

Evolution: Change in Allele Frequencies

Evolutionary Success: Leaving a greater proportion of alleles in the future generations than the average individual.

Reproductive Success: Leaving more offspring (carrying your genes) in future generations than the average individual.

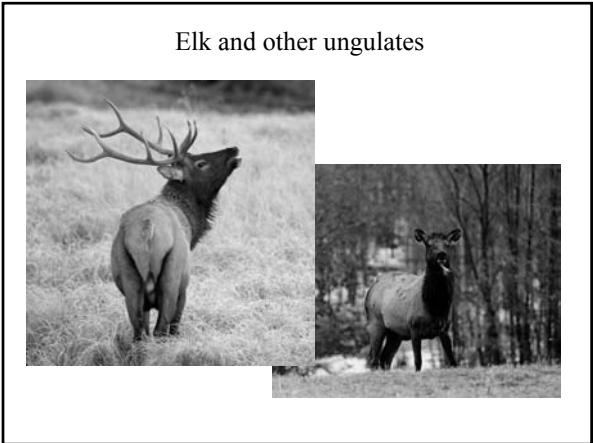
Cost of Reproduction

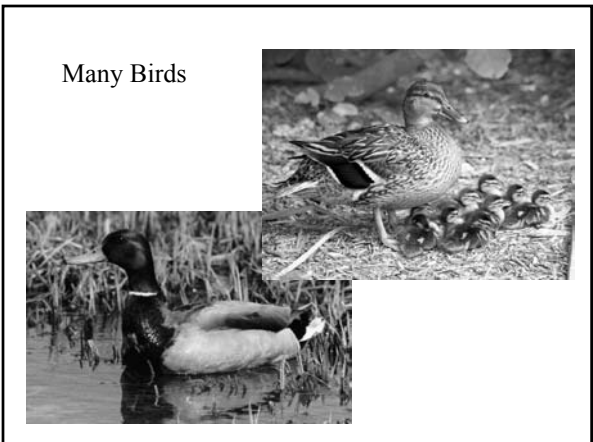
	♀♀	♂♂
Energy & Matter:	gametes parental care	gametes parental care
Time:	make gametes gestation parental care	make gametes parental care
Risk:	egg laying gestation and birth	?

Sexual Selection: differences in selective forces acting on individuals of the same species due to differences of gender.









Strategies for Maximizing Reproductive Success:

Females: Assume each female can have a maximum of 20 offspring during her lifetime due to limitations of gestation time and parental care (lactation and training).

What strategies would increase reproductive success?

Males: Assume each male can fertilize as many females per day as he may find willing to accept him AND provides no parental care whatsoever.

What strategies would increase reproductive success?

Resultant Gender-Specific Strategies

Female Choice:

Maximize probability of offspring survival and reproductive success by choosing the 'highest quality' male with whom to mate.

Male-Male Competition:

Maximize mating opportunities by 'convincing' females that you are the highest quality male available.

Female Choice and the 'Good Genes' Hypothesis

The Good Genes Hypothesis:

Females choose males with qualitatively superior genes

Must be indirect choice, so females must be keying in on some observable characteristic that correlates to "good genes"

Characteristic could be Physical: tail length, pheromones

OR

Social / Behavioral: display, interaction with other males

Male birds-of-paradise often exhibit exceptionally long tails which may hinder flight more than aid in it.

Why?

Hypothesis: Female birds of paradise choose mates based upon tail-length.



Birds-of-Paradise Example

Experiment 1: Measure tail lengths and male mating success.

Prediction: ?

Result: Males with longer tails sequestered majority of matings.



Birds-of-Paradise Example

Experiment 2: Cut tail of successful male short and glue to end of unsuccessful male bird-of-paradise.

Prediction: ?

Result: Cut-tailed male suffered sequestered fewer matings than male with artificially lengthened tail.



Fate of Alleles for Male Preference in Females

		Correlation of Character to Gene Quality	
Male Character	A	Positive	
	B	None	
	C	Negative	

Fate of Preference Alleles based on Female Reproductive Success

		Correlation to Male Gene Quality	Relative Female Reproductive Success
Male Character	A	Positive	Above Average
	B	None	Average
	C	Negative	Below Average

Fate of New, Alternative Preference Allele

New Assumptions:

Female's sons will look and behave like their Father.

Female's daughters will look and behave like their Mother.

Female has choice between Males **A** and **B**.
With whom should she mate?

Female prefers **A** over **B** **A**
90% of females are mating with **A** **A**
90% of females are mating with **B** **B**

Conclusion:

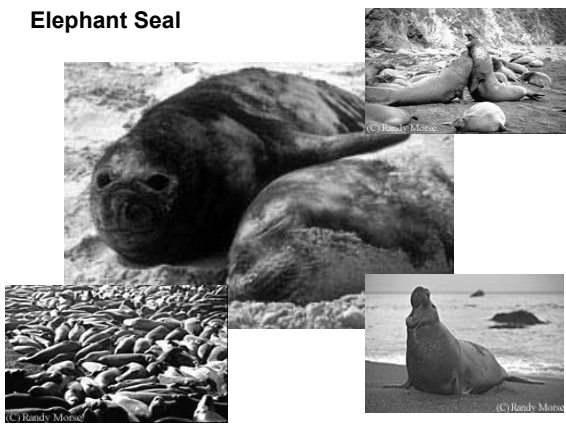
Male character need not be indicative of 'good genes' in any sense other than for female preference itself.

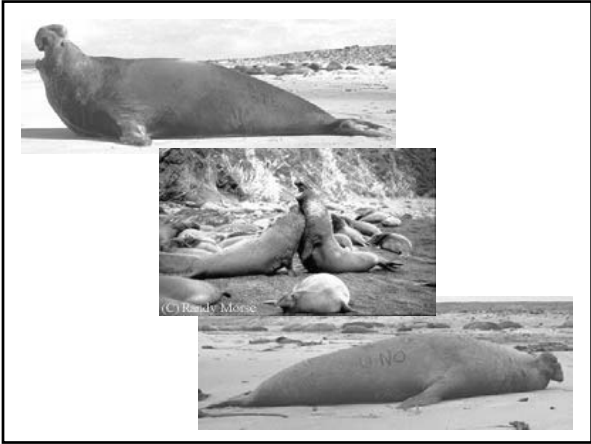
Runaway Selection:

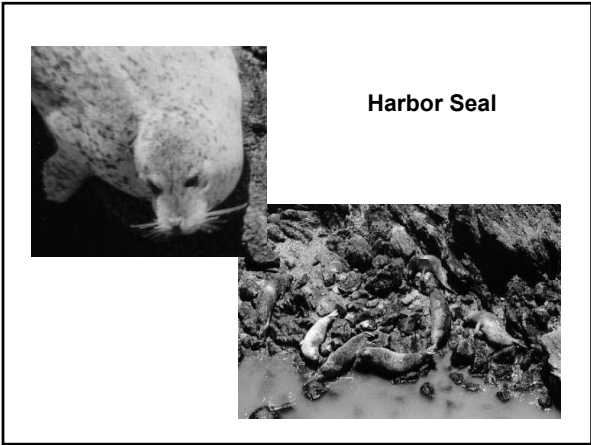
Female choice generates ever increasing level of male character expression UNTIL negative selection pressure counteracts female preference.

Range of Theoretically Possible Mating Systems

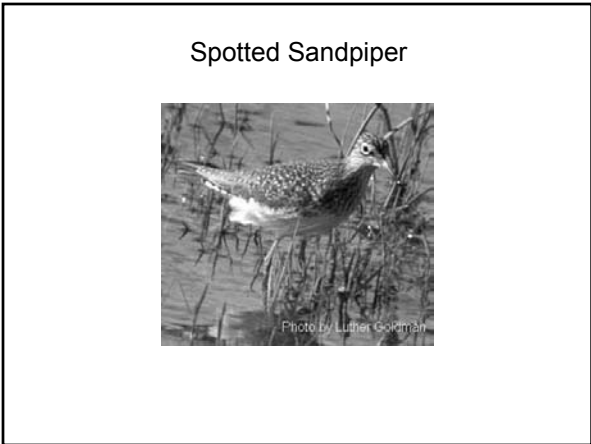
Elephant Seal







Harbor Seal



Spotted Sandpiper

Photo by Luster Goldman





Chimpanzee



Gorilla
