ESRM 350

Reproduction and Mating Systems

Autumn 2016

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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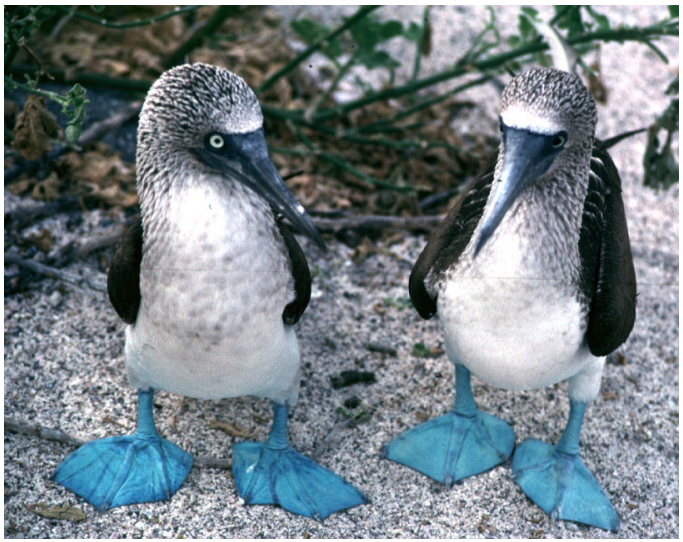
- Contributes to diversity in mating tactics, systems that we observe in wildlife populations

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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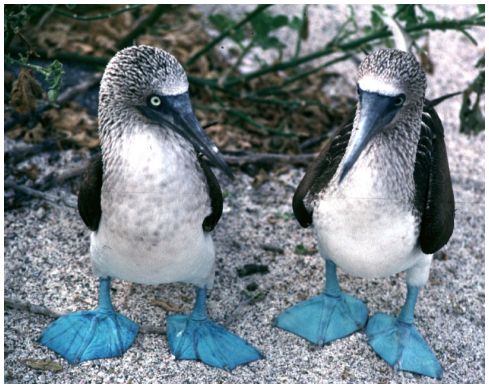
  - **solution**: extra-pair copulations



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=m0M8pZnNlnI

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 both mate with multiple partners, sometimes indiscriminantly
  - 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

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- 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)