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Abstract: In 1927, Pocock published the official description of the king cheetah (*Acinonyx rex*). In 1980, Hills and Smithers published a list of 13 known skins and a near equal number of visual records. In 1978-79 their findings were extended by the couple Bottriell, who established clearly that king cheetahs have never been plentiful and that they derive exclusively from adjoining portions of Zimbabwe, eastern Botswana, and the northern and eastern Transvaal of South Africa (resumed in a map).

San Diego Zoo
Wild Animal Park
March 1989

South African cheetah *Acinonyx jubatus jubatus*



San Diego Zoo: E. Garrison

WHEN CHEETAHS ARE KINGS

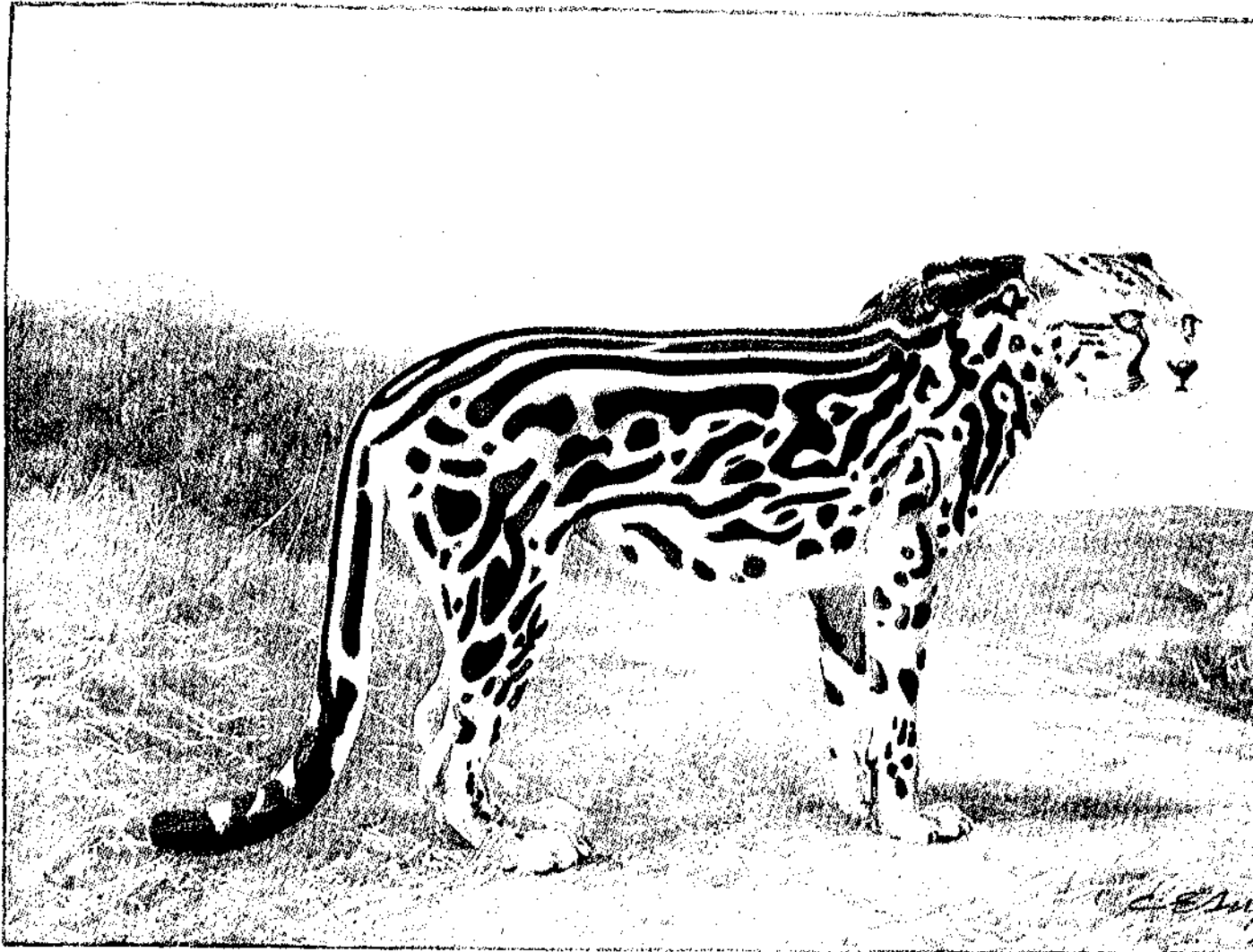
Donald Lindburg, Ph.D.
BEHAVIORIST, CRES

An ancient prophet is said to have compared the prospect of reforming human behavior to that of a leopard changing its spots. Had he lived in 1926 he may have found encouragement from the discovery in southern Rhodesia of a cheetah skin having stripes and blotches in place of the usual spot pattern. This unusual specimen had been purchased by a farmer from native hunters and then donated to the Queen Victoria Memorial Library and Museum in Salisbury. Museum authorities, however, seemed unaware of the skin's significance until a military officer, Major A.C. Cooper, opined that it might be evidence of hybridization between leopards and cheetahs.

It was Major Cooper's inquisitiveness which sparked an investigation of this unusual skin. He had heard the legend told for many years by Africans to white hunters, of the *nsulifisi*, a large cat that preyed on the kraals at night that was "neither lion, leopard, nor cheetah." Upon learning that the Queen Victoria specimen had come from the Macheke District of Zimbabwe, where the legend of *nsulifisi* was particularly strong, Cooper asked colonial officers throughout the country to notify him of any further evidence of its existence. This effort paid off when the Native Commissioner at Bikita, in the southern part of the country, sent photographs of two unusual skins from cheetahs killed in his district.

Meanwhile, Cooper had persuaded the Queen Victoria Museum to send the Macheke skin to Reginald Pocock, world renowned curator of mammals at the British Museum in London, for an opinion. From a photograph sent to him earlier, Pocock had dismissed Cooper's find as an aberrant leopard, but when he examined the foot pads and claws of the museum skin, he knew immediately that this was indeed a new kind of cheetah. In the following year (1927) Pocock published the official description of *Acinonyx rex*, or king cheetah, in the *Proceedings of the Zoological Society of London*.

An unfortunate consequence of the publicity generated by these efforts was to create a demand for king



ACINONYX REX, sp. n.

Illustration by C. E. Swan from R. I. Pocock's "Description of a New Species of Cheetah," published April 6, 1927, in the Proceedings of the Zoological Society of London.

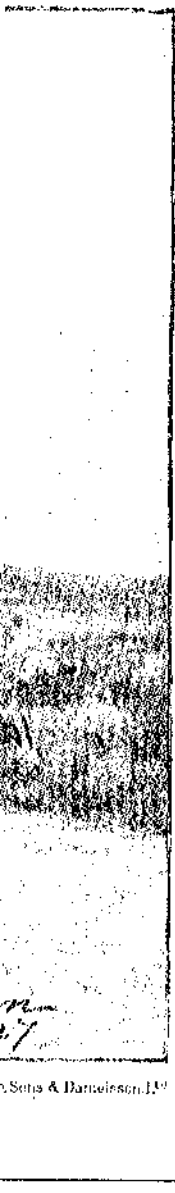
trophies in museums and private collections. Pocock himself, for example, urged Major Cooper to help find a skin for Lord Rothschild, and the two Bikita skins were eventually purchased by the London taxidermy firm, Messrs. Rowland Ward, Ltd., who in turn sold them as mounted specimens to museums in London and Natal. The number of skins that have disappeared into the stores of taxidermists and the hands of private collectors will never be known. But in 1980, Daphne Hills and Reay Smithers published a list of 13 known skins and a near equal number of visual records which they considered to be reliable. Their findings were extended by Lena and Paul Bottrill, who spent roughly two years in 1978-79 searching by Land-Rover and hot-air balloon for further signs of the king's existence. These concerted efforts established clearly that

king cheetahs have never been plentiful and that they derive exclusively from adjoining portions of Zimbabwe, eastern Botswana, and the northern and eastern Transvaal of South Africa (see map for distribution).

The story of the king cheetah took an interesting turn with the birth of a litter of five cubs to a normally spotted female at the DeWildt Cheetah Breeding and Research Centre near Pretoria in May 1981. One of the cubs, a male, bore the irregular blotch and stripe pattern found in the collected specimens of the king cheetah. Two days later, a litter of three, born at Port Elizabeth, contained a king female. Although these are widely regarded as the first captive births, Desmond Varaday, who operates the Loskop Cheetah Sanctuary near Middelburg, South Africa, has claimed that a litter born there in



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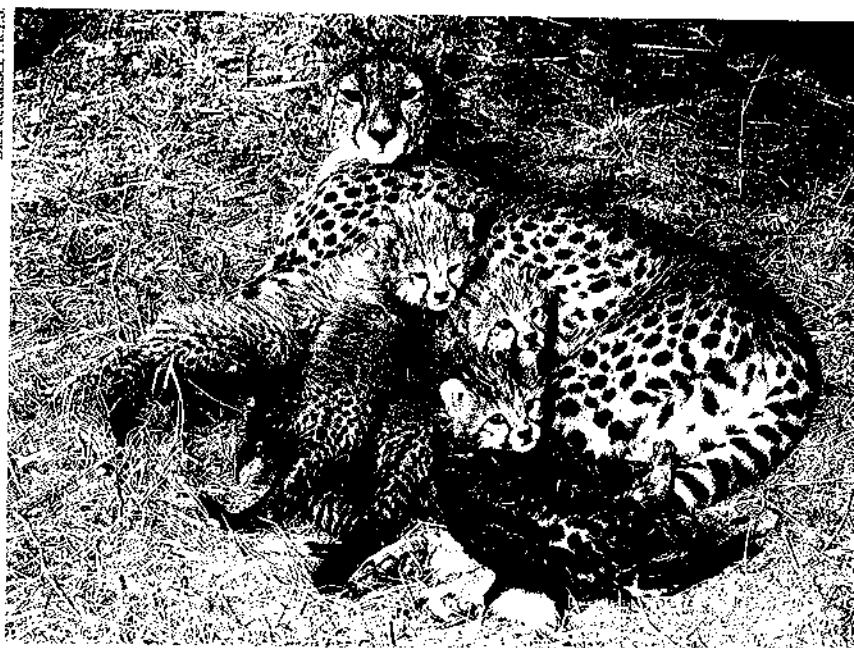
Sims & Dammeisen, 1977

June 1980 contained two king cubs.

Nine kings born at DeWildt between 1981 and 1984 (the Port Elizabeth female parent was a sister of one of the DeWildt females, and her progeny is included in this tally) provided geneticists in South Africa with an opportunity to study the inheritance of the king coat pattern. Although Pocock had many years earlier withdrawn his claim regarding the species status of *Acinonyx rex*, the captive births established unequivocally that the king cheetah is merely a variant form of the common cheetah *A. jubatus*.

From pedigree analysis of the DeWildt births it is certain that the king coat pattern is controlled by a single gene, occurring in recessive form. All of the parents of king cheetahs have had normal spotted coats. An offspring born with the king pattern has to receive the gene from both parents, who carry it in unexpressed or recessive form. By chance, such an event should occur about 25 percent of the time, on the average. The occurrence of 9 king cubs in litters numbering 26 individuals at DeWildt gives a ratio of nearly 1 king for every 3 cubs born, close enough in a small sample to be in accordance with the rules of inheritance for a

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This normally spotted cheetah mother has produced four cubs with the standard pattern and one (in the foreground) with the king cheetah coat.

Live king cheetah at the DeWildt Cheetah Research Centre in a pose that mimics Swan's illustration.



trait controlled by a single, recessive gene.

The genetics of coat variation for the cat family is actually quite well-known from extensive studies of the domestic cat *Felis domesticus*. Despite the many variations in the color characteristics of domestic cats, it would appear that mutations of only about ten genes account for this variation. Of course, domestic cats have been selectively bred by humans and, therefore, show color variation far in excess of that found in wild felids. All cat species, however, appear to have the same complement of genes for color variation, and one of these, known as the *tabby* gene, is responsible for the occurrence of dark pigment in stripes and spots. In domestic cats one gets blotched offspring from striped tabbys when a mutation of the *tabby* gene occurs. Geneticists now believe that the remarkable coat of the king cheetah results from a mutation of the *tabby* gene.

Other kinds of mutant cheetahs have been recorded, though less fre-

Of the Zoological Society's cheetahs, four have the possibility of carrying the recessive gene for the king cheetah coat pattern. Two from Pretoria, a female named Jasiri (who recently bred), and a male named Mashona, are claimed to be in the king lineage. Another from Botswana falls within the area of distribution for the king cheetah. According to Desmond Varaday, from whom we received several of our cheetahs, Ilonkah, seen below, is a half sibling of a king cheetah, sharing the same mother. Ilonkah also has some fused spots on her tail—a possible indication that she carries the gene. Her cubs (right), born by Caesarean section last spring, are of the normal spotted variety, but maybe someday Ilonkah will give birth to a "once and future king."



San Diego Zoo: R. Garrison

quently than has the king. Undoubtedly, the oldest known record is from the memoirs of Jahangir, a Mughal emperor who ruled in India during the 17th century. Known as a careful observer of wildlife, Jahangir described a white cheetah, having blue instead of black spots and a bluish cast to the white background. Homologous occurrences of these color characteristics in other cats indicate that Jahangir's white cheetah was not an albino, as some have suggested, but was rather a mutant of the *deep pigmentation* gene.

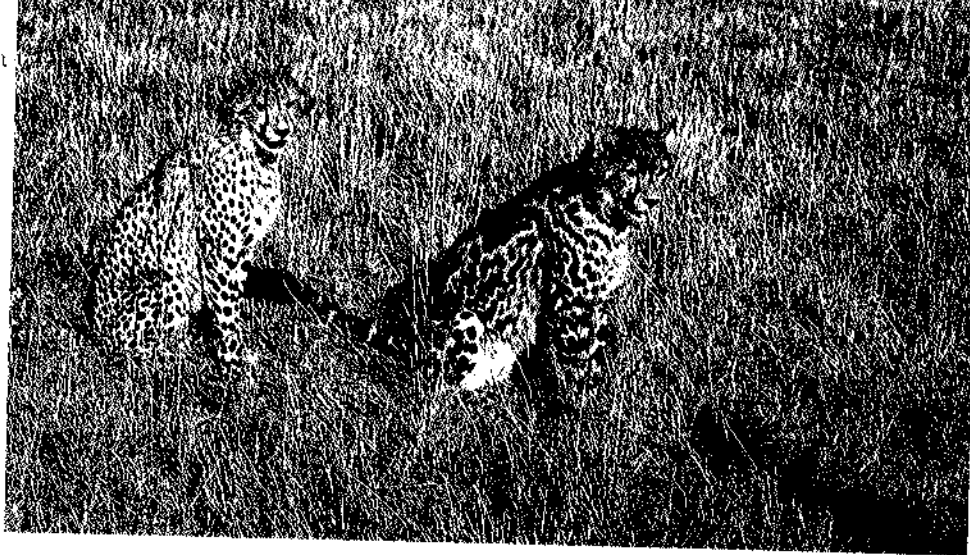
The *Proceedings of the Zoological Society of London* for 1877 carry the description of a cheetah seen in the Cape Province of South Africa and covered with "dark fulvous blotches" on a "pale isabelline" (brownish yellow) background. This cheetah is also said to have lacked the tear line which is so characteristic of the cheetah face. A 1921 photograph of a specimen shot in Tanzania portrays a virtual absence of spots on the neck



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A VERIFIABLE LIST OF KING CHEETAH SKINS COLLECTED SINCE 1925

Provenance	Date of Record	Circumstances of Collection and Preservation
1. Macheke, Zimbabwe	1926	The holotype of <i>A. rex</i> , this skin was purchased by a farmer from natives and given to the Queen Victoria Museum in Salisbury. Destroyed by museum authorities ca. 1950, due to poor condition.
2. Bikita, Zimbabwe	1925	Originally in possession of Native Commissioner H.N. Watters. Later mounted in proportions of a leopard by Rowland Ward, Ltd. and sold to the British Museum of Natural History.
3. Bikita, Zimbabwe	1925	A second skin originally owned by Commissioner Watters. This specimen also found its way to taxidermist Ward for mounting and is now on display at the Natal Museum in South Africa.
4. Seki Reserve, Zimbabwe	1926	Photograph published by Major A.C. Cooper of a skin in possession of a Mr. Lacey, who reportedly purchased it from native hunters. Present whereabouts unknown.
5. Mt. Selinda, Zimbabwe	1927	A flat skin obtained by Major Cooper for the private collection of Lord Rothschild. Now in the British Museum of Natural History.
6. Bikita, Zimbabwe	1928	A third skin obtained by Commissioner Watters and sold to the South African Museum in Capetown, where it is on exhibit as a mounted specimen.
7. Birchenough Bridge, Zimbabwe	1935	Killed by native hunters on a ranch near the Sabi River. Now in the private collection of Sir Archibald James, England.
8. Messina, Transvaal	1940	Shot by a rancher (van der Walt) at a lion stakeout. Now in private collection of J. Joubert of Krugersdorp.
9. Tjolutjo, Botswana	1942	Purchased by wife of Native Commissioner N.L. Dacomb from an African, later sold to the Kaffrarian Museum in King Williams Town, where it is now kept.
10. Tuli, Botswana	1960	In the possession of L. van Niekerk, a rancher, who purchased it from a local hawkker. A photograph has recently been published by Lena Bottriell.
11. } Eastern Botswana	1960	These three skins, which are presumed to be from eastern Botswana, have been in the possession of Messrs. J.R. Ivy, Curio Dealers, Pretoria, for several years.
12. } (presumed)	1965	
13. }	1966	
14. Rakops, Botswana	1960s	Owned by a merchant, Charlie Freeman of Palapye, this skin was recently photographed by Lena Bottriell. Freeman claimed to have lost three additional skins to a thief.
15. Mojabana, Botswana	1971	Originally owned by Mr. Clark, a dealer in skins, who donated it to the National Museum of Botswana in Gaborone.



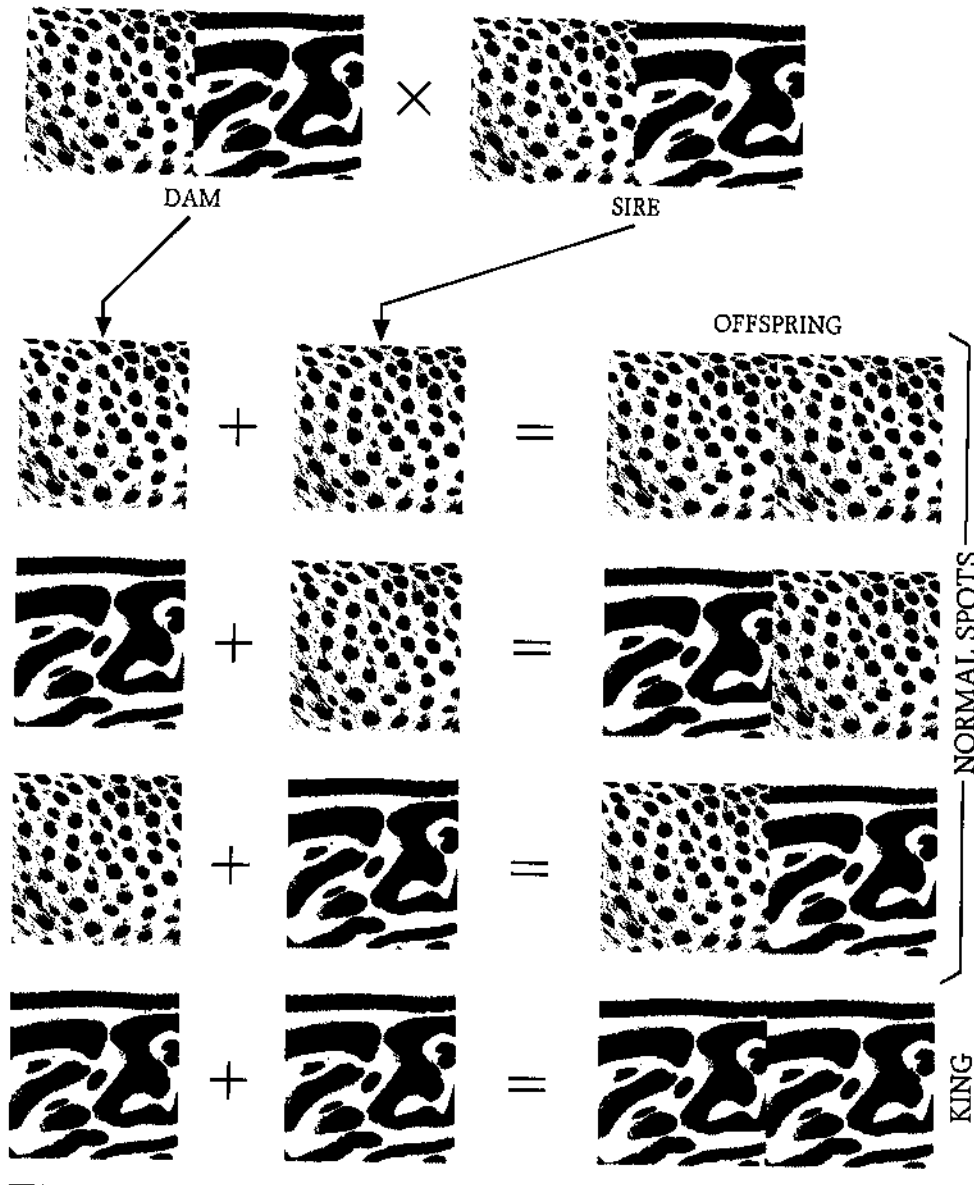
Dick Reucassel, F.R.P.S.

In comparing these cheetahs, readers can decide for themselves whether the blacker, more irregular pattern of the king cheetah would enhance hunting ability, as one theory suggests.

HOW THE KING CHEETAH GETS ITS COAT

Parents who carry both the normal gene (left) and the king gene (right) can give either gene to their offspring. Because the king gene is recessive, or hidden, only those individuals who re-

ceive it from both parents will have the king coat. The four possible combinations of parental genes shown here illustrate why this will occur in only one of every four offspring.



and shoulders, and unusually small spots on the rest of the body. Although black is by far the most common variant for felids, there is only one unequivocal report of a black cheetah, seen in Kenya in 1925. A skin from Zambia in the 1930s described as "dirty-whitish grey" and "profusely covered with black spots" such that the tawny background shone through only on the face and lower legs, is regarded by some as a second example of a melanistic form.

Less striking, but nevertheless noticeable, variations in spot arrangements and in color of the tawny background are often seen, even among littermates. Other pelage features said to be characteristic of kings are their longer, silkier hair and the raised appearance of the pigmented markings above the tawny background hairs. However, both of these features occur in normally pigmented cheetahs in our Wild Animal Park collection. Altogether, available evidence suggests that cheetahs are as genetically variant as other wild felids in the appearance of the pelage.

Why haven't king cheetahs shown up more often among captive-born offspring? One reason is surely to be found in the fact that the gene's prevalence has been reduced by the propensity of humans to collect their skins at every opportunity. It is possible, as well, that natural events affect frequency of expression. Some authors believe king cheetahs were more common in the early part of the century and have speculated that natural fluctuations do occur, as seems to be the case for South Africa's white lions.

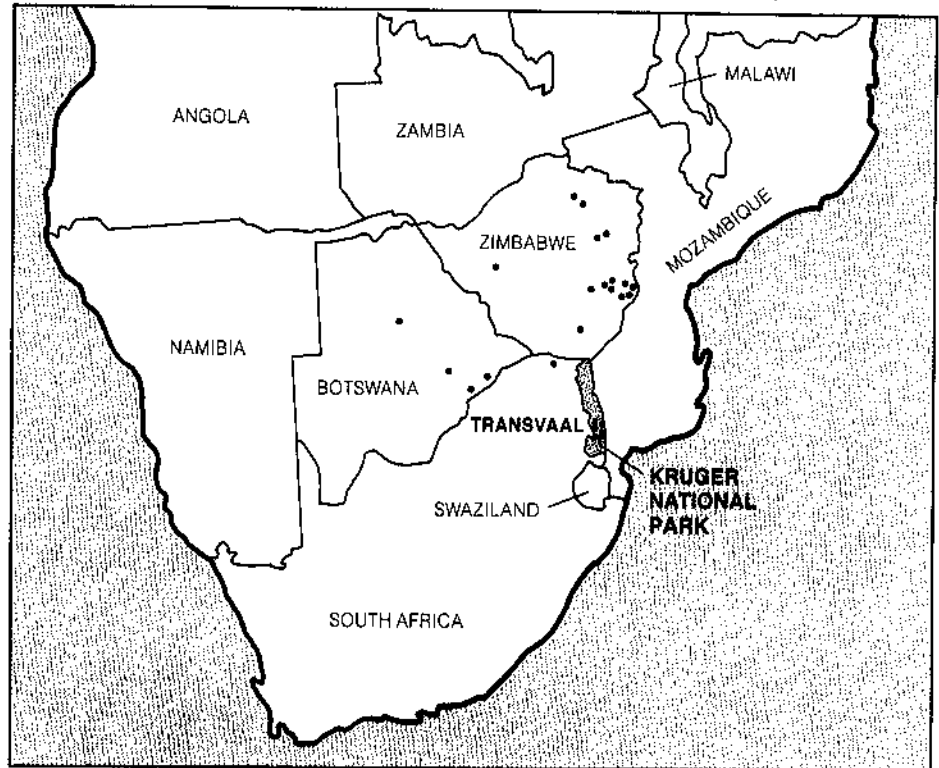
But low frequency of the gene in mutant form is unlikely to be the sole reason for its rareness in captive collections. In North American zoos alone, 113 litters had been born through 1985, none with kings, whereas the first king at DeWilder occurred in the 47th litter. It is more likely that the king's rareness in the captive North American population is



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A young king.

The dots indicate locations where king cheetahs have either been reliably collected or sighted. (Distilled from Bottriell, Hills and Smithers, and Wrogemann.)



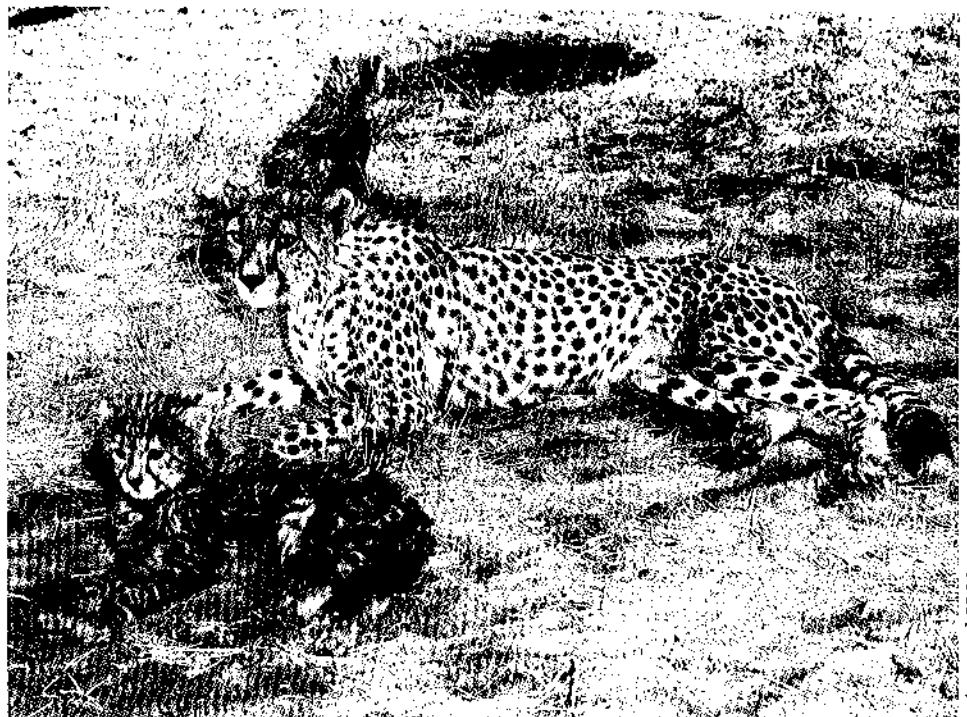
African legend has long told of the nsutlisi, a cat that was "neither lion, leopard, nor cheetah." The youngster in the foreground bears the markings of the legendary nsutlisi.

because the gene has a restricted geographical distribution in the wild, and occurs outside the area from which cheetahs have traditionally been taken for export. The sire of the first DeWildt litter was a wild-caught male from the northern Transvaal, within the known range of kings. The dam, on the other hand, was a captive-born female whose mother had come from the same area. The vast majority of North American imports have come either from Namibia or from East Africa, areas either outside the known range of the king cheetah or at its extreme edge.

The latest indication of king cheetahs in the wild is the sighting of a pair of adolescents in the southern part of Kruger National Park in 1986. Lena Bottriell has reported other visual records from Kruger during the late 1970s, but the 1986 sighting, like that of the first king seen in the park in 1974, is one of very few such reports that is backed up by a photograph. The total absence of any evidence of king cheetahs in Kruger National Park prior to 1974 could be an indication that its historic range is moving southward, to an area where it is safe from the southern African spears known as assegais and from guns. **ZNZ**

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