Wild life in ancient Khingar, Mustang

Archaeological evidence for locally extinct animal species in the Dzong Khola Valley, Northern Nepal

—Angela von den Driesch

Introduction

In 1991 and 1992 the German Archaeological Institute in co-operation with HMG Department of Archaeology has been excavating the settlement mound of Khingar, a village situated half-way between Kagbeni and Muktinath upon the left slope of the Dzong Khola creek. The excavations were carried out within the frame of the Nepal-German Project on High Mountain Archaeology under the direction of Dr. H.-G. Hüttel (KAVA, Bonn). The old settlement of Khingar has been inhabited over a long time span. The dating is mainly based upon imported ceramics from Kathmandu valley, Terai and Northern India, but also by means of radio-carbon dates. So far three periods of occupation could be established. Whereas the first settling period (I) was limited to the center of the mound, its inhabitation probably ending during the 2nd century A.D., a more extended habitation due to an increased population have been observed for the period II (3th/4th to 8th century A.D.) and for the subsequent period III dating approximately from the 10th to the 13th/14th century (see in detail Hüttel 1993; 1993a; 1994).

During the excavations a great amount of faunal material was sampled, which mainly consists of bones and bone fragments of slaughtered and hunted animals, and which can be considered kitchen refuse of the former settlers. A preliminary report on the bone material excavated in 1991 has already been published (von den Driesch 1993). In 1992 twice as much material has been collected so that the total number of bone fragments of the ancient village now exceeds 18.000 bone specimens.

As already stated for the older material from the 1991 campaign, the faunal assemblage consists

primarily of domesticated animals. Sheep, goat, cattle, yak and yak-cattle-hybrids played a dominant role in the economy of the settlement. Besides, people also kept horses, mules, donkeys and to a minor extent pigs, chickens, dogs and cats. Evidence for hunting activities is scarce and the percentage of bones of wild animals relative to the total amount of remains is below 3.

Due to the extensive sample which is now available, our knowledge of wild life has increased considerably. Apart from the species recognised on the basis of the 1991 samples, such as blue sheep, *Pseudois nayaur,* musk deer, *Moschus moschiferus,* marmot, *Marmota bobak,* wooly hare, *Lepus oriostolus,* mouse-hare, *Ochotona roylei,* and some wild birds (see table 1 in von den Driesch 1993), the new material contained other species of mammals and birds to be expected in the region (table 1). Additionally it revealed some species of game and one domestic species which are not known to occur at present or to have occurred in the more recent past in the Muktinath valley and adjacent areas (Final Report 1994). These extraordinary remains include the following species:

1) Water buffalo, *Bubalus bubalis f. domestica*
2) Himalayan tahr, *Hemitragus jemlahicus*
3) Goral, *Nemorhaedus goral*
4) Red deer, *Cervus elaphus*
5) Barking deer, *Muntiacus muntjak*
6) Wild boar, *Sus scrofa*
7) Himalayan weasel, *Mustela sibirica*
8) Weasel, *Mustela nivalis*

The purpose of this contribution is to describe the material and to illustrate the criteria used for identification. The presence of these species in question not only contributes to our knowledge of their former zoogeographic distribution, it also helps to reconstruct the former landscape and the natural environment of the valley at the time of its early occupation.

An overview of the wild species collected from Khingar is given in table 1. Those animals which fit in our knowledge of species distribution in the study area do not need further discussion here.

Table 1. Wild species identified from the bone find from Khingar (K) and the cave system from Jharkot (J)*.

Mammals

Blue sheep or Bharal, *Pseudois nayaur* (K)
Tahr, *Hemitragus jemlahicus* (K)
Goral, *Nemorhaedus goral (K)*
Red deer, *Cervus elaphus* (K)
Barking deer, *Munticaus muntjak* (K,J)
Musk deer, *Moschus moschiferus* (K,J)
Wild boar, *Sus scrofa* (K)
Grey wolf, *Canis lupus* **
Red fox, *Vulpes vulpes* (K)
Himalayan weasel, *Mustela sibirica* (K)
Weasel, *Mustela nivalis* (K)
Bobak, *Marmota bobak* (K)
Rat, *Rattus rattus* (K,J)
Tree mouse, *Apodemus flavicollis* (K,J)
Wooly hare, *Lepus oriostolus* (K,J)
Mouse-hare, *Ochotona roylei* (K,J)

Birds

Eurasian wigeon, *Anas penelope* (J)
Garganey, *Anas querquedula* (J)
Common teal, *Anas crecca* (J)
Black kite, *Milvus migrans* (K)
Himalayan griffon, *Gyps himalayensis* (K,J)
Chukar partridge, *Alectoris graeca chukar* (K,J)
Snow partridge, *Lerwa lerwa* (K)
Indian gallinule, *Gallinula chloropus* (J)
Common crane, *Grus grus* (K)
Blue rock or hill pigeon, *Columba livia* or *C. rupestris* (K,J)
Snow pigeon, *Columba leuconta* (K,J)
Thrush, *Turdus sp.* (J)
Red-billed cough, *Pyrrhocorax pyrrhocorax* (K,J)
Tree sparrow, *Passer montanus* (K,J)

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* Most of the small mammal and bird bones from the cave system of Jharkot can be considered as regurgitated pelets by owls.
** Identified from the faunal material from Dzar, 16th century.

Material and osteometric data

1) **Water buffalo**

Table 2 lists the skeletal parts which on the basis of their size and morphology can be assigned to domestic water buffalo. Figg. 1 and 3 demonstrate the morphological differences of proximal metacarpus and phalanx 2 between water buffalo and other related species of large bovids, as there are cattle, *Bos primigenius f. taurus,* yak, *Bos mutus f. grunniens,* and gaur, *Bibos gaurus.* As can be seen, the morphology of the bones from Khingar fits best with the one observed in water buffalo. The notch between the proximal articular facets of the metacarpal in water buffalo and in cattle is considerably more pronounced than in that of yak and gaur (fig.1), and the ridge between the two facets, considerably shorter than in the former species. Differences between *Bubalus* and *Bos primigenius* can be found in the two proximal articular facets being much more flattened in relation to the anterior-posterior length of the proximal articular surface in the first species (fig.1c-e). *Bubalus* possesses a strong tuberositas at the palmar margin of its articular surface, which is also seen in the fossil specimen from Khingar.

In view of location and dating, the four water buffalo bones must derive from four different individuals. None of them is dated to the latest period. The metacarpal bone is large, the two phalanges even very large. The measurement of the metacarpus falls into the size range given for corresponding prehistoric water buffalo bones from Northeastern Thailand (Higham 1975, table 1 and 4). Unfortumately no measurements of the 2nd phalanx from fossil and subfossil water buffalo could be found in the literature. But in spite oft their large size, we consider the bones as belonging to the domesticated form of water buffalo, hence *Bubalus bubalis f. domestica* (see below).

Table 2. Bone material from water buffalo.

location	period	skeletal part	measurements *
BXXII 79/11	II late	fragment of frontal bone with part of the basis of the horncore of a male	-
BXXI 87/14	II	phalanx 3	-
BXXI F 344	II late	proximal end of right metacarpus	Bp 73.0 Dp 44.0 fig.1d
BXXII 5.3/25	I	phalanx 1 posterior, partially damaged, male	GLpe (68.0) Bp (37.0) Bd (39.5)
BXXI 88/16	II	phalanx 2 anterior, male	GL 47.5 Bp 41.5 SD 30.0 Bd 33.0 fig.3c

* Abbrevations as listened in von den Driesch 1976

2) **Himalayan tahr**

The faunal material from Khingar also contained bones of a wild caprid (table 3), which considerably surpass the corresponding bones of domestic goats in size and show different morphological features. In the first stage of the investigation it was thought that they pertain to ibex, *Capra ibex sibirica,* or to markhor, *Capra falconeri,* but this two species do not belong to the indigenous fauna of the Nepalese Himalayas. With concern to the ibex Prater (1971, 254) writes: "The Himalayan ibex inhabits the western Himalayan range, and the mountain range which lie beyond in Kashmir and Baluchistan. Its eastern limits are set by the upper reaches of the Sutlej river east of which it does not occur" (see also Haltenorth and Trense 1956). From the markhor it is known that it inhabitis the Himalayas from the valley of Kahsmir westwards, and the Hindukush (Prater 1971, 257).

Intensive osteological comparison with skeletons of modern specimens revealed the three first bones listened in table 3 as belonging to the tahr (figg. 2 and 4e,f). This wild species is now extinct in the mountains surrounding the Muktinath valley but occurs on the southern flanks of the Himalayas (see below).

3) Goral

From this medium sized goat-antelope, two bone fragments have been identified (table 3). Although the right scapula, dated into the period III, is damaged, one can see the straight crest at the caudal margin of the collum and the almost circular outline articular suface of the cavity process, which is characteristic for members of the *rupicaprini* group.

Table 3. Bone material from thar and goral.

location	period	skeletal part	measurements
tahr:			
AXI 64/47	III	right scapula of a male	SLC 29.0 GLP 47.0 LG 39.5 BG 32.0 fig. 4 f
BXXII 37/1	III	right proximal radius, male	Bp 41.0 BFp 37.5 fig. 2
BXXII R 5.3/23	II early	left centroquartale	GB 35.0
goral:			
AXI 51/32	III	right scapula	BG 21.2
BXXI 62, 72/24	I(-II)	right distal metatarsus, probably male	Bd 27.0

4) Red deer

Completely unexpected were found two bone remains in the sample deriving from a large deer species. One represents a small piece from the crista ischiadica of a pelvic bone from BXXII 34/1, typical for the family *Cervidae* with its pronounced muscle attachment lines. The second find is a distal end of a right radius measuring 52.5 mm Bd (fig. 5d). It was found in BXXII 74,64/2. Both finds date to period III. However, the excavator sug-

gested, that the archaeological material from these two locations is mixed up and could contain older material.

As no species of large deer is reported to live in the southern part of the Mustang district, we first tried to establish from what species the radius might derive. Osteological comparison with deer species of about the same size and occurring in the Indian and Central Asiatic region clearly revealed, that the bone in question belonged to the group of red deer. As could be ascertained, the most distinctive osteological feature are the two sharp ridges on the dorsal side of the bone, which are shorter and stand closer together in *Cervus elaphus* than in the other two species compared, the barasingha or swamp deer, *Cervus (Rucervus) duvauceli* and the sambar, *Cervus unicolor* (fig. 5a,b). The two latter species from their distribution areas and habitat can be excluded to have occurred in the Muktinath valley or the nearby Kali Gandaki valley, even in prehistoric times.

The distal breadth of 52.5 mm falls within the variation known from radii of prehistoric red deer from southeastern Turkey. Following Pietschmann (1977, table 1) the size range of the distal radius of chalcolithic and early bronze age turkish red deer, belonging to the subspecies *maral* varies from 51.0 to 64.0 mm. The maral whose distribution area reaches eastwards as far as Pakistan, belongs to the largest subspecies of red deer known from the Old World. As quoted by Kurt und Zhiwotschenko (1988, 194) red deer is represented in Central Asia and in the Himalayas with relatively small subspecies. Unfortunately bone measurements from other subspecies of red deer from Central Asia, e.g. from the hangul, *Cervus elaphus hangul,* or the somewhat larger shou, *Cervus elaphus wallichi,* are not available.

5) Barking deer

Those skeletal parts which have been attributed to this small deer are listed in table 4. Identification was possible by means of intensive osteological comparison of the small deer bone material excavated in Khingar with recent skeletons of musk deer and muntjak. Whereas remains of musk deer, - a species which still lives today in the scrub covered ravines of the Dzong Khola, - are much more abundant in the faunal material from Khingar, three bone specimens turned out to be from muntjak. The presence of the scapula indicates that the whole carcass has been brought into the settlement and that we are not dealing with a traded skin. However, it must be noted that in some tombs excavated in the cave system of Jharkot isolated upper canines of male musk deer and muntjak were found. These teeth are often perforated and have served as jewellery. No doubt, these finds represent trade object.

Table 4. Bone material from muntjak.

location	period	skeletal part	measurement
BXXII R 7.1/20	II	right scapula of a male	GLP 29.8 LG 21.5 BG 21.0
AXI 72/39	III	right adult mandibula	-
AXI H 1.6/47	II-III	right juvenile mandibula (M3 not yet errupted)	-

6) Wild boar

From wild boar two halfs of a jaw of a male, broken into many pieces, have been identified from BXXII 79/9-11 (period II). The following measurements could be taken:

Length of the molar row 83.0
Length of M3 44.5 left 45.0 right
Breadth of M3 17.5 left 18.0 right

The third molars show medium wear (fig. 6b). Teeth dimensions leave no doubt that this huge jaw comes from a wild boar and not from a domestic pig.

7) Himalayan weasel

The faunal material from Khingar revealed the complete jaw (right and left side) of a rather large weasel originating from AXI 61/31, period III. Measurements: total length of one half 29.0, greatest height of the coronar process 13.2, length of the tooth row (M2-J) 19.3, length of the tooth row (M2-P1) 14.0, length of M1 15.5 mm. These dimensions fit well into the size range given for modern Siberian weasels, *Mustela sibirica* (Glover 1938, 372 ff), which is the largest of the weasels from the Indomalayan region (Prater 1971, 157). Recent distribution is given by Corbet and Hill (1992, map 90, see also fig. 9).

8) Weasel

From BXXI F 348 (period I) comes a very small left femur of a weasel: GL 25.0, SD 1.9. Bd 4.7 mm. These dimensions fit best to the weasel, *Mustela nivalis* (see Reichstein 1993, table 112 f.). According to Corbet and Hill (1992, 195) the range of *Mustela nivalis* in Central and Eastern Asia comprises "N Vietnam, and high altitude in Sichuan, SW China and throughout most of the Palaearctic and Nearctic regions; approaching this region in Afghanistan but apparently absent from the high Himalayas" (see also fig. 9). Two other species of weasel occurring in the Annapurna conservation area, the yellow-bellied weasel,

Mustela kathiah, and the stoat, *Mustela erminea,* grow larger than the animal from which this small femur derived, but no postcranial bone measurement for the yellow-bellied weasel are available.

Zoogeographic distribution and natural habitat

As stated by Prater (1971, 248) tall grass jungles and reed brakes in the neighbourhood of swamp provide the ideal habitat for the **wild buffalo**. It is therefore a typical inhabitant of the grass jungles of the Nepal Terai and the plains of the Brahmaputra in Assam. Pools of water to lie in, and mud wallows in which to roll and cake themselves with earth is the environment still required for its domestic descendant, the **water buffalo.** Judging from its habitat the assumption is not acceptable that wild buffalo has penetrated in earlier times into the Kali Gandaki valley as far and high as the upper Thakkola. In spite of the large size of the bones found at Khingar (see measurements in table 2), it is more likely to assume, that the early settlers who reached the Muktinath valley in the very early Middle Ages brought domestic water buffalo with them; a fact which from ecological point of view is not less interesting, since today the keeping of water buffalo is no longer possible in the area. We saw water buffalo in the lower parts of the Kali Gandaki valley between Tatopani and Ghasa. Today the animals are kept at lower altitudes, generally not higher than 2.500 m above sea level.

In Nepal the **Himalayan tahr** ranges from the broad-leaved forest zone to the alpine meadows but favours grassy cliffs with patches of trees (Corbet and Hill 1992, 272). All authors agree that the animals select the most inaccessible ground to live in and are found on cliffs, rocks, in dense scrub, and forest (fig. 7). It is known to prefer forests of oak, rungal and cane, generally favouring altitudes of 2.500 to 4.400 m. According to recent investigations on distribution, status and factors responsible for population trends (Bauer 1990), the Himalayan tahr inhabits a narrow strip along the southern flanks of the Himalayas (fig. 7). Tahr seems to be much more abundant in the eastern regions of Nepal with high precipation rates. This does not correspond with Schallers (1977) observations, that the animal is not able to tolerate warmer and more humid conditions (Bauer 1990). In western Nepal the tahr is restricted to rugged terrain at lower altitudes, and is not found at high altitudes, where it has been replaced by the bharal. Nowadays the whole Mustang district is without any occurrence of tahr (fig. 7).

A similar picture emerges for the **goral**. Like tahr goral also is confined today to the southern flanks of the Himalaya. It shows high climatic flexibility ranging from 300 m in the subtropical Terai to the cold himalayan regions in 4.000 m above sea level. Bauer (1990) argued that its present distribution - mainly on steep, dry southern and western slopes between altitudes of 2.000 to 2.800 m - suggests, that this species is now occupying more marginal habitats, whereas it has disappeared from many regions of the densely populated middle hills and in the northern valleys. Goral still occurs in considerable numbers in the lower altitudes of Langtang National Park. The Bio-diversity Conservation Data Project of the Annapurna Conservation Area (1994) has recorded

the goral throughout the southern slopes of the Annnapurna range (see also fig. 8).

From all the members of the family *Cervidae* **red deer** once occupied the widest distribution area comprising Europe, Asia and North America. Due to deforestation, overhunting and ever extending ursurpation of land by man, the territory has shrinked considerably and red deer disappeared from regions where they were common. Although very adaptable, their habitat depends from grazing conditions and season, they are mainly inhabitants of forests or grass jungles. Deer are never found in desert and open land. The Kahsmir stag for example, now limited to the north side of the valley of Kashmir and some adjacent valleys (Prater 1971, 287), seldom remains long in one area but roams from forest to forest to find good grazing. Winter is spent at lower altitudes, summer on the heights going uphill as fas as the snow-line.

As such, the presence of bones of red deer in an archaeological context always indicates forests or high vegetation where the animals could find sufficent covering.

Like all other deer species also **muntjak** needs protection through vegetation and avoids dry steppe biotope. It keeps to more or less thick jungle and comes out to graze in the outskirts of forest or in open clearings (Prater 1971, 294). Although it occurs up to altitude of 2.500 m and even higher, it cannot longer live in the surroundings of the Dzong Khola valley with its poor cover and scarce vegetation, and therefore has disappeared from the region.

The Bio-diversity Conservation Data Project (1994) reported **Indian wild boar**, *Sus scrofa cristatus,* as occurring in the past in Lamjung area. Now it is supposed to be exterminated as no recent reports are available from the Annapurna Conservation Area, where it was presumably found as high as 1.500 m. The jaw bones of *Sus scrofa* (fig. 6) excavated in Khingar from layers of period II show clearly that the distribution area reached further north and probably at higher altitudes, at least during the earlier Middle Ages. Boar require grass or scanty bush jungle or forest. This type of biotope can be postulated along the Kali Gandaki river from Jomsom northwards before deforestation by man and overgrazing by his domestic stock destroyed the vegetation.

As can be seen from fig. 9 the **Himalayan weasel** at present ranges in the E Himalayas, - mostly above 2.400 m, - and from here east to the northern parts of Burma, Thailand, Laos and Vietnam, most of China, Taiwan also throughout N China, much of Siberia and Japan (Corbet and Hill 1992, 196). Interesting to note that evidences for the **weasel**, *Mustela nivalis,* are known on the one hand from N Vietnam and at high altitudes in SW China and on the other hand from Afghanistan westwards (fig. 9). The species ' apparent absence from the high Himalayas may be due to lack of records especially when considering the fact that *Mustela nivalis* is generally very rare in Eastern Asia.

Conclusions

Today Khingar lies in a semi-desert environment with little precipitation and scarce vegetation. Apart from willows, mostly populars are found

only in and near the villages and are cultivated and exploited intensively. The natural vegetation includes shrubberies of junipers, caragana, rosa and cotoneaster. This type of biotope is also found around Kagbeni in the Kali Gandaki valley. The region above Kalopani up to Jomsom is designated as a transition zone with a similar plant cover known for the sub-alpine and alpine characteristics. This area connects the humid type of environment in the south with the dry-arid or tundra type in the north. Two important valleys cross the transitional area, i.e. Manang valley and Kali Gandaki valley. The Manang valley east to the Thorung La and Tilichio himal receives comparatively higher precipitation than the Kali Gandaki valley near Jomsom (200 - 300 mm/ year). As such the Manang valley retains better greenery than the Thakkola valley. Seen zoogeographically, the transition zone acts as a bridge for migratory fauna. The Thakkola passageway seems to represent a better migratory route than the Manang valley (Final Report 1994).

The faunal material from ancient Khingar dates back as far as the early Middle Ages or even earlier. So far, the faunal samples yielded seven wild mammal and one domestic species which do not belong the recent fauna known from the area and which are now distributed either in more southern (tahr, goral, muntjak, wild boar and water buffalo) or in more eastern resp. northwestern regions (red deer, weasels). All eight species mentioned above cannot live under arid or tundra like conditions. They need forest or grass jungles with patches of trees where they can find refuge, especially big game species such as tahr, red deer and wild boar. Judging from their preferred habitat, the assessment is allowed, that the land north of Jomsom up to Kagbeni and the Muktinath valley should have carried forests and thickets comparable to those vegetational structures found on the eastern slopes of the Nilgiri himal opposit to Marpha and Tukche. Thus it can be deduced from the fauna identified in ancient Khingar that the sparse vegetational cover of present day is solely the result of human activities, especially the cutting of bushes and trees. Whereas deforestation continued, the soil became exposed to wind and water erosion. The little precipitation did not favour the growing of new wood. Combined with overgrazing by domestic animals, in particular by sheep and goat, one can imagine that all those factors transformed the region into a habitat of extreme living conditions.

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- a *Bibos gaurus* male recent
- b *Bos mutus grunniens* male recent
- c *Bubalus bubalis f. domestica* male recent
- d *Bubabus bubalis* from Khingar
- e *Bos primigenius* fossil from Bulgaria

Bp a - e: 74.5; 69.0; 74.0; 73.0; 73.0 mm

Fig. 2 Proximal radius from tahr, Khingar

Fig. 3 Second anterior phalanges from large bovids in comparison
- a *Bibos gaurus* male recent
- b *Bubalus bubalis f. domestica* male recent
- c *Bubalus bubalis* from Khingar
- d *Bos mutus grunniens* male recent
- e *Bos primigenius* fossil from Bulgaria

GLpe a - e: 53.0; 46.0; 47.5; 41.0; 47.0 mm

Fig. 4 Right scapulae from ovicaprini in comparison
- a *Pseudois nayaur* male recent
- b *Ovis ammon hodgsoni* male recent
- c *Capra falconeri* male recent
- d *Capra ibex sibirica* male recent
- e *Hemitragus jemlahicus* male recent
- f *Hemitragus jemlahicus*, Khingar

GLP a - f: 40.5; 39.0; 41.2; 45.0; 44.0; 47.0 mm

Fig. 5 Right distal radii from large deer in comparison
a *Cervus duvauceli* male recent
b *Cervus unicolor* male recent
c *Cervus elaphus maral* fossil from Turkey
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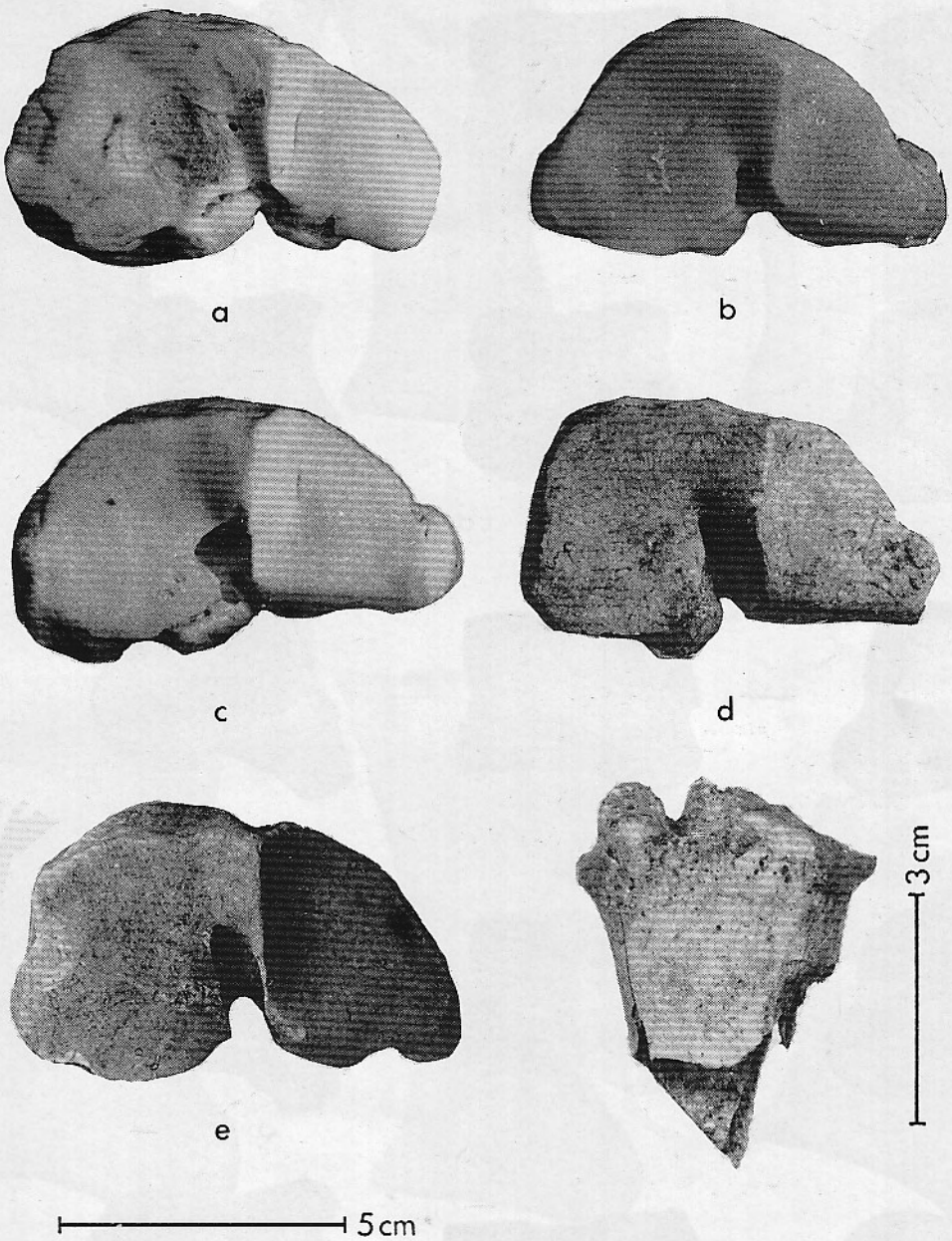


Fig. 1

Fig. 2

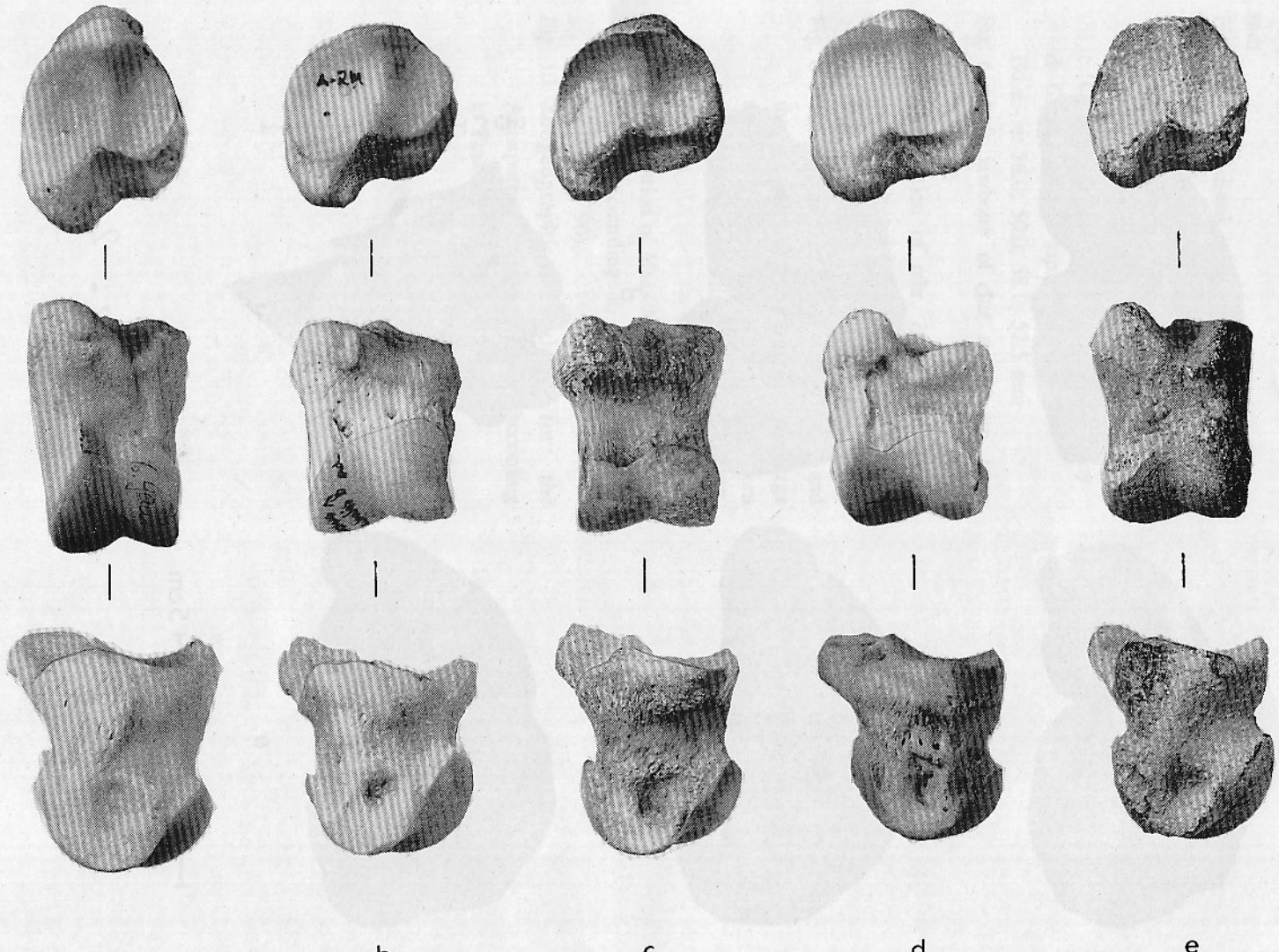


Fig. 3

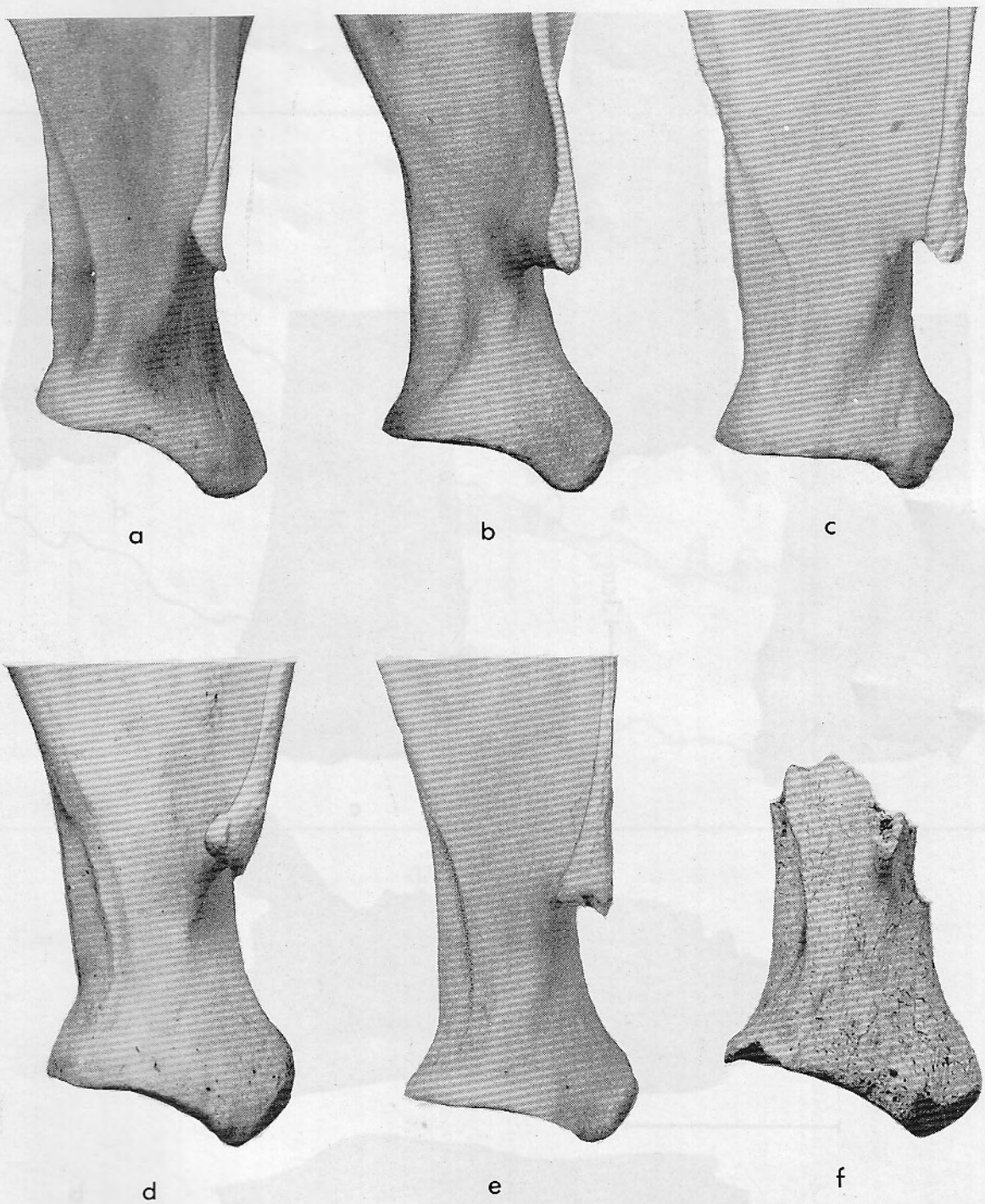
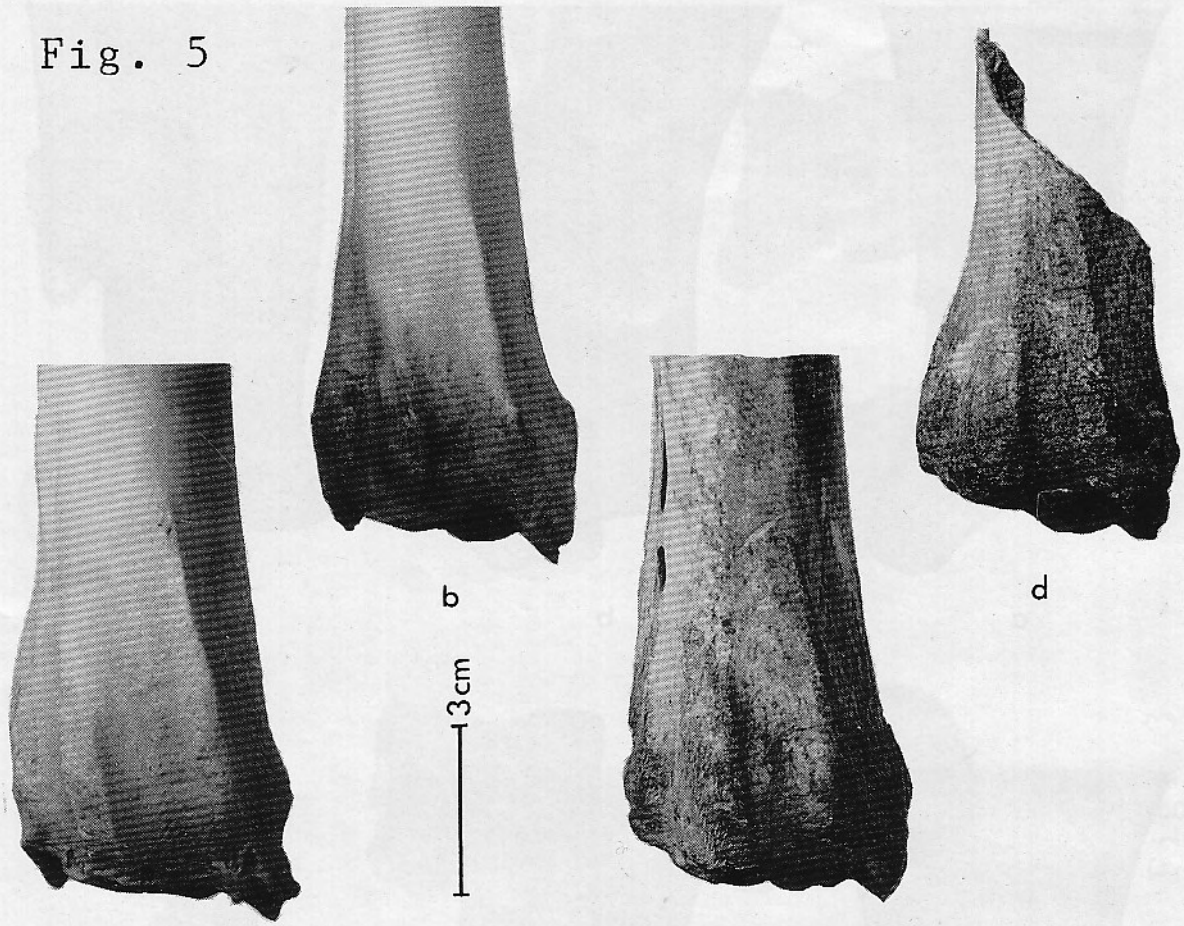


Fig. 4

Fig. 5



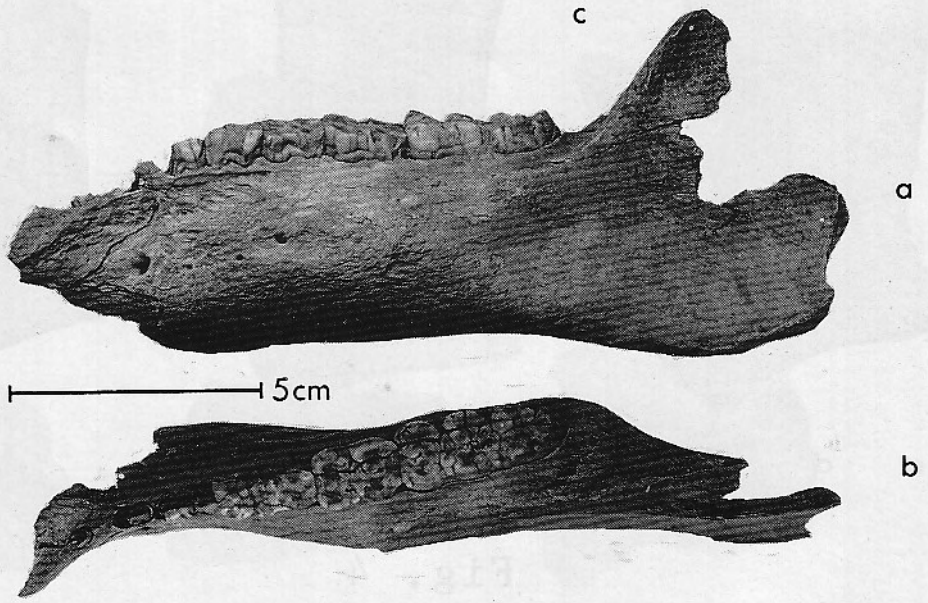


Fig. 6

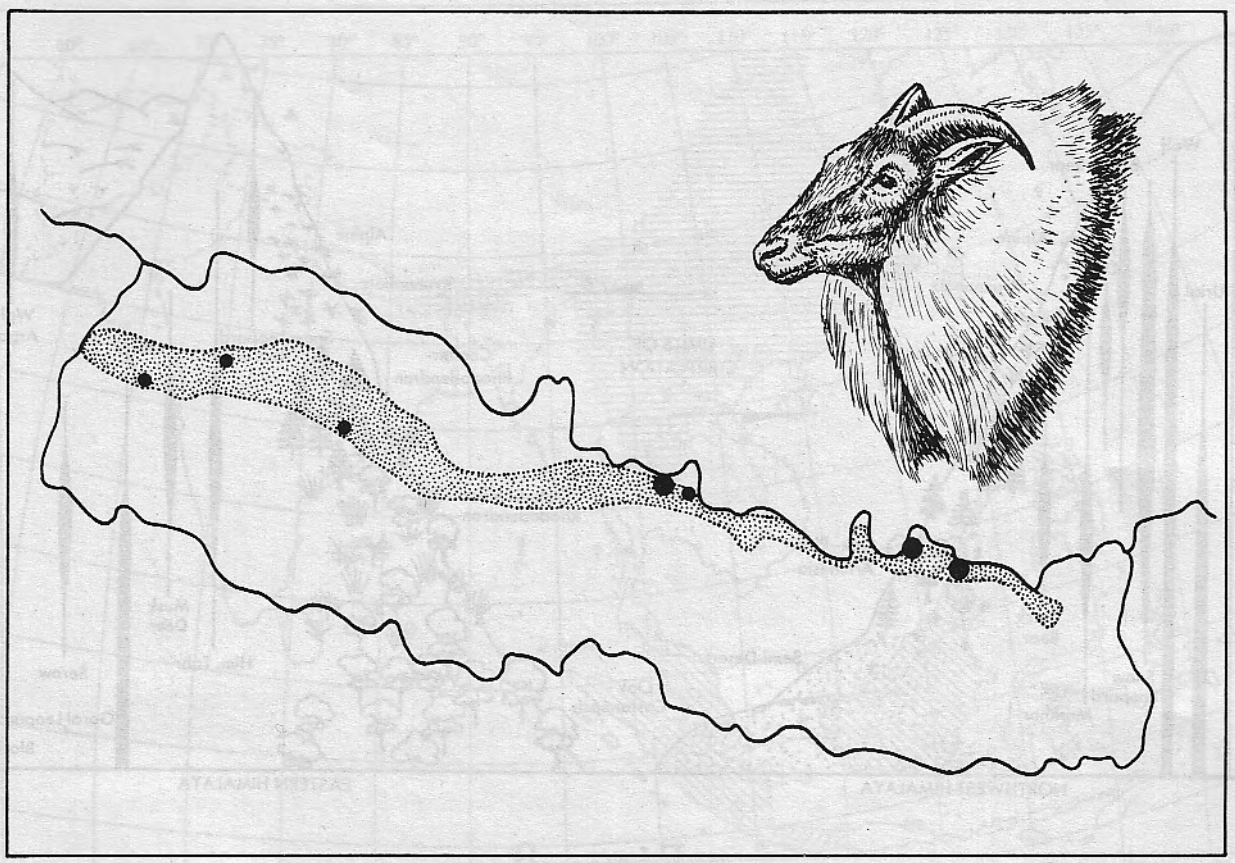


Fig. 7

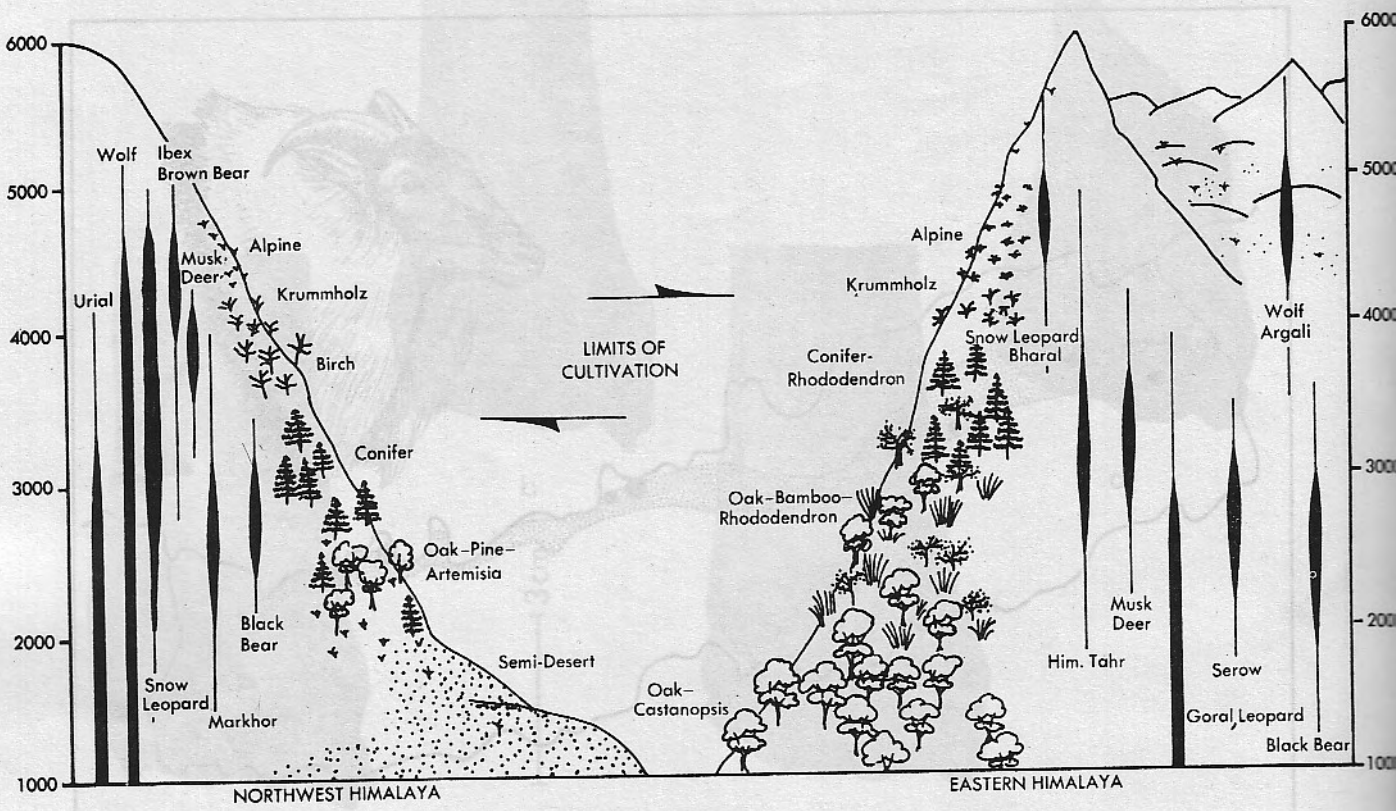

6000
5000
4000
3000
2000
1000
Wolf
Ibex
Brown Bear
Urial
Musk Deer
Alpine
Krummholz
Birch
Conifer
Oak–Pine–Artemisia
Semi-Desert
Black Bear
Snow Leopard
Markhor
LIMITS OF CULTIVATION
NORTHWEST HIMALAYA
Alpine
Krummholz
Conifer-Rhododendron
Snow Leopard
Bharal
Oak–Bamboo–Rhododendron
Oak–Castanopsis
Him. Tahr
Musk Deer
Wolf
Argali
Serow
Goral
Leopard
Black Bear
EASTERN HIMALAYA

Fig. 8

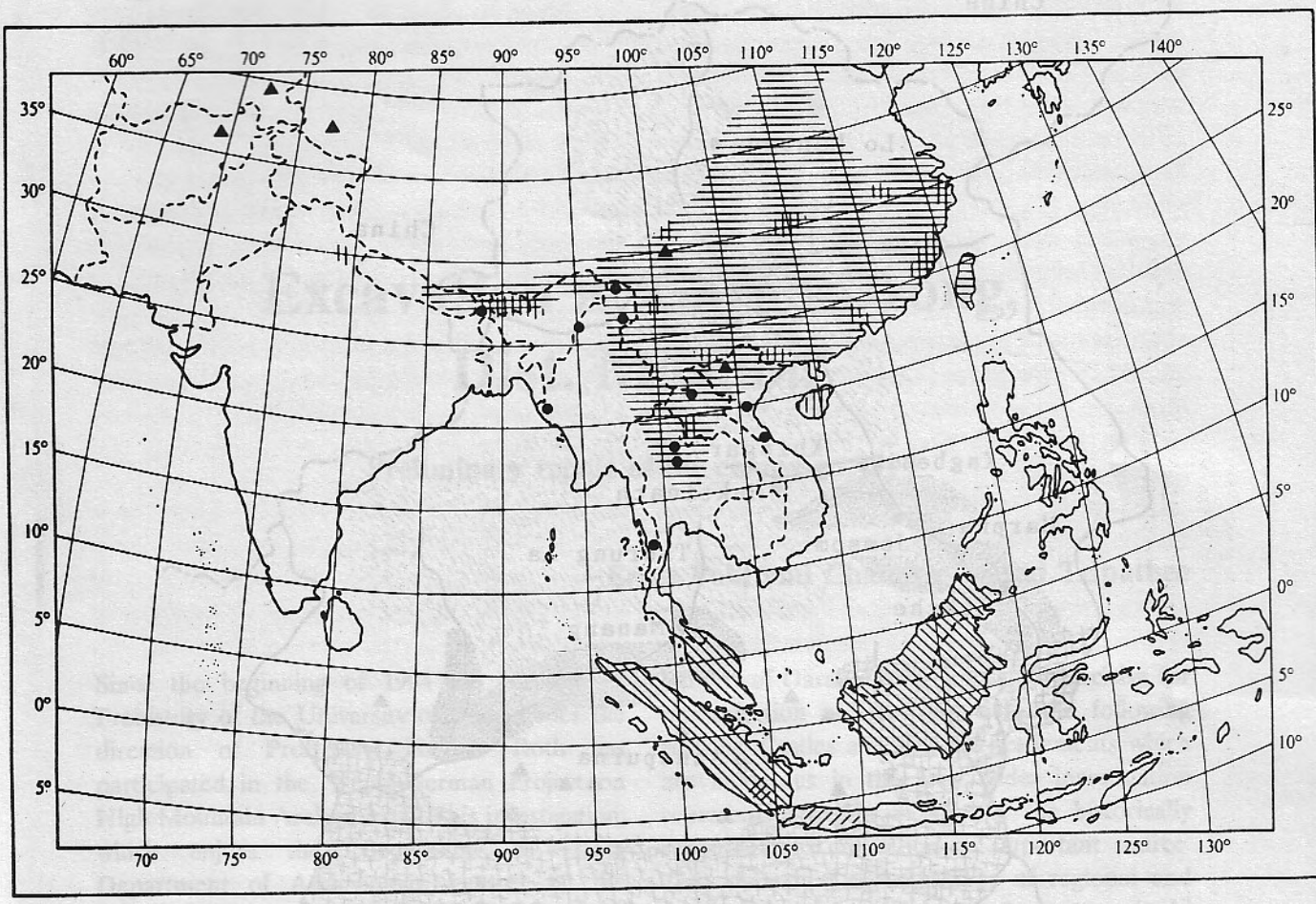

60° 65° 70° 75° 80° 85° 90° 95° 100° 105° 110° 115° 120° 125° 130° 135° 140°
35° 30° 25° 20° 15° 10° 5° 0° 5°
25° 20° 15° 10° 5° 0° 5° 10°
70° 75° 80° 85° 90° 95° 100° 105° 110° 115° 120° 125° 130°
M.sibirica
M.kathiah
M.nudipes
M.lutreolina
M.strigidorsa
M.nivalis

Fig. 9

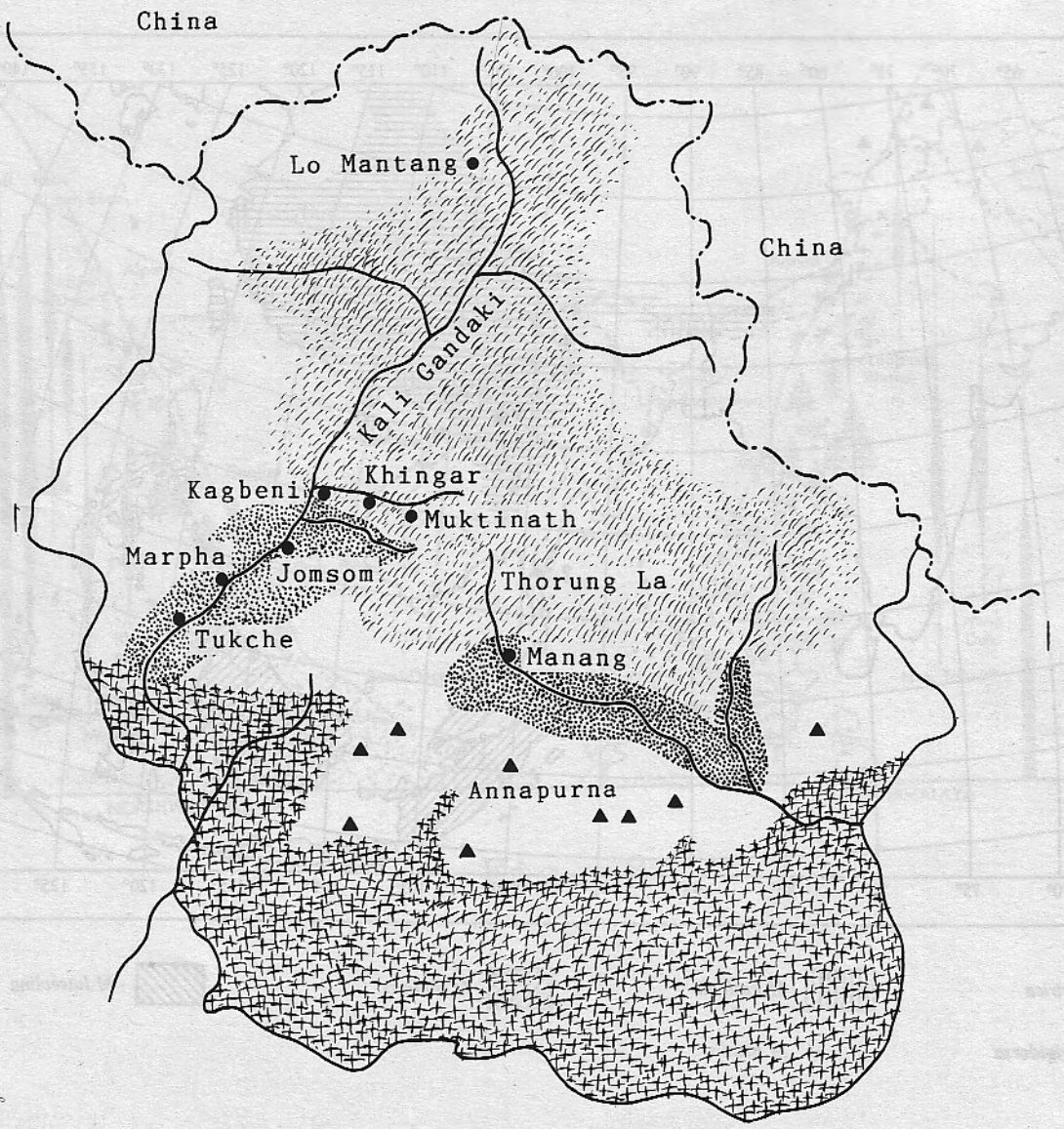
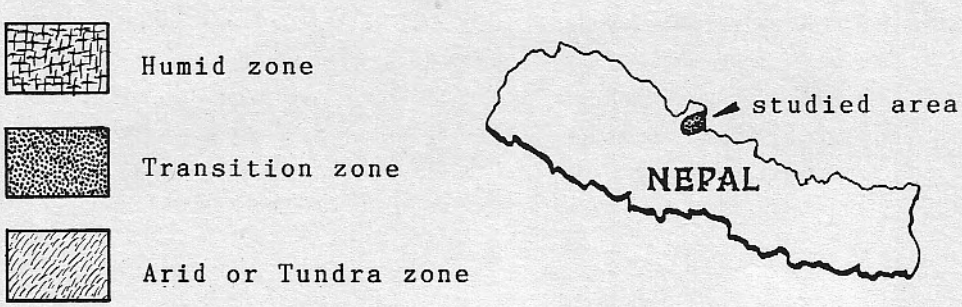

China
Lo Mantang
China
Kali Gandaki
Kagbeni
Khingar
Muktinath
Marpha
Jomsom
Thorung La
Tukche
Manang
Annapurna

Fig. 10


Humid zone
Transition zone
Arid or Tundra zone
studied area
NEPAL