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Why is Cheetah the Fastest Land Animal?

The odd cat

There's nothing faster than a cheetah on the hunt. The maximum speed is of 112 km (70 mi) per hour, but the average hunting speed is still of 72-90 km (46-56 mi) per hour. No living or extinct animal runs or used to run at such speeds. How can this be possible? The cheetah is a very special cat, with specific adaptations. First, the claws of the cheetah are semiretractile (they do not retract completely into their pads, like in the other cats), functioning like crampons during the race. The paw's cushions have transversal folds that increase adherence to the ground. The fact that the long tail acts like a rudder during the run helps cheetah overcome preys running in zig zag by making quick turns at amazing speeds. The cheetah's spine is extremely elastic, working like a spring. Also, compared with the limbs of other cats, those of the cheetah are extremely long and thin, adapted to running, possessing very lax articulations to the body (at the hip and shoulder), fact that allows them to make large steps. The skeleton of a cheetah is also very light. The elastic spine and the long legs allow the cheetah to make successive jumps 7 m (23 ft) in length each and in 2 seconds a cheetah has already reached 75 km per hour and in 3 even 110 km (that's faster than most cars can do!). Its most rapid preys, the gazelles, do not overcome 80 km (50 mi) per hour. [img=2]During the race, the number of breathing movements booms from 16 per minute to 156. But the cheetah cannot stand a run more than about 800 m (0.5 mi). The weak point of the cheetah is that the cat cannot expel rapidly enough the accumulated heat and it gets overheated. Cheetah's heart is one third of a human one, related to body's proportions, fact that also explains cheetah's lower stamina. The cheetah selects an animal isolated from the herd (a gazelle or an impala) and usually catches it in the first 500-600 m (0.25-0.35 mi). The female insists more on chasing the prey. If the prey gets an advantage of 20 seconds, the cheetah renounces. After that the cheetah is totally exhausted and needs 30 minutes to recover. Not only that the cheetah cannot feed now from the freshly killed prey, but any medium or large predator can steal its prey, from leopards and hyenas to lions. When the running cheetah reaches the prey, it will hamper its victim. In the case of larger prey, it will apply a swift blow with the front legs in the bottom or the flank of the prey. The fallen victim is immobilized and suffocated. Sometimes, cheetahs can play with their prey. Cheetahs have shorter upper canine teeth, which make way for enlarged nostrils which permit a good ventilation of the huge lungs after the race and while suffocating the victim. No need to mention that cheetah has huge lungs and heart compared to other cats. Females with cubs hunt all day long, while the isolated adult once 2-3 days. Still, about half of the attacks on the prey are a failure. Because of its adaptation for running, cheetah has renounced to force and that's why, being vulnerable to lion and leopard, must hunt during the day, especially the scorching midday, when these cats rest. And that's why cheetahs attempt to eat as much as possible in the shortest time. A cheetah can eat up to 14 kg (30 pounds) of meat once! Cheetahs can kill from rabbits and bat eared foxes (during the dry season) to preys of 150 kg (400 pounds), like zebras and wildebeest, when they are in groups. A cheetah needs 6 kg (15 pounds) of meat daily but they never turn back to the killed prey from which they consumed. This cat will never touch carrion, even fresh ones. The best sense of the cheetah is its sight: it can detect a gazelle offspring in the grass from a distance of over 500 m (0.3 mi)! Because of the diurnal life, the cheetah has very small whiskers and the black stripe stretching between the eye and the cheek confer a camouflage on the terrain. Cheetah offspring are extremely vulnerable to lion, leopard, hyena and African wild dog (and also other cheetahs) and have the back covered by a white mane, imitating the ratel or honey badger, extremely vicious carnivore mammals avoided by most predators. A male cheetah eager to mate with a female cheetah can take her "hostage", and meanwhile her cubs can die of hunger. Their calls can attract other predators. Cheetahs are sexually mature at the age of 2 years, and the female has cubs once at two years, on average 4 (rarely up to 8). The females leave scent messages when they are in heat; males too leave scent messages. The sexes attract also each other through short calls. The mating pair can spend one week together. The cubs are cared by the female for 15-18 months, a period when they must learn hunting from the mother. A cheetah has a lot to learn until turning into a killer, and even so, only one in 6 attempts results with a capture. If more brothers have survived, they stay together after being left by the mother until the age of 2

years. Then, females remain close to the territory of the mother, while the males go much further. This way, inbreeding is avoided. Newborn cubs are relocated once at 2 days, so that their smell won't attract predators. Female eats from the prey only when the cubs are fed up. 50 % of cubs are killed in their first 3 months by (especially) lions and hyenas. Only one in 20 cubs will reach maturity. Cheetah can cooperate with the golden jackal during the hunt: the jackal attracts the attention of the prey, while the cheetah approaches enough to launch its attack. Vultures represent a great danger for the cheetahs, not for stealing their meal, but for warning lions and hyenas about the existence of an easy to steal meal. Cheetahs (especially females with cubs) follow their preys during their migration, that's why they do not have fixed territories. During this time they can make tens of km daily. 80 % of the males live in bands of 2-4, with a dominant one (which initiates the hunt and mates with the females in estrus encountered by the group), and they are not always brothers. Lonely males live about 4 years, but those in a group much longer. Finding a hunting partner can be difficult. The wrong approach to a dominant male can be deadly. When a male cheetah meets a foreign male cheetah, he will bend down his head, showing menacing teeth. If the intruder does not retreat, the male will attack the other. A male cheetah can keep up to 2 years a territory of 50 square km (20 square mi). Cheetahs use to survey the territory climbed on termite mounds, rocks or hill tops, where they have a better visibility to larger distances. During the Middle Ages, hunting with cheetahs was a popular noble game in India. Akbar the Great, the Mogul emperor, had over 1,000 cheetahs. Unfortunately, the Indian cheetah is almost extinct, a couple of dozens surviving just in a remote area of Iran. [img=3]Cheetah separated 8 MA ago from the genus Panthera (which includes the lion, leopard, tiger and jaguar). The modern cheetah is 4-5 MA old! In Pliocene, 3 MA ago, in Europe, India and China there was a lion-sized cheetah (*Acinonyx pardinensis*). Specialists believe this species could not have been so fast as the modern cheetah. 2 MA ago, in North America the American cheetahs lived. They were not closely related to the real cheetah (*Acinonyx*), but belonged to the genus *Miracinonyx*, related in fact with the puma. Through evolution to the same life style, the American cheetah got traits similar to the Old World cheetah: shortened faces and enlarged nasal cavities for increased oxygen capacity and the long lean legs for rapid run. The existence in the past of the American cheetah could explain why the pronghorn reaches speeds of 61 mph (98 km/h) which classify it as the second-fastest land animal after the proper cheetah. *Miracinonyx trumani* was still flourishing 20,000 years ago and some believe the Aztecs were familiar with the animal. The name cheetah comes from Hindi, and means "spotted body". Today, cheetah has two forms: the endangered Asian cheetah, *Acinonyx jubatus venaticus*, now only in northeastern Iran (once from India to Arabia) and the African cheetah, *Acinonyx jubatus jubatus*, from the African savanna. The royal cheetah from austral Africa represents just a mutation, like the cases of black individuals in leopards. A female can have both royal and normal offspring in the same litter. 10,000-20,000 years ago, the cheetah experienced a genetic "bottleneck": a disease or another unknown reason killed over 99 % of the entire world population of cheetahs. That's why the genetic variability of the species is unusually low and dangerous, and there are many bad recessive genes in the population.