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CHORLAKKIA HASSANI, A NEW MIDDLE EOCENE DICHOBUNID (MAMMALIA, ARTIODACTYLA) FROM THE KULDANA FORMATION OF KOHAT (PAKISTAN)

By

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Abstract.– A new genus and species of artiodactyl, *Chorlakkia hassani*, is described from the middle Eocene Kuldana Formation in the Kohat District of Pakistan. This is the smallest artiodactyl described from the Paleogene of Asia, and it is one of the smallest artiodactyls yet known. The familial position of *Chorlakkia* is somewhat uncertain, but it appears to belong to the family Dichobunidae (*s.l.*).

INTRODUCTION

The mammalian fauna from the middle Eocene of Pakistan has been described in a series of papers by Pilgrim (1940), Dehm and Oettingen-Spielberg (1958), Van Valen (1965), Gingerich (1977), and Hussain, de Bruijn, and Leinders (1978). Virtually all specimens were collected from the Kuldana Formation in the vicinity of Lammidhan and Ganda Kas in Campbellpore District. In 1977 we collected an interesting assemblage of fossil mammals from several new localities in the Kuldana Formation of Kohat District, some 100 kilometers west of Lammidhan and Ganda Kas (Gingerich, *et al.*, 1978). The most important new locality discovered is 4 km NNW of the village of Chorlakki (see text-fig. 1). In approximately one full day of collecting at the Chorlakki locality, we obtained teeth referable to the artiodactyls *Khirtharia, Anthracobune, Indohyus,* the rodents *Saykanomys*, Cf. *Tamquammys,* and the creodont *Ichthyolestes*. All of these genera are also known from at least one locality elsewhere in Asia, thus demonstrating the potential correlative importance of this Pakistan fauna. The most significant specimen in our 1977 collection is the mandible of a new artiodactyl we here describe as *Chorlakkia hassani* n. gen., n. sp. The mammalian fauna, as described to date, from the middle Eocene of Pakistan is listed in Table 1. Additional background information and references for correlative Indian faunas are given in Gingerich, *et al.* (1978).

The specimens, eventually to be deposited in the Pakistan National Museum of Natural History or with the Geological Survey of Pakistan (GSP), have been given numbers consisting of the abbreviation GSP-UM, followed by the year and a three digit field number. Sharp epoxy casts of these specimens are being deposited permanently in the University of Michigan Museum of Paleontology (UM) and the Muséum National d'Histoire Naturelle.

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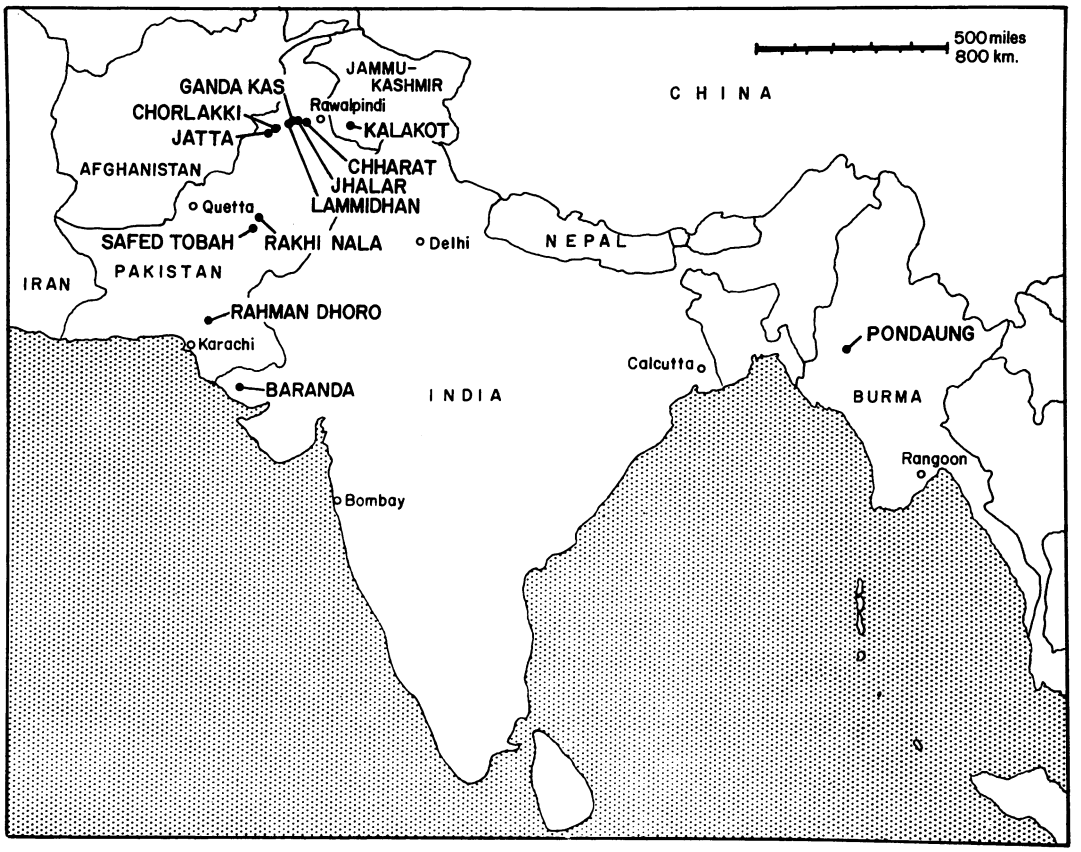


TEXT-FIG. 1 – Paleogene fossil vertebrate localities in Indo-Pakistan. Middle Eocene land mammals have been reported from all localities in the cluster from Jatta to Kalakot.

SYSTEMATIC PALEONTOLOGY

Order ARTIODACTYLA

Family DICHOBUNIDAE

Chorlakkia, new genus

Type species.– *Chorlakkia hassani*, new species.

Included species.– Type species only.

Diagnosis.– Differs from all other middle Eocene artiodactyls known from Indo-Pakistan in being much smaller. Differs markedly from other Asian artiodactyls in its combination of small size, the absence of paraconids and hypolophids, and the presence of twinned entoconid-hypoconulids on the lower molars; the entoconid-hypoconulids are higher than the hypoconids. This combination of characteristics also distinguishes *Chorlakkia* from all other known artiodactyls as well.

Etymology.– Named for the village of Chorlakki, near which the type species was found.

TABLE 1 – Mammalian fauna from the middle Eocene of Pakistan. Question mark in brackets indicates that the ordinal placement is uncertain.

CONDYLARTHRA [?]
Dulcidon gandaensis (Dehm & Oettingen-Spielberg, 1958)
Gandakasia potens Dehm & Oettingen-Spielberg, 1958)

CREODONTA[?]
Ichthyolestes pinfoldi Dehm & Oettingen-Spielberg, 1958

TILLODONTIA[?]
Basalina basalensis Dehm & Oettingen-Spielberg, 1958

PERISSODACTYLA
Eotitanops? *dayi* Dehm & Oettingen-Spielberg, 1958
Teleolophus daviesi Dehm & Oettingen-Spielberg, 1958

ARTIODACTYLA
Chorlakkia hassani n. gen., n. sp. – this report
Khirtharia dayi Pilgrim, 1940
Haqueina haquei Dehm & Oettingen-Spielberg, 1958
Indohyus cf. *indirae* Ranga Rao, 1971
Lammidhania wardi (Pilgrim, 1940)
Anthracobune pinfoldi Pilgrim, 1940
Pilgrimella pilgrimi Dehm & Oettingen-Spielberg, 1958
Cf. *Anthracokeryx* sp.[1]

RODENTIA
Saykanomys chalchae Shevyreva, 1972
Saykanomys ijlsti Hussain, de Bruijn, and Leinders, 1978
Saykanomys vandermeuleni Hussain, de Bruijn, and Leinders, 1978
Saykanomys sondaari Hussain, de Bruijn, and Leinders, 1978
Saykanomys lavocati Hussain, de Bruijn, and Leinders, 1978
Chapattimys wilsoni Hussain, de Bruijn, and Leinders, 1978
Chapattimys ibrahimshahi Hussain, de Bruijn, and Leinders, 1978
Petrokoslovia sp.
Cf. *Tamquammys* sp.

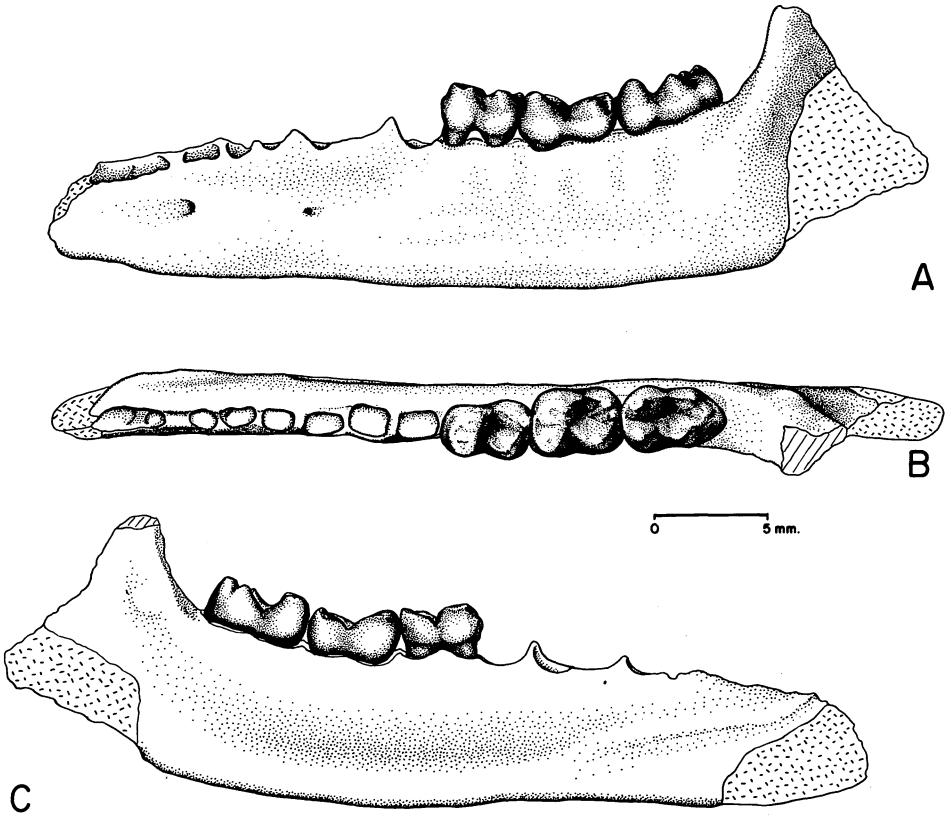
[1] Comparison of British Museum (Natural History) specimen no. 32168, described by Gingerich (1977) as *Lammidhania*, with sharp casts of the Pondaung anthracotheres preserved in Burma indicates that it is most similar in morphology and size to *Anthracokeryx birmanicus*. Thus we refer this specimen to Cf. *Anthracokeryx* rather than *Lammidhania*. Coombs and Coombs (1977b, p. 590-591) came to essentially the same conclusion in their review of early anthracotheres.

Chorlakkia hassani, new species

Pl. 1, figs. 1-3; text-fig. 2

Type.– GSP-UM 77082, a left mandible with M_{1-3}.

Type locality.– 4 km NNW of Chorlakki village, Kohat District, North West Frontier Province, Pakistan. Coordinates of this locality are 33°37′20″ N latitude, 71°55′20″ E longitude; it is situated



TEXT-FIG. 2 – Left mandible of *Chorlakkia hassani* in lateral (A), occlusal (B), and medial view (C). Specimen is type, GSP-UM 77082, x 3.

in the easternmost exposure of the Kuldana Formation in the Panoba Dome. Most fossils, including the type of *C. hassani*, came from a 10-30 cm thick bed of hard calcareous conglomerate.

Age and distribution.– The Kuldana Formation and its mammalian fauna are generally recognized as being middle Eocene in age (Pilgrim, 1940; Dehm and Oettingen-Spielberg, 1958), but in Kohat the beds may be as old as late early Eocene (Meissner, *et al.*, 1974; Shah, 1977).

Diagnosis.– As for the genus, see above.

Etymology.– Named for Mr. Mahmoodul Hassan, geologist with the Geological Survey of Pakistan, who found the type specimen.

Description.– The type and only specimen of *Chorlakkia hassani* consists of a left mandible with alveoli for P_1-P_4 and the crowns of M_1-M_3 preserved intact (text-fig. 2). The mandibular ramus is long, narrow and relatively shallow. Left and right mandibular rami clearly were not coossified. A large mental foramen is situated just behind the posterior root of P_1 and a smaller mental foramen opens behind the first, between the two roots of P_3. The lower canine alveolus is not well preserved and it is not possible to judge accurately the size of the canine root. Although none of the four premolars is present, the alveoli indicate that all four were double rooted and had long, narrow crowns. Estimated measurements of the premolars are given in Table 2. As is well known, a long shallow mandibular ramus and elongate premolar teeth, like those of *C. hassani*, commonly occur in members of the Artiodactyla.

TABLE 2 – Measurements of the cheek teeth in the type specimen of *Chorlakkia hassani*, GSP-UM 77082 (in mm).

	Length	Trigonid breadth	Talonid breadth
P_2	3.2*	1.2*	--
P_3	3.9*	1.5*	--
P_4	4.5*	1.8*	--
M_1	3.6	2.4	2.7
M_2	4.0	3.1	3.1
M_3	4.6	3.0	2.7

Mandibular depth below M_2 = 6.5

*estimated from alveoli

The molar teeth, intact except for wear, are bunodont (text-fig. 2; Pl. 1). The trigonid of all three consists essentially of only the large subequal protoconid and metaconid; no trace of a paraconid is apparent. A small, anterior, crescent-shaped cristid links the protoconid and the metaconid, but posteriorly these cusps apparently became connected only when wear progressed to the stage where the base of the cusps themselves became confluent. A deep valley is preserved on M_3, cutting through the region where a protocristid would connect the protoconid and the metaconid in a more typical tritubercular molar. The talonids of all three molars are broadly basined, but somewhat funnel-shaped, with the deepest point situated lingually behind the metaconid. Cuspation includes a distinct, but low, hypoconid and a high, twinned hypoconulid and entoconid. The hypoconulid is smaller than the entoconids on M_1 and M_2, but it is larger on M_3, forming a distinct hypoconulid lobe. The cristid obliqua and other crests enclose the perimeter of each talonid, but a deep, narrow fissure separates the entoconid from the back of the metaconid. Short basal cingula exist antero- and postero-labially. Measurements of the lower molars are given in Table 2.

DISCUSSION

Reference of *Chorlakkia* to the Dichobunidae is on a *faute de mieux* basis. Many of the diagnostic familial characters of early artiodactyls are to be found in the upper dentition; since the upper dentition is lacking here, we are obliged to consider only those present, but less evident, in the lower molars. As noted above, *Chorlakkia* presents a unique combination of rather low crowned, bunodont teeth, possessing low hypoconids and high, twinned entoconids and hypoconulids, and lacking paraconids and hypolophids. These features exclude *Chorlakkia* from the Anthracotheriidae, whose teeth are (or tend to be) selenodont, with higher cusps, reduced talonid basin and a low centrally situated hypoconulid. Cebochoerids, though low crowned, show very few of the characters seen in *Chorlakkia*; the talonid cusps are pinched together, with the hypoconulid isolated centro-posteriorly. *Choeropotamus*, representing the Choeropotamidae, is much the same. Closer resemblance can be seen in the Helohyidae, wherein species with teeth that are more or less low crowned and bunodont are to be found. In fact, several of the forms referred

EXPLANATION OF PLATE 1

FIG. 1 – Type specimen of *Chorlakkia hassani*, GSP-UM 77082, left mandible in occlusal view, stereophotograph, x 3.

FIG. 2 – Same, stereophotograph, x 6.

FIG. 3 – Same, in lateral view, x 3.

to this family in a recent revision (Coombs and Coombs, 1977) were originally considered dichobunids. *Bunodentus* and *Kunmunella* are among these. The latter is known only from an upper molar and cannot be directly compared; the estimated size of its M^2, however, would be 12-15 mm. *Bunodentus* is also an animal much larger than *Chorlakkia* and has an even more bunodont dentition.

Paraconids are absent, as in *Chorlakkia*, but a strong hypolophid posteriorly closes the relatively widely basined talonids; the entoconids are low and the hypoconulids small and centrally located; based on talonid characters, *Chorlakkia* is quite different. The contemporary *Indohyus* and *Raoella* were also referred, by the same authors, to the Helohyidae. The two genera might be synonymous, but only upper teeth are known of *Raoella*. In *Indohyus*, the talonids are deeper and narrower than in *Chorlakkia*, and a strong hypolophid extends between a high hypoconid and a low entoconid. As in *Bunodentus*, the hypoconulid is reduced to a low, rounded, centrally situated crest. There exists considerably less similarity between *Indohyus* and *Chorlakkia* than there is between the latter and *Bunodentus*, and *Indohyus* is also the largest of the three. Other helohyids, such as *Gobiohyus* and *Helohyus*, differ even more from *Chorlakkia* and need not be considered. In summary, none of the genera attributed to the Helohyidae resembles *Chorlakkia* to a degree that is significant.

In fact, it is the early Eocene dichobunoid diacodexines, from Europe and North America, that appear to be the most closely related to *Chorlakkia*, but, it must be admitted, this is based on certain characteristics of *Chorlakkia* that can easily be considered as derived from the more primitive condition seen in this group. Distinction between helohyids and diacodexines reposes (for the lower molars) on the absence in the latter of a hypolophid, the presence of a relatively small M_3 hypoconulid, and no regular size increase from M_1 to M_3. But the supposed diagnostic characters of the M_3 hypoconulid and the size increase from M_1 to M_3 appear to us to be dubius. Concerning the hypolophid, absent in both diacodexines and *Chorlakkia*, it is said to be present in dichobunine dichobunoids, although it is not evident in the material observed by us.

Asian Eocene genera that can be placed with confidence in the Dichobunidae are rare. For example, *Haqueina, Khirtharia, Pilgrimella* and *Anthracobune* were all at one time referred to this family, but their present allocation is one of uncertainty. Coombs and Coombs (1977 a,b) have even suggested that *Pilgrimella* is not an artiodactyl.

Khirtharia shows some resemblance to *Chorlakkia*, but they are not sufficiently similar to indicate close relationship. The two genera share a basically similar trigonid construction, but in talonid morphology they are very different; in *Khirtharia* there is a hypolophid directly connecting the hypoconid and the entoconid, which is conspicuously lacking in *Chorlakkia*, and the entoconid is notably lower than the hypoconid. *Khirtharia* also differs in being larger and in having highly crenulated enamel.

Haqueina, possessing a higher crown than *Khirtharia*, shows in exaggeration the same features. Differences from *Chorlakkia* are particularly well demonstrated in the talonid, where there is, in M_2, a strong hypolophid and a weak, centrally located hypoconulid. On M_3 the hypoconulid is double, in contrast to the single cusp on this tooth in *Chorlakkia*.

The lower dentition of *Chorlakkia* bears a slight resemblance to a specimen referred to the primate *Hoanghonius stehlini* by Woo and Chow (1957, fig. 2), but now considered an artiodactyl. Both are approximately the same size and, as in *Chorlakkia*, the molars of the "*Hoanghonius*" specimen also lack a hypolophid and present a twinned hypoconulid and entoconid. The trigonid structure is very different, however, since a large paraconid characterizes the "*Hoanghonius*" teeth.

Lantianius xiehuensis is very probably a dichobunid, but the lower dentition of this form is unknown; an estimation of the length of its M_2 is 5.2 mm. *Aksyiria oligostus* is represented by a single upper molar and its status as a dichobunid is questionable; the estimated size of its M_2, however, is 4.5 mm, which is interestingly close to that of *Chorlakkia*. The M_2 from the early Eocene of the Zaïsan Depression, identified as Dichobunoidea indet., is too badly worn for precise appreciation of its morphology. It differs immediately from that of *Chorlakkia* by the presence of a heavy labial cingulum; its estimated length is 5.8 mm. The *Dichobune* sp. of Zdansky from the late Eocene of China is more probably related to the anthracotheres. *Heptaconodon*, from the same region and known from a single upper tooth, is too distinctive for placement with assurance in the Artiodactyla.

CONCLUSIONS

Discovery of *Chorlakkia hassani* provides further evidence of the diversity of Asian artiodactyls during the Eocene, but it does little to clarify relationships among the forms previously recognized. As must be expected when a fauna is still incompletely known, the families of Eocene Asian artiodactyls are still poorly defined. In particular, the diverse assortment of primitive artiodactyls presently included in the Dichobunidae (*s.l.*) will probably need to be further subdivided, or redistributed, when the genera are better known; this applies to the form described here as well. In any case, *Chorlakkia* adds an interesting new element to the known Asian Artiodactyla.

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