ScienceWatch – The Mane Thing About Lions

The most regal feature of the king of beasts is his mane. But exactly why do male African lions (*Panthera leo*) have manes? Common belief is that the mane is a sexually selected trait advertising a male's physical condition to females. Alternatively, the mane is a selected trait that serves as protection in fights between males. Fights among males often occur when a coalition of males seeks to take over another coalition's pride. If the challengers are successful they kill all nursing cubs to bring the females back into estrus.

If females preferentially mate with males exhibiting the best examples of a trait, then the trait may become exaggerated. Consider the iridescent tails of peacocks or the elegantly ornate plumage of male birds of paradise. Animal behaviorist, Craig Packer of the University of Minnesota, St. Paul, MN, has studied lions at Serengeti National Park in Tanzania for 24 years, establishing a huge database on individual animals. When Peyton West, a graduate student, joined his team she used the database to ask if the mane is really favored by sexual selection like a peacock's tail or is it favored because it protects a male in fights for supremacy over other males? Moreover, what happens if environmental conditions work against a sexually selected trait? For example, do warmer temperatures keep manes short to reduce heat load?

West and Packer studied close to 300 lions living in the park from 1996 to 2001. They also searched the database going back to 1964 using photographs of lions to compare manes with records of age and testosterone levels. Their report appears in the August 23rd 2002 issue of *Science*. They found that males with longer, darker manes were more mature, had higher testosterone levels, were in better condition and had fewer injuries due to fights. Short manes indicated males with poor fighting ability or health.

To test whether these signals are observed by other lions the researchers set out two life-sized male models differing in either mane length or darkness. They then attracted lions by playing back recordings of scavenging hyenas and filmed the results. They saw significant differences between the behaviors of males and females as they drew near to the models. Male lions always preferred the light-maned model and were more likely to approach the short-maned model. Females favored the dark-maned model, but showed no preference for longer manes. Apparently males, fearing a fight they would lose, avoid dark-maned "macho" males, while females seek to mate with them to gain protection for their cubs from invading male coalitions.

Using an infrared camera the team also found that male lions with exaggerated manes suffer from greater heat stress due to higher body temperatures. Not surprisingly, manes are shorter and lighter colored during warmer seasons and in lion populations living in hotter climates. For example, lions living in the hot, moist climate of the Gir forest of India lack manes or have short ones. Those that lived the cool mountainous regions of Morocco had extensive, extremely dark manes.

Thus, it appears that the lion's mane reflects a complex interaction between reproductive benefits and environmental stress. Mane length and darkness are advantageous, but darkness appears to be the key signal to other lions, especially females. Long-term climate forecasts predict rising average temperatures over the region and are expected to yield shorter, lighter manes. The "MGM" lion may become a thing of the past.

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