

**Observations of snow leopard stalking,
killing, and feeding behavior**

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The snow leopard (*Panthera uncia*) is an endangered species for which there are very few documented observations of behavior in the wild. During surveys of snow leopard and associated species in northwestern India (Fox *et al.* in

press), we observed snow leopards for 30 hours, including one instance of stalking and killing and three instances of feeding behavior on domestic goats. The observations took place during March 1986 in the Markha and Rumbok valleys of the Hemis National Park (33°45'N, 77°40'E), 15-25 km south of Leh, Ladakh, Jammu and Kashmir, India.

According to local shepherds, on 6 March a snow leopard killed three domestic goats at about 1300 h near the seasonal encampment of Chalak in the Markha valley. Two of the goats were retrieved, but one could not be found. On the following day we arrived at the site at 1300 h. The valley bottom was 3300 m in elevation, about 200 m wide, and supported some cropfields, grassland, and open thickets of 5 m tall willow (*Salix* sp.) and buckthorn (*Hippophae salicifolia*) shrubs and a few poplar (*Populus* sp.) trees. The valley slopes were steep with many cliffs and sparsely vegetated with grasses, herbs, and a few small shrubs (e.g., *Artemisia* sp., *Lonicera* sp.).

At 1515 h the snow leopard killed another goat about 100 m from our camp. This goat was also retrieved by a shepherd girl, but the location of the leopard was discovered in the shrub thickets. It had probably remained within the thickets since the previous day, for it was now lying next to the partially consumed carcass of the goat that had not been found the day before. We purchased this approximately 20 kg goat so that the owner would not take it away, and we were able to make continuous observations of the snow leopard from across the 10 m wide streambed at a distance of about 25 m. The leopard, an adult female, was aware of our presence but remained lying next to the goat carcass for the remainder of the day. At dusk (1830 h) it began feeding on the carcass, which appeared to be missing one hindquarter. The snow leopard fed lying down, eating very slowly on the goat's remaining hindquarter.

The following morning at dawn (0600 h), the snow leopard was still lying next to the goat carcass. At 0630 h it crept slowly through the thickets to another spot 20 m away and remained lying there for 145 min before returning to drive magpies (*Pica pica*) and ravens (*Corvus corax*) from the kill. It remained lying next to the carcass for the remainder of the day. As darkness fell on the second day the snow leopard began to feed, again from a lying position, and continued eating until darkness prevented observation. At dawn on the third day, the snow leopard left the valley bottom and slowly climbed up the steep-sided valley walls, disappearing from view at 0750 h at an elevation of 4400 m. There was still some meat left around the forelegs of the goat carcass. The snow leopard returned to the kill again that night, but was gone before dawn. The goat carcass was now completely consumed, save for the skin and large bones.

At 1700 h on 27 March a snow leopard was observed for 30 min in rocky cliffs just above the village of Zinchin (3500 m) in the Rumbok valley. According to the villagers, at least one snow leopard had been in the vicinity for a few weeks and had killed several sheep and goats. The following morning the snow leopard was again seen on a small ridge above the village, moving along the cliff top where it could view movements of the village sheep and goat herd. One goat was tied to a log on the bottom of the valley at the base of the ridge the snow leopard was on. At 1435 h we moved into shrub thickets about 60 m from the goat. The snow leopard, an adult male, began to creep very slowly down, using rocky cliffs (50-60° slope) for cover, until it was just above an open scree slope about 20 m higher and 40 m from the goat. From this

point, at 1455 h, it began a rapid walk for 15 m, then a 25 m run to the goat, skidding to a stop as it executed a nape bite on the surprised goat. After 5 s, it switched to a throat bite, twisted the neck around almost 180° and held on for 6 min until the 20 kg goat stopped moving. It then dropped the goat to the ground and lay down next to it. The snow leopard was disturbed from the kill and returned to the ridgeline it had previously occupied. Examination of the goat carcass showed distinct bite marks on both the nape and throat.

At 1820 h the snow leopard crept down through the cliffs again, walked directly past the carcass, and continued on to the stream about 75 m distant. After presumably drinking water, it returned to the carcass and began feeding at 1850 h. The snow leopard squatted on its haunches, and first began ripping out clumps of hair from the lower abdomen of the goat. After seven mouthfuls of hair, it opened the belly region, slowly removed and ate the viscera and was still doing so when darkness fell at 1930 h. Next morning the entire carcass was gone and the leopard could not be found.

This snow leopard was in poor physical condition. It was very thin; its tail had been broken at some time and was nearly dragging on the ground. Its face was badly scarred with an old nose wound, a new open cut across the right cheek, and the right eye was almost completely swollen shut. Several days prior to our observations, a villager had witnessed a fight between two snow leopards about 5 km up-valley from Zinchin, and we presume that this leopard was one of the participants in that encounter. The female leopard we had earlier observed (described above) also appeared to be injured, showing a slight limp in her right rear leg which was noticeable as she ascended steep terrain.

Other snow leopards caught preying on livestock have also shown prior injuries (Bernard 1985; Inayat Ullah, pers. comm.), and it has been reported in other large felids (Rabinowitz 1986). A certain amount of snow leopard predation on livestock is tolerated by the Buddhist villagers of Ladakh because of religious stipulations against villagers killing animals coupled with the fact that they are able to retrieve and utilize many of the snow leopard kills. However, as happened with the male snow leopard several days after our departure from Zinchin, sometimes a large number of sheep and goats are killed inside an enclosure (in this case 40), which is a severe loss for the owner. Under these circumstances, snow leopards are often killed by the shepherds. As an endangered species, whether these snow leopards most subject to killing by man are those already in poor physical condition needs to be better documented.

Our observation of the snow leopard's stalking and killing was essentially consistent with other accounts of snow leopard use of steep cliffs as cover in stalking (Dang 1967; Kuznetsov and Matyushkin 1980), and its use of a suffocating throat bite in killing large prey (Schaller 1977). In the case of the female snow leopard, the use of shrub cover for stalking is consistent with other large felids, although it has not been reported previously for snow leopard. The male snow leopard beginning its feeding on the goat's viscera is in contrast to Schaller's (1977) observation that initial snow leopard feeding leaves the digestive tract intact. Feeding from either a squatting or lying position is consistent with other large felids. The snow leopard's long stay (5 days) at the kill site, despite disturbances, appears to be characteristic of this species (Schaller 1977), and has probably contributed to its endangered status because of the consequent ease of killing it.

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In memoriam

Dr Vratislav MAZAK (1937-1987)

La mort inattendue du mammalogiste Vratislav Mazak nous conduit à apprécier l'œuvre de ce savant d'origine tchèque mais d'importance mondiale. Mazak est né à Kutna Hora en Bohême centrale. Elève du lycée de Hradec Kravolé puis de l'Université Charles de Prague, il a commencé sa carrière professionnelle comme assistant à la chaire de zoologie systématique de la Faculté de Sciences Naturelles de l'Université Charles. Il travailla ensuite au Musée National et termina sa carrière comme zoologiste-parasitologiste à la Station Régionale d'Hygiène de Prague. Les traits les plus caractéristiques de Mazak étaient les suivants : rigueur dans des sujets très divers, combinée à une excellente connaissance de la littérature mondiale. Auteur de plus de 50 travaux scientifiques, de traductions et de 5 livres, c'était aussi un excellent illustrateur. Sa longue collaboration avec le peintre Zdenek Burian nous a donné de remarquables reconstitutions de Mammifères fossiles.

Il a spécialement étudié la taxonomie, la morphologie et l'écologie des Pantherinae, Hominidae, Equidae, Arvicolidae, Mustelidae, Chiroptera et Cetacea. En 1967-1968, il a travaillé à Paris où il était chercheur au CNRS, accueilli au Laboratoire d'Ecologie de Brunoy. Ses recherches portaient alors sur les Carnivores et les Mammifères de Laponie où il fit un voyage de quelques semaines.

Mazak était un homme riche de grandes qualités morales, modeste, complaisant mais toujours rigoureux en matière de principes. Il a influencé nombre de jeunes mammalogistes. Le départ de Vratislav (nous l'appelions "Vratia") est une grave perte pour toute la mammalogie, profondément ressentie par ses amis.

J. GAISLER et M.C. SAINT GIRONS.