km southwest of Chakwal with geological coordinates of 32° 47'N, 72° 42' E.

### **MATERIALS AND METHODS**

Various field trips were carried out to the site localities of Dhok Bun Ameer Khatoon, Lawa and Kallar Kahar for fossil collection. Primary mean of collection was surface collection of the fossil remains. The collected material was carried to the laboratory and was prepared for study. The specimens were catalogued i.e., yearly catalogue and serial catalogue. Measurements of the specimens were taken in mm by Vernier calipers. Tooth length and breadth are measured at occlusal level. Photographs were taken with the help of digital camera and slides were prepared by computer. The fossils are housed in the Paleontology lab of the Department of Zoology, University of the Punjab, Lahore, Pakistan.

**Abbreviations:** PUPC – Punjab University Palaeontological Collection; M<sub>1</sub>– first lower molar; L – length; W – width; my – million years ago; mm – millimeters.



**Fig.1. Geographic locations and chronostratigraphic correspondences of Lava and Dhok Bun Ameer Khatoon localities of the Chinji Formation (Middle Miocene; 14.2–11.2 Ma) in northern Pakistan.**

## RESULTS AND DISCUSSION

### Systematic Palaeontology

Order: Artiodactyla Owen (1848)  
 Suborder: Suiformes Jaekel, (1911)  
 Superfamily: Suoidea (Gray, 1821) Cope, (1887)  
 Family: Suidae Gray (1821)  
 Sub Family: Tetraconodontinae  
 Genus: *Conohyus* Pilgrim (1925)

**Type species:** *Conohyus simmorensis* Lartet, (1851)

**Included species:** *Sanitherium schlagintweiti*, *Hyotherium sindiense*, *Hyotherium perimense*, *Palaeochoerus sindiense*, *Hyotherium chinjiensis*, *Conohyus chinjiensis*, *Propotamochoerus uliginosus*, *Propotamochoerus salinus*, *Dicooryphochoerus haydeni*, *Adaetotherium incognitum*.

**Generic Diagnosis:** Small tetraconodonts with P3-4 only marginally larger than M1; molars simple with poorly developed labial cingula; M3 simple; molar enamel thick and enamel on P3-4 wrinkled; symphysis very curved so that canines are steeply inserted the jaw; no or only short diastema; P 1-2 marginally sectorial; female canines pre-molariform (Pickford, 1988).

***Conohyus sindiensis* (Lydekker, 1884)**

**Specific diagnosis:** A small species of *Conohyus* in which the upper molar row is less than 60mm long (Pickford, 1988).

**Holotype:** GSI B102. It maxilla fragment with M<sup>1-2</sup>. LYDEKKER (1884).

**Horizon:** Lower Siwaliks of the Sind, Pakistan, probably equivalent to the Chinji type area on faunal grounds.

**Locality:** Lawa, Kallar Kahar and Dhok Bun Ameer Khatoon.

**Specimens observed:** PUPC 08/93, an isolated lower first molar, PUPC 94/7, an isolated lower third molar, PUPC 94/1, an isolated lower third molar, PUPC 94/64, an isolated lower third molar, PUPC 99/51, mandible having M<sub>2-3</sub>.

**Description:** M<sub>1</sub> consists of two principal cusps which are lophodont. Cingulum forms moderate flare around the tooth. Enamel is shiny and dark in color.

Anterior half of M<sub>2</sub> is broken. The hypoconid and entoconid are visible. Hypoconid is broader than entoconid. Median accessory cusp is visible. Cingulum forms flare on posterior side.

M<sub>3</sub> is simple bunodont. It mainly consists of four low-crowned principal cusps i.e., protoconid, paraconid, entoconid and hypoconid. Cusps are blunt indicating their

omnivorous habit. Sagittal valley between principal cusps is well spaced. Anteriorly cingulum forms moderate flare and anterior accessory cusps. Median accessory cusps are also present. Posteriorly cingulum expands to form relatively broader talonid and posterior accessory cusps. Remnants of cingulum forms basal pillar at the end of median valley both lingually and labially. Enamel is thin and shiny (Table-1, Figure 2 and 3).

**Comparison and Discussion:** All lower third molars of studied samples are simple molars like those of Pickford (1979). The molars have four main cusps along with posterior talonid. Moderate flare of cingulum is present around the tooth. Moderate accessory cusps are present in all specimens. Enamel of *Conohyus* is comparatively thicker as compared to other suids.

*Conohyus* is well known genus in Lower Siwaliks of Pakistan and all over the world but it still put forward some difficulties to identify some isolated molars of this genus. Pilgrim (1926) put *Conohyus sindiensis* specimens into 5 species, including two of *Propotamochoerus* and one of *Dicoryphochoerus*. The species *Hyotherium perimense* is most probable synonym of *C. sindiensis*, however in past it is being assigned to *Hyotherium* and *Palaeochoerus*. He demonstrated that the genus *Conohyus* is distinguished by the enlargement of 2<sup>nd</sup> and 3<sup>rd</sup> premolars which its distinguished characters are setting apart the Siwalik form from its European relatives, *Hyotherium*. Colbert (1935) assigned specimens of *C. sindiensis* into three different genera, *Conohyus*, *Dicoryphochoerus* and *Palaeochoerus*. Pickford (1979) assigned *Adaetotherium incognitum* Lewis as synonym of *C. sindiensis*. According to Pickford (1988) only molars of *Hyotherium* (*Sensu soemmeringi*) approach those of *Conohyus* in enamel

thickness and they should not be confused with those of *Propotamochoerus* having thinner enamel. *Tetraconodon* is distinguished from *Conohyus* by the still greater enlargement of the lower premolars. *Sivachoerus* differs from *Conohyus* by less degree of wrinkling on the premolars and by elongation and complication of M<sup>3</sup>.

Pilgrim (1926) described three species of genus *Conohyus*, i.e., *Conohyus sindiensis*, *Conohyus chinjiensis* and *Conohyus indicus*. *Conohyus sindiensis* differs from *C. chinjiensis* having relatively broader M<sup>3</sup> and less complex talon. *Conohyus indicus* possess stouter mandible relatively larger lower premolar. *Conohyus sindiensis* differs from *C. indicus* by superior dimensions of premolars of the later (Pickford, 2001). Van der Made (1999) suggested *Conohyus indicus* as synonym of *Conohyus sindiensis* without providing any evidence but later on he agreed that *Conohyus indicus* and *C. sindiensis* are two distinct species and belong to genus *Sivachoerus*. It was Pickford (2001), who conclude that *C. indicus* and *C. sindiensis* belong to genus *Conohyus* not *Sivachoerus*.

In Siwaliks tetraconodontinae is represented by 4 genera, *Conohyus*, *Lophochoerus*, *Tetraconodon* and *Sivachoerus* (Pickford, 1988).

In Europe, tetraconodontinae is represented by two genera, *Conohyus* and *Parachleuastochoerus*. *Conohyus* lineage starts with *C. simorreensis* (van der Made, 1990, 1999). *Conohyus* differs from *Parachleuastochoerus* in morphology of premolars (Pickford and Gupta. 2001).

*C. thailandicus* is junior synonym of *C. indicus* (Pickford and Gupta 2001) which was erected by Ducroq *et al.* (1997) on the basis of several specimens from northern Thailand.

**Table 1: Comparative measurements (in mm) of cheek teeth referred to *Conohyus sindiensis***

| SPECIMENS  | POSITION       | LENGTH<br>(mm) | WIDTH<br>(mm) | HEIGHT<br>(mm) |
|------------|----------------|----------------|---------------|----------------|
| PUPC 94/7  | M <sub>3</sub> | 24.5           | 14.0          | 10.0           |
| PUPC 94/1  | M <sub>3</sub> | 27.9           | 14.8          | 11.0           |
| PUPC 94/64 | M <sub>3</sub> | 21.1           | 12.1          | 10.5           |
| PUPC 08/93 | M <sub>1</sub> | 14.2           | 10.3          | 8.4            |
| PUPC 99/51 | M <sub>3</sub> | 20.0           | 9.3           | 6.45           |
|            | M <sub>2</sub> | 11.7           | 9.1           | 5.3            |
| *K41/836   | M <sub>3</sub> | 21.5           | 12.2          | -              |
| *K13/820   | M <sub>3</sub> | 24.9           | 13.6          | -              |
| *K41/829   | M <sub>1</sub> | 15             | 10.6          | -              |

\*K taken from Pickford, 1988.



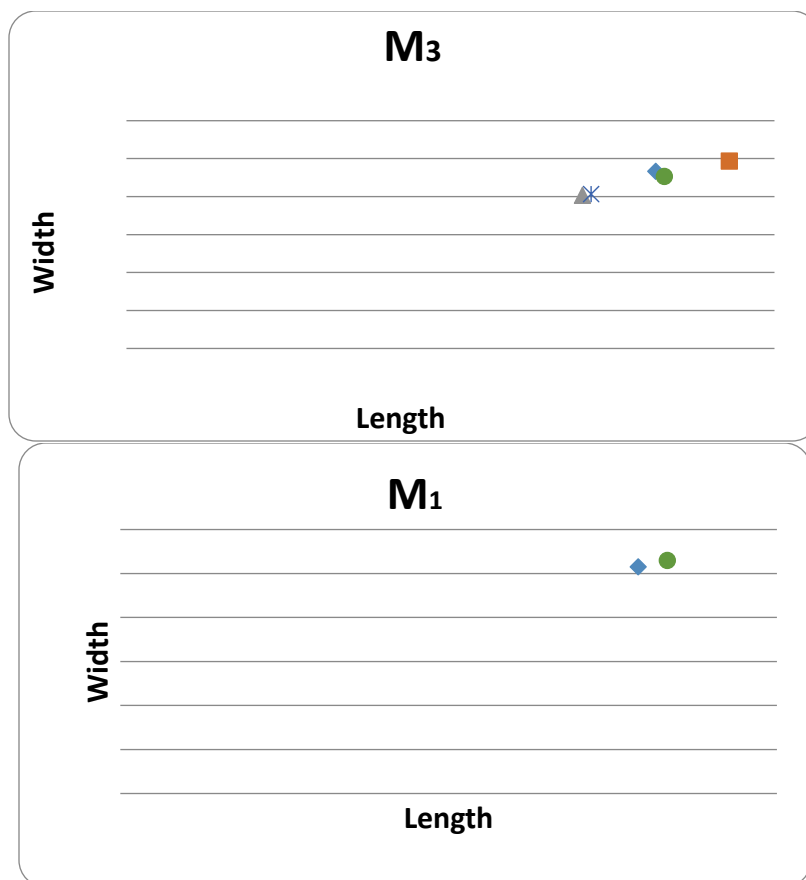


Fig 2. Scatter diagrams of cheek teeth of *Conohyus sindiensis*. Comparative measurements have been taken from Pickford, 1988.

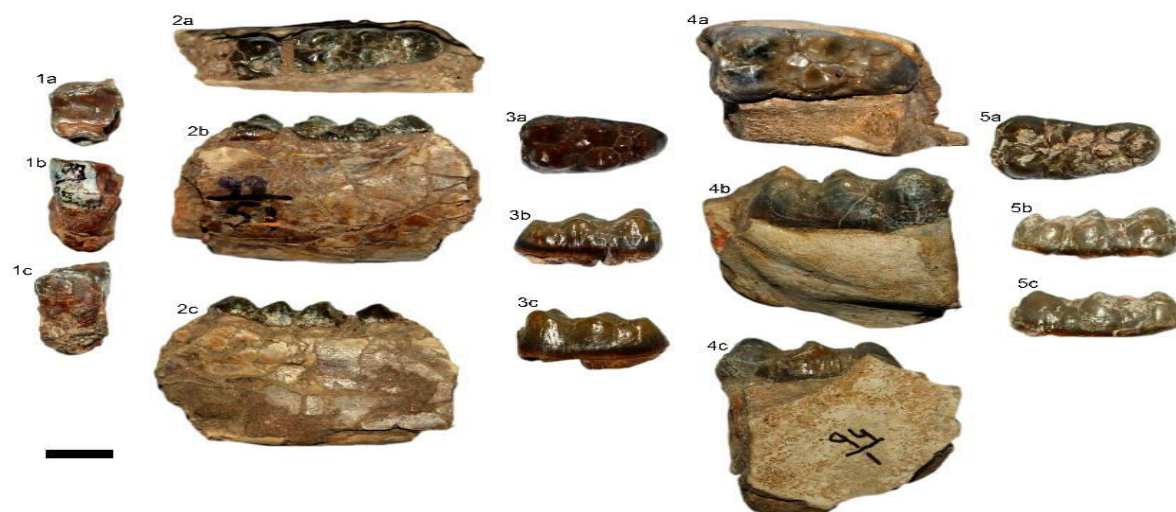


Fig 3. *Conohyus sindiensis*. 1. PUPC 08/93, an isolated lower first molar; 2. PUPC 99/51, mandible having  $M_{2-3}$ ; 3. PUPC 94/64, an isolated lower third molar; 4. PUPC 94/1, an isolated lower third molar; 5. PUPC 94/7, an isolated lower third molar. a. occlusal view b. buccal view c. lingual view. Scale bar 10mm.

**Conclusion:** Specimens described here morphometrically differ from other specimens of the genus *Conohyus*.

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