

# Speciation

# Three types of speciation

- Geographical
- Polyploidy
- Competitive

# Geographical speciation (Barriers)

- Prevent gene flow
- Divergence Occurs (even absent selection)
- Products of eventual hybrids have reduced success (including none)

# Geographical speciation (Barriers)

- Some regions are more prone to isolate species
- Some species are more prone to division
  - Size of range
  - Shape of range

# Geographical speciation (Barriers)

- Barriers can be moats or knives
  - Knives must find and divide
  - Moats just need to find

# Geographical speciation (Barriers)

- Rapaport's rule therefore suggests that geographical speciation should *increase* with latitude
- Mayr (1954) Says that isolation frees small isolates from compromises
- Centrifugal speciation models differ but seem to imply faster change in bigger isolates

# Polyploidy

- Fast
- Effective
- Requires tolerant form (morphology and life history)

# Polyploidy

- Taxon sensitive
- Positive feedback (species number)
- Proportion (only) grows with latitude



# Competitive Speciation

- Competition drives species members to adopt alternative resources (or methods)
- Competition pushes intermediate forms toward extremes (Either mode A or mode B)

# Competitive Speciation

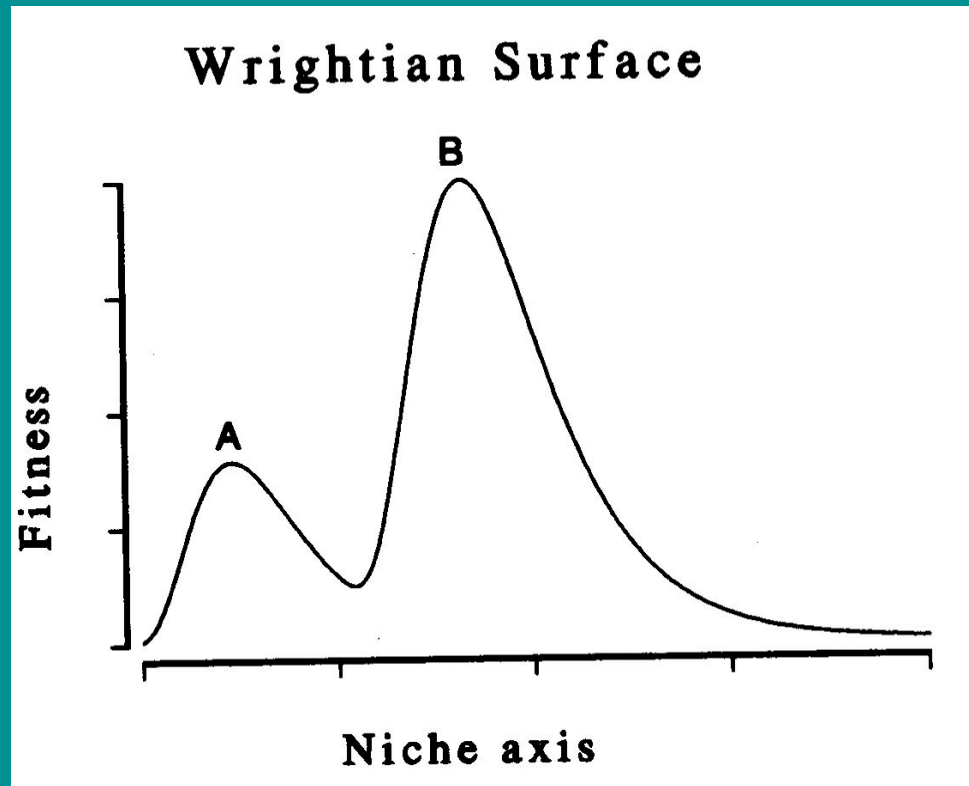
- Density dependant fitness
- Frequency dependant fitness
  - Potential Buffers
  - Negative feedback
- Disruptive selection

# Competitive Speciation:

Problems crossing the valley

- Random mating (gene flow-possibly a false issue)
- Intermediates penalized

# Competitive Speciation: a new inroad into an old problem?



Alternative explanations for crossing the valley  
(No valley, search phase...

# Competitive Speciation: Evidence?

- Works for flies from trash cans
  - Works for urine feeders
  - Rice made species in 25 generations
- 
- Is variance good or bad? (variance)

# Speciation modes

- Differ in speed
- Differ in sensitivity to species density (neg-feedback)
- Historical obviousness
- Differ in latitudinal pattern

# Speciation modes

- “No other mode but geographical speciation predicts that islands will be so dense with endemics.”
- ‘The pattern is similar for fresh and salt water fishes’
- “Most of the time speciation works with more traditional modes [than competitive]”

# Speciation modes

- Fossil evidence of radiations shows evidence of competitive speciation
- No other mode predicts negative feedback.