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Predation Patterns and Hunting Behaviour of Snow Leopards: Insights from an Ibex Hunt

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Abstract

The hunting behaviours of the snow leopard (*Panthera uncia*) are poorly understood. In this note, we describe the successful hunt of an adult male ibex (*Capra sibirica*) by a known male snow leopard in Tost Mountains, Mongolia. The hunt started in a mountain slope close to three large boulders and progressed downhill for 115 m until it concluded at the bottom of a drainage. By comparing the habitat where the ibex was killed to the kill sites of 158 ibex and 17 argali (*Ovis ammon*) that were killed by GPS-collared snow leopards, we demonstrate that the majority (62%) of these kills occurred in drainages. We propose that in successful hunts, snow leopards commonly ambush from above, causing prey individuals to typically flee downhill. Thereby

the prey maintain their momentum and it is not until they are slowed down upon reaching the bottom of the drainage that the snow leopards are able to subdue them.

Main text

Most felids are ambush predators that stalk their prey to within striking distance for the final ambush (Ewer 1968, MacDonald, Mosser and Gittleman 2010). Hunting success depends on access to cover that allows the felid to get close to the prey. Pursuits rarely last for more than 50 m, but struggles can continue further before the prey is subdued (Laundré and Hernández 2003, Haglund 1966). The snow leopard (*Panthera uncia*) is an apex predator of the alpine ecosystems of High Asia. Throughout their range, snow leopards primary prey on wild sheep and goats, including bharal (*Pseudois nayaur*), Siberian ibex (*Capra sibirica*), Himalayan tahr (*Hemitragus jemlahicus*) and argali (*Ovis ammon*) (Lyngdoh et al. 2014, Mallon, Harris and Wegge 2016). These prey species weigh between 30 and 180 kg (Wilson and Mittermeier 2011), while the average weight for male and female snow leopards is 42 and 36 kg, respectively (Johansson et al. 2022). This indicates that snow leopards differ from other large solitary felids that prefer to hunt prey similar in size or smaller than themselves (Hayward et al. 2006a, Hayward et al. 2006b, Hayward et al. 2012). Anatomically, snow leopards have forelimbs adapted for climbing, rapid pursuit across rocky terrain and grappling large prey (Smith et al. 2021). Due to the difficulty of observing and tracking snow leopards, our understanding of their hunting techniques is limited to a few film-clips showing them hunting by ambushing prey from above and pursuing it downhill (BBC, Planet Earth I, Wilderness Films India).

In this note, we report on a successful hunt of a large male ibex, compare the habitat of the hunt to a large dataset of ibex and argali kill sites by GPS-collared snow leopards, and propose explanations for the species' hunting techniques.

During our long-term snow leopard and ibex research in the Tost Mountains (lat 43, long 100) of Southern Mongolia, on 26 September 2022, we encountered an adult male ibex that had been killed by a snow leopard the night before or possibly two nights earlier. Based on the annular rings on the horns, the ibex was determined to be nine years old and estimated to have weighed around 90 kg. We set up a camera trap (Reconyx Hyperfire 2) at the kill site, and the images confirmed that the snow leopard returned to feed in the evening of September 26. From the images, we identified the snow leopard based on its spot patterns as a male that was captured and fitted with a GPS-collar on 12 April, 2023, at the time weighing 41 kg and estimated to be between six and eight years old. We were able to track the path of the hunt by signs such as fur, blood, broken branches, disturbed rocks and pugmarks. We found the first disturbed rocks on a mountain slope with approximately 30° angle near three large boulders. Despite intense efforts, we could not locate any sign beyond this point and conclude that the snow leopard had likely ambushed the ibex here after which the ibex fled downhill (Fig 1 & 2). Approximately 70 m after the ambush, we found the first broken branches of Mongolian almond bushes (*Prunus mongolica*) and fur, indicating that the snow leopard had pounced or lunged on to the ibex. Over a distance of 13 m, the amount of fur increased rapidly, suggesting an intensified struggle, here the slope angle was approximately 20-25°. The ibex then turned into a shallow drainage, and 20 m later, we found the first blood.

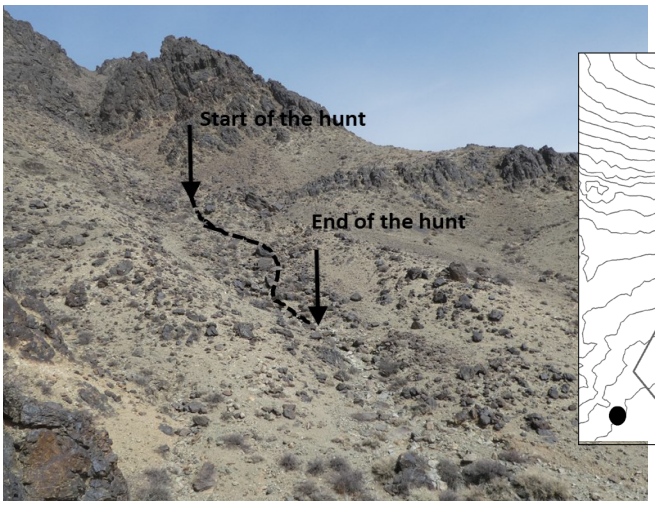

Figure 1: *Picture showing the area where the hunt occurred. The start and end of the hunt are shown by the arrows and the approximate route of the hunt is indicated by the dashed line.*

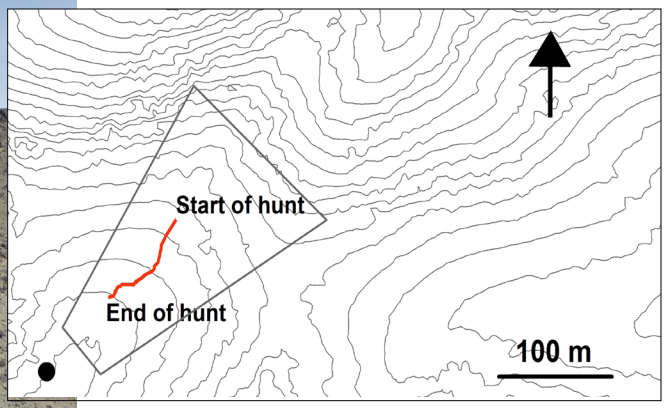

Figure 2: *Map of the hunt where the red line shows the route of the hunt, the thin gray lines are 10 m elevation curves. The view of the photograph in Figure 1 is outlined by the black polygon and the location where the photograph was taken by the black dot.*

Twelve meters further down, the ibex was killed where the drainage flattened out to about 10-15° angle. Total length from the ambush to the kill site was 115 m (Figure 1 & 2).

In a study on predation patterns by GPS-collared snow leopards (Johansson et al. 2015), the kill sites of 17 argali and 158 ibex were classified according to habitat. The majority of these prey (62%) were found killed in the bottom of drainages such as creek beds, gullies and small ravines, with 12 argali (71%) and 97 (61%) ibex.

The snow leopard hunt described here follows the previously described pattern of successful snow leopard hunts where the cat is attacking the prey from above, and the prey flee downhill. As an explanation of the observed pattern, we propose that it is likely beneficial for the snow leopard to stalk and ambush from above and that they are unable to subdue the prey because during the downhill escape the prey maintain momentum. This is true even if the snow leopards lunge on to the prey, especially because the prey is often heavier than the snow leopard itself. It is not until the prey lose momentum by reaching the bottom of the drainage that the snow leopards are able to subdue them. Ambush predators generally do not pursue their prey for long distances, as they need to catch the prey before it reaches its maximum speed and outrun the predator (Schaller 1972, Bailey 1993). The hunt of the male ibex described here lasted for at least 115 m and we suggest that the downhill momentum commonly increase the length of the pursuit compared to other large cats. However, this note is based on tracking and not a direct observation of the hunt, it is possible that we have misinterpreted the signs, it is especially difficult to determine the site of the ambush and where the pursuit starts. Further research on the hunting behaviour of the snow leopard is needed to understand their hunting technique and how topography and other habitat variables affect hunting success. This can be achieved through dense GPS-collaring schedules and detailed tracking of the hunt.

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