

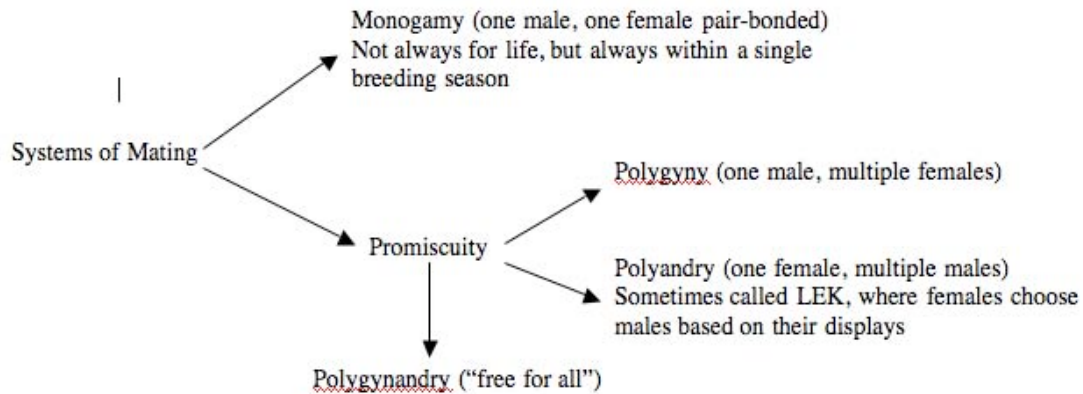
## Sexual Selection

Or, competition for mates or fertilization

After *On the Origin of Species*, Darwin wrote *Descent of Man*, in which he applied his theories on descent with modification to humans

- Essentially, his book covered selection in relation to sex

Here are the known systems of mating:



- The systems in which males must compete for females lead to extreme competition among the males (physically or competition of their sperm) and sexual dimorphism (marked differences in appearance between males and females of the same species: think of peacocks)
- Darwin hypothesized about two forms of sexual selection: intrasexual and intersexual
  - Intrasexual includes male-male competition for females. This often results in body size sexual dimorphism, meaning that the males are much larger than females and often have adaptations to fight other males, i.e. antlers on the extinct Irish Elk)



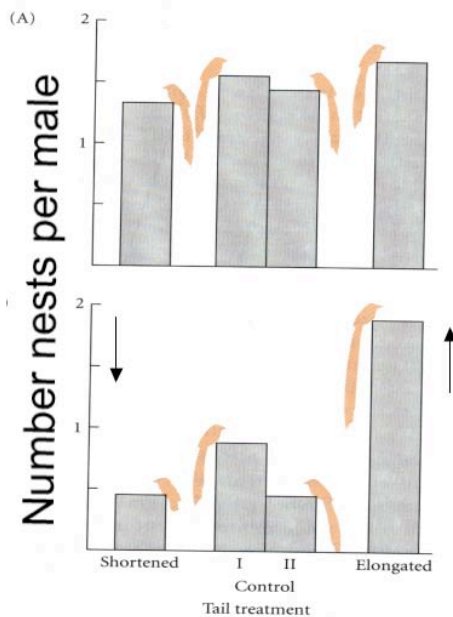
2. Intersexual competition is the case where males must show themselves to be genetically attractive to females, such as the satin bowerbird, which decorates its nest with blue materials, such as flowers or plastic

Sexual selection can be identified through experimentation, such as in the Long-Tailed Widowbird:

- In Widowbirds, longer tails are more attractive to females looking for mates
- In this study, three groups of the birds were established: a regular control group, a group in which the males' tails had been cut off/shortened, and a group in which the tails from the second group of males were glued to a set of normal males

Here are the results:

Female choice: manipulation of tail-length in male widowbirds



One might ask, "If longer tails mean better reproductive success, why don't males have longer tails than they naturally do?" This is where the subtle balance between natural and sexual selection. A longer tail might decrease a male's chance of survival before he is able to reproduce, thus lowering his reproductive fitness.

Futuyma. Evolution. 1st Ed.

Back to Mating Systems:

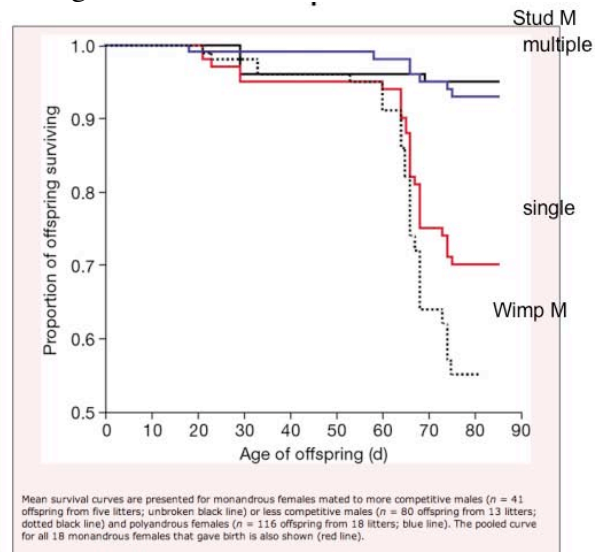
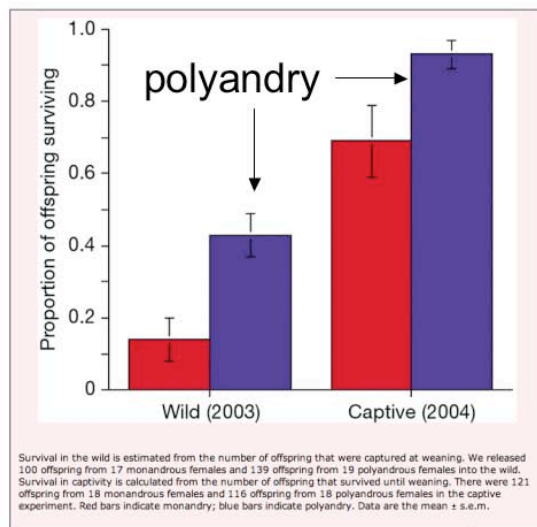
In polygynandrous and polyandrous systems, females are promiscuous, and mate with many males. As a result, males develop sperm competition to ensure that their sperm (and genetic material) make it to the egg first

- In general, one sperm reaches one egg, but the norm is that females can ovulate multiple eggs, opening up the potential for multiple paternity as well
- Sperm often cooperate to make it to the egg first, such as aggregating to swim faster
- Fisher & Hoekstra did research on sperm aggregation in mice, and found that in sperm from a promiscuous variety of mouse, sperm from one male clumped together, yet in a monogamous variety's sperm, sperm clumped randomly, and sometimes with sperm from another species

## Advantage of Multiple Mating

In species that practice multiple mating, sperm competition mediates the survival of offspring

- In the marsupial mouse *Antechinus*, all mating occurs within a two week period, after which all of the males die. During that period, the males mate with as many females as possible, and vice versa.
- Fisher (a different one) found that females that mated with multiple males had a higher percent of their offspring surviving:



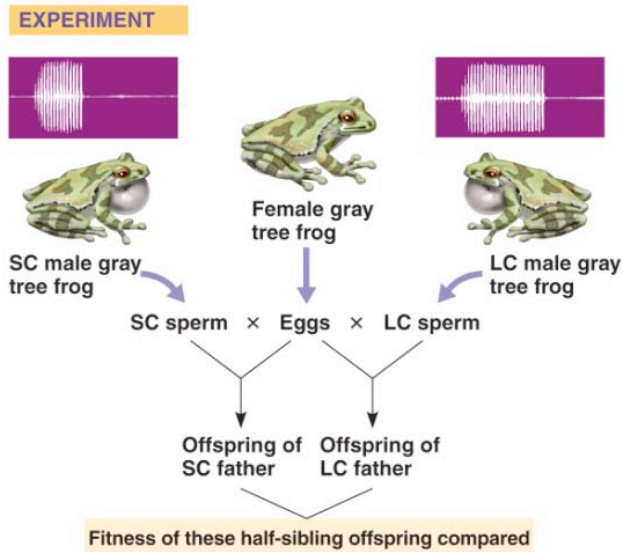
(Fisher et al. 2006 Nature 444: 89-92)

- Also, males that were able to mate multiple times had higher offspring survival rates, suggesting that their DNA was generally more fit

## Why do females choose?

- There is a direct benefit to the female's own fitness, such as a female pairing with a male who controls a better territory with better resources that she can share by mating with him
- There is an indirect benefit to the female's offspring, rather than the female herself
- This gives rise to the "Good Genes" Hypothesis, which states that males able to convince females to mate with them based on their physical traits are better adapted to the environment, as will be their offspring
- An example of an experimental test of the good genes hypothesis concerns Gray Tree Frogs:

Note that females prefer males with long calls:



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**RESULTS**

Fitness Measure	1995	1996
Larval growth	NSD	LC better
Larval survival	LC better	NSD
Time to metamorphosis	LC better (shorter)	LC better (shorter)

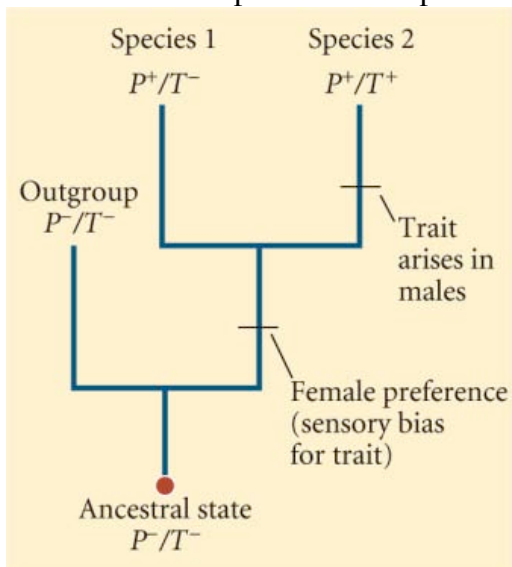
NSD = no significant difference; LC better = offspring of LC males superior to offspring of SC males.

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Males with longer calls  
had more successful  
offspring

Figure 23.16 (pg. 482, 8<sup>th</sup> edition)

Males can also exploit females' pre-existing preferences:



**EVOLUTION 2e, Figure 15.22**

P+ indicates that females have the preference  
P- indicates no preference

T+ indicates that males have the trait preferred by females  
T- indicates that males do not have the trait preferred by females