



TAJIKISTAN'S AND INDIA'S FOSSIL ALCELAPHINAE

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ABSTRACT

The present paper gives a description of the Upper-Pliocene antelope *Damalops palaeindicus* (Falconer) from Tajikistan. Questions related to ecology, phylogenetic relations, origin and migration of Alcelaphinae are discussed.

Paleontological investigations in Southern Tajikistan, within Afghan-Tajik depression, led to the discovery of an extremely abundant fauna of Vertebrata of the Villafranc appearance at the Kuruksai locality.

The locality lies in the dry bed of the river Kuruksai (Sai Navrukho). The deposits of "Kuruksai formation" occurring with erosional and angular unconformity on the rocks of different age crop out here both sides along the flanks of the river bed. They are composed of conglomerates, gray variegated polymict sands and grayish-brown aleuritic clays. The whole strata is dismembered into three patches whose total thickness approximates to 400-420 m (Dodonov, 1973).

Animal remains are mainly confined to the 2nd and 3rd patches.

Investigations conducted by the paleontologists B. A. Trofimov, E. A. Vangengeim, V. S. Zazhigin, M. V. Sotnikova and E. L. Dmitrieva (Nikonov *et al.* 1971; Sotnikova, 1974; Dmitrieva, 1975) resulted in the establishment of the following composition of the fauna: *Villanyia sp.*, *Hystrix sp.*, *Primates* (Cercopithecidae), *Archidiskodon gromovi* Garutt et Alex. aut *Protelephas planifrons* Falc. et Cautl., *Equus ex gr. stenorhinus*, *Dicerorhinus sp.*, *Paracamelus gigas* Schlosser, *Suidae* gen., *Euctenocerus sp.*, *Axis sp.*, ? *Cervus*, *Sivatherium sp.*, *Gazellospira gromovae* Dmitrieva, *Damalops palaeindicus* (Falconer), *Protoryx paraticeps* Dmitrieva, *Gazella parasinensis* Dmitrieva, *Geochelonia sp.*, Aves. Carnivora are represented by *Canis ex. gr. aureus*, *Hyaena perrieri* Croizet et Jobert, *Euryboas cf. lunensis*, *Megantereon megantereon* Croizet et Jobert, *Homotherium sainszelli* Aymard, Machairodontinae gen nov., *Felis (Lynx) cf. issidorensis*.

Villanyia sp. and *Equus ex. gr. stenorhinus* present in the fauna suppose the Late-Pliocene age of the enclosing deposits. The remains of *Damalops palaeindicus*, found in Tajikistan, are also known from the Pinjor deposits of Indian Siwaliks. And finally, M. V. Sotnikova (1974) points out that the evolutionary level of the Carnivora from Tajikistan is close to that of Carnivora from the middle Villafranchian of Europe. Thus, the age of the Kuruksai deposits can be dated back to the Late Pliocene (according to I. I. Krasnov and K. V. Nikiforova's scheme, 1973).

Bovidae Gray, 1821

Alcelaphinae Pilgrim, 1939

Type-genus: *Alcelaphus* Blainville, 1816.

Diagnosis: large antelopes with an unusually elongated facial region and strongly bent down cranium axis.

Composition of the family¹

Alcelaphus Blainville, 1816, Pleistocene—Present, Africa and Arabia²; *Parabubalis* Vera Gromova, 1931, Pliocene, Transbaikal area; *Damaliscus* Sclater et Thomas, 1894, Pleistocene—Present, Africa; *Damalops* Pilgrim, 1939, Upper Pliocene, India; *Prodamaliscus* Schlosser, 1904, Mio-Pliocene, Europe; *Parmularius* Hopwood, 1934, Middle Pleistocene, Africa; *Damalavus* Arambourg, 1959, Upper Miocene, N. Africa; *Praedamalis* Dietrich, 1950, Pleistocene, E. Africa; *Peloroceras* van Hoepen, 1932, Pleistocene, S. Africa; *Orangitherium*

¹ According to Sokolov J. J. (1961).

² It is exterminated in the Arabian Peninsula at present. "Life of Animals", v. 6, pp. 449, 1971.

van Hoepen, 1932, Pleistocene, S. Africa; *Megalotragus* van Hoepen, 1932, Pleistocene, S. Africa; *Lunatoceras* Hoffman, 1953, Pleistocene, S. Africa; *Parestigorgon* Dietrich, 1950, Pleistocene, E. Africa; *Connochaetes* Lichtenstein, 1814, Present, S. Africa; *Gordon* Gray, 1872, Pleistocene—Present, E. Africa.

Comparison: From other forms of Bovidae, the Alcelaphinae differ by the elongated facial region of the cranium.

Occurrence: Sarmat—N. Africa; Upper Miocene—Lower Pliocene, Europe; Upper Pliocene, Asia; Pleistocene—Present, Africa, Arabia, Transbaikal area.

Damalops Pilgrim, 1939

1939. *Damalops* Pilgrim. Pal. Ind. N. S., XXVI, n 1, p. 67.

Type-genus: *Antilope palaeindica* Falconer¹ (1859, p. 154, N S 581). Pinjor Zone of India.

Diagnosis: Alcelaphinae with a long, arch-like, forwardly expanding muzzle, with wide and deep pre-orbital fossae, nearly straight and relatively parallel horn-cores.

Composition of the genus. *Damalops palaeindicus* (Falconer). India's Pinjor Zone.

Comparison: The antelopes of the genus *Damalops* are distinguished from the African modern and fossil antelopes of the genera—*Alcelaphus*, *Damaliscus* and *Parmularius*, having more or less prominently arched and outwardly and posteriorly bent horn-cores, apparently, by almost straight and rather parallel, at least in the lower third, horn-cores, as well as by the presence of deep and wide preorbital fossae (from *Alcelaphus* and *Damaliscus*). From the antelopes of the genus *Prodamaliscus*, the *Damalops* is distinguished by a straight or even slightly concave profile of the post-horn cranial region. (In *Prodamaliscus* the post-horn region is slightly convex). In addition, the length of the post-horn region in *Prodamaliscus* essentially exceeds that of the frontal zone, which is not the case in *Damalops*. In contrast to *Parabubalis* from the Transbaikal area, in which the dorsal surface in the post-horn cranial region is nearly in the same plane with the occiput and the horn-cores are slightly homonymous, *Damalops* is distinguished by a different relation between the plane of the dorsal part of the braincase and the occiput and, apparently, by the absence of any homonymity of the horn-cores. From *amalav s*—by larger curvature of the skull axis and inclination occiput of the horn-core.

Occurrence: Upper Pliocene of India and Tajikistan.

Damalops palaeindicus (Falconer)

1843. "Fossil Antelope" Baker, Jour. As. Soc. Beng., XII, p. 770, pl. XIII, figs. 1, 2.

1859. *Antilope palaeindica*, Falconer, Cat. Foss. Vert. As. Soc. Beng., p. 154, No. S. 581.

1868. *Antilope palaeindica*, Falconer, Pal. Mem., I, pp. 290, 555, pl. XXIII.

1878. *Damalis palaeindica*, Rüttimeyer, Abhandl. Schweiz. Paläont. Ges., Y, p. 89.

1885. *Alcelaphus palaeindicus*, Lydekker, Geol. Mag. (3), II, p. 170.

1885. *Alcelaphus bakeri*, Lydekker, Geol. Mag., (3), II, p. 170.

1885. *Alcelaphus palaeindicus*, Lydekker, Cat. Foss. Mamm. Br. Mus., II, p. 55.

1885. *Alcelaphus bakeri*, Lydekker, Cat. Foss. Mamm. Br. Mus., II, p. 56.

1886. *Alcelaphus palaeindicus*, Lydekker, Pal. Ind., (10), IV, p. 14.

1928. *Damaliscus palaeindicus*, Abel in Weber. Die Säugetiere, 2nd ed., II, p. 584.

(Fig. 1A, B, C, D)

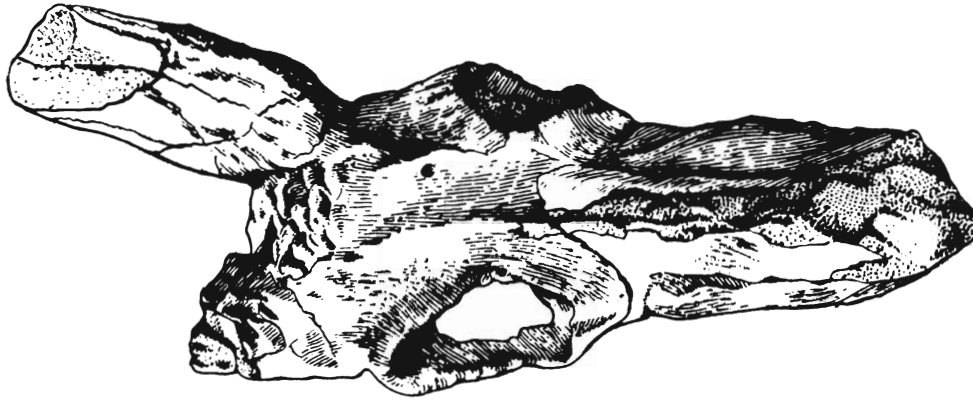
Holotype: No. B. 231. Cranium. Upper Pliocene (Pinjor Zone) of Indian Siwalik hills; stored in the Geological Survey of India in Calcutta. Pictured in Lydekker's work (Lydekker, 1886, pl. IV, fig. 3, 3a; 4, 4a; 5, 5a).

Material: Cranium. 3120-485, PIN, USSR Academy of Sciences. Considerably deformed (right-left crushing, particularly of its occipital area). Nasal bones are partly destroyed, but a natural cast of the facial region has preserved. The upper jaw fragments, 3120-486 and 489, PIN, USSR Academy of Sciences. No. 486-pd²-pd⁴, M¹ belongs to a young animal of about 6 months old. No. 489-P²-M². The lower jaw with P₂-M₃, 3120-521, PIN USSR Academy of Sciences, has preserved relatively well. The remains belong to at least 2-3 adult species and a calf of about half a year old.

Collections of the Paleontological Expedition of the USSR Academy of Sciences (B. A. Trofimov).

Description: Cranium large (its main length measuring about 300 mm), with an elongated facial region (the nasal bones are approximately over 130 mm in length). The nasal and (in a lesser degree) frontal bones are arch-like and narrowed at the sides. The frontal bones rise above the orbits. The supraorbital fossae are very small, rounded. The jugal tuber at the upper jaw is expressed sufficiently well. In the region of os lacrimale, there is a deep and wide preorbital fossa (its length is 53 mm across the cranial axis and 97 mm along it). The orbits slightly protrude outwards. Their longitudinal and transverse diameters are 55×42 mm. The cranium width is about 136 mm at the orbits and about 94 mm in front of them. The cranial axis is strongly bent down (over 60°). The dorsal part of the brain-case lies at an angle of 110°—120° to the plane of os frontale and at about 100° (with account to the strong deformation of the occiput) to the occipital plane. It is flat, even slightly concave. The sagittal length of os parietale is 40 mm. The parietal crests are weakly developed. The surface of parietal bones is gradually proceeding into the surface of the temporal fossa. Neither the sagittal suture on frontal bones nor the clearly cut transverse suture on

¹ Falconer's authorship is according to Pilgrim (Pilgrim, 1939).



←Fig. 1A

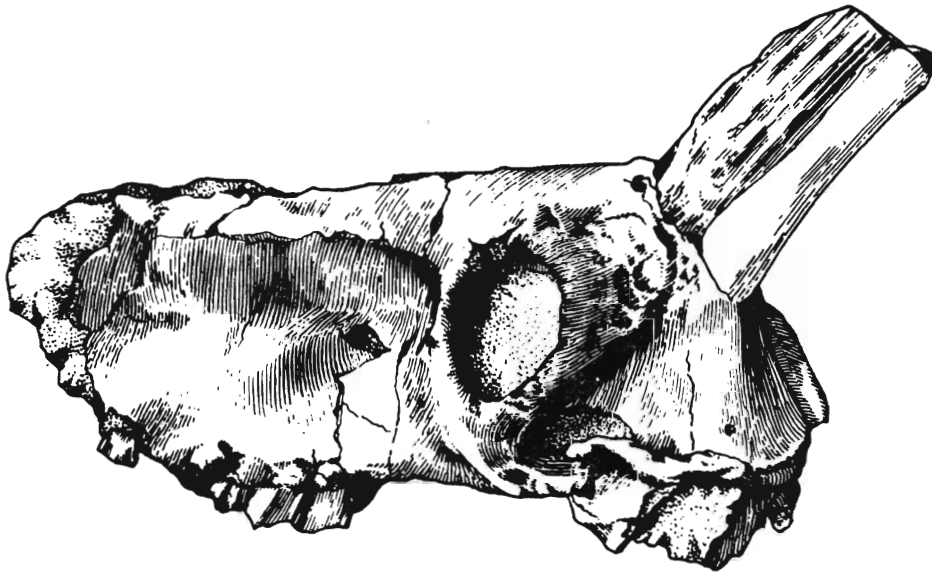
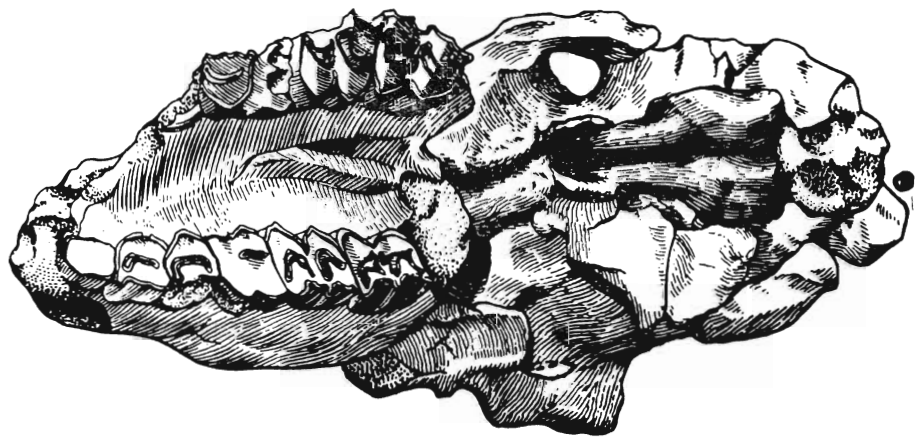


Fig. 1B→



←Fig. 1C



↓ Fig. 1D

1. *Damalops palaeindicus* (Falconer) (p. 98), No. 3120—485, PIN, USSR Academy of Sciences ; X—1/3 ; cranium ; Tajikistan, Kuruksai. Upper Pliocene.

A—view from above ;
 B—side view ;
 C—view from behind ;
 D—view from below.

the parietal bones are to see. The width of the brain case behind the horn-cores is about 80 mm.

The main occipital bone is broad and nearly square with massive pharyngeal tubers. On the sides of basioccipitale, from its ventral surface, there are longitudinal ridges, and in-between them, a groove. The length of basioccipitale is about 64 mm, the width at pharyngeal tubers—44 mm. The choana is narrow (about 25 mm in width) and elongated (80 mm)¹. The front edge of choana goes either beyond the level of the front lobe of M³ or beyond the level of the hind lobe of the same tooth. The palate is slightly concave. The width of the palatin bones (between M³) is about 50 mm (N 3120-485). Teeth rows of the right and left side appear to be parallel to each other, rather than curving out.

The horn-cores lie on the flat, elevated tuberos platform (above and behind the orbits). Relative to the post-horn cranial region they lie at an angle of about 120°. They are oval in cross-section (52×38) and, at least in the lower part, straight and comparatively parallel to each other. They were apparently long, slightly diverged outwards and inclined posteriorly. At the base they were drawn together (distance between them is 36 mm from the front, and 28 mm from behind). Thus, the longitudinal axes of the horn-cores were lying at an angle of 30° to the sagittal plane of the cranium. The stump is absent. Frontal sinuses, apparently, did not spread beyond the base of the horn-cores. The surface of the latter is longitudinally grooved.

The teeth are hypsodontal. The length of the maxillary teeth attains 120 mm. The premolars (L - 48 mm) make up for about 40% of the complete row. The teeth are sculptured. The ribs are moderately and the styles little more developed. Spurs are occasionally visible in the dental alveoli, and between the anterior and posterior semilunars of M³ and M² there are islands of enamel. Additional elements are lacking. The surface of the teeth (3120-485) is somewhat streaky. Upon them there is a thin cement layer. From the inner side the anterior semilunars of the molars are more angular, the posterior ones are rounded. In the young specimens (3120-486) a row of milk premolars is practically of the same length as those in the adults (47.5 mm). Pd³ and pd⁴ are strongly molarized.

The mandibular teeth² are large. The length of the P₂-M₃ is 134 mm. Premolars (their length being 47 mm) make up 35% of the length of the whole series. Ribs and styles are weakly developed, no additional elements are present. "Goaty" or frontal fold of the molars on the outer side is missing. The surface of the

teeth is slightly streaky. The height of mandible in front of M₁ is 35 mm, in front of M₃—46 mm.

Remarks: This form differs from the genus described by Pilgrim (Pilgrim, 1939) in somewhat larger dimensions (Table 1). Certain differences in the degree of inclination of the horn-cores to the parietals are, obviously, due to variability and partial deformation of the cranium.

Table 1. Cranial Measurements in *Damalops palaeindicus* (Falconer), mm

Measurements	Locality	India		Pilgrim, 1939		Tajikistan
	Nos.	Holotype G.S.I. B. 231	Br. Mus. 39594	Br. Mus. 39598	Br. Mus. 39571	Kuruksai 3120-485
Width of brain-case..		70	74	76	..	80
Width between orbits		125	132	107	..	136
Width in front of orbits		87	91	83	..	94
Width of palate at M ³		45	45	40	..	50
Length of nasal bones		..	155	over 130
Angle between parietale and frontal bones	65	110°-120°
Anterior-posterior dia- meter of horn-core at the base ..		49	..	? 42	..	52
Ditto, transverse dia- meter ..		33	..	? 36	..	38
Distance between horn- cores at the base— in front	36
behind	28
M ¹ —M ³	67	69 ? 65	70	72
P ² — P ⁴	35	36	.. 36.5	48

Ecology: The antelope was inhabiting the intermountain valleys of the Gissar, Darwaz, Pamir, and Hindu Kush mountain systems. Certain morphological features of its dental system, i.e. hypsodontism, presence of spurs and enamel islands, absence of a "goaty" fold at the lower molars, retention of the elongated serie of premolars, thin cement layer on the teeth, give grounds for an assumption that it lived in savanna and was adapted to a pasture mode of life and to eat relatively soft grassy foods.

Modern alcelaphinae are inhabiting either open

¹ The choanas are slightly altered by deformation.

² Only one mandible was provisionally referred to *Damalops palaeindicus* (3120-521) because it fits to *Damalops* both by its size and a number of morphological features.

plains (savannas) or hilly regions overgrown with scrubs. They feed, as a rule, on succulent grasses and are adapted to long and fast drivings. "...even a horse is unable to outrun them. Kongoni pace very fast, with their muzzle pressed against the neck." ("Life of Animals", vol. 6, p. 449, 1971). Considerable elongation of the muzzle of Alcelaphinae is probably related to their adaptation for fast running. Fast and distant running required increased oxygen supply and this obviously led to the volumetric expansion of the nasal cavity and respectively to muzzle elongation. In *Damalops palaeindicus* it was raised and upwardly arched.

Locality: Tajik Republic, Dangarin district, right bank of the dry Kuruksai river, Sai Navrukho, Kuruksai locality. Upper Pliocene.

Occurrence: Upper Pliocene (Pinjor Zone) of India and Tajikistan.

CONCLUSION

One of the most ancient genus of Alcelaphinae is *Prodamaliscus gracilidens* Schlosser from the Upper Miocene—Lower Pliocene deposits of Europe (Samos Island). This species is represented by very fragmentary material and this makes it difficult to establish its phylogenetic relationships with all other Alcelaphinae genera (Sokolov, 1953).

From more young (Upper-Pliocene) deposits of India the remains of *Damalops palaeindicus* are known. The latter displays in its organization a number of primitive features: arch-like frontal bones, expansion of the muzzle towards its frontal end, presence of deep and wide preorbital fossae, relatively parallel arrangement of horn-cores on the skull, elongated row of premolars. Earlier this genus was said to be related to the modern African antelopes—*Damaliscus*. However, I. I. Sokolov (1953) thinks that their geographic and geological separation does not permit to trace their direct genetic relations.

From the Pleistocene deposits of Africa and Transbaikalian area, *Alcelaphus*, *Parmularius*, *Parabubalis* etc. have been described. The area of modern Alcelaphinae (*Alcelaphus*, *Damaliscus*) is confined to Africa and Arabia. Thus, in the course of time, distribution of the antelopes was perceptibly reducing.

In 1959 Arambourg described from North African Sarmatian deposits (Qued el Hammam) the remains of a very primitive antelope—*Damalavus borocoi* with a cranium axis only slightly bent down, with the horn-cores shifted back, beyond the front half of the orbits. This species is very close to Alcelaphinae due to some of its features: pneumatization of frontal bones and horn-core bases, little uprise of the frontals and the degree of inclination of the horn-cores to the cranium. Arambourg considers this form to be the most ancient representative

of the subfamily, furnishing evidence about the existence of this subfamily since the end of Miocene.

But is this the way of migration of the Alcelaphinae from Africa to Europe and Asia? Or are Bovidae most probably to migrate from Asia? Obviously, this problem is still waiting for solution.

New finds of the remains of *Damalops palaeindicus* in the Tajik upper Pliocene deposits extend the area of ancient Alcelaphinae and at the same time indicate the position of Kuruksai at the junction of zoogeographic subregions: Central-Asian and Indian (as it was previously indicated for Carnivora by M. V. Sotnikova, 1974). It appears that representatives of faunas from the Central Asia and India mixed here, on the territory of Southern Tajikistan.

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