
ESRM 350

**Reproduction and
Mating Systems**

Autumn 2013

**Life's but a walking shadow, a poor player
That struts and frets his hour upon the stage
And then is heard no more.**

- *Macbeth*, William Shakespeare

Reproduction

- The *sexual* or *asexual* process by which organisms produce individuals of the same kind
 - **sexual reproduction**: new individuals created through combination of genetic material from (at least) two parents
 - **asexual reproduction**: new individuals created as near perfect copy of one parent
- From an evolutionary perspective
 - means by which individuals pass on their genes
 - the ultimate determinant of fitness

Sexual vs. Asexual Reproduction

- The “Two-Fold Cost” of sexual reproduction
 - Sexual reproduction transfers only half of an individual’s genome to the next generation
 - asexually reproducing individuals get *double* the fitness benefit per reproductive event
 - Also called the “two-fold cost of males”
 - females in asexually reproducing species don’t need males
- Why so many sexually reproducing species, then?

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- Why so many sexually reproducing species, then?
 - recombination via sexual reproduction leads to increased diversity; adaptability in populations

Sexual Selection

- Special case of natural selection where fitness differences manifest as variance in the number of mates
 - Female choice
 - Male-male competition
- Can lead to sexual traits that are otherwise costly
 - energetically expensive
 - dangerous (peacock)

http://www.youtube.com/watch?v=SB8UodV_DJg

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 - Female choice
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- Can lead to sexual traits that are otherwise costly
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- Contributes to diversity in mating tactics, systems that we observe in wildlife populations

Mating Systems

- Describe how males and females in wildlife populations pair when choosing a mate
 - only apply to sexually reproducing species
- Four main categories
 - Monogamy
 - Polygyny
 - Polyandry
 - Promiscuity

Monogamy

- Pairing with a *single* member of the opposite sex
 - lifetime
 - serial
- Benefits
 - shared parental care, resource defense

Blue-footed Booby (*Sula nebouxii*)

Males and females often bond for life (15-20 y)

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 - offspring not as diverse
 - **solution:** extra-pair copulations

53% of paired females engage in
extra-pair copulations

Bennet and Owens (2001)

Polygyny

- Pairing where one male mates with several females
 - Harem: dominant male lives with group of females, mates with each during breeding interval (e.g., lions)
 - Serial: One male attracts passing females in turn (e.g., lyrebird, many frogs and toads)
- Benefits
 - females mate with “high-quality” males
 - males get access to numerous mates
- Cost
 - low **operational sex ratio** (few males mating)
 - reduces effective population size

Lek Mating

- Special case of polygyny where males gather and display competitively for females, who do the choosing
 - males defend small territories solely for display
 - no resources involved
 - gathering may help males attract females

Lekking sage grouse (*Centrocercus urophasianus*)

Sage grouse leks can include 25-30 individuals

<http://www.youtube.com/watch?v=m0M8pZnNlI>

Polyandry

- Pairing where one female mates with several males
 - simultaneous: female's breeding territory encompasses that of many males (Northern Jacana, *Jacana spinosa*)
 - sequential: female mates with several males in turn (e.g., spotted sandpiper, *Actitis macularius*)
- Same benefits and costs as polygyny
 - but, sex roles can be reversed
 - males invest in parental care
 - females often the larger (and more colorful) sex

Polyandry in Reptiles

Green anaconda (*Eunectes Murinus*) “mating ball”; 2-12 males wrestle for chance to copulate with the much larger female

Promiscuity

- Males and females engage in multiple, indiscriminant copulations
 - Low skew in mating success among individuals
 - Competition often takes the form of “sperm competition”
 - sperm production corresponds to greater chance of paternity
 - copulatory plugs

Chimpanzees (*Pan troglodytes*) are known to mate promiscuously within social groups

Reproductive Strategies

- Two major reproductive strategies, or lifestyles
- ***r*-Selected** species
 - live life in the “fast lane”
 - short lived
 - produce lots of offspring
 - little parental care
 - high mortality rate

Pacific tree frogs (*Pseudacris regilla*) produce many offspring (females lay 400 - 750 eggs in small, loose, irregular clusters of 10 - 80 eggs each), provide little parental care

Reproductive Strategies

- Two major reproductive strategies, or lifestyles
- **K-Selected** species
 - live life in the “slow lane”
 - long lived
 - produce few offspring
 - provide parental care (sometimes considerable)
 - low mortality rate

Mountain gorillas (*Gorilla beringei beringei*)
produce few offspring (first give birth at 10,
then every 3-4 years; 8.5 month gestation and
single infant born) and provide lots of parental
care (weaning after 3.5 years)