

Term paper

on the subject of

BIOLOGY

BEHAVIOURAL STUDIES ON CHEETAHS IN CAPTIVITY

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BEHAVIOURAL STUDIES ON CHEETAHS IN CAPTIVITY

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I. INTRODUCTION

The cheetah, (*Acinonyx jubatus*, from the Greek word „*a kaina*“, immobile, and „*onyx*“, claw, referring to the inability of adult animals to retract their claws, as well as from the Latin word „*jubatus*“ meaning maned¹) a cat of prey, is the fastest land animal in the world. Within three seconds the animal is able to reach speeds of about 110-115 km per hour², but this velocity can only be upheld for a distance of about 300 metres³. This immense feat is only made possible because of the cat's physique – in contrary to other big cats the cheetah's body is especially optimized for speed and thus rather slender. The tail is elongated since it serves as a stabilizer helping with balance during running. Furthermore the cheetah has enlarged nostrils and sinuses as well as an especially large lung, enlarged heart and kidneys which help maintain an adequate oxygen supply during hunting. The non-retractable claws of the cheetah work similar to the spikes on shoes, allowing for extra purchase on the ground. An especially flexible spinal cord allows for long strides, as it is able to catapult the animal forward not unlike a spring. It also contributes to the cheetah's mobility and ability to accelerate.

The cheetah sneaks as close as possible to its prey before actually starting to chase, and is quite successful using this method. Lions, for example, succeed in about 25-30 percent of their hunting attempts whereas cheetahs manage to successfully catch their prey in about 50 percent of their hunts⁴. The cat's black-spotted, tawny fur also provides additional camouflage in its natural habitat, the African savannah. The characteristic tear marks running down from the corners of its eyes to the muzzle help reduce sun glare during hunting. The fact the cheetah has fewer whiskers than other big cats, indicating the animal is less active during the night than during the day⁵, probably also to avoid coming into contact with its relatives.

The cheetah's unique social structure makes it very different from lions, leopards and other big cats. Whereas lions live in prides and leopards live solitary lives, female cheetahs will stay alone outside of brood care, yet male cheetahs, typically coming

¹ Marker, L., Aspects of Cheetah (*Acinonyx jubatus*) – Biology, Ecology and Conservation Strategies on Namibian Farmlands, p. 3

² Hunter, L., Hamman, D., Cheetah, p. 38

³ Rich, T., Rouse, A., Cheetahs, p. 38

⁴ Hunter, L., Hamman, D., Cheetah, p. 104

⁵ Denis-Huot, C., Denis-Huot, M., The Lords of the Savannah – Leopards and Cheetahs, p. 34

from one litter, will usually form a so-called coalition after separating from the mother after about 13 to 24 months⁶ and will then live together their entire life. This allows for even higher success rates while hunting since they can work together. In captivity, it is possible to keep mixed genders in a single group since the animals will in most cases get along well if reared together.

The many physical and behavioural differences also manifest themselves in the taxonomic classification of the cheetah – the *Acinonyx jubatus* is, in contrast to other big cats, not a member of the genus *Panthera*, of which the lion (*Panthera leo*), the leopard (*Panthera pardus*) as well as the tiger (*Panthera tigris*) and the jaguar (*Panthera onca*) are part of. The cheetah is genetically most closely related to the cougar (*Puma concolor*). This is most likely due to the fact that the cheetah originates from its distant relative *Acinonyx pardinensis* that was to be found in northern America, where the cougar is now located, before it migrated to Europe, Asia, India and Africa⁷.

This term paper contains observations on hand-reared cheetahs in captivity. This includes activity periods, territorial behaviour as well as social interactions. Additionally, a short outlook on the future prospects of the cheetah is given. The aim of this term paper is to find out which behaviours of a cheetah are inherent or learned, as well as under which circumstances these behaviours are shown in captivity in order to give suggestions on how to raise and keep captive animals based on these observations, ultimately allowing to give suggestions on how to conserve the sprinter among the big cats based on the living conditions of wild cheetahs.

⁶ Hunter, L., Hamman D., Cheetah, p. 82

⁷ Marker, Dr. L., Aspects of Cheetah (*Acinonyx jubatus*) Biology, Ecology and Conservation Strategies on Namibian Farmlands, p. 3

II. BEHAVIOURAL STUDIES AT THE CHEETAH CONSERVATION FUND IN NAMIBIA

PROCEDURE

The observations took place on the Cheetah Conservation Fund's (CCF) property near Otjiwarongo in northern Namibia. The CCF is a non-profit organisation that has committed itself to protecting and studying the cheetah. It is noteworthy that while all of the cheetahs observed were born by wild mothers, but have been hand-raised. This is partly owing to the fact that it isn't allowed to breed cheetahs in captivity in Namibia, meaning that only injured and orphaned animals reach the CCF.

During the studies five cheetahs in total were kept track of, with only three animals constantly visible to the observer due to the pen's different layouts. The trio under constant observation was the so-called Hogwarts group consisting of Harry, Ron and Hermione. Harry and Hermione are both females whereas Ron is a male cheetah. They're about three years old and were raised together. Their pen is adjacent to Little C's enclosure – an about two year-old male cheetah – which in turn is next to that of the thirteen year-old male Chewbaaka. Due to the pen's location and layout⁸, not all cheetahs were visible at all times. It was difficult and sometimes impossible getting Little C's position reliably, and especially Chewbaaka's position was so unreliable to pinpoint exactly that his influence on the other cheetah's behaviour, if any, was not taken into account at all. Since Ron was close to sexual maturity, he was administered with a hormone implant that would prevent him from becoming fully mature, thus making sure the male would not disrupt coexistence with the two females.

In order to avoid affecting the cat's usual daily routine, a derelict water tower just outside the Hogwarts pen was used as a vantage point, allowing for a complete view of all the pens. However, due to the fact the CCF relies partly on income by allowing tourists onto the property and also into the pen during special activities, human influence on the observations could not be completely avoided. Special activities include the so-called Cheetah Runs where tourists were allowed into the pen accompanied by keepers, who would then let the cheetahs chase a lure attached to a rope moved by a rope winch. The cheetah's natural instincts to chase anything that moves fast would then kick in, simulating a hunt rewarded with a small piece of meat

⁸ See enclosure map in addendum

served on a wooden spoon once a cheetah catches the lure. This activity usually took place during the morning hours, but not daily.

The observations spanned over a period of six days, from 7 to 9 AM and from 5 to 7 PM. Since it was impossible to note down the position on a map of the enclosures as well as current behaviour of three or more cheetahs in one minute, noting down the behaviour was replaced by marking the cheetah's positions on the maps every thirty minutes and vice versa.

An ethogram⁹ comprised of eleven behaviour patterns was used in order to keep record of what kind of behaviour which animal was showing. This table was updated every minute, giving a rather accurate representation of how the animal's routine looked. The patterns examined were the following:

- *Pacing* (walking along the fence, on special ways or just across the enclosure)
- *Running*
- *Rolling* on the ground
- *Urine marking*
- *Defecate marking*
- *Rubbing* of the body and/or face onto objects
- *Grooming* (autogrooming or allogrooming, meaning self-grooming or grooming others)
- *Sniffing* (of objects, markings or other animals)
- *Laying down*
- *Standing* and *sitting* over a prolonged period of time

Furthermore, any outstanding actions or activities that were shown every now and then, such as drinking from a trough or climbing a tree, were recorded as well.

⁹ See example ethogram in addendum

OBSERVED BEHAVIOUR

What was striking about the Hogwarts group consisting of Ron, Harry and Hermione was that they were most active when Little C appeared on the other side of the fence. Especially in the morning they would pace along the fence separating their enclosures. From time to time Little C would start running for a few metres, animating the others to follow him which they actually did. Neither the trio nor Little C did show any kind of aggression.

From time to time a cheetah from the Hogwarts group started running without discernible cause, with the other pen mates and Little C quickly reacting and trying to follow. Playing behaviour could be observed repeatedly after or during the brief running periods, but sometimes the other cheetahs would just cease following the moving individual and just go on doing what they were doing before or even just sit or lie down and watch.

This was different when a Cheetah Run was about to take place: the animals were excited once they noticed the preparations for it, with the motor and battery being carried into the pen and the rope being fixed to the bearings at the corner points of the run area. Usually the preparations took only about ten to fifteen minutes, but at one point the arrival of the tourist group was delayed by about half an hour. In this case the cheetahs behaved passively, eventually finding resting spots with Ron lying a bit further away from the others. No interactions with the tourists the guides had let inside the pen were to be observed. As soon as the lure came into play, Hermione stood out as the most active huntress, with Harry following right behind her. Ron was mostly keeping himself busy watching, only on few occasions did he actually try to catch the lure. From time to time he would even walk away from the area the run was held in and settle in the far back of the enclosure while his sisters were still busy hunting the rag.

In the mornings, heightened activity in comparison to the evening was to be observed. Grooming, both allogrooming and self-grooming, was only to be observed sporadically. Territorial marking behaviour was also not commonly shown, and if, only by the males, although free-roaming female cheetahs will also mark their home range

as well. The female cats did show interest in Ron's urine markings, but did not mark anywhere in their enclosure during the period of observation.

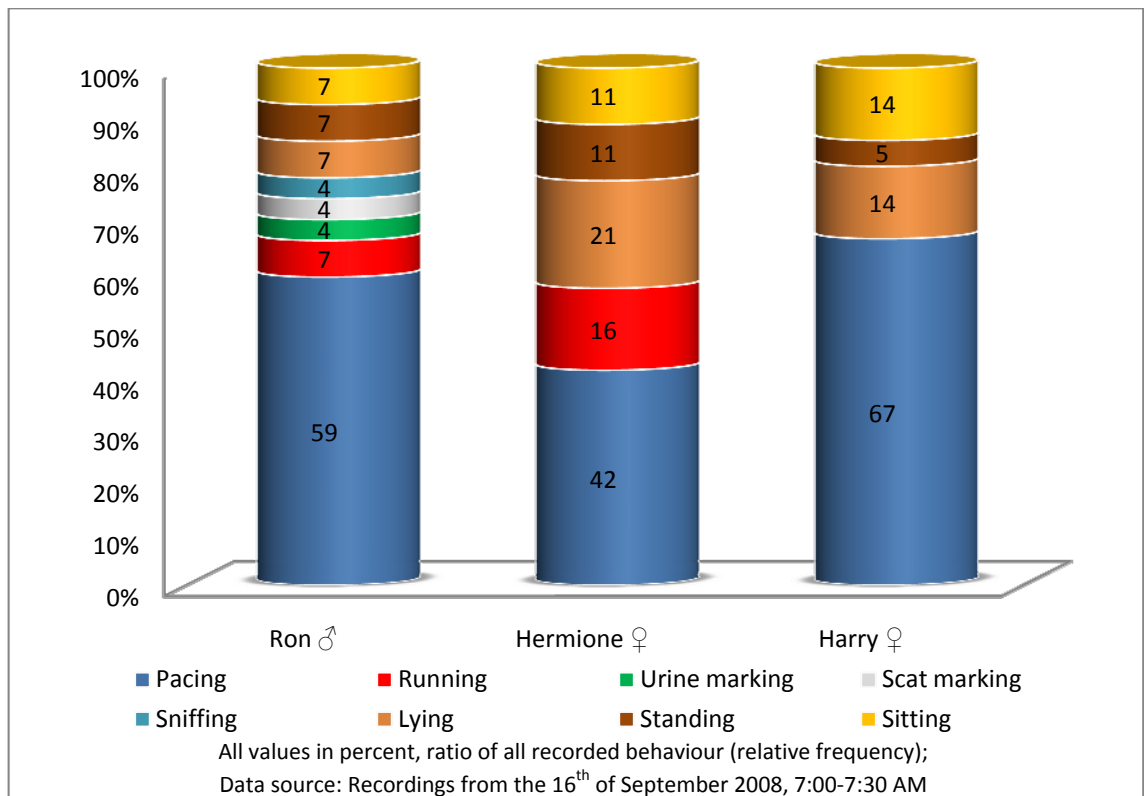
The cheetah's main activity, however, was the pacing, especially along the fence separating the Hogwarts enclosure from Little C's. In most cases of pacing Ron was the most active of the three cats, with him usually walking beside Little C on the other side of the fence.

INTERPRETATION OF OBSERVED BEHAVIOUR

Apparently the animals' observed running and following each other did only serve to satisfy their play instinct, considering there was no aggression shown while doing so. It would, however, be possible that through the running the animals show disconcertment, but no reasons for this were to be observed; external factors such as animals or game in sight or hearing distance could not be detected. The animals were at all times able to drink from a water bowl, and regularly fed two kilograms of donkey meat on six days of the week at 2 PM.

During Cheetah Runs, the animals did show the same kind of behaviour, following the lure without hesitation despite it not having any similarity with cheetah prey. If something moves away from the cheetah quickly enough, it will follow the moving element regardless of it resembling prey, meaning that the only reason for the cats to pursue the lure was its movement. As this was observed with cheetahs raised in captivity it hints at the hunting instinct as well as the pursuit of moving elements being inherent behaviour.

Ron's behaviour during Cheetah Runs was of interest as well. At times, the male seemed to be bored by what was happening around him, sometimes even disapproving of the event, which led him to retreat into the far corner of the enclosure. A possible explanation for this could be that Ron had already satisfied his urge to play during the time he was pacing along the fence with Little C, with him not being interested in chasing after the lure or the running females. His gender as well as his good nutritional status could be another reason for his less pronounced urge to hunt. Hunger as leading factor for chasing prey and hunting behaviour in general can be excluded due to the fact since Ron always received the largest amount of food. Females, however, do not only have to hunt for themselves, but also for their young, which could lead to them being more willing and eager to hunt. The fact that both females reacted more to the moving lure than the male leads to the assumption that even in captivity their hunting instinct is more pronounced than a well-nourished males'. This hypothesis is further supported by the fact that the cheetahs received different amounts of meat, with Hermione, the smallest of the three cats, receiving less meat than Harry did, who in turn was fed still a bit less than Ron.



The observed, prevalent pacing (see diagram) can also be observed among zoo animals. Wild cheetahs usually don't face fences that restrict their movement. Usually, holding wild animals of different sex together in one enclosure would not be possible since they would likely attack each other. It is normal for males to form a coalition, however, with this kind of group usually consisting only of males coming from the same litter, though it has been observed that non-siblings join a – usually young – coalition. Animals that have been raised together in captivity can usually be kept together even after the time they're supposed to separate. The territorial instinct of male cheetahs is more pronounced than that of females, with males usually establishing a territory while females tend to have a so-called *home range*¹⁰ instead that they live in. The pacing can therefore be seen as the heightened urge to patrol the territory whereas the females' urge to move around manifests itself in this manner. This assumption is covered by the fact that an average male's territory (about 50-65 km²) is smaller than a female's home range (up to far more than 1000 km²)¹¹.

The human influence on the cheetahs' activities, especially during the mornings, can be described as low, considering feeding time was at a later time, meaning that the animals most likely didn't expect food to arrive until later. Also, the urge to move

¹⁰ Gattermann, R., Wörterbuch zur Verhaltensbiologie der Tiere und des Menschen, p. 6

¹¹ Rich, T., Rouse, A., Cheetahs, p. 48

cannot be attributed to the occasional Cheetah Run since it was not a daily activity. It is more likely that the heightened activity during morning hours is related to wild cheetahs' activity periods, meaning they move more during the mornings and less whenever the sun is shining, helping to conserve energy as well as coping with the scarcity of resources in the wild, especially water. The heat that is generated by the extremely fast-moving muscles during a hunt needs to be dissipated, and the midday heat makes heat dissipation much more difficult. This can have fatal consequences for the animal, considering that the cheetah's body temperature rises to about 40,5°C¹² during hunting.

The constant availability of resources can therefore be seen as a reason for the lack of competitive behaviour among the cheetahs. Since everything is available in sufficient amounts, the animals don't have reasons for intraspecific aggressive behaviour. While the activity periods follow inherent patterns, the aggression is omitted since neither territories nor females ready for mating have to be defended. Since the outer, pivotal factors for aggressive behaviour are missing, it doesn't have to be shown despite the inherent readiness.

Autogrooming and allogrooming, respectively, were probably not to be observed because there's no apparent need for cheetahs in captivity to keep themselves and each other clean apart from aesthetics, which, of course, is not of importance for the animals. However, wild cheetahs have to rely on their fur to be clean and groomed, since parasites, burrs, blood or scents embedded in the fur could make hunting more difficult to them, whereas cheetahs in captivity will get food no matter how they look. Many animals at CCF had a lot less well-kept fur in comparison to, for example, new arrivals.

¹² Hunter, L., Hamman, D., Cheetah, p. 40

III. OUTLOOK ON THE FUTURE

Simply by looking at the former range of the cheetah it becomes clear that the spreading of the human has had and is still having a very large impact on the number of individuals. Around the year 1900 an estimated number of 100,000 cheetahs roamed throughout Africa¹³, but nowadays even optimistic assessments put the number of wild cheetahs at about 7,500 to 10,000 adult individuals¹⁴. The reason for the massive decline in population numbers is often described as the result of the decreasing amount of prey animals outside of protected, and often fenced, areas as well as the expulsion of the cheetah out of its original habitat, the tree-free grass savannahs, that have often been used (and still are being used) for agriculture or stock farming¹⁵. Namibia is a prime example of what human-induced perils the cheetah is facing: an estimated 90 percent of all remaining cheetahs live on farmland¹⁶, a dangerous habitat for any predator. Farms that predominantly are home to livestock such as cattle, sheep or goats are especially perilous considering that the cheetah is often enough perceived as a threat to livestock, which usually means that farmers will try to preventively kill the cheetah once they know there's one around, even though it might not even have caused any damage. But even farms that tolerate the spotted hunter are not necessarily an ideal habitat for the animals since often will the owner give up farming, which leads to bush encroachment in areas formerly used for plant cultivation because bush-browsing game is not often found on such farms, and even if, not in large numbers. This makes it very difficult or even impossible for the cheetah to hunt since the animal is not able to use its biggest advantage, the high-speed chasing ability, in such an area.

The cheetah is very selective when it comes to choosing its prey – a healthy animal will always prefer endemic prey to cattle, sheep or other livestock. The CCF is therefore suggesting to farmers they tolerate some native game such as gemsbok, gazelles or other potential prey on their farms. The wild animals are hardly any competition for livestock, but allow the cheetah to hunt its usual prey instead of farm animals. In addition to this the CCF also breeds Anatolian shepherds, dogs that

¹³ Scott, J., Scott, A., *Big Cat Diary – Cheetah*, p. 28

¹⁴ Red List by the *International Union for Conservation of Nature*, <http://www.iucnredlist.org/details/219> (date accessed: 29th of January 2009)

¹⁵ Scott, J., Scott, A., *Big Cat Diary – Cheetah*, p. 28

¹⁶ Marker, Dr. L., Kraus, D., Barnett, D., Hurlbut, S., *Cheetah Survival on Namibian Farmlands*, p. 6

develop a very strong bond to the animals they're raised with, which makes the dogs protect them from any dangers. Since cheetahs are naturally cautious and will avoid fights that can lead to injuries which hamper their ability to run fast and therefore run if possible, even the presence of a large, barking dog willing to fight to the death will usually scare them away. Employing these dogs also significantly decreases the danger of so-called *problem animals*¹⁷ killing livestock.

The Cheetah Conservation Fund and other organisations such as Africat try to educate the public and especially farmers concerning the cheetah and what repercussion its demise might have on ecological balance in the affected areas. Especially young people are supposed to learn more about the cheetah, be it through the contact to tame animals that might even be petted or by driving through enclosures filled with cheetahs that cannot be released (anymore), but still behave like wild animals.

Most of the work of such organisations of course consists of taking in caught and possibly injured cheetahs in hopes of being able to release them after their recovery. Animals that cannot be released anymore due to a permanent injury or sickness are usually kept in enclosures and taken care of until their dying day. Male cheetahs that come to CCF help preserve their species regardless of a permanent stay or not since sperm samples are taken of every male cat that arrives at CCF and subsequently frozen, thus helping to create a genetic database. Additionally, an international cheetah studbook has been created. It is available to all zoos worldwide and contains records of the degree of kinship of cheetahs, a welcome aid once it comes to choosing a suitable and preferably distantly related breeding partner for a zoo with a female in heat, assisting with increasing the genetic variety of the cheetah.

Even with all the problems that make releasing cheetahs bred in captivity into the wild impossible or highly complicated, this might become more important in the future for maintaining genetic diversity due to the fact the cheetah has a rather small gene pool¹⁸. Until this becomes more important, behavioural studies on cheetahs will be able to contribute to the conservation of the species, because as this paper shows

¹⁷ Animals that have killed livestock; see Marker, Dr. L., *Aspects of Cheetah (Acinonyx jubatus) Biology, Ecology and Conservation Strategies on Namibian Farmlands*, p. 55

¹⁸ Owing to a genetic bottleneck about 10.000 years ago that only few cheetahs have survived; see Marker, Dr. L., *Aspects of Cheetah (Acinonyx jubatus) Biology, Ecology and Conservation Strategies on Namibian Farmlands*, p. 3

suggestions for tourists and animal filmmakers: cheetahs best shouldn't be disturbed in their natural daily routine, especially not during hunt in the morning since this can result in an enormous energy loss, nor during their resting time in the midday heat since they shouldn't have to abandon their resting places in the occasionally scarce shade, forcing them to raise their need for water and heighten their need for cooling. The more research about the behaviour of the spotted hunter there is, the better the chances to find better ways to allow cheetahs and humans to live together. This also includes researching the hunter-prey relationship since only in a healthy ecosystem can the human survive – if the larger predators are missing, the *Homo sapiens* might be confronted with missing vegetation due to an abundance of herbivores, soil erosion and resulting intensified desertification.

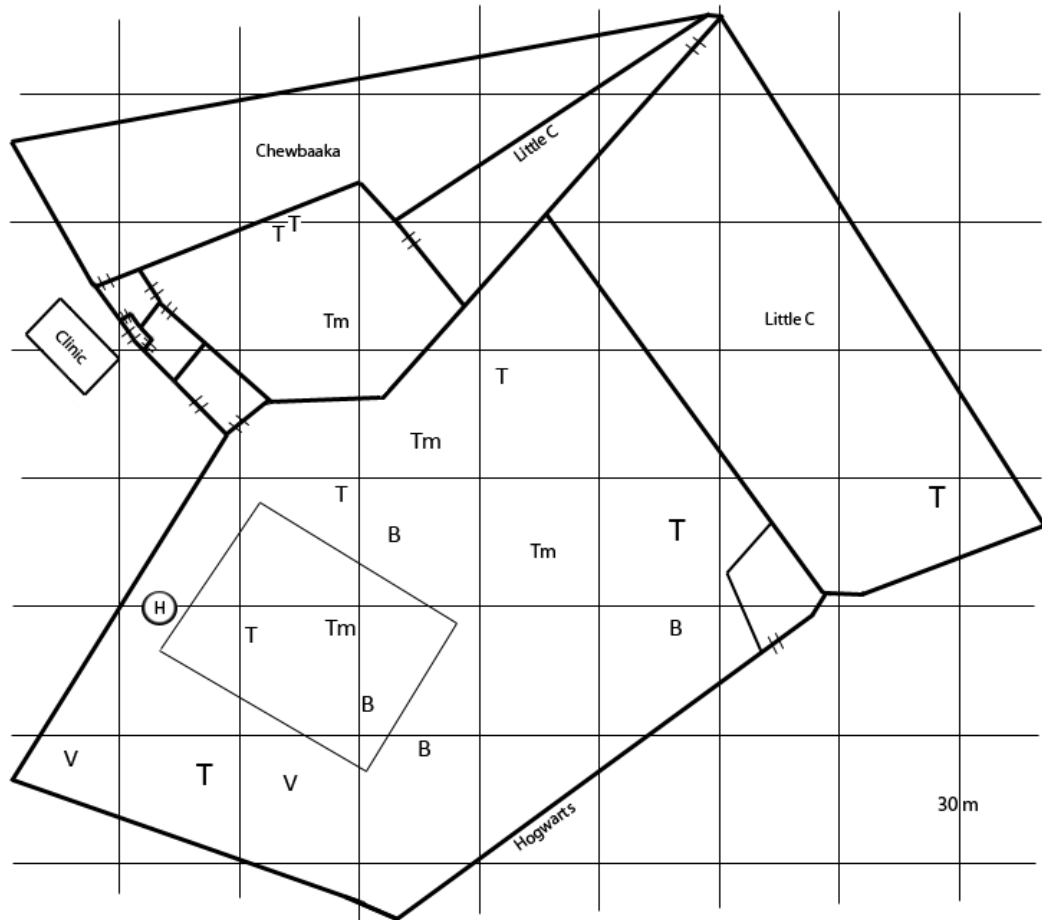
But knowledge about the cats is also important for captive animals and their keepers since it might help prevent behavioural disorders. Again, the results of this paper can help with decision-making: the cheetahs' activity periods should be used sensibly, either by letting them run or maybe offering activities, perhaps even toys, while the resting times should be respected since they don't seem to change in captivity. The consideration of these activity periods falls into the category of humane keeping¹⁹ of animals. Furthermore, it can be necessary for the keepers to be forced to help the cheetahs keep their fur clean (which can be realised by installing brushes on passageways). Of course, an adequately sized pen has to be provided in order to make it possible for the animals to live out their tremendous urge to walk around. Maybe someday will behavioural research make it possible for cheetahs raised in captivity to be taught how to hunt, with a subsequent release into the wild becoming possible.

As seen, many important steps and progresses have been made already concerning the protection of the cheetah. Of course there still has to be done a lot in terms of educational work on social and political levels in order to gain more support and willingness to protect the cheetah, but one thing is for certain: the more we know about the spotted hunter, the more we can do for the cheetah.

¹⁹ "Holding systems are to be considered humane once an animal receives what it needs in order to enable the fulfilment of its demands and self-preservation and if they allow for the covering of the animals' requirements and the avoidance of any damage by giving it the ability to exhibit adequate behaviour."; see Möbius, Dr. G., *Ethologie*, p. 9

IV. ADDENDUM

ENCLOSURE MAP



LEGEND

- T = tree
- V = vantage point, usually higher than ground level
- Tm = termite mound
- B = bush
- H = hut
- Square close to the hut = track used for the Cheetah Run

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VI. AFFIDAVIT

I hereby declare that I have created this term paper without foreign help. I have only used the sources and means described in the bibliography.

_____, the
Location

Date

Signature