

Intrasexual Selection and Intersexual Selection in Two Male African Animal Species with Exaggerated Secondary Sexual Characteristics

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Image courtesy of Craig Packer.

Despite the differences in intrasexual and intersexual selection as it relates to males in a species, Smith and Smith (2015) note that, “some of the same [secondary sexual] characteristics related to intrasexual selection can be seen in intersexual selection.” These include horns, antlers, and in the case of lions (*Panthera leo*), mane coloration.

Lions are a sexually dimorphic species. Males are larger in both size and weight than females, and they adorn thick tufts of fur around the head, face, neck, and chest that begin growing just before sexual maturity. Concerning fitness, West and Packer (2002) suggest that phenotypic features such as mane size, mane color, and mane presence or absence are associated with genetic preconditions, the production of testosterone, and the state of sexual maturity.

Concerning color specifically, West and Packer (2002) discovered that darker-maned lions are positively associated with increased fitness. In addition, and also concerning phenotypic

plasticity among male lions, West and Packer found that when given the option, lionesses consistently select darker-maned males in lieu of blonde male counterparts.

This sexual selection discovery was made during a series of experiments, whereby professionally crafted dummy lions fitted with both phenotypic traits (dark and light colored manes) were placed in Tanzania's Serengeti National Park. After a number of recorded playbacks of lion roars (known in ecology as call-up surveying), both researchers noted that in a series of sexually suggestive displays, approaching females largely favored the dummy lions with the dark-maned phenotype. This suggested better fitness due to the fact that dark-maned males were found to have, "longer reproductive life-spans and higher offspring survival," (West, 2005) and are generally more feared by male rivals with blonde manes. It can thus be inferred that females prefer darker-maned males to blonde males since it means better offspring protection through the defense of territory, not to mention an increase in offspring survival. There are ecological trade-offs for dark-maned males, however, including an increase in heat stress from higher body temperatures resulting from dark mane coloration and subsequently less food intake during annual hot months (West, 2005; Science Watch, n.d.).

By contrast, another animal with secondary sexual characteristics that illustrates intrasexual selection is the kob (*Kobus kob*), an ungulate antelope that inhabits savanna habitats throughout East, Central, and West Africa (Kingdon, 1988). Like lions, the kob is another sexually dimorphic species. Males are larger than females, and only males adorn horns. It is these horns that males will use in intrasexual competition.



Image courtesy of Wikimedia.

In particular, kob males will participate in a lek. Broadly defined, a lek is an area where a male species will congregate to acquire female mates (Kingdon, 1988). For kob, the lek consists of an

area where males will meet and engage in intrasexual competition for mating rights, specifically utilizing their horns as secondary sexual characteristics in aggressive displays and male-to-male combat. According to Buechner and Schloeth (1965), there are typically only one or two horn clashes that occur when male kob fight one another, and fighting is as ritualized as it is physical. This is all done to, "determine superiority," and male fatalities never occur as a result of the lek (Buechner & Roth, 1974; Estes, 1991).

While kob who gain access to female harems by winning leks may appear to have an overall increase in fitness, it should be noted that such activities may reduce the probability that a male will survive. For example, the allocation to reproduction in the lek could bear the cost of an increased risk of predation by predators such as *P. leo* or leopard, *Panthera pardus*.

Balmford et. al. (1992) draw attention to the fact that though, "reduced predation risk has been suggested as a major advantage to males and females of mating on leks rather than elsewhere...predation risk to males was [found to be] relatively high around its periphery," suggesting the additional trade off between the possible predator detection resulting from high numbers of males and females, and the tendency for leks to draw more attention from predators.

Returning to *P. leo*, the color or shade of the mane itself is not important on its own. It does, however, imply that the male lion carries genes for "high viability," which is why secondary sexual characteristics that are exaggerated are often sought after by females of different species.

When thinking about the aforementioned trade-offs in dark-maned lions (the increase in bodily heat stress from higher internal temperatures and less food consumed during the hot months of the year), it is important to consider that a male that makes it to adulthood is one with overall health, strength and genetic dominance (West & Packer, 2002). Thus, females are selecting males based on their resistance to environmental selection pressures.

It is also interesting to observe that manes are highly variable both within and between populations, not just in color or hue, but also in patterns ranging from mohawk-shaped and balding shapes to fur that reaches the chest and even down to the back of the elbows. If lions survive human persecution in Africa and their very small range in the Gir Forest of India, further research should be carried out to see how their manes might continue evolving under the ecological stress associated with competition for mates. Moreover, might mane variation in males and continued preferential selection in females lead to some sort of sympatric speciation within a microevolutionary framework, thus leading to subspecies? In furtherance of ecological and evolutionary understanding of *P. leo*, such a question would be worth exploring.

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