

## **Bio 213. Spring 2004**

### ***Lecture 5. Speciation***

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#### I. Population Change

- A. Populations can change and diverge when they are isolated from one another.
  
- B. Speciation is a splitting event that creates two or more distinct species from a single ancestral group.

#### C. Isolation and Divergence

#### II. Defining and Identifying Species

- A. Species are distinct types of organisms because they represent evolutionarily independent groups.

- B. Lack of gene flow makes a species independent.

- C. Species are defined as evolutionarily independent populations.

D. The Biological Species Concept

E. The Morphospecies (form-species) Concept

F. Phylogenetic Species

G. In actual practice, researchers use all three species concepts.

H. Species Definitions in Action

### III. Isolation and Divergence in Sympatry

- A. When populations or species live in the same geographic area, or at least close enough to make interbreeding possible, they are said to live in sympatry.
- B. Traditionally, it was thought that speciation could not occur among sympatric populations because gene flow was possible and could overwhelm any differences that might arise by drift or selection.
- C. Natural selection can cause speciation even when gene flow is possible.
- D. Mutation also plays a role in speciation.

### IV. Isolation and Divergence in Allopatry

- A. Speciation begins when gene flow is reduced or eliminated.
- B. Speciation that begins with physical isolation is called allopatric speciation.
- C. Dispersal and Colonization Isolate Populations
- D. Vicariance Events Isolate Populations

## V. Secondary Contact

- A. What happens when populations that have been isolated come into contact again?
  1. Prezygotic Isolation
  2. When prezygotic isolation occurs, intermating is rare, gene flow is minimal, and populations continue to diverge.
- B. Prezygotic isolation may not exist, and the populations may begin interbreeding again.
  1. Gene flow may take over and erase any distinctions between the populations.
  2. Other possibilities may occur:
    - a. Reinforcement
    - b. Hybrid Zones
    - c. New Species through Hybridization
  3. The result is a third, new species that has unique combinations of alleles from each parental species. It thus has different characteristics.
  4. Example—Experiments on the relationship between three species of sunflowers.