**Lecture 10: Species Concepts**

Reading: **Ch. 26**: 503 - 507

**Key terms**: Biological species concept, Morphological species concept, Phylogenetic species concept, Ecological species concept

**BIG Questions for today**:   
 What is a species?

How do scientists determine the difference between species?

**Learning Objectives:**

1. Explain how each of the four major mechanisms of evolution contribute to divergence and potentially speciation.
2. Analyze and interpret how organisms and taxa are related.
3. Interpret phylogenetic trees in order to describe the evolutionary relationships among the organisms or taxa represented

**Lecture Outcomes:**

1. Identify the 4 species concepts covered in class, and explain how they differ.  
   a) Biological, b) Morphospecies, c) Phylogenetic, d) Ecological
2. Use examples to illustrate how species concepts are used to define species.
3. List advantages and disadvantages to the use of each of these species concepts

**Species Concepts**

1. **Biological Species Concept**

According to this concept, species are a group of organisms that are able, or potentially able, to interbreed and **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Species are identified based on **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Genetic isolation may be either:

1. Prezygotic: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

For example, due to differences in:

1. Postzygotic: Offspring of members of different speciesdo not **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

For example, due to:

Advantages:

Disadvantages:

*The concept of reproductive isolation can be applied only to populations that overlap geographically.*

1. **Morphospecies Concept**

According to this concept, species are defined by **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The morphospecies concept holds that **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** arise when populations are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**and **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** from gene flow

Advantages:

Disadvantages:

**3. Phylogenetic Species Concept**

According to this concept, species form a monophyletic clade - **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

*A species is the smallest set of populations (if sexual) or lineages (if asexual) that shares unique, derived features (e.g., base pair changes, morphology, etc.)*

Advantages:

Disadvantages:

**4. Ecological Species Concept**

According to this concept, a species is a group of organisms that **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

e.g..

Advantages:

Disadvantages: