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A NEW DEER FROM THE SIWALIKS

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Among the fossils from India collected by the writer for the American Museum in 1922, there is an exceptionally fine deer skull that combines characters of the living Indian sambur and chital to such a degree that it may well represent a transition stage by which the former was derived from ancestral chital stock.

Cervus punjabiensis, new species

TYPE.—No. 19911, an incomplete skull with antlers.

LOCALITY.—Two miles west of Chandigarh, Delhi Division of Punjab, Amballa District, Patiala Estate.

HORIZON.—Upper Siwaliks. Immediately below conglomerate, estimated to be about 500 feet below the top of known beds.

CHARACTERS.—Brain case formed as in *C. axis;* bullæ low and rounded; antlers lying in a plane parallel to facial angle, widely expanded, round and comparatively smooth; nasals narrow and muzzle not expanded; teeth hypsodont, with open crescents and enfolded enamel, lacking accessory inner columns; surface smooth.

When found the skull was completely weathered out and in such position that, like many specimens in the Siwaliks, the absence of missing parts could not be attributed to erosion.

As contacts between fragments in front of the brain case are missing, the skull has been restored in order to interpret the preserved parts, which include the antlers and complete brain case, with face forward to the orbits; ventrally it extends almost to the palate and laterally includes the inner walls of the orbit. Of the left side there is the greater part of the jugal and a fragment of the maxilla with the last molar perfect. Half of the right maxilla is preserved with the three premolars perfect and all of the first molar except the outer face of the tooth. Two-thirds of the nasals are preserved, with the extreme anterior and posterior ends missing.

This animal was fully mature (apparently about four years old), with permanent teeth erupted and slightly worn. The antlers had probably just passed the "velvet" stage.

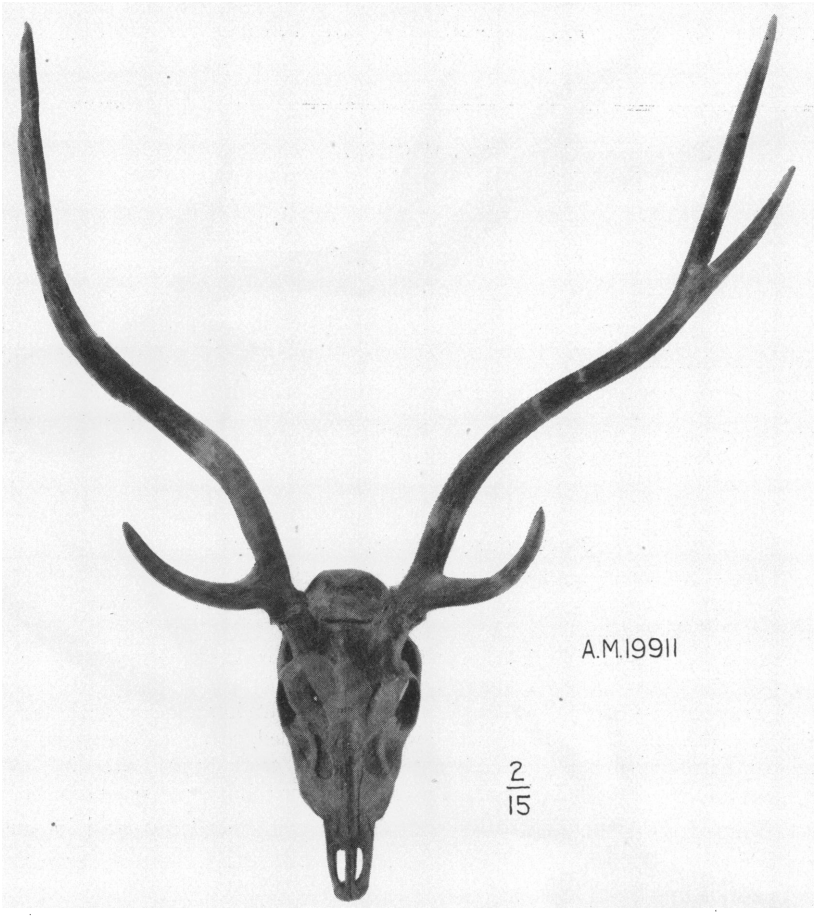

Fig. 1. Top view of skull of *C. punjabiensis*.
Left antler normal, right antler slipped above middle of beam.

Compared with the two nearest living deer, *C. axis* and *C. unicolor*, to which it is clearly related, we find a combination of characters that now distinguish these two racial stocks.

The antlers, supported on short pedicles, are long, round, divergent and moderately smooth, the brow-tine making an obtuse angle with the beam. The rear tine of the terminal fork, which forms the continuation of the beam, is much the longer, the shorter front tine being placed forward and outward. The antlers are comparatively shorter and more slender

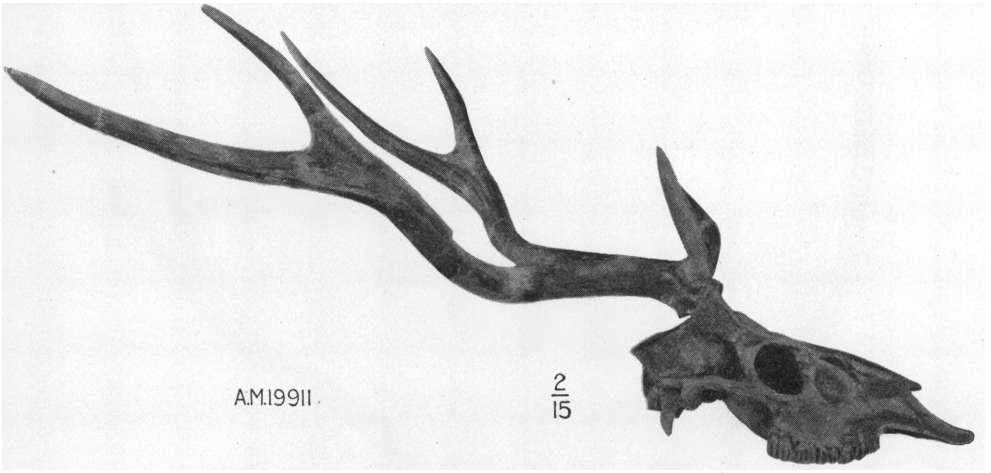

Fig. 2. Right side of type skull, *C. punjabiensis*.

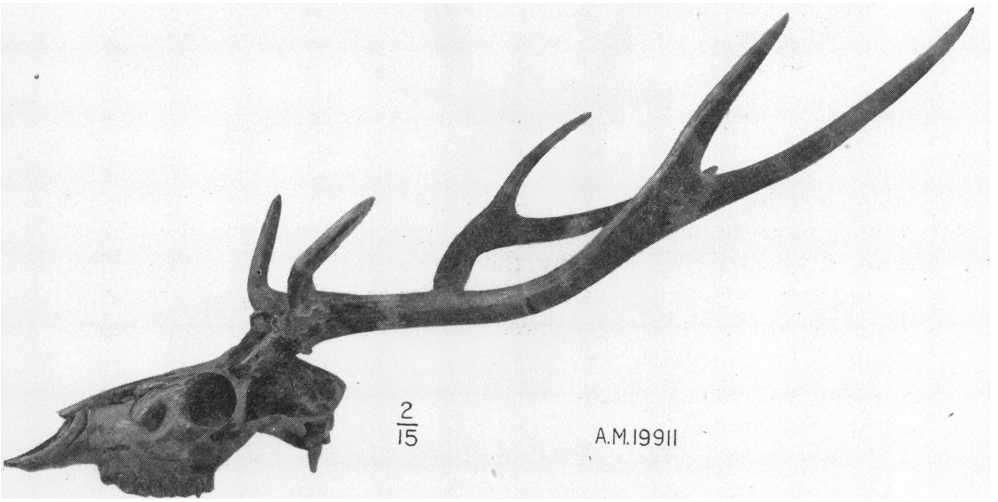

Fig. 3. Left side of type skull, *C. punjabiensis*.

than in the living chital, but, unlike the chital or any member of the sambur race, they are widely divergent and in profile lie in a plane generally parallel to the facial angle without forward recurve.

The range of variation in form and size of antlers in the axis deer is considerable, depending chiefly upon the age of the individual, as is shown in a series of antlers developed by an animal during its life in captivity (Fig. 5).

The brain case is formed as in *C. axis*, with a similar development and relationship in each of the skull elements.

The teeth are hypsodont and higher-crowned than in the several skulls of *C. axis* with which this specimen has been compared, agreeing in this respect with *C. unicolor*. They are more oblique to the axis of the

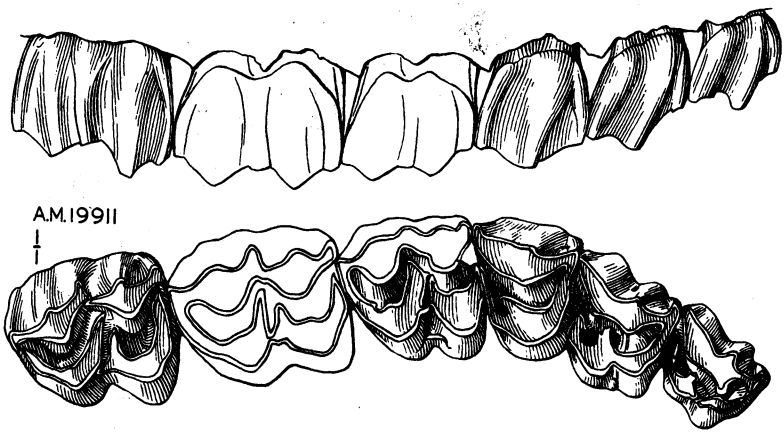

Fig. 4. Side and crown views of type, *C. punjabiensis*.
Premolars and m^1 reversed from right side.

skull and to each other than in *C. unicolor*, the anterior premolars approaching the median line as in *C. axis*, thus verifying the narrow muzzle which is indicated by the high-arched narrow nasals. The crescents are more open than in *C. unicolor* or in *C. axis*, with costæ on outer faces of teeth less pronounced and inner accessory columns absent. Enamel surface smooth.

Among fossil Cervidæ there are few that can be confused with the the present species.

Deer of *axis* affinity were common in the Pliocene faunas of Val d'Arno and Auvergne, several species having been proposed on antlers. Of these, *C. pardiensis* (Croizet and Jobert, Recherches sur les Ossemens fossiles du Departement du Puy-du-Dome, 1828, and B. Dawkins, Quart. Jour. Geol. Soc., 1878, pp. 402–420) bears a fairly close resemblance to *C. punjabiensis* in general form and size of antlers. The antlers, however, are straighter in the beam, with shorter distance between the brow-tine and the terminal fork.

Lydekker (Palæontologia Indica, Ser. X, Vol. I, Pt. 2, 1876, pp. 46–52) described and figured three species of the genus *Cervus* from the Siwaliks of India: *C. latidens*, which is based upon a right upper molar,

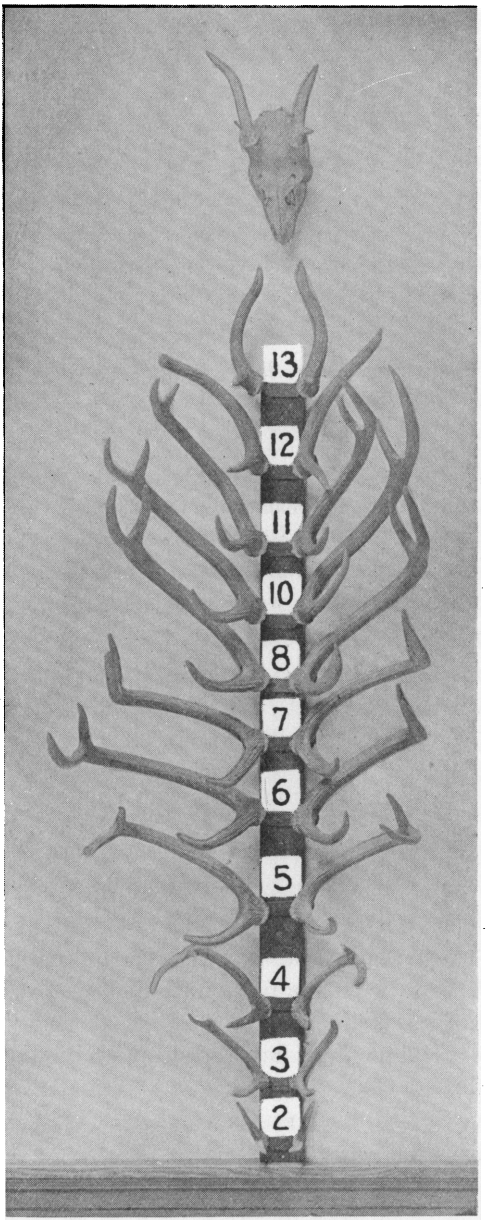

Fig. 5. THE RISE, PROGRESS AND DECLINE OF THE ANTLERS OF AN AXIS DEER (*Cervus axis*)

Head and series of antlers of "Billy," after fourteen years of life in the New York Zoölogical Park. This animal died of old age and rheumatism in 1914. The first pair of antlers developed in the animal's second year; they reached maximum size in the fifth year and began to diminish in the eleventh year. The eighth year's antlers (not shown in this series) are preserved on the mounted skin.

(By courtesy of the officials of the New York Zoological Park.)

C. triplidens, based upon a fragmentary right maxilla with m^{2-3}, and *C. simplicidens*, based upon the left upper molars, m^{2-3}. They are characterized as follows:

C. latidens, as large as *Megaceros*, crown oblong, lateral costæ on outer face of barrels prominently developed, with a large inner accessory column.

TYPE LOCALITY.—Padri and Asnot (now spelled Hasnot), both localities being in Middle Siwalik exposures where there are no Upper Siwalik beds present. This form is fairly abundant in the Middle Siwaliks. Later, in 1880, Lydekker removed this species to the genus *Oreas*.

C. triplidens is distinguished by having more hypsodont teeth than do living deer, an unusually large accessory column, rugose enamel and prominent costæ.

TYPE LOCALITY.—Siwaliks (probably Upper Siwaliks).

C. simplicidens is distinguished from the former species by the small size of the accessory columns, squareness of crowns and less oblique position of teeth to each other and to the axis of the series; enamel slightly rugose.

LOCALITY.—Siwaliks (probably Upper Siwaliks).

In the preface to this volume (p. xvii), a fourth species, *C. sivalensis*, is proposed for a fragmentary lower jaw with m_{2-3}.

LOCALITY.—Padri (Middle Siwaliks, near Hasnot). In 1884 (Palæontologia Indica, Ser. X, Vol. III, Pt. 1, pp. 121–122) the species was more fully described and two upper molars were selected from the Upper Siwaliks as the type, the lower molars here being referred to it. These teeth are squarish in outline, fairly hypsodont, rugose, and are figured with a distinct cingulum and small accessory column.

By careful comparison with the figures and with Lydekker's descriptions of these several species, *C. punjabiensis* agrees more closely with specimens referred to *C. simplicidens*, which probably came from the same series of rocks but is distinguished from that species by the more open valleys between the cones, by the enfolded enamel, by the flatter outer face of all teeth, with less pronounced costæ, by greater obliquity of teeth to axis of series and total absence of accessory column on last molar, with only a rudimentary accessory column on first molar; enamel perfectly smooth.

MEASUREMENTS

Length of antler on outside curve	695 mm. = 27⅜ in.
Width of antlers tip to tip; double left, normal side	670 mm. = 30 in.
Circumference of beam above brow-tine	95 mm. = 3¾ in.
Length of molar series	100 mm. = 3 15/16 in.