

Bio. 3302 – Introduction to Evolution
Study Guide, Lecture 18
Speciation

Important Terms and Concepts

Adaptive Radiation
Allopatric Speciation
Behavioral Isolation
Biological Species Concept
Classification
Cryptic Species
Divergence
Ecological Isolation
Ecotype
Essentialism
Evolutionary Species
Gametic Isolation
Gene Flow
Geographic Isolation
Gradualism
Hybrid Breakdown
Hybrid Inviability
Hybrid Sterility
Introgressive Hybridization
Isolating Mechanisms
Latitudinal Gradients in Species
Mechanical Isolation
Morpho Species Concept (Morphological)
Phylogenetic Species Concept
Postzygotic Mechanisms
Prezygotic Mechanisms
Punctuated Equilibrium
Reproductive Isolation
Sibling Species
Speciation
Species
Subspecies
Sympatric Speciation
Temporal Isolation
Variety
Vicariance

Discussion Questions

1. How would you distinguish microevolution from macroevolution?
2. How does sympatric speciation differ from allopatric speciation?
3. Define and compare the major species concepts? Which one is "right"?
4. Define and discuss the advantages and disadvantages of the Morpho Species Concept.
5. Define and discuss the advantages and disadvantages of the Biological Species Concept.
6. Discuss some geographic barriers which lead to the formation of varieties and species.
7. Define and discuss the advantages and disadvantages of the Phylogenetics Species Concept.
8. What are the general, basic steps that are involved in the formation of "new" species?
9. List the barriers that prevent interbreeding, and give an example of each.
10. What are the two groups of reproductive isolating mechanisms? Which of these is regarded as more efficient, and why?
11. Sympatric speciation is not thought to be as common as allopatric speciation. Why is this? How might sympatric speciation occur?
12. What are some possible things that can happen when two separated populations come back into contact? How might we determine if they should now be considered two species? What can make this determination difficult?
13. What is introgressive hybridization and how common is it?
14. Why do species definitions matter in conservation biology and which one has the force of law in the USA?
15. Make a diagram showing Ernst Mayr's concept of allopatric speciation, showing the steps a population goes through toward becoming a separate species. What does "gene flow" between populations do?
16. It has recently become appreciated that evolution may move at different rates at different times in a lineage. Darwin believed in gradualism. Does this new understanding pose, as some suggest, that Darwin was wrong about evolution or does it simply reflect a better understanding of genetics and the environment?
17. Is the following statement true or false? Explain why.

According to the BSC, "true" species cannot produce hybrid offspring that are viable and fertile in the laboratory.

18. Briefly explain the difference between hybridization and hybrid speciation.
19. Molecular methods allow biologists to measure the amount of gene flow among populations that make up a species. When such methods first became available, systematists were surprised to find that many morphologically indistinguishable populations seem to be reproductively isolated from each other and thus, according to the biological species concept, are considered entirely different species. Is it possible to account for the existence of such cryptic species by allopatric speciation? by sympatric speciation? Should these cryptic species be named and treated like other recognizable species?
20. What factors lead to speciation among asexual species? What construction of speciation should we use for asexually reproducing species?
21. Two closely related species may have very few phenotypic differences. How can we justify classifying them as two different species instead of one species with a small range of phenotypic variation?