

page 212, bottom

B. IRBIS Snow Leopard

I. Known behavior to present time.

Up to now, little more is known about the Snow Leopard than about the Clouded Leopard. General data on its way of life is the most complete.

According to agreeing examples from Blanford (1888-1891, Bombay Nat. Hist. Soc. (1935), Novikov (1962) Ognev (1962) Schaposchnikov (1956) and Stroganov (1961) the Irbis lives in high rocky regions spreading across central Asia, where it mainly hunts steinbok, Markhor, Tahr, and wild sheep. In lower, forested regions which would be sought more in winter, there are elk, deer and wild pigs; in the Aktau mountains there are Persian gazelle (Novikov). Generally, smaller mammals are caught also - hare, marmot, and often a bird also. In summer in the alpine meadows, just as in winter in the valleys, the Irbis kills livestock - mainly sheep and goats, but occasionally dogs, steer, and young horses. By contrast, man is never attacked.

Most often it will lurk in background, camouflaged, and from this cover it will attack. Ognev (1962) in agreement with Satunin, brings out the information that the Snow Leopard crouches in a tree, lying in wait for its prey, but that it has often been mistaken for other superficially similar animals and often confused with the Amur leopard (*Panthera pardus*

Schaposchnikov (1936) has given out that the Snow *orientalis*) Leopard frequently hunts in groups. He cites an observation of an attack by 5 Irbis (a family group) on an adult wild pig. "The Irbis fell upon the victim at almost the same instant and quickly tore it to pieces."

The same author says that a hungry Irbis is capable of attacking other big predators. A two-year-old bear was surprised by an Irbis and overcome. The Irbis ate the rear (anal) portion of the body of the bear, & the inner organs. The head, ribcage, and hide were left.

According to Stroganov (1961) the Snow Leopard is not only active at night and in twilight, but during the day also. The lair or den is found in holes and between gaps or crevices in rocks, but according to this author the daytime hours are often spent in the nests of birds of prey (Geierhorsten - vulture).

Stroganov gives some examples regarding propagation. Breeding takes place at the end of winter or in early spring. The gestation period is about 3 months (according to Novikov, 90-100 days). The young are born in April or May, with a litter of two or three (on rare occasions, four or five.) Until the beginning of July, the young follow the mother in her wanderings. The litter-mates will not separate for the winter, but will hunt together. (top 211)

The Russian authors agree that it makes fairly long, regular walks or patrols. Ionov gives an account of two observations of the behavior of Snow Leopards:

see text printed in English, top of 214. *

Novikov (1962) speaks of jumps up to 6 meters (20'). T'ian Pang Chieh (1964) calls the Irbis "agile like a monkey." examples of

Not much more can be learned from ~~observations of~~ life in the wild than from observations of captive Snow Leopards, but this species is not infrequently kept in zoological gardens.

By aid of photographs, Krumbigel shares information regarding the contrasting behavior of an imported, freshly captured pair of Snow Leopards in comparison to that of a similar pair who were fully accustomed to their keeper. In the first case there was "cramped posture of fear/threat and

use of the farthest retreat-corner." In the other case, "quiet relaxation", the female allowing herself to be stroked.

About the same Snow Leopards, Krumbiegel (1937 a & b) describes their fondness for snow - rolling, trying to dig into new-fallen snow. With a heavier snowfall, they played - throwing themselves or letting themselves fall back downward from rocks in their cage, then reversing themselves at the last moment.

(nurture)
The attempt to artificially bring up a young zoo-born Snow Leopard is described by Schneider (1937) with aid of photographs. That the young one was not being sufficiently nourished by the mother was brought to notice by its restlessness and crying. It was then brought up with the aid of a Dackelamme (?) (Dachshund or badger) midwife. "After 6 weeks it was so strong that it was repelling its milk-brother, the young Dackel." Unfortunately, it died later. Exact information wasn't given.

In a natural upbringing, surprisingly enough, the father took part, her according to Krumbiegel (1937b). The mother animal had "torn hair from belly & her breast and made a nest for the young." This exactly corresponds with a report by Hagenbeck (1909). Crandall (1964) puts together all other breeding results from other zoos (e.g. Copenhagen) but doesn't give any observations of behavior. Recently Juncys (1964) gives some little examples of breeding from 1,1 Snow Leopards in Kaunas Zoological Garden (Lithuanian SSSR -Lithuania). The young opened their eyes on the 7th day. After 10 days they crawled around and grunted like a little pig. After 15 days the voice changed. It was thinner and resembled birds. After 2 months they ran around quite well. At this time, the young snow leopards began to eat meat independently, and to lap up milk, in spite of the fact that the mother was still nursing them." These reports agree with development of Clouded Leopards.

According to Stanek (1961) an excited snow leopard gives a shriek or "croaking cry". Krumbiegel speaks of incessant growling/snarling and mewling or spitting on being approached. According to Juncys, the females meow like a cat during heat. Of vocal behavior there is still only the example that the purring of the snow leopards is like that of small cats, with breathing in and out.

BEHAVIOR STUDIES OF SNOW LEOPARDS IN CAPTIVITY

II. Behavior Worth Noting

page 215

1. Movement

The movement of snow leopards is remarkable for their great capability for jumping, which is clearly observed in the wild. But in captivity this is not possible for them to demonstrate in small cages. Most remarkable is the lightness which which the snow leopard makes small leaps to higher resting places. In the Arnhem zoo during the night often, in play, makes powerful high jumps against the grid of the outer cage (a minimum of 2 meters high) although there is no space to make a run for it. So, they must do it from a more or less standing position. I myself did not observe this behavior, unfortunately.

Their great mobility and use of it in play are indicated in the above citation and in Krumbiegel's observations during snowfalls.

Climbing ability, on the contrary, does not seem to be especially developed, in no case better than that of leopards, seemingly worse. However it is difficult to double check this. When the climbing trees in the cage are at all desired as a higher observation point, they are gained in a jump. It isn't possible to miss the horizontal branches. I have never seen an attempt to climb a tree, therefore.

The normal methods of moving on the ground are so similar to that of other cats that we don't need to describe them.

Mostly, as with other cats living under normal zoo conditions, the snow leopards take their crouching position when the keeper or other special well-known persons are noticed in the distance. When the animal sits on the elevated places such as a strong post or boulder and feels itself unnoticed by the person in question, it lets ~~down~~ itself fall downward fast, in a second, and lies flat - possibly in cover - with the tail stretched backward. The front legs are retracted and pressed against the body. Hind legs are stretched backward, then brought forward and pressed tightly against the body. However, they don't normally jump because the persons usually don't come near enough to the grid. They abandon this lurking/crouching position when the person goes farther away.

2. Beuteerwerb Catching the Prey page 217

Direct action of capturing prey could not be observed in a playful mood. Nevertheless, hints are given by the previously discussed crouching position, of the method of attacking by the aroused animal.

To lie in wait, the snow leopard searches for a hiding place on the ground between rocks or, more rarely, on a higher place from which he can somehow jump. The jump follows that of most other cats (excepting the Clouded Leopard) from the ground.

Similarly, in a provoked attack against a spectator standing too close to the grid, the excited animal was located on a higher plank from which direct attack on the grid was very possible. During the attack, however, the Snow leopard jumped down first to the floor of the cage, 5-6 then high onto the grid against the onlooker standing outside (Table III, fig. 5-6). (Footnote: The observation of Enckes (1966-67) of a female at the Krefeld zoo didn't show any attacking zeal when it was lying behind a thick bush, but the keeper could not enter the enclosure when she was sitting above on a log. It can be guessed that the animal on the ground feels unsure. In this behavior, the possibility of hiding could be a factor.)

3. Fressen Eating

Like the Clouded Leopard, the Arbis feeds in a hunched position. However, the front part can be lowered with stronger bend of the foreleg joint (elbow), but this can exactly correspond to Clouded Leopard. In normal eating, the front paws do not hold the meat, but are at some distance away. The food is held tightly between the paws only when it must be broken or torn apart.

The handling of food and the intervals between feeding is similar to that of other cats.

4. Handlungen der Körperpflege Grooming - Body Care

After eating comes grooming of the skin/fur, by licking the lips and nose, and intensively licking the front paws with which it washes its face, but mostly the top of the nose. The same grooming is done after waking up from sleep. However, this last is done mostly in sleeping position, for instance a half or three-quarters circle without standing up. While lying down, it licks its sides also. Complete grooming is composed of many different actions. To start, it first licks its front paws, either sitting or lying down, then washes its face with the wet paws (but very superficially). On the face not much more is done than the top of the nose, and never does the paw go as far as eyes or ears. By a strong twisting of the head and neck, mostly while lying down, the shoulder and side can be licked. The upper thighs, and neighboring parts, the root of the tail, and the genitals are licked by turning the front part of the body, while in a sitting or half-sitting, half-lying position.

Next after this comes scratching with the paws. The neck and back

of the head will be scratched by the hind legs. While licking the sides, often a short Fellbeknabben (? skin _____?) be undertaken.

The division of polishing movements in a single region of the body correspond to Clouded Leopard, example 15.

Licking is also a form of social grooming, when mates* will lick the neck and head in places an animal cannot possibly reach by itself. Brief licking of the nose is possible between or after Flehmen(? _____)
* mostly by the female

Care of the claws, by sharpening, can be considered part of grooming. The snow leopard gets near to the tree, standing on hind legs, and scratches downward through the bark with his front legs/paws. (Table IV, Fig. 1 & 2)

5. Ruhestellungen Resting Positions

The resting positions of the Irbis correspond to those of the Clouded Leopard and to other big cats. In sitting or lying down, the tail is normally stretched backwards (Table IV, fig. 3) and often also it lies slack beside the body. (This especially occurs in a sitting position.) The arched, bent back position is assumed later, during sleep, by laying the head on the body, with the tail sometimes thrown loosely over the body. The animal is often observed in this position for some time before it goes to sleep.

When sitting on an elevated point, the animal permits its tail to hang simply downward. In the lying down resting position, the forepaws remain stretched out.

6. Schlafstellungen Sleeping Positions. 219, bottom

In the Sleep Positions there is nothing that deserves special notice, since they are similar to Clouded Leopard and other felines. The snow leopard sleeps during warm weather normally in flat or in a quarter or half circle. The tail will lie loosely. During cooler outside weather, it will lie in a three-quarter or full circle. Conversely, in relatively high temperatures it can be observed sleeping on its back or stretched out on one side. These last resting positions are also chosen in lower temperature by leopards and jaguars. This seems to indicate a better accommodation to lower temperatures and cold periods by the snow leopards.

7. Koten und Harnen Bowel Movements and Urination

Like all cats, the snow leopards of both sexes urinate and defecate with the back crouched down, and with a somewhat raised tail.

Before this, the animal rakes or scrapes more or less strongly, like the Panther genus, often very informatively with the hind paw. (You know what he is about to do).

Under drawing, Abb 61: Defecation position, with strong swiping-out with the hind paw.

The marking or urine-spray I cannot prove directly for the snow leopard, but from the following observations in the Rotterdam Zoo it appears that the snow leopard knows how to do this:

A male snow leopard often stretches his tail high in the stopping, or holding, of the urine spray; in that light, appearing to be cramped with tail trembling, but no urine emission. Animals however frequently sick; during observation time, twice eruptions of small quantities of white fluid; mostly the attempt, with strong scratching normal to the defecating or urination action, usually with small result. During the urine-spray-position also once very little, weak scratching motions with the hind foot."

That no stream of urine came may here too be accounted to sickness.

8. Flehmen Baring of Upper Teeth behavior

In full intensity, the tooth-baring~~ing~~ of snow leopards corresponds exactly (completely) to that of tigers. The male bares his teeth after intensive sniffing of the skin of the rear of the female, prolonged, with a far hanging out tongue. The strong expression is typical of panthers, with wrinkling of the upper lip, nose, and skin in eye region. At the close of the tooth-baring, the tongue becomes somewhat inrolled and pulled far back in the mouth.

221 captions under illustrations The Upper-Teeth Baring of Irbis

Pictures run from left to right and from top to bottom

62. Resting expression, for comparison
63. Tooth-baring, smallest intensity - upper lip very slightly pulled higher, tongue remaining back in mouth behind forward teeth.
64. Intensity increases - tongue stands out forward of the front teeth and hangs in a point, downwards. (Corresponding to the Tooth-baring of Clouded Leopards)
65. (~~ausgelaech~~ Similar
66. Tooth-baring in stronger intensity. Upper lip drawn high with wrinkled appearance of the nose, upper corner teeth bared, tongue hangs far out of mouth.
67. Tooth-baring, strongest intensity. Upper lip pulled far up with very strong wrinkled formation of skin on the bridge of the nose, and in the eye region, tongue hangs far out of the mouth.

222 text continues

In lighter intensity, the Tooth Baring of the snow leopard is less expressive, but corresponds to that of the Clouded leopard. The tongue, by that, stands straight out over the front teeth, without properly hanging down. Ab. 64-65.

In opposition, (~~ausgelaech~~) to the Tooth Baring of Clouded leopard, the toothbaring snow leopard turns its ears somewhat sideward/forward so that the ear position is transposed to the Attack/Defense voice, with the outer sides of the ears becoming visible.

After and between the Tooth Baring, a short licking of the nose can occur, with --so far-- at certain times: Tooth Baring, Nose Licking, Tooth Baring.... (again renewed without new introduction of scent (or stink)..... and so at certain times.

9. Stimme Voice

The method of howling of the Panther Genus, as practiced by the snow leopard, is exactly like that of the Clouded Leopard. His loudest projection of the voice is the mating cry, which is half loud up to the very loud production during the period of heat. It swells quickly to full loudness, can then maintain the same pitch for a long time, at the end again somewhat slower until abatement. One remembers in looking back that not so much in the color of the voice, it more resembles the Tiger, in the corresponding cry of the Puma. ""

To paraphrase, the mating cry is something like "oääääau" becoming "ääääo" (between a and deep dark ä). Instead of a uniform tone, he can in the middle, make it somewhat softer, then back again, without actually breaking off, then taking up anew to greater loudness.

½ way down page 222

Very similar to the mating call, only much softer in tone, are the equally partner-directed calls which can be lumped together under the heading of Mauzen (Mewing).

Next in line to the mating call itself are peculiar deep-to-light mewing sounds, mostly soft but occasionally half-loud "u~~uuuu~~uu" (voice color is the same as in mating calls) but in the voice there's a somewhat bleating sound. Making use of this Mewing Voice, the author was able to establish direct voice contact with the female Snow Leopard in the Krehfeld Zoo, and the animal answered. Simply by steadily increasing the volume of the voice while producing these mewing calls, the observer can coax out a half-loud performance of the mating call. Many times there follows a back and forth answering of the mating call between the Snow Leopard and the observer.

With these Mewings, there comes forth also a cry that in some measure resembles a loud "miau".

With various distinctly different Mewing calls the Snow Leopard also answered the experimenter many times, then it dissolved out into the Prusten (Greeting - blowing air out through the nostrils.) The Snow Leopard in the Rotterdam zoo reacted in this manner, with a quiet but high-pitched voice that sounded like "iei", without however having any visible reason for making the sounds.

In the Amsterdam Zoo, one individual made the "Giving the Little Head" (Antonius, 1939) on a moss-covered branch of the climbing tree, and repeatedly gave out quiet moaning sounds.

Also in the vocal repertoire of the Snow Leopard is the Greeting/Prusten which is similar to that of Clouded Leopards and Tigers (and to a smaller degree also to the other Pantherbreed/Hemmer 1966). It is made use of less frequently by the Snow Leopards than by Tigers, but it is obviously used in similar situations, and can surely always be heard after stimuli by the onlooker. The method of manufacturing the sound corresponds to

the Greeting of the Tiger and Clouded Leopard, but is somewhat lighter than that usually made by the Tiger.

The Krehfeld individual always answered to the Greeting of the author, first with a meow, then the Greeting, but at certain times by hand contact. For the triggering of the Greeting by an Amsterdam Snow Leopard, and the tie-in with other vocal sounds, this report was prepared: Observer for one hour standing at rest before the locked door of the cage, the Snow Leopard becoming somewhat more active by the end of this period, as usual in the vicinity of the bars, up and down, also "Making the Little Head" on the bars. At Greeting of the observer, first a short mew/spit, then suddenly the Greeting (relatively mild, low voice, similar to Clouded) Later ~~skikk~~, in much the same way, twice giving out ^{the Greeting} (at a distance of about 1 meter, without previous mewing); later only short mews; still later a prolonged Greeting was given, however this was connected with a small defensive mew/spit. In between there were very quiet moaning sounds, long drawn out, somewhere between U and O. Again, "Making the Little Head" at the bars. By repeated scratching of head against the bars, the observer (now standing close to the cage) attempted hand contact. The animal allowed himself to be tickled/scratched in the neck and head regions, with stronger pressure on the bars and the hand, but with constant defensive growling; finally with a prevaillingly defensive voice, it sprang high on the bars, beating with its forepaws and producing a mew/spit sound.

From this observation report, it is obvious that the defensive voice in the usual forms but in varying degrees of loudness is present in all felines. Also, the Snow Leopard has a loud attack-and-Defense cough that sounds close to that of the Clouded Leopard. (That von Stanek (1961) mentions a "scratching shriek" may well be taken into account here.) The growl of the Snow Leopard is somewhat rolling, and resembles that of the Clouded Leopard.

As already established by Sanderson (1956) and Steinbacher (1955) and as I myself can hear, the Snow Leopard's loud and prolonged purring is produced while exhaling and also while inhaling, as opposed to those members of the panther genus that can only purr when exhaling.

10. Erkundungsverhalten - Inquisitive Position

The inquiring behavior of the Snow Leopard corresponds to that of the Clouded Leopard, with squatting of body and stretching forward of neck. The Snow Leopard can take this position equally as well on the ground as in a higher place, for example when already sitting on a large post (or piling) like the one in the Rotterdam zoo. (Illustration 58, page 16. This caption reads "Inquiring position, from the same stance as in Illus. 57; body lowered, head and neck stretched forward") In this case, the position of the legs is somewhat different, as necessitated by the small base - the paws must be next to one another in this restricted space. One must recognize the character of the stimulus for this Inquisitive Position (if it pertains, for example, to the activities of the Keeper). With Snow Leopards living under zoo conditions, it seems to follow immediately after the Lurking Position. In the case of the Inquisitive Position in a higher place (illustration 58) this pose will be abandoned immediately; the Snow Leopard will let itself fall down and will go behind something into a hiding place, and assume the Lurking Position.

11. Other Types of Behavior -(Andere Verhaltensweisen)

As with the Clouded Leopard, not only the Mating but also the Fighting behavior of the Snow Leopard are known to the author. Techniques of attack and defense can be found in descriptions of catching prey. Fighting, or merely play fighting, one under another, could not be observed. The latter activity is made clear in a quotation from Ionov in the Introduction to Review of Literature.

Regarding special behavior of the Snow Leopard, I've noticed at

certain times a scratching or digging with the fore paws which I do not know in other Pantherinae. At times, without apparent reason, the male digs or scratches with his front paws on his drinking water container (in the outer cage in sand, in the inner cage on the concrete floor, also). (Arnhem Zoo). In these cases a partial drinking is achieved, but never any urination or bowel movement. The scratching will first be performed many times with one paw, then a few times with the other paw, but never with the two paws alternating. Also one female scratches in similar fashion, without any obvious reason.

III. Conditions caused by Captivity (Gefangenschaftsbedingte Verhaltensweisen)

The author was not able to observe behavior of animals in unfamiliar surroundings. Concerning this, the reports of Krumbiegels (1953) note differences in behavior between freshly caught animals and those accustomed to zoo conditions.

Conditions caused by captivity for Snow Leopards, as already described for the Clouded Leopards, include stereotypical running in the cage, which takes many forms. This stereotypical pacing about occurs sooner, the smaller and more unfurnished the cage is.

In a relatively large enclosure in the Arnhem Zoo, the stereotypical running was performed along one cage wall at right angles to the visitors' side, mostly as a smooth flat glide, with turning at the corner. This running depended on an influx of visitors to the cage. Similar stereotypes were seen and verified by all other observers.

In the Rotterdam Zoo, the incompatible Snow Leopard pair were brought into adjoining cages separated by a wall that was solid half-way up, but above that it was possible to obtain a view into the other cage through the bars (or wire grid). Many times a mutually induced, stereotypical but fast running about (hunting) on the part of both animals could be observed. In this case, they sprang from their own sides onto the top of the wall, at the base of the grid. Because it was not possible to stop there as

there was no place to sit, they were falling off. After great leaps around their cages, they would try again to jump to the same place.

In zoological gardens, the period of activity of the Snow Leopards falls more markedly in the twilight and nighttime hours than that of the other large felines. Throughout the day only short periods of activity could be noticed. From one side, it may be concluded that the Snows in the free wild condition are night and twilight hunters. (Compare descriptions in the literature). However, on the other side, this could be the consequence of our European climate. The cold-adapted Snow Leopard naturally finds the cooler night preferable to the warm daytime hours, during which it will mostly sleep. That the latter reason very probably plays a role emerges from observations in the Krehfeld zoo. When a sudden drop in temperature and rain followed a period of warm autumn days, the Krehfeld individual showed somewhat increased daytime activity. This occurred before the warm weather observations in Holland were noted.

In spite of this normal strong shift to twilight hours, the division of phases of activity of the Snow Leopard corresponds to those von Haas (1956) found to be a rule: First Maximum Activity in the early morning hours, then throughout the day an intermission or rest pause ("Midday Sesta") that is interrupted from time to time by brief periods of activity. Second (Head) Maximum Activity in evening twilight hours, setting in - for the most part-- a certain time before the late feeding.

IV Mimicry of the Snow Leopard (Zure Mimik des Irbis)

According to the impression made on one onlooker, the Mimicry form of expression of the Snow is basically similar to that of the Clouded Leopard, but with the Snow it is a little more marked than with others. This is especially true of the expression of Toothbaring (Illus. 62, page 67) which with the Snow possesses the typical pantherine expression carried to its strongest intensity. With the Snow Leopard, the upper lip will be pulled much higher at the sides of the nose and under the nostrils. A

stronger contraction of the muscles under the eyes produces more noticeable wrinkling of the skin than with the Clouded Leopard, and the upper side teeth are more extensively exposed. The ears of the Clouded remain in an almost normal position, but during the Toothbaring of the Snow Leopard, they will be turned more to the outside. We conclusively determined that with the Clouded Leopard, the movement of the ears comes in the category of the expressions in circumstances of fighting and defense. The movement of the ears during the Toothbaring of the Snow Leopard may be similarly interpreted as an expression of defense against an unpleasant stimulus - in this case, smell.

For a further description of Mimicry in the Snow Leopard, see reference to that of the Clouded Leopard, with which it appears to coincide completely.