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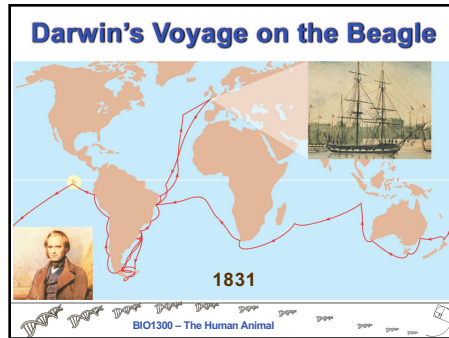
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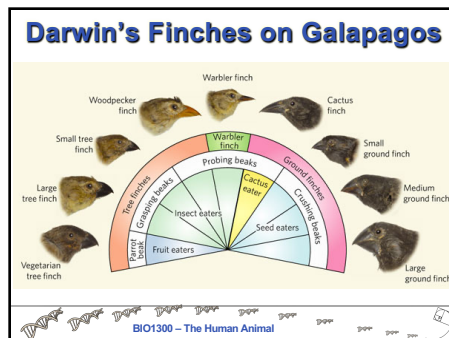
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**Evolution Terms & Concepts**

- Natural selection acts on heritable traits that vary among individuals in a population
- Those differences lead to differences in 'fitness': variable abilities to survive and reproduce
- Adaptations occur when they improve the fitness of individuals
- Natural selection acts on populations (not individuals) by changing traits throughout different generations

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**Evolution Terms & Concepts**

- Natural Selection acts on heritable traits that vary among individuals in a population



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**Evolution Terms & Concepts**

- Those differences in traits lead to differences in 'fitness': variable abilities to survive and reproduce



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### Evolution Terms & Concepts

- Adaptations occur when they improve the fitness of individuals



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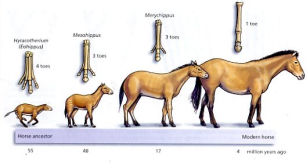
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### Evolution Terms & Concepts

- Natural Selection acts on populations (not individuals) by changing traits throughout different generations



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### DNA: The Genetic Code

- Illustrates the universal relatedness of all organisms
- Allows us to measure closeness or distance of relatedness of organisms
- Several genes are common to all forms of life



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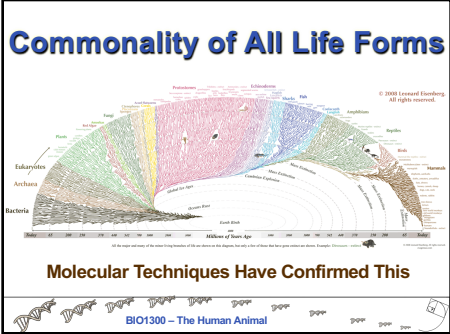
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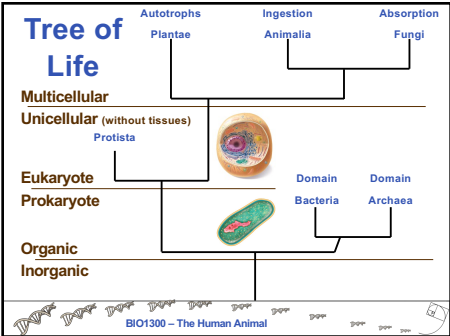
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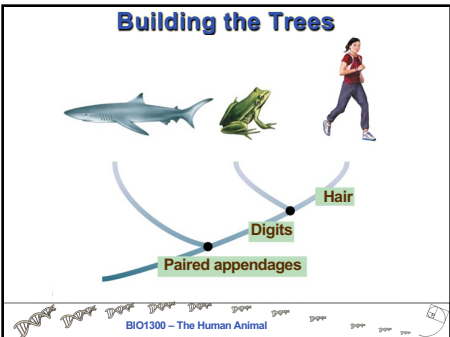
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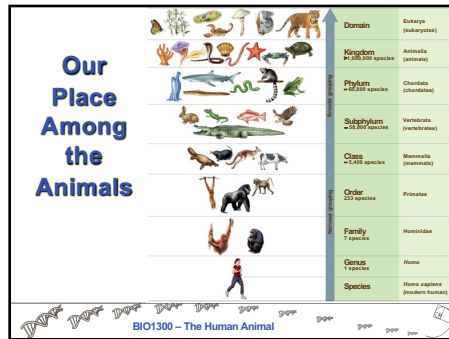
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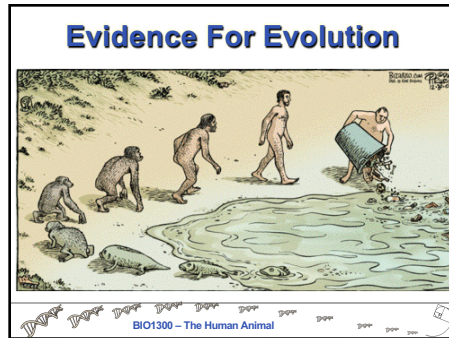
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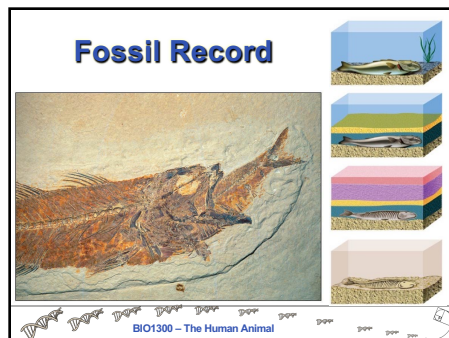
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### The Fossil Record

● Most types of organisms do not exist anymore



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### Transitional Forms



Archaeopteryx      Epidexipteryx

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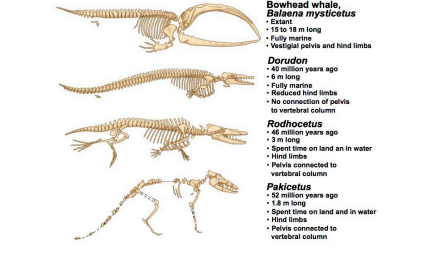
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### Evolution of Whales



**Bowhead whale, *Balaena mysticetus***

- Extant
- 15 to 18 m long
- Fully marine
- Vestigial pelvis and hind limbs

**Dorudon**

- 46 million years ago
- 6 m long
- Fully marine
- Reduced hind limbs
- No connection of pelvis to vertebral column

**Rodhocetus**

- 46 million years ago
- 5 m long
- Spent time on land and in water
- Hind limbs
- Pelvis connected to vertebral column

**Pakicetus**

- 52 million years ago
- 1.8 m long
- Spent time on land and in water
- Hind limbs
- Pelvis connected to vertebral column

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### Vestigial Structures

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### Vestigial Structures

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### Distribution in Space and Time

- Older rocks are lower down, newer ones higher up
- Relative dating of organisms by comparing earlier to later ones based on positions in strata
- Absolute dating can be done through radiometric dating

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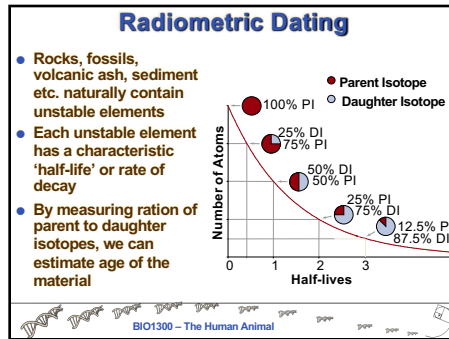
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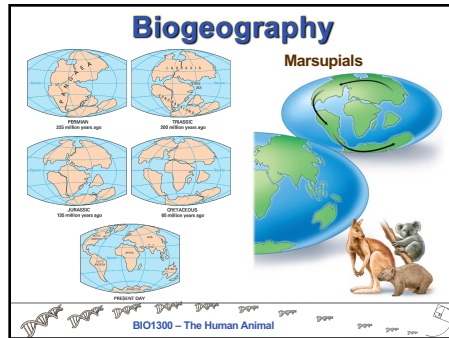
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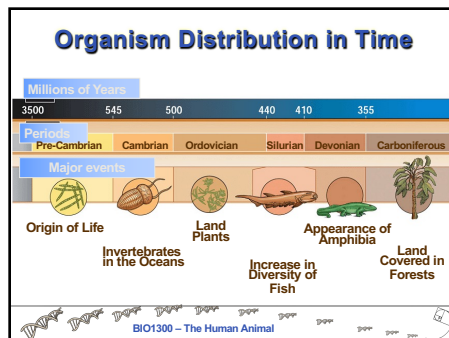
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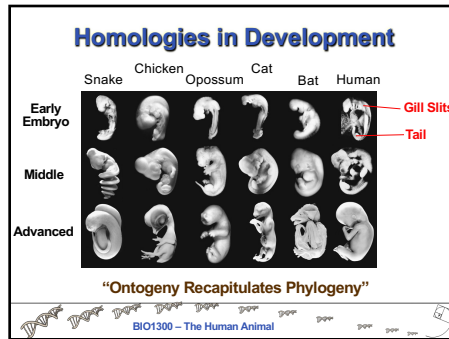
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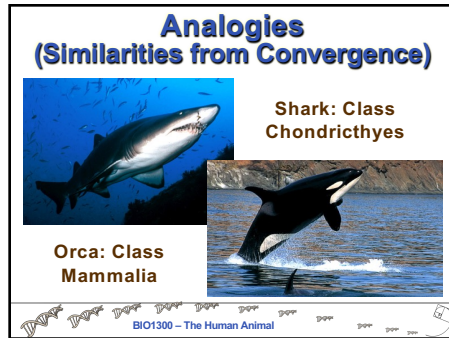
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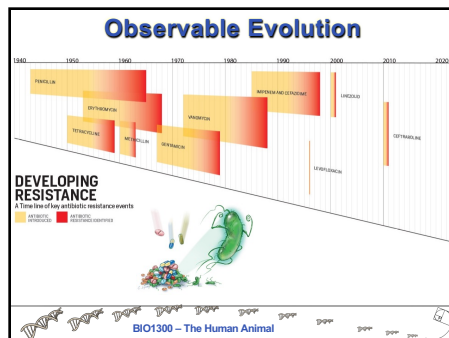
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### Pesticide Resistance

- Due to a high selection pressure (death) and insect reproductive potential (high numbers and fast generation time), pesticides lead to resistance very quickly

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### Evolutionary Change

- There was a drought in 1977 and more of the larger-billed birds survived

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### Industrial Melanism

- 2 forms: light and dark moths

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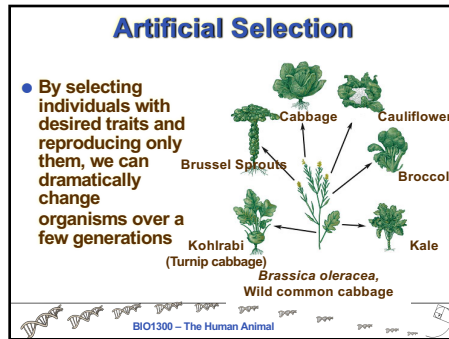
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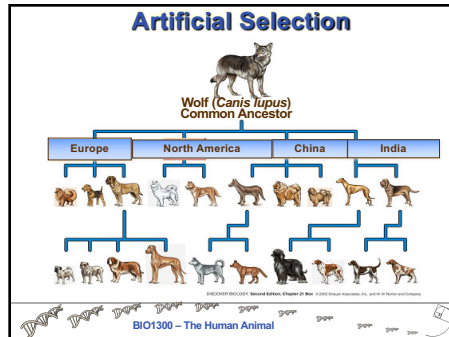
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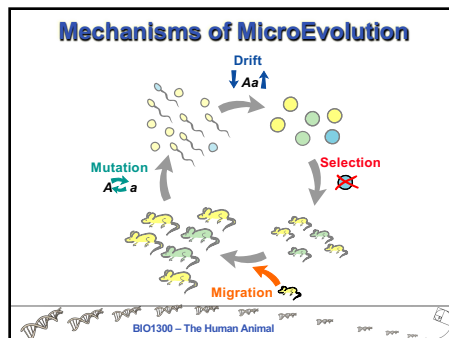
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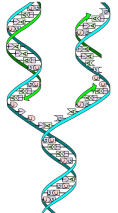

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### Mutation

- The basis for all future selection
- Most mutations deleterious
- Some bring novel abilities or traits

Mutated gene results in brown coloration

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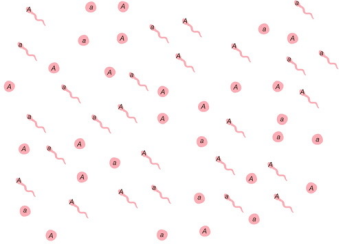
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### Genetic Drift



Gene Pool:  
60% A  
40% a

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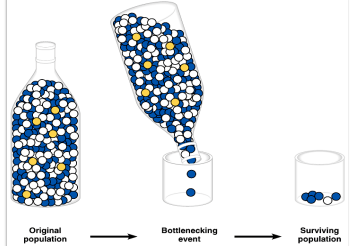
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### Population Bottlenecks



Original population → Bottlenecking event → Surviving population

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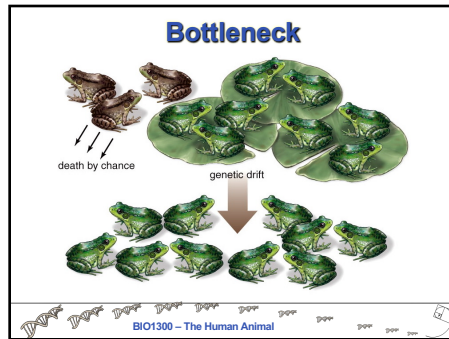
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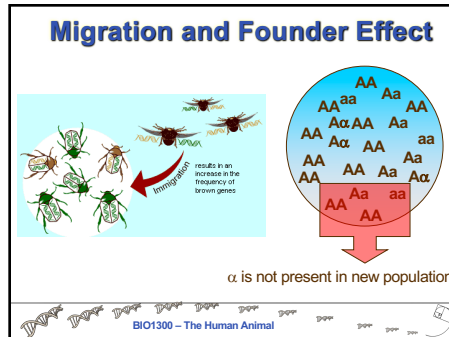
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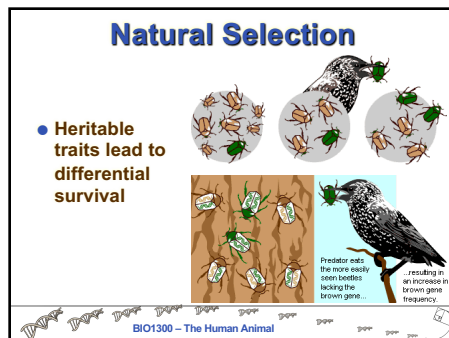
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### Sexual Selection



- Some individuals have greater reproductive success

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### Questions?



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