Discovery of the Tibetan macaque *Macaca thibetana* in Arunachal Pradesh, India

The genus *Macaca*, comprising 21 well-characterized species, represents the largest and one of the most ecologically and socially diverse of all the non human primate genera. Eight species of this genus have so far been reported from India. We report here the discovery of the Tibetan macaque, so far believed to be restricted to China, from the high altitudes of central Arunachal Pradesh, a biodiversity-rich state in northeastern India.

Arunachal Pradesh (26°28′–29°30′N and 91°30′–97°30′E, 83,743 km^2; Figure 1) lies in the Eastern Himalaya global biodiversity hotspot[1] and is uniquely located in the transition zone between the Himalayan and Indo-Burmese biogeographical regions[2]. This state has the world's northernmost tropical rainforests and harbours approximately 50% of the total flowering plant species in India[3,4]. Nearly 600 of the 1200 bird species in India have been recorded from the state, now recognized as an endemic bird area[5]. Arunachal Pradesh also has amongst the richest mammalian diversity in the country, with several records of mammals new to the Indian subcontinent being reported from here in recent years[6,7].

In the past, most wildlife surveys and studies in Arunachal Pradesh were restricted to low- and mid-elevation forests, with the high-altitude areas (> 3000 m) remaining largely unexplored. Recent surveys have led to the documentation of a unique wildlife assemblage in the high-altitude areas of western Arunachal Pradesh, including the discovery of a primate new to science[8–10]. This species, the Arunachal macaque (*Macaca munzala*), has so far been observed in subtropical forests between 2000 and 3500 m in Tawang and West Kameng districts of the state (Figure 1). It could also occur in adjoining areas of Arunachal Pradesh, and in Bhutan and China as well. It shares certain morphological characteristics independently with the Assamese macaque *M. assamensis* and with the Tibetan macaque *M. thibetana*, and occurs sympatrically with the former in Tawang and West Kameng districts[10].

The Tibetan macaque (Figure 2), another high-altitude primate, is distributed mainly in east–central China (25°–33°N, 102°30′–119°30′E) at altitudes of 1000–2500 m, south of Guangxi (23°48′N and 110°E), and west of the Yangtze Gorge in western and northwestern Szechuan[11]. In India, Choudhury[12,13] had earlier described a troop of macaques from West Kameng district (Figure 1), which he provisionally identified to be either the Tibetan macaque or a new subspecies of it, or a subspecies of the Assamese macaque on the basis of their relatively short tails, prominent buffy side-whiskers, and differences in their vocalizations. Subsequently, however, Fooden[14] calculated the tail-to-hindfoot ratio of two of these individuals from sketches made by Choudhury, and suggested that this population may actually represent the Eastern Assamese macaque, *M. assamensis assamensis*. We are, however, of the opinion that the troop observed by Choudhury represents the Arunachal macaque, a species that seems to occur widely in the West Kameng district of the state[10] (unpubl. obs.).

The Tibetan macaque is a large primate with a short stump-like tail, a diagnostic feature of the species (Table 1, Figure 2). Its body is dark brown dorsally and pale buffy or grey below[11]. The crown is usually pale brown, with a small whorl on the vertex with short hairs radiating from it. The general pelage is long and dense, and the species is characterized by a prominent, bushy, pale, buffy beard and full-cheek whiskers.

We report here the first clear evidence for the presence of the Tibetan macaque in India. While surveying for wildlife around the village of Taksing (28°35′N, 93°13′E) in the Upper Subansiri district of central Arunachal Pradesh in August 2003, one of us (R.S.K.) found an unusual macaque skin (Figure 2). Apparently that of a large heavy individual, it was dark chocolate brown dorsally with a long thick pelage that extended over all the limbs, while the peripheral hairs, indicative of the ventral region of the body, were pale and whitish. Although such coloration is itself typical of Tibetan macaques, the

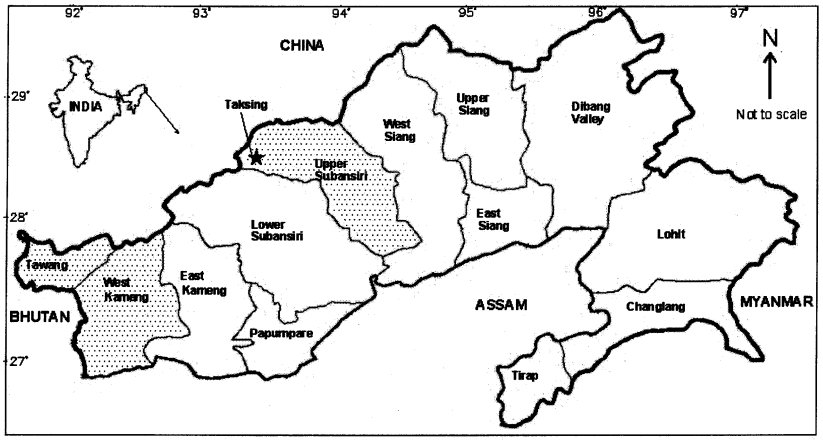

Figure 1. District map of Arunachal Pradesh showing Taksing village where the skin of the Tibetan macaque *Macaca thibetana* was found. Shaded region represents districts whose high-altitude areas were surveyed.

Table 1. Morphometric measurements of the Tibetan macaque *Macaca thibetana*

	Fooden[11]	This study
Head and body length (mm)	Adult male: 580–660 (6)* Adult female: 490–555 (5)	708
Skull length (mm)	Adult male: 146–168 (18) Adult female: 121–140 (10)	
Tail length (mm)	Adult male: 55–80 (5) Adult female: 56–80 (5)	101
Tail-to-head and body length ratio	Adult male: 0.070–0.090 Adult female: 0.110–0.130	0.135

*Sample size is given in parentheses.

Figure 2. Skin of the Tibetan macaque *M. thibetana* discovered during this study being displayed. (Inset) Tibetan macaque from China with its characteristic dark and long pelage, pale white underside and stump-like tail.

identity of the skin was confirmed by its extremely short, stump-like tapering tail, with a relative length (ratio of the length of the tail to that of the head and body) of 0.135 (Table 1). The macaque was reported by the indigenous Tagin people of this region to have been killed in forests near Taksing, at an approximate altitude of 2200 m. They also confirmed the occurrence of troops of similar individuals in this area.

A comparison of the relative tail length of the skin with that reported for the Tibetan macaque by Fooden[11] suggests it to be a much larger individual and one with a longer relative tail length (Table 1). Given that Fooden's data come from museum specimens originally collected from eastern and central China, at least 1000 km from Taksing, the observed disparity may represent inter-population variation in morphology.

What are the implications of this discovery? The finding of the Tibetan macaque is of great importance to our knowledge of Indian wildlife and adds yet another species to the growing faunal catalogue of the Eastern Himalaya, a global biodiversity hotspot. This discovery, as well as that of another high-altitude species, the Arunachal macaque[10], also has tremendous significance to our understanding of the biology of Indian primates. The macaques are an ecologically versatile and evolutionarily successful group of monkeys, second only to humans, among primates in their wide geographical distribution and range of habitats occupied. As all the other seven macaques found in India occur mainly at relatively low altitudes, research on these two species will contribute to our understanding of the ecological and behavioural adaptability of this group of primates.

Finally, the Monpa people of Tawang district report the presence of four macaques in this region (Nima Wangdi, pers. commun.). We have tentatively identified three of these, the *lung pra* ('warm-area monkey', Tawang Monpa dialect), the *na pra* ('forest monkey') and the *bar pra* ('mid-elevation monkey') to represent the Assamese macaque, the Arunachal macaque and their hybrids (Sinha *et al*., manuscript under preparation) respectively. We believe that the fourth macaque, the *la pra* ('mountain-pass monkey'), which they describe as 'dark, heavy-set and forest-dwelling', may represent hitherto unreported troops of the Tibetan macaque in high-altitude areas of the district.

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