

The following is a summary from Chapter Three, “Prides and Prejudice,” from *Tears of the Cheetah* by Dr. Stephen O’Brien. Dr. O’Brien is a medical geneticist and conservationist whose science adventure stories cover the earth’s most endangered and beloved wildlife. *Tears of the Cheetah* takes a look at the genetic backgrounds of different animals from around the world. This chapter explores the genetics of lions.

Prides and Prejudice: Summary

In 1987, at the request of Craig Packer, an assistant professor at the University of Minnesota and manager of the longest running lion ecology study, Dr. Stephen O’Brien gathered a team of scientists and a wildlife photographer to study the genetic history and diversity of lion populations. They collected biological specimens including blood and skin from twenty-seven lions in Serengeti National Park and from sixteen lions in the Ngorongoro crater, both in Tanzania. They used these specimens to study and compare the two populations of lions.

Serengeti National Park is located in the Serengeti-Mara ecosystem in Tanzania, a 25,000 square kilometer savannah defined by the migration patterns of twenty-eight herbivorous species. These large migrating herds provide prey for carnivore species including the lion. The area is filled with one of the richest densities of large fauna on earth.

The Ngorongoro Crater is a long-extinct volcanic caldera where two-thousand-foot-high mountainous walls surround a 2.50-square-kilometer crater floor covered with dense vegetation. In 1962, the lion population in the crater was affected by an outbreak of bloodsucking flies that left the lions barely able to hunt. The population in the crater plummeted from a high of one hundred lions to a low of ten individuals. By the 1980s, the lion population had rebounded to a large number. O’Brien’s team wanted to study the effects of the 1960’s bottleneck on the genetic diversity of the lions found in the crater twenty-five years later.

The scientists first examined the specimens from the Serengeti lions. They found that these lions had a great deal of genetic diversity, similar to what you would find in domestic cats or other wild cat populations like ocelots or leopards, leading to healthy lions. When they studied the Crater lions, they found that these lions had 50% less overall genetic diversity than the prides in the Serengeti. The 1962 bottleneck had cost the crater lion population half of its endemic genetic variation. The inbreeding that occurred after the bottleneck led to reduced reproductive success and increased birth defects in the Crater lion population.

The group then went on to study Asiatic lions. The remaining wild population of about three hundred Asiatic lions is found in the Gir Forest Sanctuary in the Gujarat peninsula of western India. Asiatic lions were almost extirpated by agricultural development and rampant colonial big-game hunting around the turn of the twentieth century. Records show multiple occurrences when the population dropped to fewer than 20 individuals between 1880 and 1920. Hunting was outlawed in the 1920s, allowing the population to increase gradually to its present size.

Blood samples were collected from six wild males in the Gir Sanctuary and twenty-eight captive Gir lions at the Sakkarbaug Zoo. The researchers were shocked to find that both populations had virtually zero measurable genetic diversity. The lions were all essentially identical. Conception rates were very low and cub mortality rate was very high when compared to African lions due to the extreme inbreeding. In fact, O’Brien’s team found that some phenotypes long thought to be distinctive traits of Asiatic lions (reduced mane, belly fold and skull variations) were actually due to inbreeding.



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At the request of the Asiatic Lion SSP, captive lions in the SSP in America, Australia and Europe were tested and found to have more genetic diversity than the Gir lions. After examining their alleles and tracking them back to the five founder lions, O'Brien's team determined that two of the five founders were actually from Africa. That meant that the thirty-eight zoos in the SSP that had spent decades breeding "pure Asiatic" lions had inadvertently created a hybrid population. As a result of this discovery, all SSP lion hybrids were fitted with birth control implants to discontinue hybrid breeding.

The Serengeti lions serve as an example of the benefits of genetic diversity, while the Ngorongoro Crater and Gir Forest lions show the enormous genetic cost of inbreeding and lack of genetic diversity.



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