

Modern Synthesis

- What is the modern synthesis?
- How do we define evolution?

Questions

- What are the four forces of evolution?
- How does each change gene frequencies within and between populations?
- What is a population?

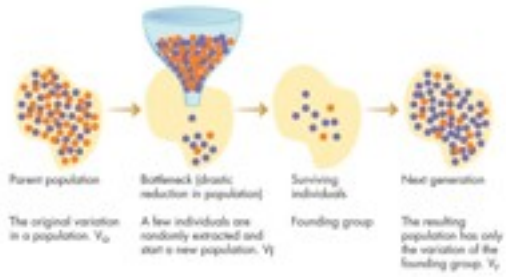
The four forces

- What is genetic drift?
 - When is genetic drift most effective?
- Why is mutation so important?
- What is the role of gene flow in maintaining species?
- What are the different ways in which Natural selection works?

Genetic Drift

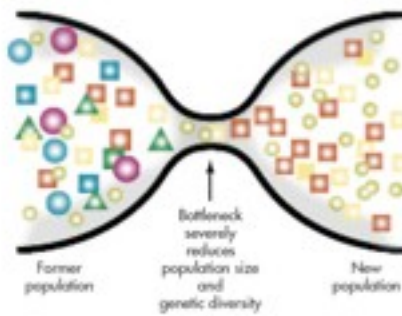
- The random factor
- Greatest effect in small populations
- Founder effect

Genetic Drift - Bottleneck



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Genetic bottleneck



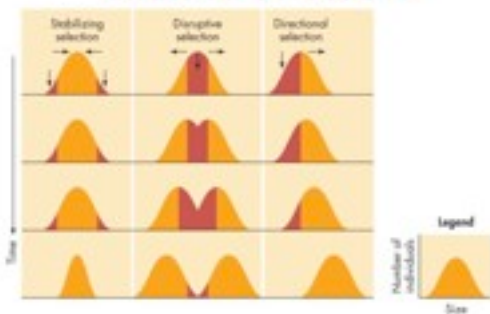
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Natural selection

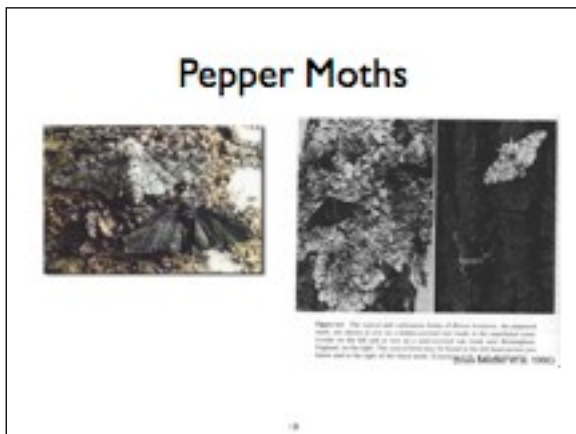
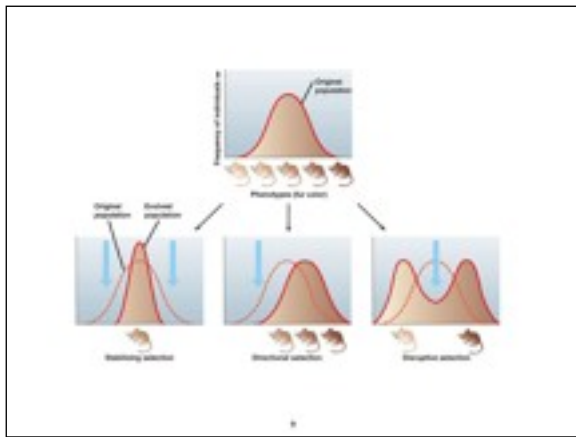
- differential reproductive success over multiple generations
- some variations are more successful than others, leading to a change in the entire population over time

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Natural Selection



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Four Forces and Populations

	Within	Between
Mutation		
Genetic Drift		
Natural Selection	=	
Gene Flow		

MICROEVOLUTION = the small changes in gene frequencies in a population from generation to generation

MACROEVOLUTION = the cumulative effect of these small changes over a long period of time - may lead to **SPECIATION**

What is a species? What is speciation?

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What is a species?

- an interbreeding group of animals or plants that are reproductively isolated through anatomy, ecology, behavior, or geographic distribution from all other such groups

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Reproductive Isolating Mechanisms

- Premating RIMs
 - Habitat isolation
 - Temporal isolation
 - Behavioral isolation
 - Mechanical incompatibility
- Postmating RIMs
 - Sperm-egg incompatibility
 - Zygote inviability
 - Embryonic or fetal inviability

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Theridion grallator



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Pan



Common Chimpanzee



Bonobo

Gorilla



Mountain



Eastern lowland



Western lowland



x



x

=

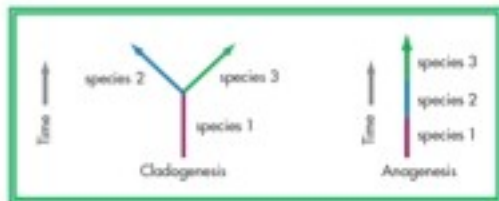


Species Concepts

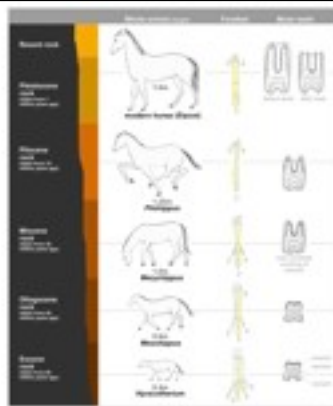
- Biological species concept:** Defines species as interbreeding populations reproductively isolated from other such populations.
- Evolutionary species concept:** Defines species as evolutionary lineages with their own unique identity.
- Ecological species concept:** Defines species based on the uniqueness of their ecological niche.
- Recognition species concept:** Defines species based on unique traits or behaviors that allow members of one species to identify each other for mating.

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Modes of Evolutionary Change

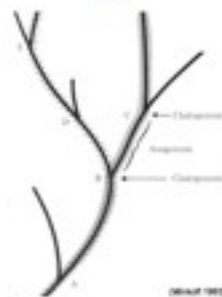


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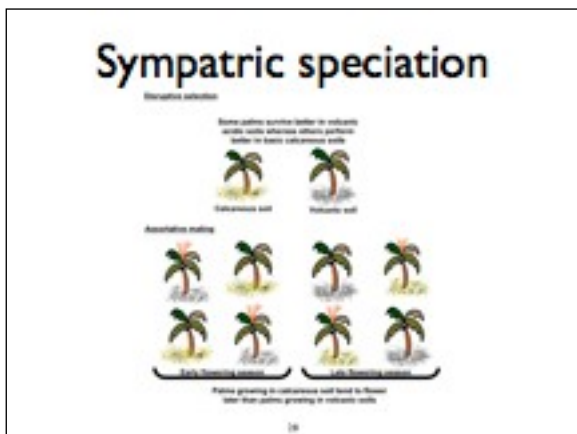
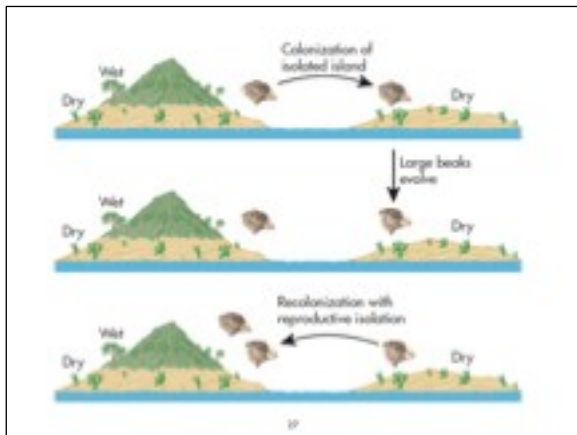
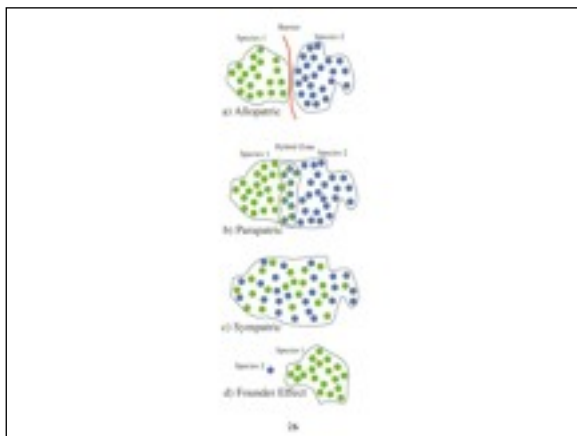
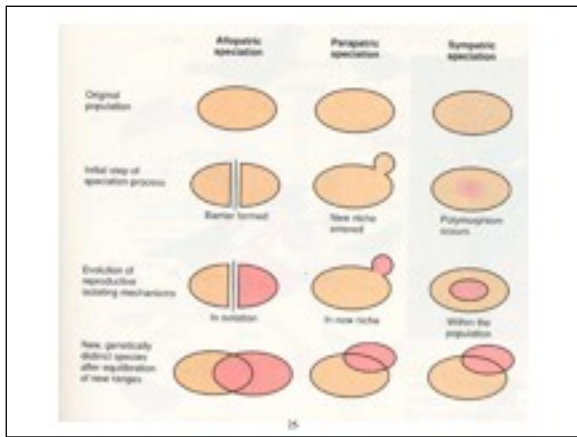


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Cladogenesis



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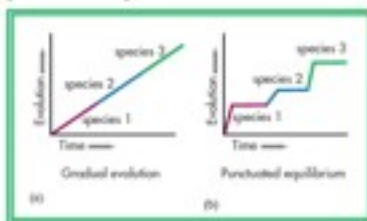
Speciation creates clades

- clades are evolutionarily related groups
- Classification is the naming of these groups
- Started with Linnaeus
 - tried to group organisms together based on relationship
 - based on similarity

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Tempo of Speciation?

- Gradualism?
- Punctuated Equilibrium?



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