

# Preliminary assessment of large mammals in the Namcha Barwa region of south-eastern Tibet

Qiu Ming Jiang and William V. Bleisch

*In 1994 the authors made two rapid assessments of wildlife in the remote Namcha Barwa region, south-eastern Tibet, China. They conducted interviews, examined and recorded trophies in the possession of local Menba, Luoba and Kangba Tibetans and made opportunistic field observations. Despite the extensive forests in this extremely remote region, wildlife populations appeared to be low except in inaccessible areas along county borders. Frequent reports of tiger predation on cattle, horses and mules in glaciated valleys on the south slope of the Himalayas may indicate a shortage of natural prey. Uncontrolled hunting, human population growth and expedient economic development threaten the survival of large mammals in the region.*

## Habitat

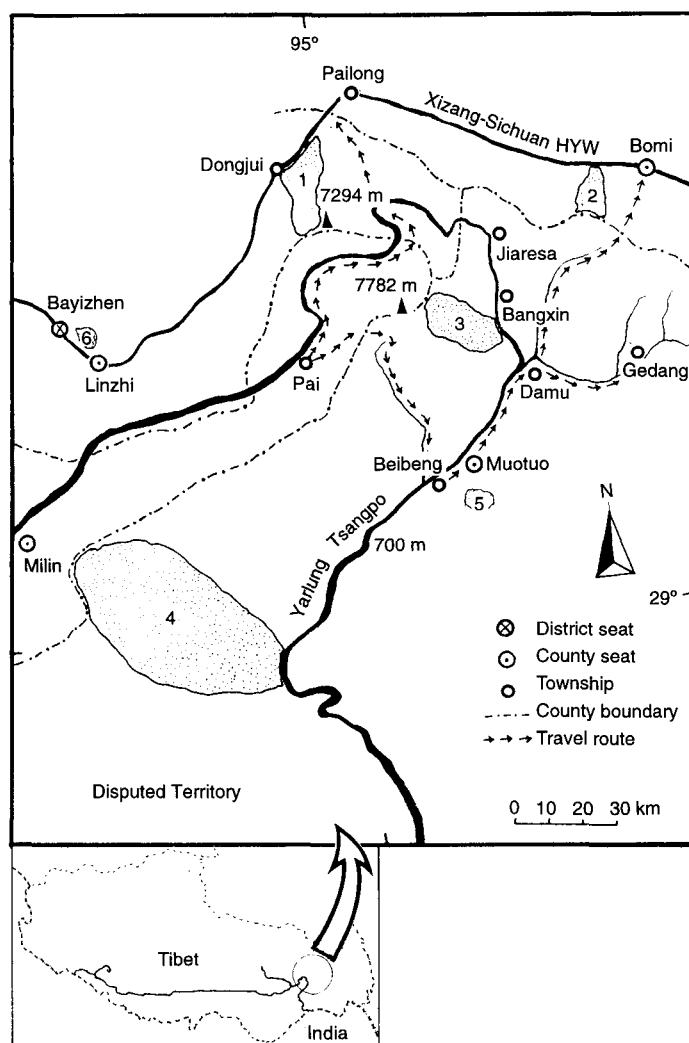
The Namcha Barwa region lies within the Linzhi District in the south-east of the Xizang (Tibetan) Autonomous Region in China (Figure 1). Zoogeographically, it lies at the junction of the Eastern Himalayas, the Qinghai–Xizang Plateau, the Hengduan Mountains and the Assam Region (Zhang *et al.*, 1982). The Yarlung Tsangpo River (the Brahmaputra in India) runs from west to east, cutting through a range of high mountains dominated by Namcha Barwa (7782 m) and Jala Beri (7151 m). The river bends sharply south around Namcha Barwa and flows rapidly down to the Assam Plains in India. In the process, the river creates the world's deepest canyon (Anon., 1994). Within 45 km the depth of the gorge spans 700 m at Beibeng to over 7000 m (Figure 1).

The region has a monsoon climate, which provides excellent growing conditions for forests. The annual average rainfall is 1000–3000 mm (Editorial Board of the Chinese Geographic Series, 1990). Some of China's best old-growth forests, both in term of species composition and forest productivity, remain here (Xu Fengxiang, pers. comm.).

The vertical zonation of habitats is dramatic. Tropical monsoon forest is found between 560 and 1100 m and has a diverse flora, character-

ized by *Terminalia myriocarpa*, *Lagerstroemia minuticarpa*, *Garcinia morella*, *Sloanea sinensis*, *Fissistigma oldhamii* and other broadleaved evergreen species. The trees *Alingia* sp., *Actinodaphne lancifolia* and *Cryptocarya chinensis* form an understorey. Between 1100 and 2500 m there are well-developed subtropical, montane, broadleaved forests, containing oak *Quercus tungmaiensis* and evergreen chinkapins *Castanopsis xizangensis* and *C. lamellosa*. Alder *Alnus nepalensis* and birch *Betula utilis* dominate the lower slopes and valley bottoms. From 2500 to 3000 m, the forest consists of Yunnan pine *Pinus yunnanensis*, hemlock *Tsuga dumosa* and spruce *Picea likiangensis*. From 3000 to 3700 m, the fir, *Abies delavayi*, predominates. Alpine shrub covers the slopes between 3700 and 4000 m and the tree-line may extend up to 4200 m, depending on local topographical and edaphic conditions. The upper forest limit is fringed by many rhododendron species. Alpine meadows, bare rocks and permanent snow occupy the higher elevations.

Complex topography has resulted in varied vegetation and uneven wildlife distributions. For example, west and north-west of Xiejian La (*la* means mountain pass in Tibetan), the coniferous forest ends at 2900 m. However, on southern slopes in Seqi La Mountains, conifers extend as high as 4200 m. South and south-



**Figure 1.** The Namcha Barwa region. Shaded areas indicate protected areas. 1, Dongjui Red Goral Reserve; 2, Bomi Gangxiang Nature Reserve; 3, Niela Tsangpo Protected Area; 4, Deyanggou Takin Protected Area; 5, Buqiong Lake Protected Scenic Spot; 6, Bajie Giant Cypress *Cupressus gigantea* Protected Spot (based on Liu, 1993; Yin and Liu, 1993).

west of the Xiejian La, the fauna is dominated by Oriental species (Cai and Zhang, 1980; Feng *et al.*, 1980; Du and Xi, 1993), while Palaearctic elements increase sharply north and north-west of the range. The northern limit of tropical Asian fauna lies further south, towards the disputed border between India and China.

Early western explorers described the abundant and diverse animals and plants in the region (e.g. Ward, 1930; Bailey, 1957). Many of the mammal and bird species still occur but their survival is threatened. Among them, 31 species – including tiger *Panthera tigris*, leopard *P. pardus*, clouded leopard *Neofelis*

*nebulosa*, snow leopard *Uncia uncia*, takin *Budorcas taxicolor* and red goral *Nemorhaedus baileyi* – are on Schedule I of China's protected wildlife. An additional 65 species are on Schedule II (Yin and Liu, 1993). Table 1 lists the major protected mammal species in the region.

### Methods

The authors made two assessments of wildlife in the Namcha Barwa region, between 22 April and 27 May and between 22 September and 13 October, 1994 (Figure 1). Local Menba,

Finger-like projections of tropical and subtropical forests along the Yarlung Tsangpo (*Ming Jiang Qiu*).



**Table 1.** Major protected mammal species in the Namcha Barwa region, south-eastern Tibet

English name	Scientific name	Chinese list	IUCN list
Assam macaque	<i>Macaca assamensis</i>	I	–
Rhesus monkey	<i>Macaca mulata</i>	II	–
Hanuman langur	<i>Semnopithecus entellus</i>	II	–
Dhole	<i>Cuon alpinus</i>	II	V
Asiatic black bear	<i>Ursus thibetanus</i>	II	V
Brown bear	<i>Ursus arctos</i>	II	–
Lesser panda	<i>Ailurus fulgens</i>	II	V
Eurasian otter	<i>Lutra lutra</i>	II	–
Small-clawed otter	<i>Aonyx cinerea</i>	II	K
Large Indian civet	<i>Viverra zibetha</i>	II	–
Small Indian civet	<i>Viverricula indica</i>	II	–
Spotted linsang	<i>Prionodon pardicolor</i>	II	–
Yellow-throated marten	<i>Martes flavigula</i>	II	–
Tiger	<i>Panthera tigris</i>	I	E
Leopard	<i>Panthera pardus</i>	I	–
Clouded leopard	<i>Neofelis nebulosa</i>	I	V
Snow leopard	<i>Uncia uncia</i>	I	E
Golden cat	<i>Felis temmincki</i>	II	I
Jungle cat	<i>Felis chaus</i>	II	–
Southern musk deer	<i>Moschus sifanicus</i>	II	–
Forest musk deer	<i>Moschus berezovskii</i>	II	–
Black musk deer	<i>Moschus fuscus</i>	II	–
Gongshan muntjac	<i>Muntiacus gongshanensis</i>	II	–
Red deer	<i>Cervus elaphus</i> subsp?	II	–
Blue sheep	<i>Pseudois nayaur</i>	II	–
Takin	<i>Budorcas taxicolor</i>	I	–
Goral	<i>Nemorhaedus goral</i>	II	–
Red goral	<i>Nemorhaedus baileyi</i>	I	–
Serow	<i>Capricornis sumatraensis</i>	II	I

Note: English names follow Tan (1992); scientific names follow Nowak (1991). Chinese Wildlife Law prohibits killing or trapping Class I or Class II species without the Central or Provincial Government's permission, respectively. The IUCN red list definition: E, Endangered, V, Vulnerable, I, Indeterminate and K, Insufficiently known (Groombridge, 1994).

Luoba and Kangba Tibetan villagers were interviewed; when required, pictures and/or drawings were presented and standard Tibetan names for animals (Feng *et al.*, 1986) were used to enhance communication. A total distance of about 270 km was walked. The complex topography, dense vegetation (visibility as low as 3 m) and mists allowed only opportunistic field observations.

Cliff faces, grassy swards, riversides and other open areas were scanned with 10 × 30 binoculars and a 15 × 45 telescope. When possible, animals observed were aged and sexed. The altitude of sightings, tracks, feeding sites and other evidence of animal presence were recorded. To assess hunting intensity, fresh trophies in or around village houses along the travel routes were recorded. When a house contained more than one trophy that might have come from the same animal, such as a hide and a skull, they were counted as one animal. Tiger predation was investigated by interviewing county officials and examining feeding sites. Families with heavy losses of livestock were visited to investigate the conflicts between tiger predation and livestock grazing. Forest cover was estimated from 1:100,000 scale maps in reference to data published by the Institute of Geography, Chinese Academy of Sciences (1990).

**Wild species of conservation concern**

Presence of tiger, leopard, clouded leopard, snow leopard, serow *Capricornis sumatraensis*, Asiatic black bear *Ursus thibetanus*, rhesus and Assamese macaques *Macaca mulatta* and *M. assamensis*, hanuman langur *Semnopithecus entellus*, takin, red goral and other animals was

confirmed. No large vertebrate species were observed in habitats accessible to humans, which suggests that densities are very low except in the most remote areas.

*Primates*

*Macaca assamensis* and *M. mulatta* were seen briefly in a forest in Milin at about 2700 m and skins of the former species were frequently found in villagers' homes (Table 2). It was reported consistently that hanuman langurs occur only on the west side of the Yarlung Tsangpo, which may be the eastern limit of this species's distribution. Yin and Liu (1993) reported that the hoolock gibbon *Hylobates hoolock* is found in southern Motuo, which it was impossible to visit because of restrictions.

*Carnivores*

At Jiala (Gyala) on the Yarlung Tsangpo, villagers reported that snow leopard and its main prey, blue sheep *Pseudois nayaur*, used to occur there at higher altitudes, but have retreated further down the valley because of hunting. At Damu we examined the fur of a young clouded leopard, which had been shot by a local villager. Tiger tracks were found in Gedang, where examination of a kill confirmed a case of tiger predation on livestock. Three black bears were seen, all on the border between Linzhi and Milin, the part of the area that is least accessible to humans.

*Ungulates*

Nine herds of takin were seen, a total of 67 individuals, most on the left bank of the Yarlung Tsangpo River. Herd size ranged from one to

**Table 2.** Number of trophies at village houses along travel routes in Linzhi, Milin, and Motuo counties, south-eastern Tibet (22 April–27 May and 22 September–13 October 1994)

County	<i>n</i>	Takin	Red goral	Macaques	Black bear	Musk deer	Serow	Muntjac
Milin	2	1	7	1	3	8	2	0
Linzhi	12	50	18	9	4	7	5	3
Motuo	19	34	6	30	13	2	15	57



Tibetan porters sitting on takin hides drinking tea during a break (Ming Jiang Qiu).

24 animals. Of all the takin, five (6.9 per cent) were newborns of the year (Table 3).

Seven herds totalling 11 red goral were seen on cliffs above the Yarlung Tsangpo. Herd size was small, ranging from one to three animals, although local hunters reported that as many as seven may be observed together.

The skins of Indian muntjac and a recently described new species – Gongshang muntjac *Muntiacus gongshanensis* (Shi and Ma, 1988; Ma *et al.*, 1990) – were found east of Xiejian La. At Beibeng, three muntjac barks were heard, two in the day and one in the evening. Based on the number of trophies found and the local game harvest report from the previous year, muntjac appear to be common around Beibeng.

### Hunting and lowland habitat loss: threats to species survival

Despite the legally protected status of many large mammals in Namcha Barwa, subsistence hunting threatens the survival of large mammals in the region, as indicated by their disappearance in areas with easy access, and in other regions in China (Wu, 1990; Gao *et al.*, 1993; Hu and Wei, 1993; Schaller, 1993). Table 2 summarizes the information on trophies found in village houses along the travel routes. Most trophies observed had been collected by the owners but some skins are sold

to the upland Tibetans, thus the figures represent minima. The interviews revealed no evidence of arrangements for traditional management of hunting or restriction of hunting areas.

Large mammals, such as takin and red goral, were only found at higher altitudes, although local hunters reported that these animals descend to as low as 1500 m in winter. Based on sightings and observations of tracks and other signs, the authors estimated a population of about 150–200 takin on the border between Linzhi and Milin, a density in forest habitat of about two animals per sq km. Elsewhere this species, like the red goral, is heavily hunted (Table 2). Two instances may

**Table 3.** Herd size of takin in Yarlung Tsangpo valley (22 April–27 May 1994)

Herd no.	No. adults and subadults	No. calves
1	10	0
2	2	0
3	10	0
4	6	0
5	24	3
6	1	0
7	8	0
8	2	1
9	4	1
Totals	67	5

reflect the severity of poaching. In April 1993 the Tibetan porters hired by the authors had taken some Americans into the same area and killed four takin (one adult and three calves) during their 28-day trek. The meat was consumed by the Americans as well as by the porters. A Chinese forest ecologist, Xu Fengxiang, reported that in April 1994 a porter working for her killed three takin in one day.

Takin calves seemed to suffer heavy losses, judging by the incident described above and by the six young takin hides (10.5 per cent of all the trophies) found in and around villagers' homes. The calf: adult and subadult ratio in Nmacha Barwa was only 6.9 per cent compared with the 17.8 per cent reported by Hu (1994) for takin in northern Sichuan and 14.8 per cent and 21.0 per cent reported by Wu (1990) and by Song (1994), respectively, for takin in Qinling in central China. The combined effect of poaching and the unusually heavy winter snow in 1993–94 may have taken a significant toll of the young.

Turning forests into pasture in northern Motuo presented a problem for the local Tibetan communities. Although Santiapillai and Ramono (1987) found tiger density to be generally low in mountainous areas, as we did in the steep Yarlung Tsangpo valley, tigers appear to cluster in Namcha Barwa's glaciated valleys, whose flat bottoms provide excellent conditions for grazing. This observation is supported by frequent reports of tiger predation of livestock, which has caused much concern among the local people in Gedang, Bangxin and Jiarsa in northern Motuo. The situation was reported to officials in Lhasa (Pingzhen, pers. comm.). Due to lack of reliable data, however, no action was taken to institute a compensation programme. Between July 1993 and October 1994, Motuo county reportedly lost 190 cattle, horses and mules. The predation is especially heavy in the Gedang Valley, where local Tibetans pushed grazing land to the upper limit of broadleaved forests. During this 16-month period, Gedang claimed to have lost 141 (10 per cent) of its cattle, horses and mules.

Although leopards *Panthera pardus* occasionally hunt large mammals such as takin (Hu,

1994) and may even bring down cattle, studies on leopards' and tigers' feeding habits indicate little overlap in the diets of these two predators, with the prey of the former ranging between 25 and 50 kg, and that of the latter species from sambar deer to livestock weighing as much as 450 kg (Sunquist and Sunquist, 1988). The losses of only large livestock in northern Motuo suggests that the tigers there are losing their food base and may have become accustomed to eating livestock. Loss of lowland habitat and thus the home ranges of tigers increases male–male competition and sometimes produces man-eaters (Sunquist and Sunquist, 1988). Local villagers have reported incidents of tigers mauling people (Liu Wulin, pers. comm.).

Tiger densities decline rapidly when forest, alluvial plains and river basins are cleared or converted to agricultural use (Seidensticker, 1986, cited in Rabinowitz, 1993). No reliable data exist on how many tigers live in the Gedang area. Judging from field observations, however, tiger–human conflict in the Gedang valley will either intensify or the tiger population will decline with further habitat deterioration.

## Conclusions

The Namcha Barwa is one of the world's richest regions in terms of biological diversity. Because of its extreme ruggedness, poor accessibility and relatively low human population density (1.2 humans per sq km; Yin and Liu, 1993), the region still contains some of China's most extensive broadleaved forests and most productive coniferous forests.

Large mammals unique to the Eastern Himalayas, such as takin and red goral, are now found only in extremely remote areas, where their survival is threatened by unmanaged hunting.

The tiger has disappeared from most of its former range in China (see for example, Ma *et al.*, in press). What is perhaps the last viable population of tigers in China survives in the Namcha Barwa region. Loss of lowland habitat and frequent reports of livestock predation

indicate that this large predator may be short of natural prey, especially in northern Motuo.

### Wildlife protection and economic development in the region

Legal steps towards wildlife conservation were taken in 1983, when the Xizang Autonomous Region Government declared six protected areas. These reserves, however, are too small for effective conservation of large mammals, especially large predators (Figure 1).

Long-term plans for developing south-eastern Tibet involve targeting the natural resources of the region (Ding, 1993). As the human population grows and China's economic development gathers speed, extraction of timber resources will accelerate. Depletion of forest resources in western Sichuan and north-west Yunnan provinces is forcing timber operations to move further west (Jiang, 1992). Outdoor activities, such as hiking and sport-hunting, have been proposed as attractions for tourism development in the next 10 years (Tibet Tourism Bureau and Shankland Cox, 1990).

In summary, Namcha Barwa is a very important region in China's wildlife conservation system. To preserve the diverse mammalian community requires bringing poaching under control, curtailing further lowland habitat loss and carrying out research to find an integrated solution to problems faced by resource conservation and economic development.

### Acknowledgements

This project is a collaborative effort between the Wildlife Conservation Society and the Conservation Biology Centre of the Kunming Institute of Zoology, Chinese Academy of Sciences. Funds were provided by the Wildlife Conservation Society, the John D. and Catherine T. MacArthur Foundation and the US Bureau of Oceanographic and International Environmental and Science Affairs. The authors wish to thank Ji Weizhi of the Kunming Institute of Zoology and Yin Bingao of the Tibet Forestry Bureau for organizing institutional support. We are

grateful to project drivers Cheng Jinhui, Zang Jie and Zhang Boyao, who transported us safely between Kunming and the remote study area. Thanks are extended to Ma Shilai, Han Lianxiang and Zhang Ming for their assistance and companionship in the field. We also would like to thank Zhao Qikun and Richard Harris for critically reviewing the manuscript.

### References

- Anon. 1994. Mother of all gorges. *Asiaweek*, January 20.
- Bailey, F.M. 1957. *No Passport for Tibet*. London.
- Cai, G.Q. and Zhang, N.Z. 1980. On mammalian fauna in Motuo Region, Xizang. In *Symposium Proceedings on Scientific Explorations of Qinghai-Xizang Plateau* (ed. Anon.), pp. 85–86. Chinese Academy of Sciences, Beijing. (In Chinese.)
- Ding, Q.F. 1993. *The Himalayan Model – a Hypothesis for Future Economic Development on the Qinghai-Xizang Plateau*, 1st edn. Xizang People's Press, Lhasa. (In Chinese.)
- Du, J.W. and Xi, Y.G. 1993. Avian fauna of Namcha Barwa area. In *Scientific Exploration Series on Namcha Barwa Area* (ed. Anon.), p. 120. Science Press, Beijing. (In Chinese.)
- Editorial Board of the Chinese Geographic Series. 1990. *China Atlas of Maps*, 1st edn. Chinese Cartographic Press, Beijing. (In Chinese.)
- Feng, Z.J., Zheng, C.L. and Cai, G.Q. 1980. Investigation on fauna of southeastern Tibet. In *Symposium Proceedings on Scientific Explorations of Qinghai-Xizang Plateau* (ed. Anon.), pp. 84–85. (In Chinese.)
- Feng, Z.J., Cai, G.Q. and Zheng, C.L. 1986. *The Mammals of Xizang*, 1st edn. Science Press, Beijing. (In Chinese.)
- Gao, Z.X., Ma, J.Z. and Ma, Y.Q. 1993. Historical changes in distribution of northeast China tiger. In *The Successional Changes of Mammals in China Under Influences of Human Activities* (eds. Xia W. P. and Zhang J.), pp. 61–67. China Science and Technology Press, Beijing. (In Chinese.)
- Groombridge B. (ed). 1994. *1994 IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland and Cambridge, UK.
- Hu, J.C. and Wei, F.W. 1993. The past and present of Sichuan takin. In *The Successional Changes of Mammals in China Under Influences of Human Activities* (eds. Xia W. P. and Zhang J.), pp. 115–117. China Science and Technology Press. (In Chinese.)
- Hu, J.C. 1994. *Sichuan's Rare Mammals*, 1st edn. Sichuan Science and Technology Press, Chengdu. (In Chinese.)
- Institute of Geography, Chinese Academy of

- Sciences. 1990. *Atlas of Qinghai and Xizang Plateau*, 1st edn. Science Press, Beijing. (In Chinese.)
- Jiang, Y.X. 1992. Environmental impact and development strategies for western China. In *Proceedings of Symposium on Natural Resources and their Development in Western China* (ed. Li W. L.), pp. 50–55. The Natural Resources Society of China. (In Chinese.)
- Liu, W.L. 1993. *Xizang's Nature Reserves*. Xizang People's Press, Lhasa. (In Chinese.)
- Ma, S.L., Wang, Y.X. and Shi, L.M. 1990. A new species of the genus *Muntiacus* from Yunnan. *Zoological Research*, **11** (1), 47–53. (In Chinese.)
- Ma, S.L., Han, L.K., Lan, D.Y., Ji, W.Z. and Harris, R.B. In press. Faunal resources of the Gaoligongshan region of Yunnan, China: diverse and threatened. *Environmental Conservation*.
- Nowak, R.M. 1991. *Walker's Mammals of the World*, 5th edn., Vols I and II. The Johns Hopkins University Press, Baltimore and London.
- Rabinowitz, A. 1993. Estimating the Indochinese tiger *Panthera tigris corbetti* population in Thailand. *Biological Conservation*, **65**, 213–217.
- Santiapillai, C. and Ramono, W.S. 1987. Tiger numbers and habitat evaluation in Indonesia. In *Tigers of the World*, pp. 85–92. Noyes Publications, New Jersey.
- Schaller, G.B. 1993. *The Last Panda*, 1st edn. The University of Chicago Press, Chicago.
- Shi, L.M. and Ma, C.X. 1988. A new karyotype of muntjac (*Muntiacus* sp.) from Gongshan county in China. *Zoological Research*, **9**, 343–347. (In Chinese.)
- Song, Y.L. 1994. Present population status and conservation of the golden takin in the Shaanxi Foping National Reserve, China. *Tigerpaper*, **21** (4), 9–12.
- Sunquist, F. and Sunquist, M. 1988. *Tiger Moon*. The University of Chicago Press, Chicago and London.
- Tan, B.J. 1992. *A Systematic List of Mammals*, 1st edn. Chinese Pharmaceutical Science and Technology Press, Beijing. (In Chinese.)
- Tibet Tourism Bureau and Shankland Cox. 1990. *Tourism Plan for Tibet Autonomous Region – Working Report for the People's Government of Tibet Autonomous Region*. China National Tourism Administration, United Nation Development Program, and World Tourism Organization. Business Press, Shanghai. (In Chinese.)
- Ward, K. 1930. *Plant Hunting on the Edge of the World*. Cadogan Books, London.
- Wu, J.Y. 1990. *The Chinese Takin*. China Forestry Publishing House, Beijing.
- Yin, B.G. and Liu, W.L. 1993. *Tibetan Wildlife and Their Conservation*, 1st edn. Chinese Forestry Press, Beijing. (In Chinese.)
- Zhang, R.Z., Zheng, D. and Yang, Q.Y. 1982. *The Physical Geography of Xizang*, 1st edn. Science Press, Beijing. (In Chinese.)
- Ming Jiang Qiu, Kunming Institute of Zoology, Kunming, Yunnan 650223, People's Republic of China.
- William Bleisch, Wildlife Conservation Society, The Bronx, NY 10460, USA.