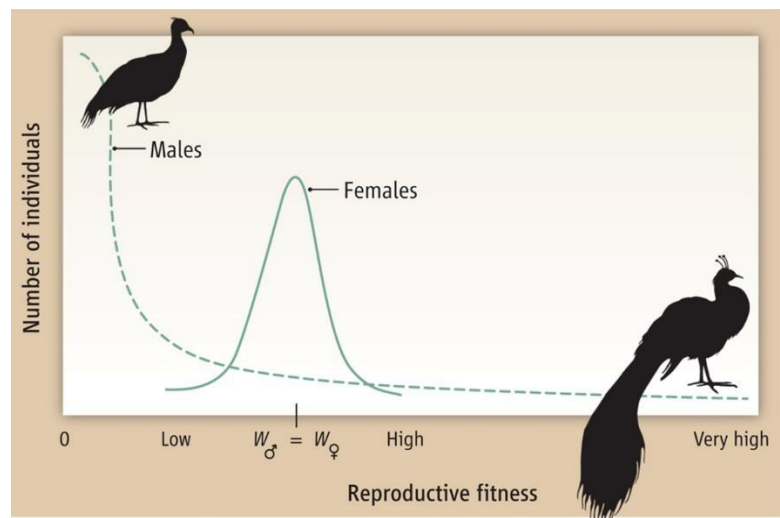


Lecture 10 – Sexual Selection

1. What is the biological distinction between males and females?
 - a. Gamete size
 - i. Males produce sperm which are small; females produce eggs which are large.
This is fundamental distinction between males and females across all organisms.
 - ii. Why is there a difference in gamete size?
 1. Selfish Sperm Competition Theory
 - a. “Males” reduce gamete size to make more, forcing “females” to increase gamete size
 - b. Possible, but not mathematically supported
 2. Cooperation
 - a. Beneficial to have quick, motile, numerous gametes (sperm) as well as larger, well-provisioned gametes (egg)
2. Investment
 - a. Eggs more expensive to produce than sperm
 - b. Also, much rarer (for humans, only 300-500 eggs released. For males, >12 billion sperm produced per month)
 - c. Thus, an egg cell is worth much more than a sperm cell
 - d. Small number of eggs coupled with plenty of sperm means that:
 - i. Male fitness increases with # matings
 - ii. Female fitness stabilizes after small # matings
 - e. Bateman’s Principles:
 - i. Females should be choosier, to reflect their greater investment
 - ii. Female choosiness should translate to large reproductive variance in males (but not females)
 1. High quality males sire many offspring, low quality males sire none (or very few)
 2. Females sire average number offspring, regardless of quality
 - f. Sexual Dimorphism
 - i. Traits that differ between males and females
 - ii. Males usually have more exaggerated sexual characters
 - iii. For males:



1. High investment in attractiveness/ toughness
 2. Less gamete investment
 3. Less paternal care
 - iv. Unless males invest highly in offspring!
 1. Then, males choosy too
 2. Lower sexual dimorphism
 3. Lower reproductive variance
3. Mating Systems
 - a. Polygyny:
 - i. 1 male, multiple females
 - b. Polyandry:
 - i. 1 female, multiple males
 - c. Monogamy:
 - i. 1 female, 1 male
 - d. Promiscuity:
 - i. Multiple females and males
 - e. Polygynandry:
 - i. Pair bonds between multiple males and females
4. Sexual Selection
 - a. Traits which help the organism reproduce are favored
 - b. Sexually selected traits may “pull” in the opposite direction from naturally selected traits
 - i. For example, bright male coloration that is attractive, but dangerously conspicuous
 - c. Intrasexual Selection: “Between” sexes; females choose among males
 - i. Often elaborate male 2nd sexual characteristics
 - ii. Evolution of mate choice:
 1. Direct Benefits
 - a. Nuptial gift: Male provides food item, then mate with her while she consumes it
 2. Good Genes
 - a. Females choose mates most likely to pass on good genes to their young
 - b. Honest signaling mechanisms prevent males “faking” high fitness
 3. Runaway Sexual Selection
 - a. Positive feedback: females attracted to trait, trait becomes more elaborated, females MORE attracted to trait, trait still MORE elaborated, etc...
 4. Sensory Bias
 - a. If females show some previous preference for certain stimuli, males may hijack that stimuli
 5. Non-genetic mechanisms mate choice:
 - a. Sexual Imprinting

- b. Mate Copying
 - d. Intrasexual Selection: “Within” sexes; usually male-male competition
 - i. Males compete amongst themselves for access to territory/resources
 - ii. Females may choose among males based on results of male/male competition
 - 1. Lekking: males display in ritualized areas, compete for “high status” locations
 - iii. Types of Intrasexual Competition:
 - 1. Male-male aggression: May be serious combat, but more often systems in place to limit danger
 - 2. Male-male Competition by interference
 - 3. Male-male competition by cuckoldry
 - 4. Sperm competition:
 - a. If females mate to multiple males (promiscuous mating systems), male sperm can compete within female reproductive tract
5. Back to investment:
- a. Males low investment sex, high reproductive variance, dramatic dimorphism; Females high investment, low reproductive variance, less dramatic dimorphism
 - i. In cases where males are high-investment sex, situation is reversed
 - b. Revisiting Bateman’s Principles
 - i. Modern conceptions of Bateman’s principles prioritize investment inequality over biological sex
 - 1. High Investment sex should be choosy (usually females, but not always)
 - 2. Low investment sex will have high reproductive variance
 - 3. Effects will be amplified in species with greater investment inequality
6. Evolution of Mating Systems
- a. Why would a male “agree” to monogamy?
 - i. Mate-Assistance Hypothesis
 - 1. Scarce Resources
 - 2. High-Investment Offspring
 - ii. Mate Guarding
 - 1. Increase paternity assurance
 - 2. Helps to have small breeding window/ overlapping female ranges
 - iii. Infanticide Risk
 - b. Why would a female “agree” to polygyny?
 - i. Polygyny Threshold Model
 - 1. Females choosing among male territories must make decision between sharing better territory, or having worse territory to self
 - ii. Sexy Sons Hypothesis
 - 1. Females can maximize fitness by mating with sexy males, and thus have sexy sons herself

Focal Questions:

1. What is the important distinction between males and females?

2. How does this distinction explain the divergence in physiology and behavior we see between sexes in nature?
3. Why are male and female gametes different sizes?
4. Which sex should (on average) be choosier? Why?
5. What is reproductive variance? Which sex should (on average) see higher reproductive variance? Why?
6. Which sex should (on average) have more dramatic sexual dimorphism? Why?
7. What are the various mating systems?
8. What is intrasexual competition? Intersexual?
9. In cases where females are choosing between males, what factors explain the evolution of those choices/attractiveness?
10. How do males compete amongst themselves for reproductive opportunities?
11. Why would a male “agree” to monogamy?
12. Why would a female “agree” to polygamy?