I. Definitions
   • Types of Speciation
     – Allopatric = geographic isolation
     – Parapatric = geographically contiguous
     – Sympatric = overlaps geographically

II. Allopatric Speciation
   • Probably most common form of speciation
   • Barriers can arise or a rare dispersal event can create a barrier
   • In the absence of gene flow, s and drift should force these populations to diverge into separate species
   • Isolating mechanisms usually evolve as a by-product

III. Lab Experiments and Allopatric Speciation
   • Dodd and Drosophila pseudoobscura
     – Caught in Utah and divided into 8 populations at Yale
     – 4 were fed maltose-based food
     – 4 were fed starch-based food
     – Reared for several generations and showed genetic distinctions
     – Dodd also showed that
   • Rice and Hostert
     – Reviewed 14 similar experiments and found that

IV. s reinforces isolation
   • If two separate populations become genetically distinct,

   • RI could evolve

   • This process is called

V. Peripherally-Isolated Populations
   • Defn = a small population at the edge of a species’ range becomes separate from the main group
   • Occurs because
     – Local adaptation favors a distinct phenotype
     – Isolation from main group encourages drift in the peripheral group
   • E.g., Mayr’s (1954) kingfishers on New Guinea
     – Five peripheral islands all have distinct species
     – Mainland also has 3 distinct spp.
     – Divergence
VI. Parallel Speciation
• Defn = independent evolution of the “same” reproductively isolated forms in different localities
• Three-spine sticklebacks
  – One ocean ancestral fish has given rise to several freshwater populations, in several different rivers, that have smaller body size
  – These body changes

VII. Parapatric Speciation
• Mayr’s favorite mode of speciation
  – E.g., Bradshaw (1971) examined grass fields in England where heavy metals contaminated soil
    • Grasses adapted to harsh soils developed an isolating mechanism from neighboring, intolerant variety
    • Flowering time differed between tolerant and intolerant
    • Hybrid breakdown occurred when they occasionally crossed
    • s must be incredibly strong for this mode of speciation to occur, which is why it is not as common as allopatric
  • Usually begins with a hybrid zone

VIII. Hybrid Zones
• Crows (*Corvus* spp.) in Europe
  – Hooded crow occupies western Europe
  – Carrion crow occupies eastern Europe
  – Interbreed in a hybrid zone where the two meet =

IX. Sympatric Speciation
• Least common/most controversial
• Requirements
  – Strong disruptive selection favoring two genotypes (e.g., multi-niche polymorphism)
  – Assortative mating
  – Linkage of the above two requirements
• Polyploidy can cause sympatric speciation
  – One organism develops double genome and cannot mate with monoploid
  – Very common in plants b/c
  – E.g., Owenby’s work on *Tragopogon* in North America; irises in Louisiana

X. Sympatric Examples
• Tauber & Tauber: Green lacewings
  – Two different color morphs:
    • Light green adapted to meadows
    • Dark green adapted to conifers
  – Ranges are sympatric
  – Breeding seasons differ
  – Genetics show that the color and breeding loci are linked
• Apple maggot (*Rhagoletis*)
  – Found only on Hawthorne bush, which overlapped with apple trees
  – Meet all above requirements
  – Sibling species