

Caro TM. 1990. The big cats cheetahs. Cats up close.

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Abstract: Article of 5 pages about social structure in males and females, reproduction and development of the cubs. It includes another small article about cheetah speed.

CHEETAHS

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Cheetah is a word derived from the Hindu "chita" meaning spotted one. Cheetahs (*Acinonyx jubatus*) have several unique morphological features not found in other living felids: a slight build, long thin legs, and a small, delicate skull. Their light brown coat is covered with large and small solid, round, black spots that are scattered over the body. Some individuals, called "king" cheetahs, from Central Africa have a blotched coat as a result of possessing an identical pair of recessive alleles for coat pattern. *A. jubatus* is the last surviving species of at least four cheetah species that lived in both North America and the Old World during the Pleistocene (2 million–10,000 years ago). Seven subspecies are currently recognized from subtle differences in their coats, although analyses of the blood proteins suggests that the differences between some subspecies are trivial. *A. jubatus* once had a wide distribution throughout Africa and southwest Asia, but its range is now confined to savanna and Sudano-Sahelian vegetation zones south of the Sahara. A relic population of perhaps 200 animals still survives in Iran and possibly northwest Afghanistan.

Cheetahs are notable not only for their beauty and unusual build, but also for their hunting technique which involves a concealed approach towards prey, followed by a sudden rapid dash and very fast chase of less than 300 meters (330 yards). They are much more active during the day than other cats, relying on visual means to locate their prey. As a result of these attributes, cheetahs were used for the sport of coursing in Asia prior to the Assyrian dynasty, in Libya during the reign of the Pharaohs, and by Mogul emperors in India between the thirteenth and sixteenth centuries. Despite their prolonged attention from the nobility, the behavior and ecology of cheetahs has been documented only very recently.

► Female cheetahs live alone except when rearing cubs. Males live alone or in permanent groups of two to four, called coalitions. Males in coalitions are often siblings and share kills such as this springbok. In general, coalitions kill larger prey than lone males or females.

▼ In historical times, cheetahs (*Acinonyx jubatus*) ranged throughout the dry areas of Africa, the Arabian Peninsula, Asia Minor, and as far east as India. Today, substantial numbers of cheetahs survive only in Namibia and Kenya. In Asia, only fragmented populations remain.

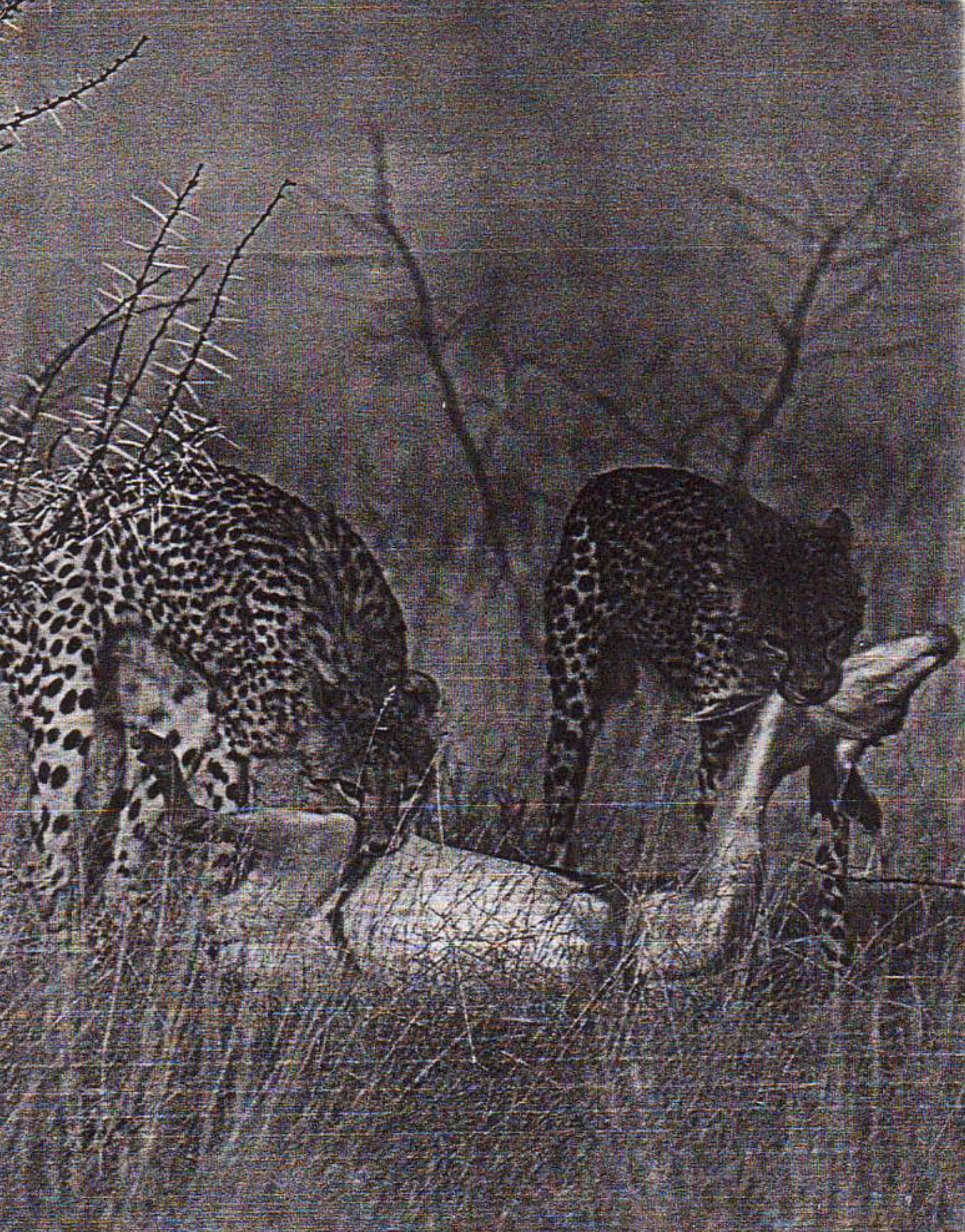
SOCIAL STRUCTURE

Compared with other felids, cheetahs have a unique and highly flexible social structure. In East Africa, females live alone unless they have cubs accompanying them, a characteristic shared with females of other solitary species. Males, however,

either live alone (approximately 40 percent of individuals) or in permanent groups of two (40 percent), three (20 percent), or occasionally four. These groups, termed coalitions, last throughout the lifetime of the males, a period of up to eight years in the wild. Coalitions are normally made up only of sibling males from the same litter, but approximately 30 percent also include additional unrelated males. In southern Africa, persistent reports suggest that cheetahs live in larger groups containing more than one adult female, and also groups containing adults of both sexes, but these accounts have yet to be confirmed.

In the Serengeti National Park in northern Tanzania, cheetah density is high, reaching 1 per 10 square kilometers (2.5 per 10 square miles). Female cheetahs have huge (800 square kilometers or 310 square miles) annual home ranges because their movements closely follow the migratory routes of Thomson's gazelles, which make up 50 percent of the female cheetah's diet in this area. A female remains in one locality within her range for several weeks until hunting becomes poor, then she moves a few kilometers to an area with more prey. Annual ranges are too large to be defended effectively against other females and there is extensive range overlap; nevertheless, females show avoidance behavior.





**FOUND IN GROUPS**

Years	Coalitions of males
Months	Mother with cubs Adolescent siblings
Months or days	Adolescents or lost cubs parasitising unrelated adults
Days	Males and females in consort

FOUND ALONE

Years	Single males
Months	Pregnant females Lactating females with cubs in den Single adolescents

▲ The social structure of free-living cheetahs is flexible, as the above table shows. For different periods of time and for various reasons, different social patterns are exhibited.

In contrast to females, some males (approximately 30 percent) scent mark and actively defend their territories against other males, but these ranges are much smaller (40 square kilometers/15.5 square miles) than those of their female counterparts. Other non-territorial males wander over large areas of the Park as do females. The siting of territories is fixed in that boundaries do not alter after a change of ownership. Each territory contains a certain amount of cover either in the form of vegetation growing in riverbeds or tall rocky outcrops on the savanna landscape. Large expanses of short grass plains between territories appear unsuitable for territory occupation. At any one time there is a maximum of 10 territories occupied on the Serengeti Plains and woodland border, and competition for these limited sites is severe, with males dying in contests over ownership. In fights, a male will first use its weight to pin down its opponent, and then attempt to suffocate it with a bite to the neck, while its coalition partners deliver repeated bites to the haunch and genitals. This fighting technique means that coalitions of males are better able to acquire territories and hold them than single males; single males become residents only if territories are voluntarily vacated or if there

are few coalitions to compete against. Competition for territories results in high mortality among males, skewing the adult sex ratio by as much as 1:2 in favor of females. Although the costs of territory acquisition and defense are great, the reproductive benefits are high because female cheetahs temporarily gather in territories during their annual migration, capitalizing both on cover and a high concentration of gazelles. As yet, it is unknown whether females choose to mate with certain males or give birth in particular territories.

REPRODUCTION AND DEVELOPMENT

Mating has been observed very rarely in the wild and is a brief affair lasting less than a minute; nevertheless, males often remain with females for as long as two days, either in anticipation of estrus or to guard the female after mating with her. When a male coalition locates a female there can be mild aggression between the males, but these confrontations are slight compared with fights between coalitions. In the single observation of a pair of males mating in the wild, both males copulated, suggesting paternity among some littermates may be mixed.

After a 90 to 95 day gestation period, as many as six, but usually fewer, cubs are born in a lair

CHEETAH SPEED

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If an Olympic competition could be arranged among the world's mammals species, cheetahs would likely win the gold medals in the 200 and 400 meter sprints (without steroid supplementation!). Obtaining precise, reliable measurements of the maximum speed of cheetahs has been difficult, but it is generally conceded to be about 110 km/h (68 mph). In comparison, some antelope have maximum speeds approaching 100 km/h (62 mph), canids about 70 km/h (44 mph) and humans about 40 km/h (25 mph). What gives cheetahs their celebrated swiftness?

A stride is one cycle of sequential footfalls, that is, two steps for a biped and four steps for a quadruped. The speed of an animal equals its stride frequency times its stride length. Anything that causes an animal to have a longer or quicker stride will increase its speed. Felids in general have anatomical adaptations that promote relatively long strides. These include a

digitigrade stance (only the "toes" touching the ground), lateral placement and heightened mobility of the scapula (the shoulder blade), and heightened flexibility of the spine. For increasing stride frequency the main adaptation consists of a reduction of the distal mass of the limbs, which serves to heighten the rate at which the limbs can be oscillated.

Cheetahs differ from other cat species primarily by taking these features a little bit further. In comparison to other large felids, cheetahs have proportionately somewhat longer limbs, longer scapulae, longer lumbar portions of the vertebral column (between the ribs and the pelvis, allowing greater spinal flexion), more consistently vertical orientation of the foot bones and leg bones, and larger muscles for flexing and extending the spine.

Considered one at a time, none of the cheetah's differences from other cat species is very large, but the net effect of them all is to make cheetahs champion sprinters.



situated among boulders, in tall vegetation, or a marsh. Cheetah cub mortality is very high during the first two months of life, but surviving cubs are brought out of the den at six to eight weeks and from then on accompany their mother. The cubs have a peculiar natal coat which is light gray and woolly on the cub's back and black on its belly. Many functions have been ascribed to this coat, but its main function is probably to camouflage cubs against carnivores, such as lions and spotted hyenas, and against raptors, such as martial eagles and crowned hawk eagles. The natal coat is entirely lost by four months, exactly the time cubs are strong and agile enough to outrun these predators. If a mother loses her litter during this time, she comes back into estrus within days.

Cheetah cubs are extremely playful from the time they first emerge from the den until eight months of age. They stalk, chase, and wrestle with each other, particularly during the first two hours of the day; some mothers take part in bouts of chasing and fleeing as well. Cubs begin to hunt many different species in their environment when they reach three months of age. Small birds such as francolins are the focus of most hunts by groups of young cubs, although they never catch them. At five months, cubs start to chase small carnivores, mostly jackals, but by the time they are eight months old, the cubs are mostly stalking inappropriately large prey, such as adult giraffes or elands. Cubs are actually responsible for less than 10 percent of the kills eaten by the family.

▲ This sequence of movements illustrates the rotary gallop of a sprinting cheetah. The hind limbs land first on alternate sides, and this is followed by a phase of floating, when no feet touch the ground. The forelimbs then land on alternate sides, and this is followed by a period of crossed flight, when all feet are gathered under the body.

▼ After an incredible burst of speed the cheetah will overtake this fleeing Thomson's gazelle. A slap to the gazelle's leg will trip and knock it down, and to kill, the cheetah will bite down on the animal's throat until it suffocates. Cheetahs must consume their prey quickly because lions, wild dogs, and hyenas readily steal their kills.



When cubs first leave the den and accompany their mother, she captures and kills prey for them as would any adult female. When the cubs are three months old the mother brings live prey, such as newborn Thomson's gazelles and hares, back to the cubs and releases it in front of them. The cubs canter after the fleeing prey and attempt to slap it to the ground; on the few occasions it escapes, the mother retrieves it for them. This way cubs soon learn to kill for themselves. Nevertheless, when they do separate from their mothers, at between 14 and 18 months, they are still very poor at capturing prey. Littermates remain together for up to six months after leaving their mother, but after that time the females leave their siblings. The male siblings stay together for life. The daughters range over an area that partially overlaps their mother's home range, but the sons establish territories that are 20 kilometers (12 miles) or more outside their natal range. Sexual maturity in females occurs at 20 to 24 months; in males it occurs at two and a half to three years of age.



▲ Separated from its mother and herd, a confused baby Thomson's gazelle is easy prey for a young cheetah in Kenya's Masai Mara Game Reserve. Inefficient hunters, young cheetahs frequently start their chase too early, allowing more experienced prey animals to escape.

► Three young cheetahs follow their mother on a late afternoon expedition on the East African plains. Cheetahs rest and sleep at night, generally hunting in the late morning and early evening when competition from nocturnal and crepuscular predators is less keen.

Cubs that are not yet fully grown but who have lost their family through ill fortune will attempt to associate with unrelated cheetah families or even male groups for as long as they can, sharing meat caught by the adult females or by the males. Single adolescents or adolescent groups have also been observed to latch on to an unrelated family for several weeks. Despite suffering aggression from the mother, parasitic cubs and adolescents seem to steal sufficient meat to survive and, for very incompetent hunters, this may be their only means of survival.

