Fossils of Gazella (Bovidae, Mammalia) from Dhok Bun Amir Khatoon Chinji Formation of Pakistan

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ABSTRACT

In the Siwaliks, the genus Gazella is represented by Gazella sp. reported from the Chinji Formation, G. lydekkeri and G. superba from the Nagri and Dhok Pathan formations but this genus was not reported from the Soan Formation of the Siwaliks. New remains have been recovered from the Middle Miocene of the Siwaliks. The scope of this study is to add new anatomical features to this genus.

Key words: Artiodactyls, vertebrates, Pliocene, Pleistocene, Siwaliks.

INTRODUCTION

Gazelles are diverse herbivorous mammals that inhabit wide spectrum of habitats and occur naturally over large part of the globe. The wide variety of Gazella is found across the Eurasia from China to Spain and to the far south of South Africa. Gazella sp., G. lydekkeri and G. superba were found in the Siwaliks (Pilgrim, 1937, 1939). Gazella is known from the Pliocene of Eurasia and several Pleistocene localities in Africa. It is abundantly found at the same time in Asia and southern parts of Europe.

The specimens were naturally excavated and found in the nearby area of the Dhok Bun Amir Khatoon village (Fig., 1). The embedded material was carefully recovered with the help of different kinds of tools including chisels, small brushes and geological hammers. Some parts were broken, which were assembled with some kind of gum (resin) such as Araldite, Magic stone, Elfy, Elite and Fixin. Some specimens were not in a good condition. These were thoroughly washed and cleaned in the laboratory with the help of fine needles and brushes, and prepared for the study.

Specimen catalogue number consists of three parts: GCS (institutional abbreviation of Government College of Science, Wahdat road, Lahore, Punjab, Pakistan), the collection year (numerator) and serial number of the respective year (denominator). Terminology used, follows Pilgrim (1937, 1939).

SYSTEMATIC PALAEONTOLOGY

Family BOVIDAE Gray, 1821
Subfamily BOVINAE Gray, 1821
Tribe ANTILOPINI Gray, 1821
Genus GAZELLA Blainville, 1816
Gazella sp.

Geographical distribution: The species is known from the Lower Siwaliks of the subcontinent (Pilgrim, 1937, 1939; Akhtar 1992; Khan et al., 2009, 2013).

Stratigraphic range: Lower Siwaliks.
Locality: Dhok Bun Amir Khatoon (Chinji Formation, Lower Siwaliks), district Chakwal, province Punjab, Pakistan.
New Material: GCS 13/12, partial left upper first molar; GCS 13/13, partial upper molar; GCS 13/16,
right upper third molar; GCS 13/10, right mandible fragment with second molar; GCS 13/11, mandible fragment with second molar.

**DESCRIPTION:**

The upper molars are nearly quadrate and rugose. The major cones are interconnected to each other (Fig., 2(1)). The ectostyle is weakly developed. The longitudinal valleys are not much deep. The mesostyle is well developed. The anterior and posterior ribs are moderately developed. The cingulum is poorly developed antero-posteriorly.

The fossettes are wide and crescent shape. The goatfold is present anteriorly in the lower molars. The protocristid is larger than the postprotoconid (Fig., 2(3)). The apices of the conids are somewhat conical. The conids have non smooth convex lingual wall. The ectostylid is absent or rudimentary present. The parastylid is less developed than the mesostylid. The paraconus rib is flat and the metaconus rib is prominent. The posterior fossette is narrower than the anterior one. The anterior fossette is simple and wide.

**Fig., 2:** *Gazella* sp. 1. GCS 13/12, partial left upper first molar; 2. GCS 13/16, right upper third molar; 3. GCS 13/10, right mandible fragment with second molar. Views: a, occlusal; b, lingual; c, labial.
COMPARISON AND DISCUSSION

The general teeth pattern shows selenodonty and mesodonty, without entostyle and strong anterior median rib (Fig., 2). The molars are small with finely rugose enamel and can be included in medium sized bovids (Pilgrim, 1939; Khan et al., 2009). The lower molar represents goat fold (Fig., 2). The dimensions and morphology of the studied material reveal all the features of the species *Gazella*, found in the lower Siwaliks of Pakistan.

The numerous previously reported species of gazelles are now placed in three genera, mainly based on the body size. The small sized includes the genus *Gazella*; the medium sized gazelles include the genus *Eudorcas*; the large bodied gazelles include the genus *Nanger*. Nevertheless, the specific identification is very difficult due to high intraspecific variability. The gazelle community is clearly related to the physiographic setting of sites with extensive open or bush-covered plains at no great distance (Bibi & Güleç, 2008; Kostopoulos, 2005). The grazing species as *Gazella*, *Procapra*, *Saiga* tend to form larger herds, probably as a defense against predators (Brashares et al., 2000).

The genus *Gazella* was recorded from the Lower and Middle Siwaliks and not found in the Upper Siwaliks (Pilgrim, 1937, 1939; Khan, 2008; Khan et al., 2014). The absence of gazelles in the Upper Siwaliks may be an indication of the absence of bushed lands. However, this also raises a question of how they suddenly became extinct during the Siwalik Pleistocene in Pakistan.

**Table I:** Comparative measurements (in mm) of the cheek teeth of *Gazella* sp. Referred data are taken from Colbert (1935).

<table>
<thead>
<tr>
<th>Specimens</th>
<th>Nature</th>
<th>Length</th>
<th>Width</th>
<th>W/L ratio</th>
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<td>GCS 13/10*</td>
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</table>

Conclusions

*Gazella* sp. was recovered from the Chinji Formation of Dhok Bun Amir Khatoon, Chakwal, Northern Pakistan. The outcrops of Dhok Bun Amir Khatoon represent one gazelle species along with the other Middle Miocene mammalian species *Progrira* *exigua*, *Giraffkoryx punjabensis*, *Listriodon pentapotamiae* and *Deinotherium indicum*. The associated fauna of *Gazella* sp. indicates bushed lands in Dhok Bun Amir Khatoon during Middle Miocene.

REFERENCES


