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Abstract: Studies of cheetah's genetic variation and immune response lead to the conclusion that the species could be soon vulnerable to extinction. Careful breeding would have to take place with unrelated cheetahs in captivity in order to save the species.

Diverse Genes Sought to Save Cheetahs

New York Times Service

WHEN Marco Polo visited Kublai Khan at his summer residence in the Himalayas 700 years ago, he reported that the Mongol ruler kept 1,000 cheetahs as hunting companions.

The use of the fastest animal in the world to aid in royal hunts began with the Sumerians in 3000 B. C. and was continued by Egyptian pharaohs, French kings, Indian princes and Austrian emperors.

In later centuries scientists were puzzled by the fact that with all those thousands of royal pets taken from the wild on three continents, there was not one known instance of cheetahs successfully breeding in captivity until 1956.

Five years ago researchers from the American Cancer Institute set out to find out why.

Preliminary results two years ago in the study of captive cheetahs in the United States and southern Africa indicated that cheetahs had trouble reproducing because their genes were not sufficiently diverse.

Now, with the study complete, the researchers have concluded that if they do not find some diversified cheetah genes, the species could soon be vulnerable to extinction.

"It is not a trivial thing to lose your genetic variation," said Dr. Stephen O'Brien, head of the research team. "Genetic variation exists so ecological pressures can be adapted to."

Blood and sperm of 55 cheetahs from southern Africa, some of them in Africa and some in American zoos, were tested. The researchers found a rare genetic constellation resembling that of highly inbred mice — the genes of the cheetahs were virtually the same.

The researchers then analyzed the results of 14 reciprocal skin grafts on captive animals and studied mortality charts for cubs born in captivity.

The cheetahs that once roamed North America, Asia and Europe are extinct. Cheetahs now exist in the wild only in southern Africa and eastern Africa. Researchers are hoping that those in eastern Africa have a different genetic makeup.

Dr. O'Brien recently went to Kenya and Tanzania to collect blood and sperm samples of cheetahs from eastern Africa. He said analysis of the samples would be completed in October. If the genes differ, scientists will urge the two countries' governments to export cheetahs for breeding.

Laurie Marker, cheetah curator at Wildlife Safari in Winston, Oregon, said that if the genes from

cheetahs in eastern Africa proved similar to those of cheetahs in southern Africa, careful breeding would have to take place with unrelated cheetahs in captivity in order to save the species.

Since 1970, the researchers reported in the journal *Science*, 10 to 15 percent of cheetahs caught in the wild have been successfully bred. The mortality rate among offspring produced in captivity has been 29.1 percent.

"The main thing we're looking at is maintaining genetic diversity, monitoring it, making sure animals don't inbreed, trying to get variation," Miss Marker said.

The researchers concluded that lack of genetic variation caused the cheetahs' immune systems to fail, as indicated by their bodies' failure to reject the skin grafts traded surgically among captive cheetahs. A virus at Wildlife Safari a few years ago almost wiped out the cheetahs

there, and it is feared that if a foreign virus got into Africa, cheetahs could not combat it.

Mammal populations normally have a wide enough range of genetic traits that if a disease or a change of climate threatened the species, some members would be able to adapt.

Estimates of the worldwide population of the cheetah range from 1,500 to 20,000.

Dr. O'Brien said he believed the genetic uniformity resulted from a sudden drop in the population followed by inbreeding that recovered the population but not the genes. If the genes from eastern Africa cheetahs prove different from those of southern Africa, it will mean the drop probably came in the past 200 years as a result of hunting, he said; if the genes are the same, the population drop could date as far back as the last ice age.