time was recaptured from Jasapur (Talala subdistrict) where it had been caught earlier. The maximum distance travelled by a leopard, before being caught again, was 47 km (from Devkarnia (NP) to Sukhpur in Maliya subdistrict). Of all leopards that were recaptured from peripheral areas, two were involved in attack on humans, one had killed livestock, and the rest were captured due to fear and disturbances to humans.

In 1996, a male Leopard captured from a village farm well in Kodinar sub-district and subsequently tagged and released inside the forest area, had migrated to Dharoi village in Mehsana district (North Gujarat), where it was shot inside a house by the Police Department for the safety of people. The leopard had travelled 340 km (within 8 months) from the area of release.

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REFERENCES

PRATER, S.H. (1997): The Book of Indian Animals. Bombay Natural History Society. Bombay.

SINGH, H.S. & R.D. KAMBOJ (1996): Biodiversity conservation plan for Gir. Gujarat State Forest Department, Gujarat.

VIJAYAN, S. & B.P. PATI (2001): Impact of changing cropping pattern on man-animal conflicts around Gir PA with specific reference to Talala Taluka. *Indian Forester 127*: 1121-1133.

4. SPECIES OF BARKING DEER (GENUS *MUNTIACUS*) IN THE EASTERN HIMALAYAN REGION

The barking deer or muntjacs are small, solitary, cryptic forest dwellers found throughout southern and eastern Asia from India through China, Indochina, and Malaysia, to Indonesia. Two species have long been known from the eastern Himalayan region. The Red Muntjac (*Muntiacus muntjak*) is relatively common and widely distributed, whereas the Chinese or Reeves' Muntjac (*M. reevesi*) is confined to southeast China, east of about 100° E. During the 1990s the discovery of two new muntjac species and the rediscovery of a third species in the Annamite Mountains along the Lao-Vietnam border focused attention of zoologists on this ancient lineage of cervids (Groves and Schaller 2000, Amato *et al.* 2000). In 1997, yet another new species was discovered in Myanmar (Burma) and named Leaf Deer (*M. putaoensis*) by Rabinowitz *et al.* (1999). That year, the Black Muntjac (*M. crinifrons*), previously known only from China, was also found in Myanmar, extending its recorded range by about 1,750 km (Rabinowitz and Khaing 1998, Rabinowitz *et al.* 1998). Although the Leaf Deer and Black Muntjac were each initially found only within small areas, our recent work has shown these species to have a much more extensive distribution. The purpose of this note is to describe their known geographic range and point to their possible occurrence in India and elsewhere in the eastern Himalayan region.*

Leaf Deer (*Muntiacus putaoensis*)

The Leaf Deer, so named because local hunters wrap their kill into large *Phrynium* leaves, is a diminutive fawn-coloured muntjac, weighing about 12 kg, with spike antlers in males up to 5 cm long. The conspicuous canines are of the same size in males and females, an unusual condition in muntjacs (Rabinowitz *et al.* 1999). It was discovered in secondary and old-growth evergreen broad-leafed forest northeast of Putao in northern Myanmar (26° 58' N, 96° 09' E) at elevations of around 800-2,000 m (Rabinowitz and Khaing 1998, Rabinowitz *et al.* 1999). Analysis of its mitochondrial DNA confirmed it as a new species most closely related to two other small muntjacs (*M. rooseveltorum*, *M. truongsonensis*) in the Annamite Mountains (Amato *et al.* 2000). We now have additional specimen records from the Hponkan Razi area (27° 30' N, 97° 09' E), the Hukaung valley (26° 58' N, 96° 09' E), and near the Saramati massif (25° 42' N,

*This note was submitted for publication in March 2002. In it we predict that two muntjac species new to India might occur within its borders. One of these was discovered in November 2002. See, Aparajita Datta *et al.* 2003, Discovery of the Leaf Deer *Muntiacus putaoensis* in Arunachal Pradesh an addition to the large mammals of India. *Current Science 84*: 454-458.

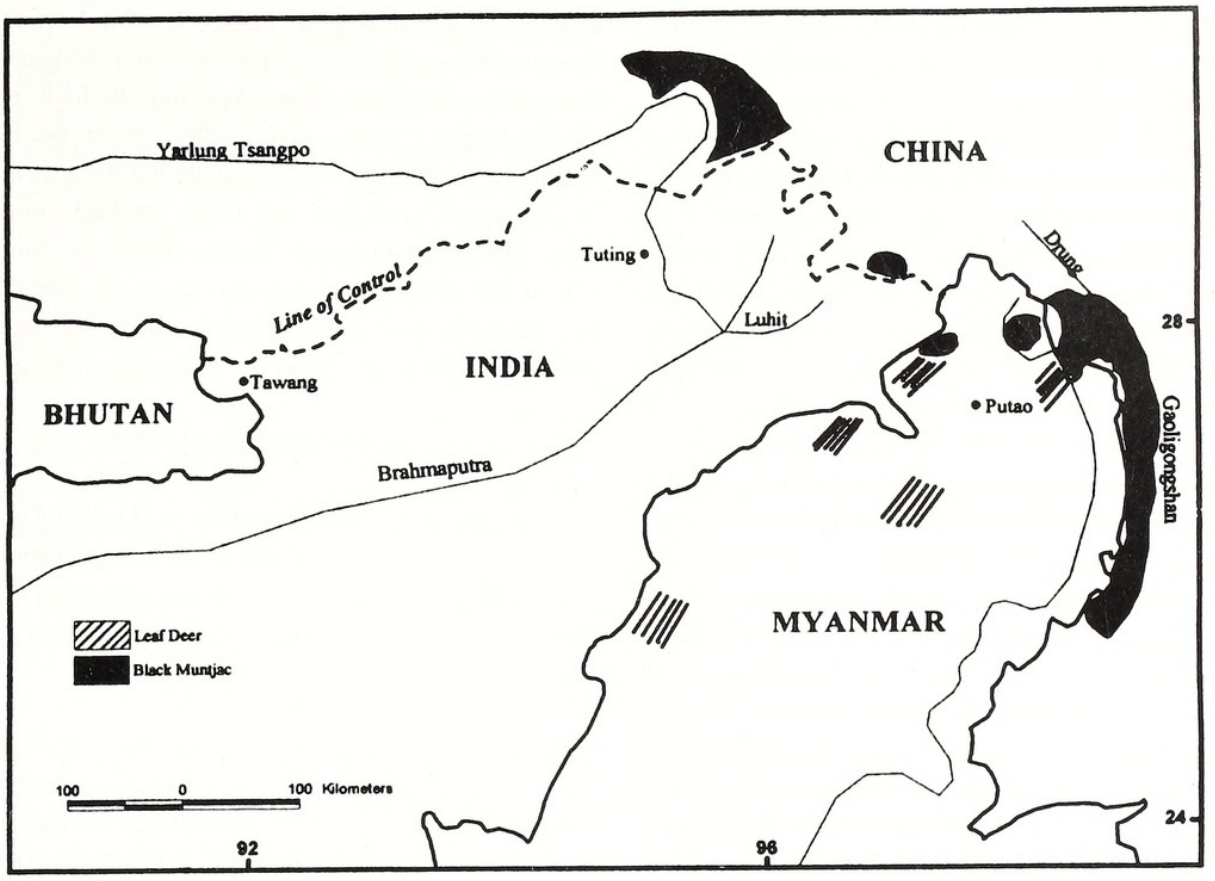

Fig. 1: Known distribution of two muntjac species – Leaf Deer and Black Muntjac – in the eastern Himalayan region

95° 13' E), all close to the Myanmar-India border (Fig. 1). These records suggest that the species occurs or once occurred within Indian limits, especially in the southern part where high mountains do not block movements. Leaf Deer are also said to extend into north-central Myanmar (26° 25' N, 97° 30' E) "west and northwest of Sumpra Bum" (Mg 2001). There is a vague report from China from the southern part of the Gaoligongshan in Yunnan between about 24-25° N where Ma *et al.* (1994) describe "a possible new species of small muntjac". These mountains border Myanmar and are relatively low at that latitude, providing an immigration route. The Leaf Deer may thus have a fairly wide distribution in the northern third of Myanmar and the areas of India and China immediately bordering that region.

Black Muntjac (*Muntiacus crinifrons*)

In the past, Black Muntjacs were known only from parts of the Anhui, Zhejiang, Fujian, and Jiangxi provinces of eastern China. About the size of a Red Muntjac, the species weighs 21-26 kg (Sheng 1992). Its coat colour is variable, ranging from brown with a chestnut hue or grey-brown to dark brown with blackish legs and white undersides. The antlers are usually small, 4-6 cm long (Sheng 1992), and without the terminal hook as often found in adult male Red Muntjac. In 1988, a supposedly new species of muntjac (*M. gongshanensis*) was found in the Gaoligongshan in Yunnan, China (Ma *et al.* 1990), but detailed analysis of the mitochondrial DNA revealed that the animal is actually *M. crinifrons,* far outside its known range (Amato *et al.* 2000). In the Gaoligongshan, the Black Muntjac is said to occur along most of that range from near the border of the Tibet Autonomous Region (28° 10' N) south to about 25° N (Ma *et al.* 1994). Rabinowitz and Khaing (1998) then discovered this species in Myanmar in the forested hills north of the banks of the Nam Tamai (about 27° 50' N, 97° 50' E). In 2002, we found it near the Myanmar-India border at 27° 43' N, 97° 05' E (Fig. 1). During surveys of southeast Tibet in 1998 and 2000, we discovered two other disjunct populations of Black Muntjac. One population is located along the Pailong and Yigong rivers (30° 07' N, 95° 02 E), both tributaries to the Yarlung Tsangpo, which becomes the Siang as it enters India, and in the Medog area to the south (Schaller *et al.* 2000). The other is located to the east near Zayu where a specimen was obtained at 29° 56' N, 94° 48' E.

Black Muntjac inhabits primarily broad-leafed evergreen and semi-evergreen forests in hilly to mountainous terrain, a habitat also often occupied by Red Muntjac. Both species, so similar in size, occur in the Gaoligongshan, but an ecological separation, if any exists, has not been described there (Ma *et al.* 1994). Only the Black Muntjac is found in far northern

Myanmar (Rabinowitz and Khaing 1998). However, farther south, we noted that Black Muntjacs are mainly above 1,500 m, extending sparsely up into the temperate forest at least to 2,600 m, whereas Red Muntjac occurs at lower elevations. In south-eastern Tibet, Black Muntjacs were at 1,800-2,600 m and Red Muntjac lower down (Schaller *et al.* 2000). We had found that the Capped Leaf Monkey (*Trachypithecus pileatus*) has penetrated northward from the mountain forests of Arunachal Pradesh in India into the big bend of the Yarlung Tsangpo in Tibet, and we expected a similar distributional pattern in Black Muntjac. One of us (GBS) visited Arunachal Pradesh on an ecotourism assignment in 2000. Local hunters characteristically hang trophies on the walls of their home. Many muntjac specimens were examined along the Luhit river, Siang river as far north as Tuting, around Tawang (Fig. 1), and elsewhere. All were Red Muntjacs even at high elevations, and near Tawang one animal of this species was observed at 3,000 m, higher than any elevation reported for Black Muntjac. Possibly the Black Muntjac reached southeast Tibet via a northern route, bypassing India. But a more widespread search for the Black Muntjac is required before its distributional dynamics can be discussed with confidence.

The evidence suggests some degree of competition and ecological separation between Red and Black Muntjacs, species with a long, separate evolutionary history judging by their DNA (Amato *et al.* 2000). The Black Muntjac may have evolved somewhere in China and entered Myanmar from the northern Gaoligongshan, bypassing the high mountains via the Drung (Tarong) river valley, or via the low-lying southern part of this range. Considering the distribution of the two species in China and India, the Red Muntjac may have colonized a vast area first and the Black Muntjac later moved into sparsely occupied terrain, or the Black Muntjac survives in the eastern Himalaya as relic populations at high elevations with the Red Muntjac having become dominant.

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REFERENCES

Amato, G., M. Egan & G. Schaller (2000): Mitochondrial DNA variation in muntjac: evidence for discovery, rediscovery, and phylogenetic relationships. Pp. 285-295. *In*: Antelopes, Deer, and Relatives (Eds. Vrba, E. and G. Schaller). Yale University Press, New Haven.

Groves, C. & G. Schaller (2000): The phylogeny and biogeography of the newly discovered Annamite artiodactyls. pp. 261-282. *In*: Antelopes, Deer, and Relatives (Eds. Vrba, E. and G. Schaller). Yale University Press, New Haven.

Ma, S., L. Han & D. Lan (1994): Bird and mammal resources and nature conservation in the Gaoligongshan region, Yunnan Province, People's Republic of China. Kunming Institute of Zoology, Kunming. 116 pp.

Ma, S., Y. Wang & M. Shi (1990): A new species of genus *Muntiacus* from Yunnan, China. *Zoological Research 11*: 46-53. (in Chinese)

Mg, M. (2001): Sumpra Bum Township tiger survey report. Wildlife Conservation Society, New York. Unpublished report, 8 pp.

Rabinowitz, A. & S. Khaing (1998): Status of selected mammal species in North Myanmar. *Oryx 32(3)*: 201-208.

Rabinowitz, A., G. Amato & S. Khaing (1998): Discovery of the black muntjac, *Muntiacus crinifrons* (Artiodactyla, Cervidae), north Myanmar. *Mammalia 62*:105-108.

Rabinowitz, A., T. Myint, S. Khaing & S. Rabinowitz (1999): Description of the leaf deer (*Muntiacus putaoensis*), a new species of muntjac from northern Myanmar. *J. Zool. Lond. 249*: 427-435.

Schaller, G., E. Zhang & Z. Lu (2000): An ecological survey of the Medog area in the Yarlung Tsangpo Great Canyon National Reserve, Tibet. Wildlife Conservation Society, New York. Unpublished report, 86 pp.

Sheng, H. (ed) (1992): The Deer in China. East China Normal University Press, Shanghai. (in Chinese)

5. ON THE PANGOLIN AND PORCUPINE SPECIES OF BANGLADESH

There seems to be some confusion as to which species of porcupine and pangolin occur in Bangladesh. The country is located on the eastern fringe of the distribution of the Indian pangolin *Manis crassicaudata* and Indian porcupine *Hystrix indica*. The western / south-western limit of the Chinese pangolin *Manis pentadactyla* and crestless Himalayan porcupine *Hystrix brachyura* is also in this region. It is because of this transition that the confusion prevails.

Khan (1985) mentioned that *M. crassicaudata* occurs widely, but in small numbers in areas bordering northeast India as the main range. He doubted presence of *M. pentadactyla* in eastern areas, but mentioned no sight record. From my field survey experiences in north-eastern India, especially near the Indo-Bangladesh border in