Materials and Methods

All data analyzed using the SAS system for Windows software, release 8.02.

Wounding was measured from the distribution and consequences of 954 lion-inflicted wounds on 504 lions recorded from 1974-2001. We divided wounds into four regions of the body: neck/shoulder region (delineated by the perimeter of the mane), trunk, legs and face. If the mane serves primarily as a protective shield, lions should be wounded most often on the neck/shoulder area, but the proportion of wounds was fairly evenly distributed over all four regions in females and subadults (animals whose neck/shoulders are clearly visible) and in the remaining three regions for adult males. If this part of the body is most vulnerable, lions should be less likely to survive wounds to the neck/shoulder area. However, females and subadult males were equally likely to survive 12 mos after wounds to each part of the body.

Most photographs taken from 1964-1990 were black and white; color film was used from 1991. Each photograph was graded for length and color by 5 undergraduate judges who had never seen the animals in the wild. Multiple images of the same male were evaluated collectively if they were taken within a one-week period. For each male, the judges' highest and lowest scores were discarded, and the remaining 3 were averaged. The averages were normalized so that the mean across all males was 1.0. We found no statistically significant effect of picture quality or film type on the judges' scores. Except for Fig. 1 and Fig. S1, each male was only represented once (using data collected closest to his ninth birthday).

Playback experiments followed the protocol described by R. Heinsohn and C. Packer (*S1*). Roars were randomly selected from recordings of five different females, all of whom were unfamiliar to the experimental subjects. Roars were recorded on a Panasonic SV 250 portable digital audio tape recorder through a Sennheiser MKH816T directional microphone. Roars were broadcast through a Proton 100 watt/channel amplifier and a Klipsch Heresy speaker adjacent to the vehicle, parked 200m from subjects. All animals were habituated to the vehicle. Peak sound pressure levels were 116 db at 1 m. All responses were video-taped. Each coalition was tested one time, and we calculated the absolute differences in mane length and color scores between males in a given experiment and ranked these differences.

Patterns of feeding behavior based on observations at 100 carcasses. Cubs feed significantly longer at medium-sized carcasses in the presence of dark-maned males ($t = 3.10$, $P = 0.0027$, $N = 76$ cubs), but significantly less at small carcasses ($t = -4.00$, $P = 0.0001$, $N = 125$ cubs). The extra time that cubs spend feeding at larger carcasses largely derives from the fact that dark-maned males exclude adult females from these carcasses ($t = -2.51$, $P = 0.0143$, $N = 75$ females).

Mane hair samples were collected during routine immobilization. Hairs were washed, mounted on slides, and digitized at 10x magnification using Metamorph software. The images revealed that hair color is related to melanin content; dark hairs contain granules of

eumelanin while light hairs either contain phaeomelanin granules or no pigment at all. Hair colors followed a bimodal distribution and were mostly either very dark or very light. We eliminated medium-colored hairs and found the average widths of 2-8 hairs of each color per individual using IP Lab 3.5 Evaluation software.

We used a Flir 590 NTSC camera to take thermal images of Serengeti/Ngorongoro males. The camera produces measurements of infrared radiation which are translated to surface temperatures after correcting for ambient temperature, distance and humidity. All animals were imaged during a two-month span in the dry season to control for humidity, and all images were collected at least ½ hr after direct exposure to sunlight. Each animal was sampled repeatedly during a single 1 hour time span, and images taken during this period were averaged. We analyzed the images using Irwin Research 2.01 software, selecting a trapezoidal area covering the flank area as this was easily controlled between animals and images (Fig. S2D). The software calculates the average temperature of all pixels in the selected area. Ambient temperature was measured in the shade, and distance from camera was confirmed by comparing image sizes to standard measurements. Temperature accuracy of the camera is ± 0.1°C. We used a Prism DS camera in Tsavo; otherwise, the protocol was identical.

Supporting Text

The Barbary lion (*Panthera leo leo*) and the Cape lion (*P. l. melanochaita*) were both typified by extremely dark, extensive manes, and both lived in cool mountainous regions. Lions living in hot, moist climates such as the Gir forest of India (*P .l. persica*) or Tsavo East National Park in Kenya often have short manes or no mane at all (see Fig. S2C).

The relationship between mane length and ambient temperature may have a dietary component; variation in ambient temperature can alter development through effects on both maternal and juvenile nutrition (*S2*). However, ambient temperature during growth directly influences adult morphology in rabbits (*S3*).

Figures

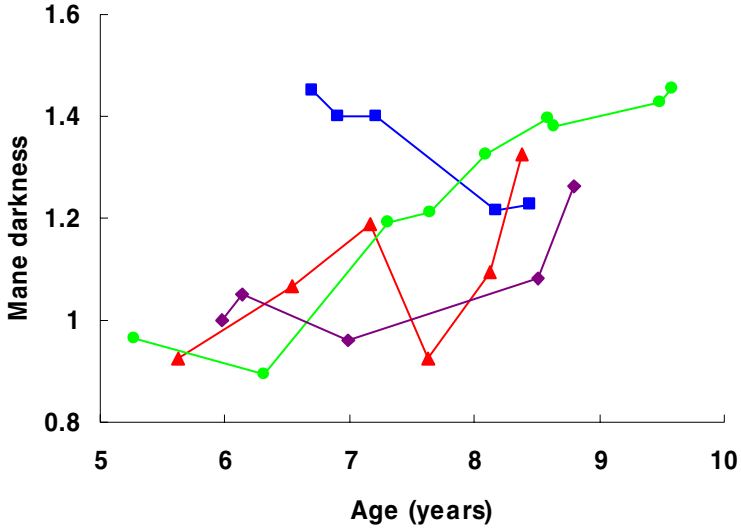

Fig. S1. Age-changes in mane darkness in five selected males. Although manes generally darken with age (see Table 1), some males' manes darkened rapidly, some oscillated back and forth, while others became lighter as they grew older.

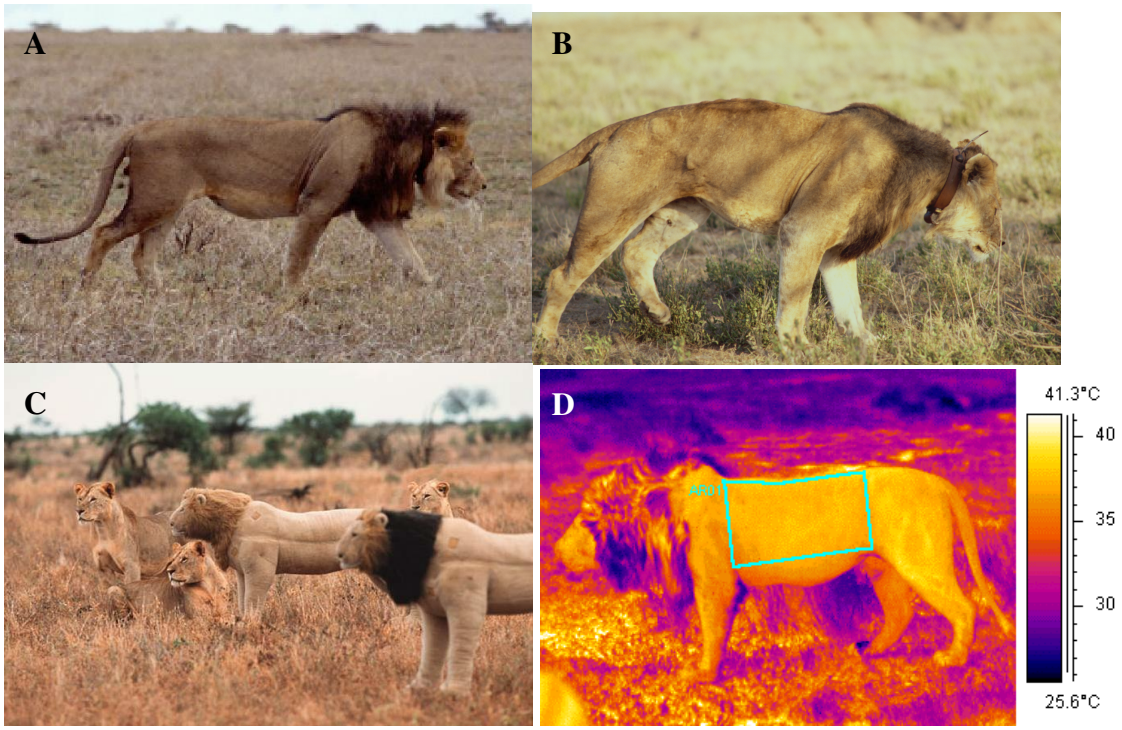

Fig. S2. A. Healthy Serengeti male in March 1999 and **B**. in January 2000 after developing an infection post-injury in October 1999. **C**. Three maneless males in Tsavo next to the light-maned model (photo by R. Caputo). **D**. Infrared image of Serengeti male. Image color denotes surface temperature; blue box outlines the sample area.

Table

Table S1: Responses to model experiments. The contrast between male and female behavior is significant for both mane darkness (P = 0.002, Fisher's exact test, two-tailed) and mane length (P = 0.018)

	Approach:		Approach:	
	Dark-maned model	Light-maned model	Long-maned model	Short-maned model
FEMALES	9	1	7	3
MALES	0	5	1	9

Movies

Movie S1. A male approaches the short-maned model in a test to determine the importance of mane length to male-male competition. After circling around behind the models, the male approaches with extreme caution and eventually sniffs the model's hindquarters.

Movie S2. An "excess" estrous female approaches the models in a test to determine the importance of mane color to mate choice. She angles towards the light-maned model before approaching the dark-maned model which she inspects from a few meters away. Eventually she "walks sinuously past" the dark-maned model indicating sexual interest by weaving and lifting her tail. In the background, her resident male watches but remains behind to guard another female.

References

S1. R. Heinsohn and C. Packer, *Science* **269**, 1260 (1995)
S2. M. C. Forchhammer, T. H. Clutton-Brock, J. Lindsrom, S. D. Albon, *J. Anim. Ecol*. **70**, 721 (2001)
S3. K. C. Williams, R. J. Moore, *J. Anim. Ecol*. **58**, 495 (1989)