

Species Concepts and Speciation Mechanisms

Factors that Discourage Gene Flow (continued)

What is Haldane's Rule? And what is the major cause? How does it apply to the case of Ligers and Tigons?

Coyne and Orr (1997) reviewed 60 years of *Drosophila* studies and compiled data on reproductive isolation. One of the things that Coyne and Orr (1997) found was that prezygotic isolation was stronger between sympatric/parapatric populations than between allopatric populations but that postzygotic isolation is virtually identical in the two groups. Using the information you have learned in the class so far, devise an explanation for this finding.

Discuss possible postzygotic cellular level processes that might cause mating between species to fail to produce viable fertile offspring.

What are *Wolbachia*? Are they common? Give an example of how *Wolbachia* might reduce gene flow.

Why would selection not oppose the mitochondrial male sterility factor we discussed in class?

Did Darwin recognize subspecies? Did he suggest that subspecies could become species? Would always become species?

Darwin talked about an "insensible series" or "continuum". What was he referring to?

Species Concepts

Why do we have species concepts, i.e., how are they useful?

Know the definition of each species concept we learned in class.

Know the advantages and disadvantages of each species concept we learned in class: morphological/typological, biological, evolutionary, phylogenetic, genealogical, genotypic cluster, and cohesion.

How did de Queiroz's Unified Species Concept try to resolve the differences among species concepts? What was his primary defining criterion for species?

Why is it difficult to test the biological species concept in the laboratory?

How does the cohesion species concept differ from the biological species concept? Be specific.

What cohesive forces did we mention in class?

In practice what is the most common species concept to be applied in large biodiversity studies?

Remember that: Although in practice the biological and cohesion species concepts are not easily used, they are useful in theory for understanding the biological basis for speciation.

What is DNA bar coding and what are its uses/advantages?

What aspects of barcoding are controversial/problematic?

Speciation Mechanisms, Secondary Contact, and Character Displacement.

Spatial speciation mechanisms can be divided into what three categories?

In allopatric speciation, how does the vicariance model differ from the founder model?

How does the founder effect work to encourage speciation? Mention alleles, heterozygosity, drift, selection and founder-flush (or transience) in your answer.

Butlin et al. 2008, placed speciation in a temporal context and defined three steps in speciation, what are these steps? What did he say about spatial isolation at each of these steps?

How did Butlin et al's (2008) view of speciation differ from earlier views?

Can speciation take place in the presence of gene flow? What conditions are necessary for parapatric speciation to occur?

What are four possible consequences of secondary contact?

What happened when Higgin et al. (2000) crossed undisplaced *Drosophila birchii* with *D. serrata*? How many generations did it take before she saw the results she was predicting? Why was this experiment important?

Explain how allochronic speciation works to create new species in periodical cicadas. Use the following words in your answer: plasticity, predator satiation, reproductive character displacement, life-cycle shifts, female signal.