


Bio 115 Cells & Evolution of Life

Species and their Formation

Events Leading to Speciation

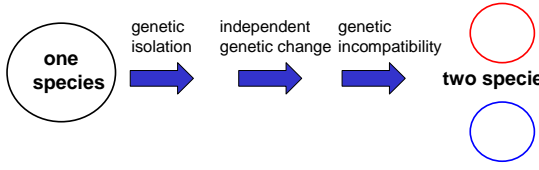


Start Audio Lecture!

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Patterns of Speciation

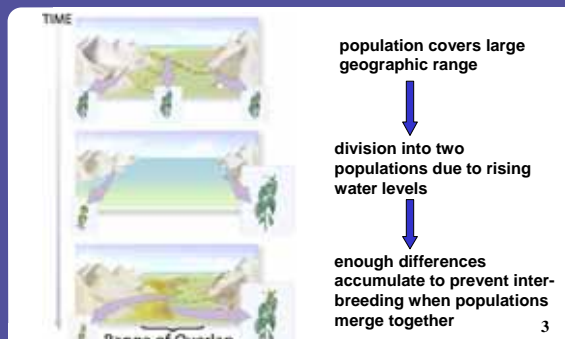


one species → genetic isolation → independent genetic change → genetic incompatibility → two species

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Allopatric Speciation



TIME

population covers large geographic range

↓

division into two populations due to rising water levels

↓

enough differences accumulate to prevent interbreeding when populations merge together

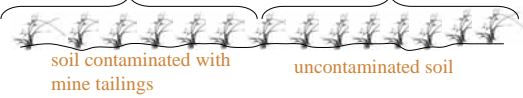
Range of Overlap

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Parapatric Speciation

Genotype of these plants allow them to live in soils with heavy metals. Plants also flower at a different time than...

These plants of same species, which are not able to live in contaminated soils.



In *Anthoxanthum odoratum*, mining activity has caused a genetic divergence in adjacent populations.

Currently, populations in different soils technically can interbreed, but do not typically do so due to genetically controlled differences in flowering time.

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Sympatric Speciation

2n diploid zygote

chromosome doubling

4n tetraploid zygote

cell divisions by mitosis

tetraploid organism

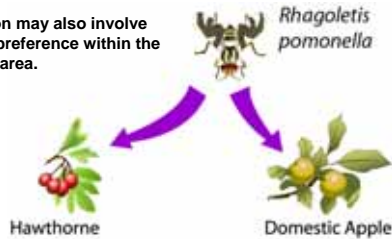
Events that change the genome of individuals, for example chromosome doubling, can create instant genetic isolation independent of the environment.

If the resulting polyploid individuals persist, they may diverge into a new species over time. polyploidy seems to be an important speciation mechanism in plants.

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Sympatric Speciation

Sympatric speciation may also involve changes in habitat preference within the same geographical area.



Populations of *Rhagoletis* fruit flies appear to have diverged to lay their eggs on either the fruits of hawthorn or domestic apples.

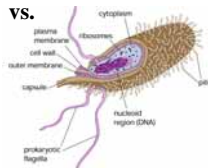
Other differences, such as metabolic rate, breeding time, and responses to different smells have also accumulated between the different populations.

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Variation in Speciation Rates

Many factors affect speciation rates

- time of separation
- differences in environment
- behavior
- generation time
- others...



Speciation: A Sliding Scale

