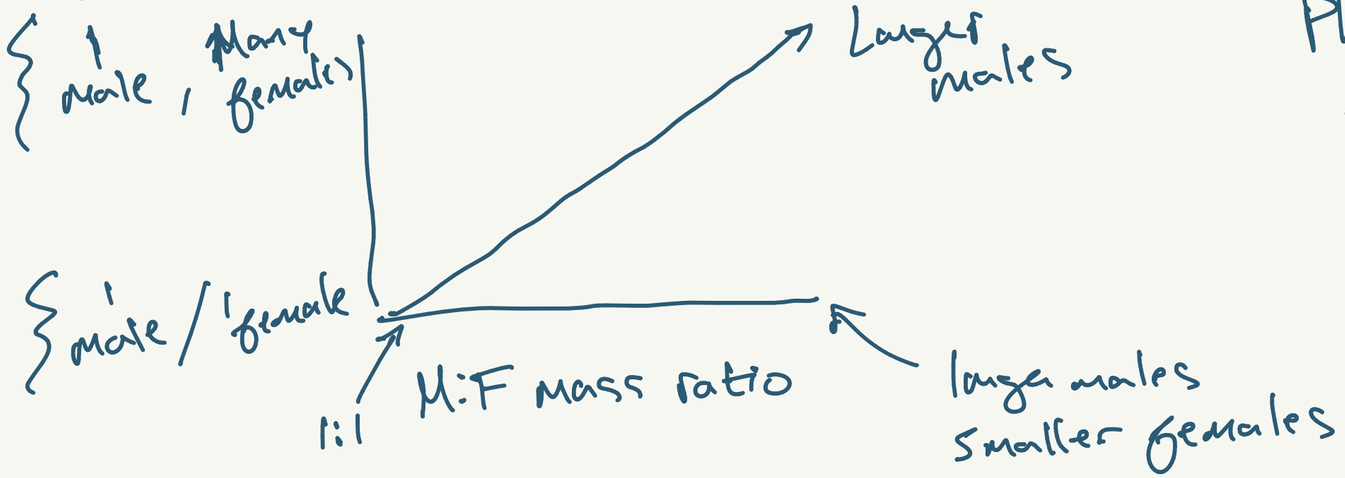
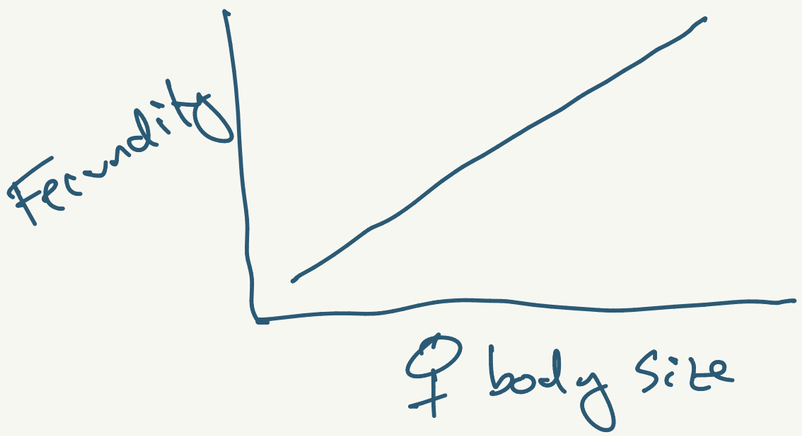
Sexual size Dimorphism



Physical combat drives size dimorphism, rather than female selection

Why would ♀ be larger in some systems?



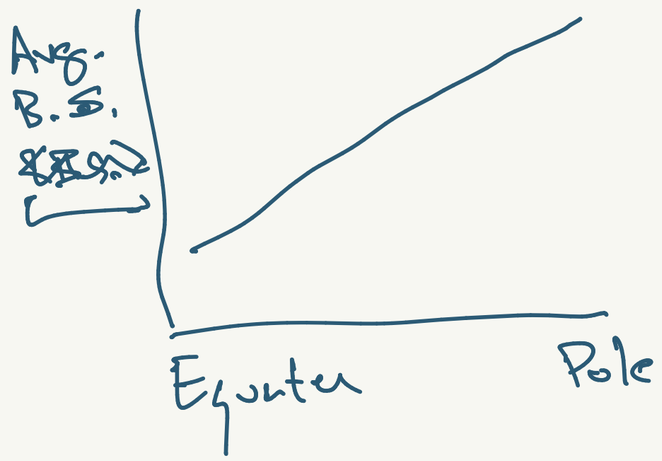
- Birds: egg size constrained
- ♀ w/ larger body size can produce more eggs

Why have small males

- when you have species with small population size, its often better to be small
- Many smaller sons vs. few larger sons
  ↳ increased likelihood of passing down genetic material

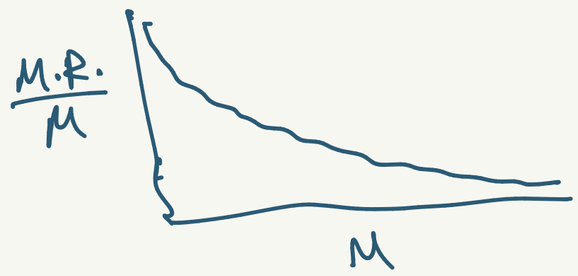
Geographic patterns

A.) Bergman's Rule



- 72% of bird spp.
- 65% of mammals

- Classic Argument: ↓ SA : Vol. ratio ~ ↓ Heat dissipation
- Seasonal Argument: As you ↑ variability, larger body sizes have an advantage
  - Larger B.S. can last longer on stored resources
    - Cheaper per unit mass (3/4 scaling)



    - Body fat scaling is superlinear (exponent 1.19)

Island Size "Rule"

Big things become smaller

Wrangel Island Pygmy Mammoths

Artiodactyles / Carnivores

Bali Tiger

Channel Island Fox

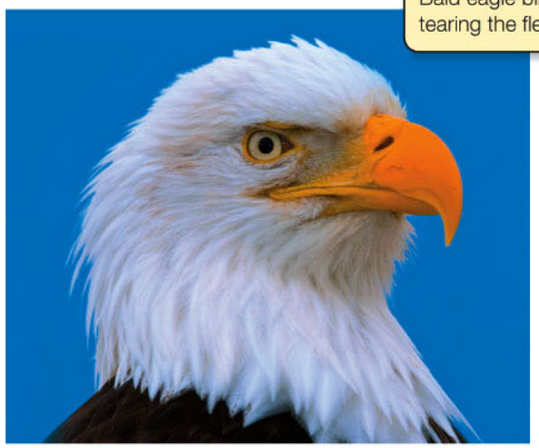
Smaller things get big

Komodo Dragon

St. Kilda Field Mouse

- Food abundance (Big → small)

- Predation



- Change in frequency of genotype/phenotype over time (generations)
- Descent with modification
- Both smaller fluctuations (genotype/phenotype freq.) as well as longer-term differentiation from more ancient ancestors (micro-evolution // macro-evolution)

Genes } encode proteins
/ \
Multiple alleles } different versions of gene/protein

- Change in the proportion of alleles in a population over time

Sexually-reproducing population
- Each individual has 2 copies of each gene ← Dad / Mom

A = Dominant (expressed in phenotype)
a = Recessive (not expressed)

♂ A a
♀ A | AA | Aa
♀ a | Aa | aa

AA, aa = homozygous
Aa = heterozygous

36♀ AA
48♀ Aa
16♀ aa

A = 60% a = 40% → a = 71%

Evolution

Evolution by Natural Selection

1) Variation
2) heritability
3) Selective Differences
   ↳ Differences in FITNESS
   { SURVIVAL
   { REPRODUCTION

(Relative to current conditions... NOT ABSOLUTE)

Selection act on individuals

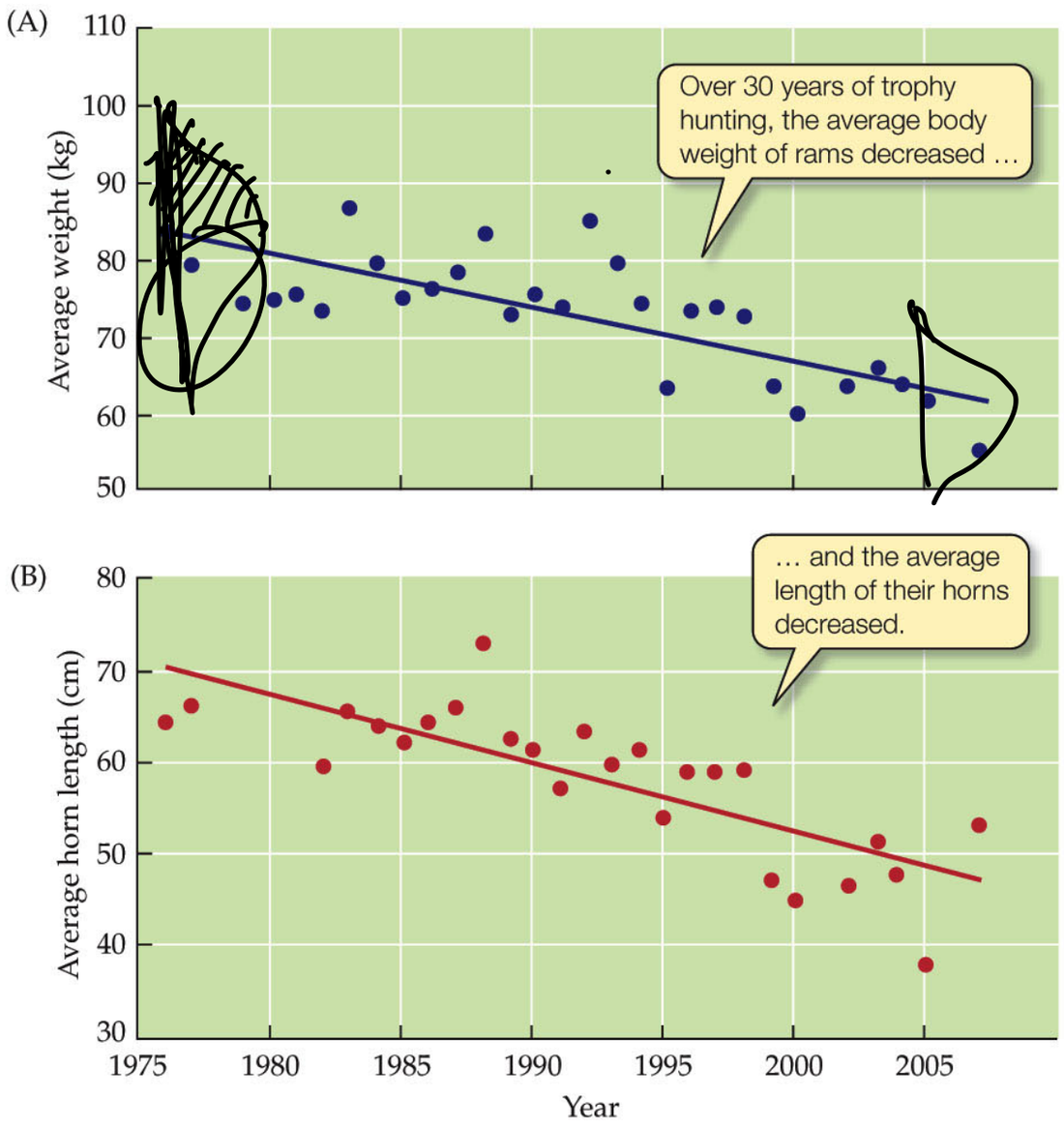
Evolution acts on populations

Four key processes that influence evolution

1) Mutation ~ introduces variation
2) Natural Selection ~ blind sorting over time
3) Genetic ~~Drift~~ Drift ~ effects of random fluctuations
4) Gene flow ~ effect of movement on evolution

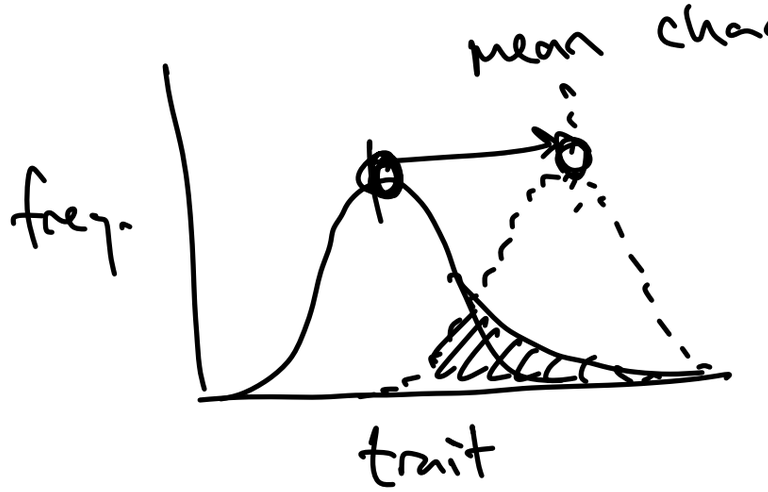
Mutation : New alleles
Changes in DNA/encoded protein via copying errors

+ Recombination
- production of offspring w/ different combinations of alleles via the shuffling of genes during meiosis



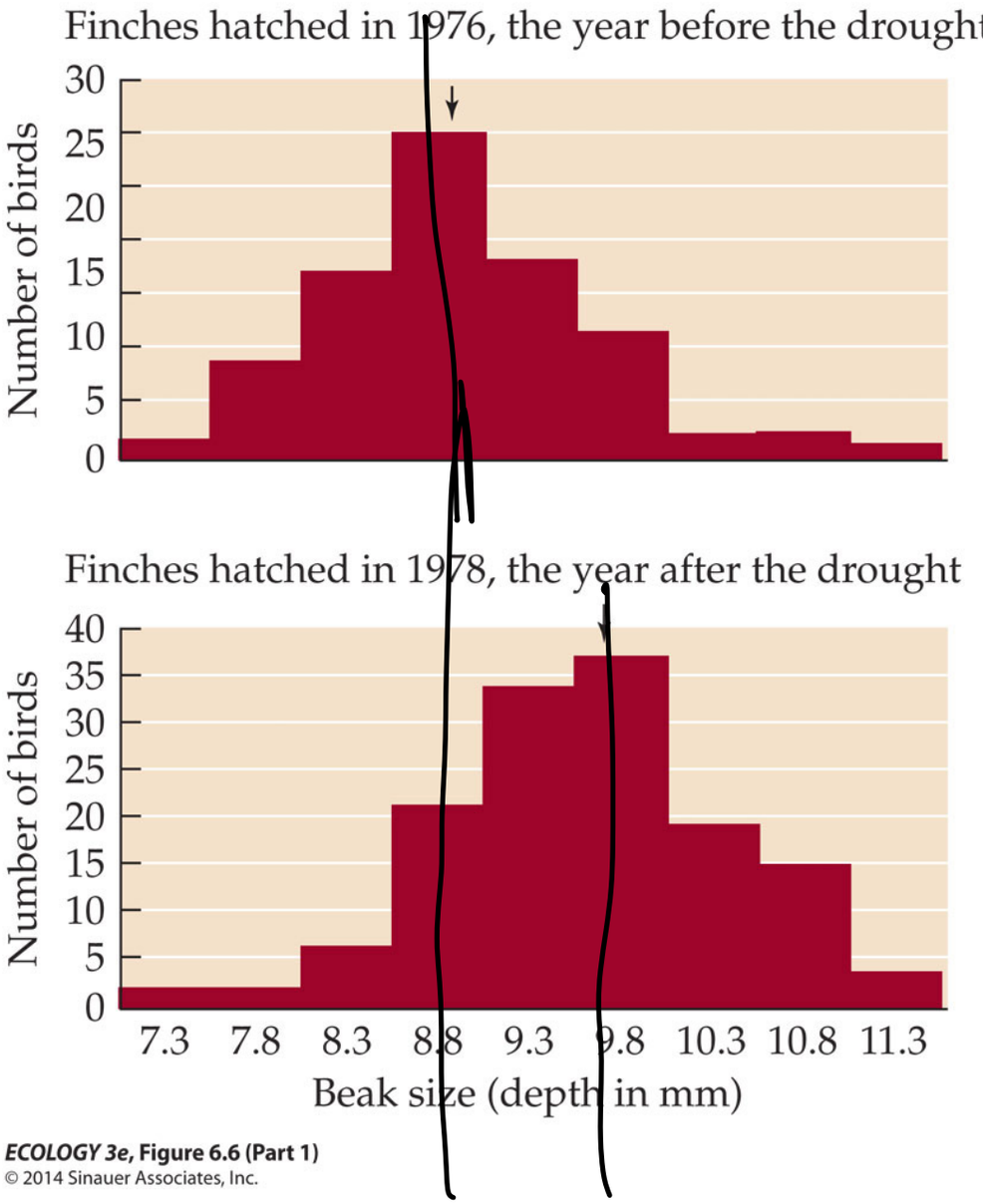
- human hunters
  - actively selecting out larger

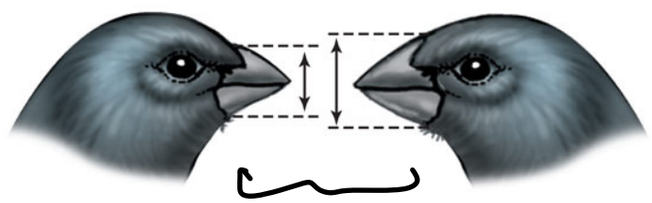
Directional Selection



***ECOLOGY 3e*, Figure 6.1**

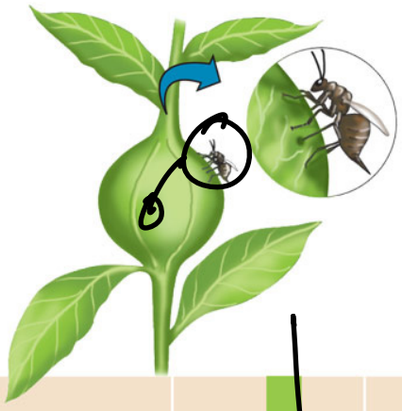
(A) Directional selection

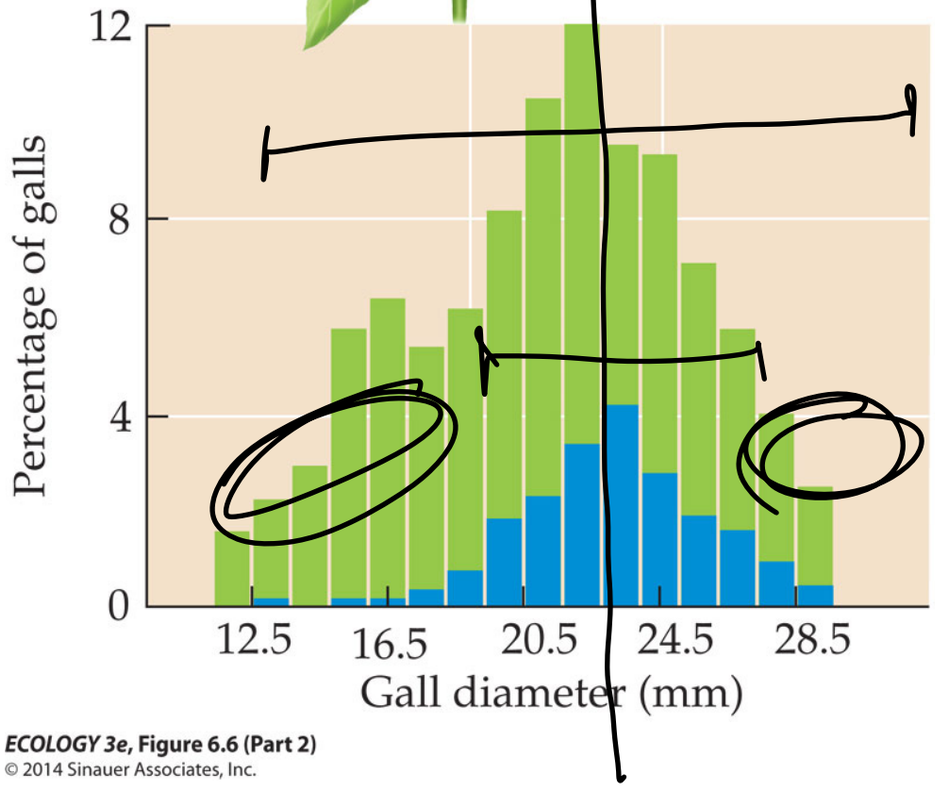




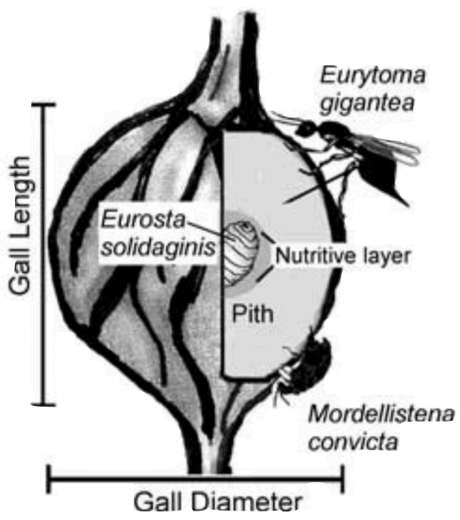
***ECOLOGY 3e*, Figure 6.6 (Part 1)**

(B) Stabilizing selection





***ECOLOGY 3e*, Figure 6.6 (Part 2)**



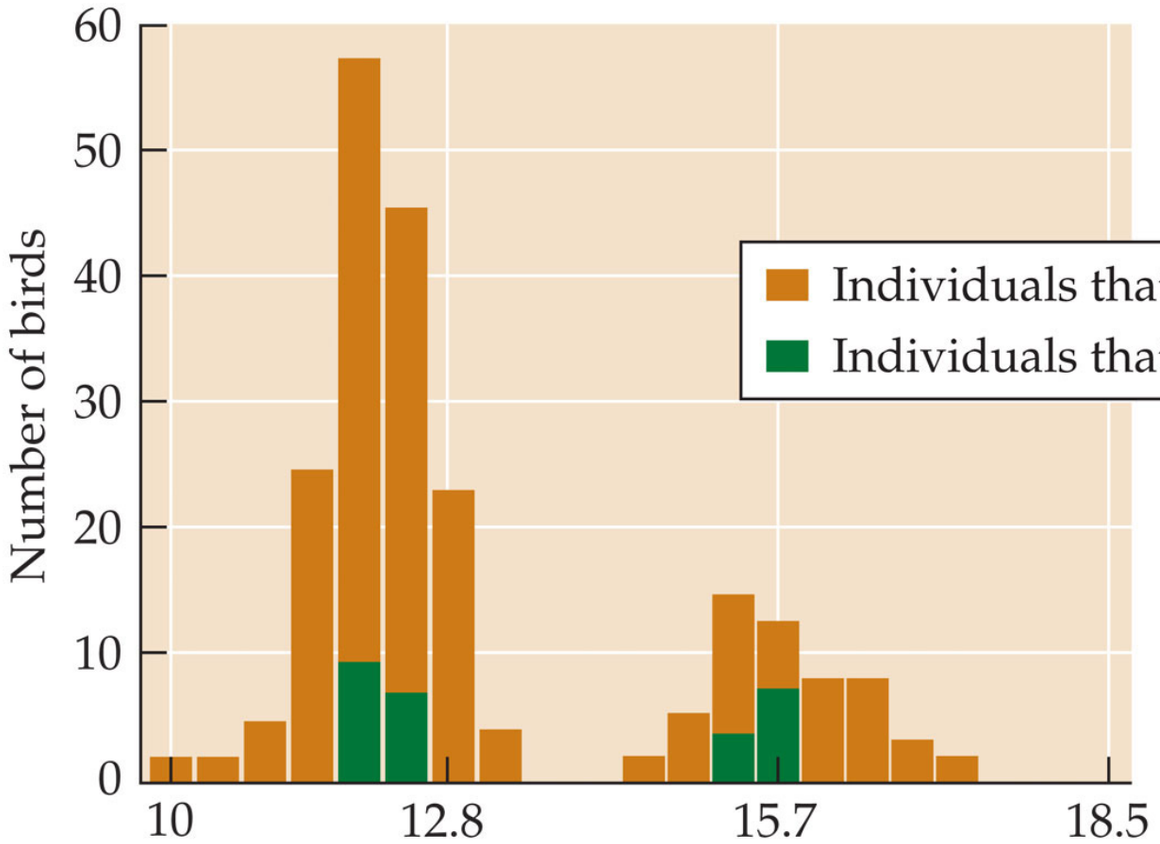
Stabilizing ~~Section~~ Selection

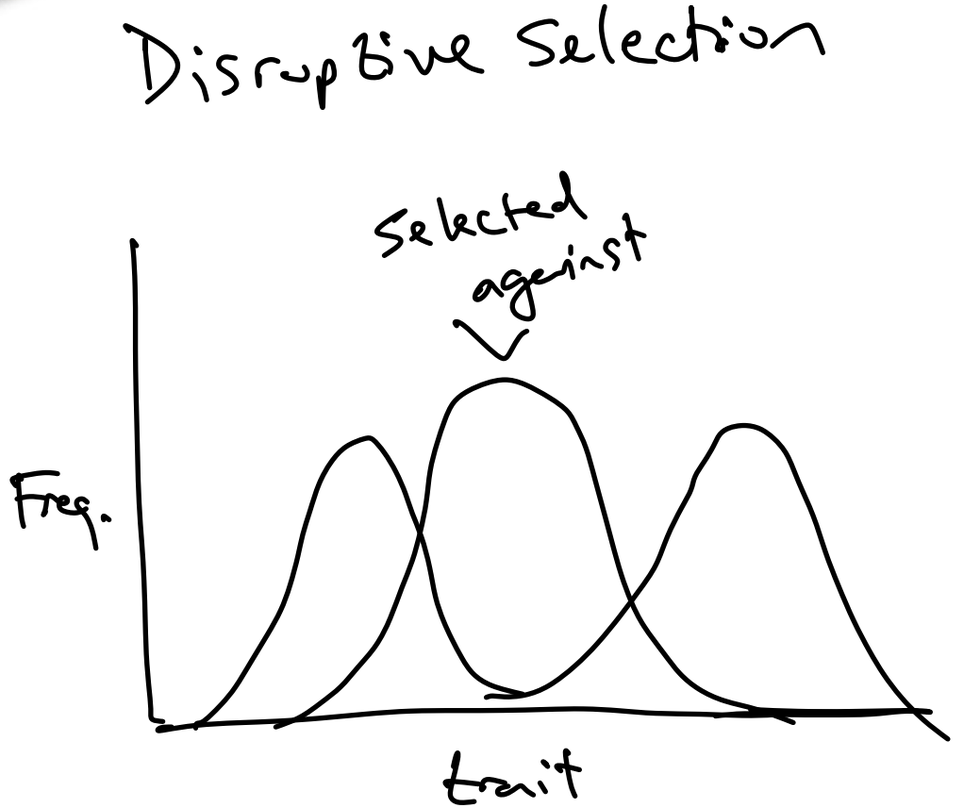
Eurosta flies

- If the gall is small then wasps attack gall and consume fly larvae

- If the gall is large then birds will target the gall

(C) Disruptive selection





African seedcrackers

disruptive

- Can result in speciation if there is formation of a reproductive barrier

ECOLOGY 3e, Figure 6.6 (Part 3)