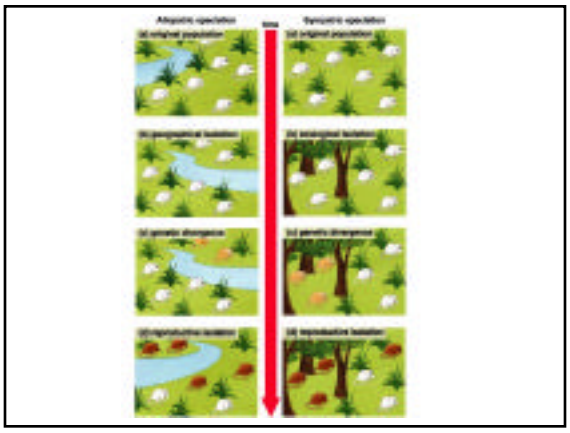
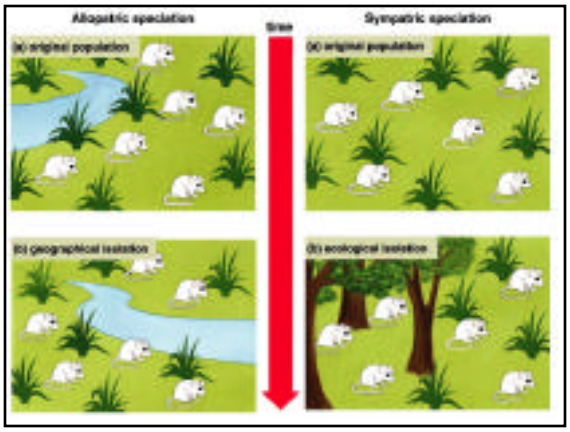
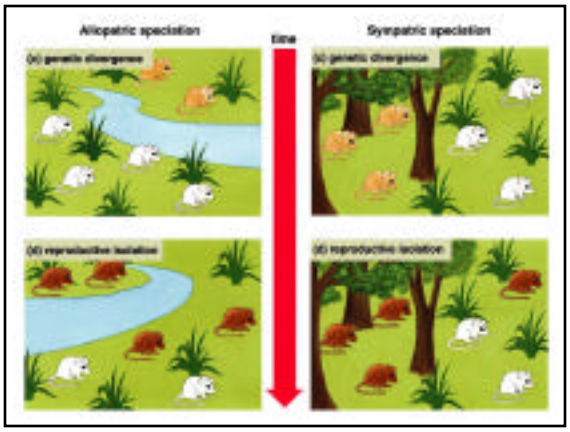
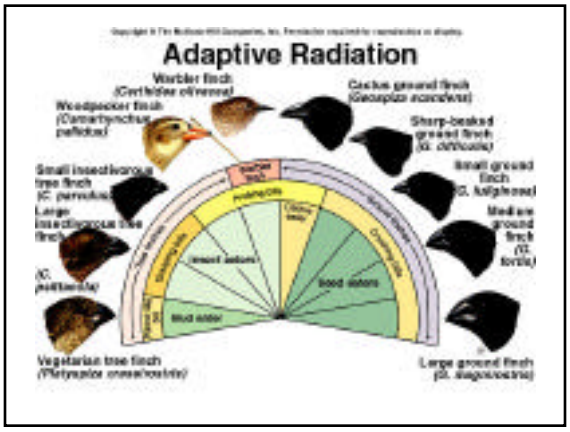
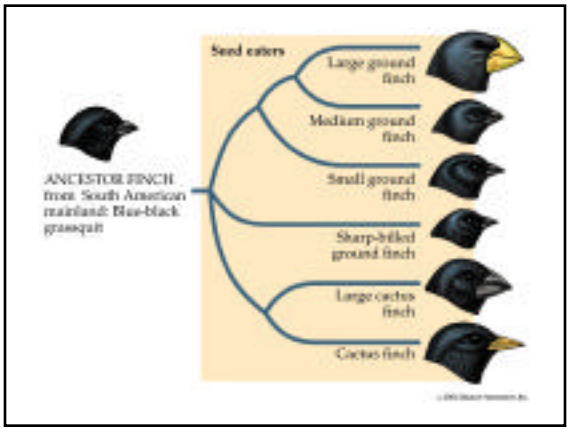
Macroevolution

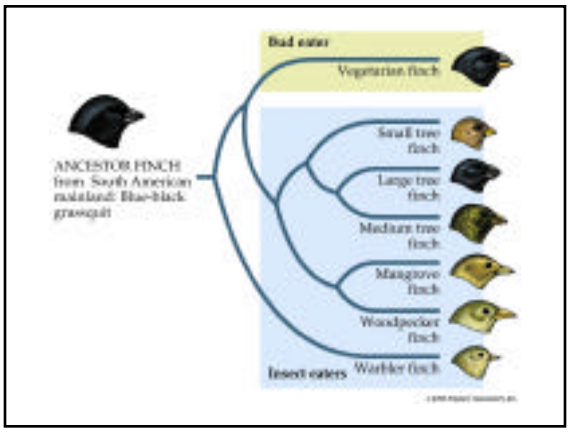


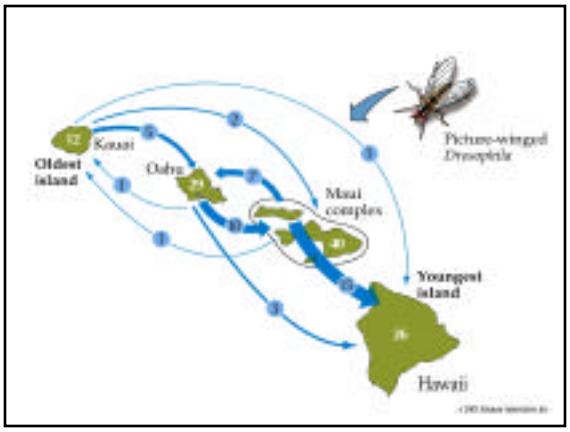


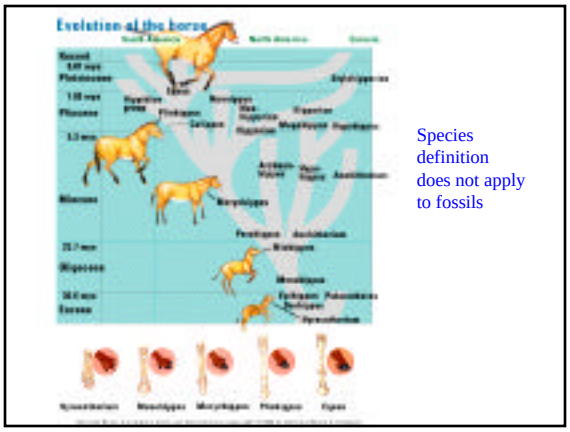










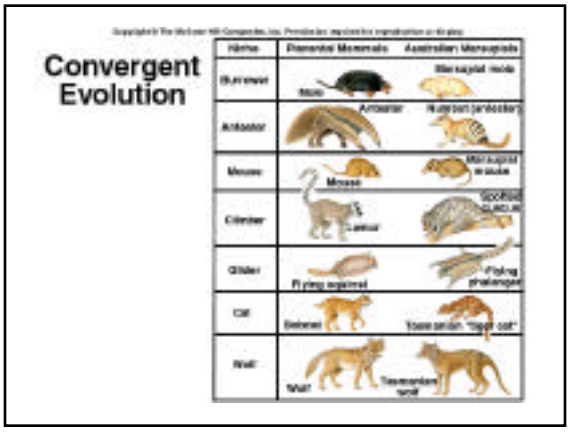


Species definition does not apply to fossils

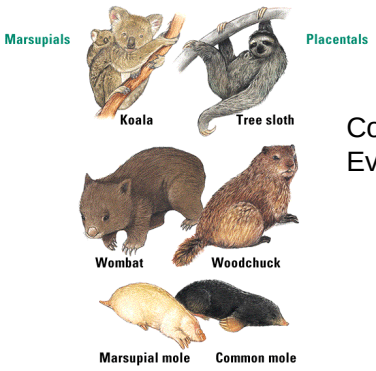
Parallel Adaptation

✓Placental Mammals verses Marsupials

➨Same niche - different location

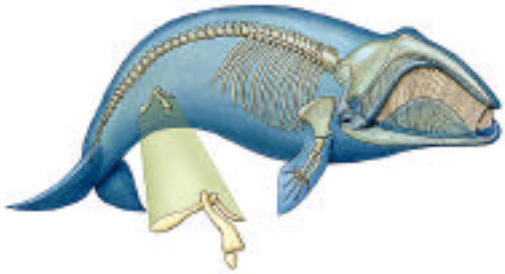


Convergent evolution



Convergent Evolution

Fins



Patterns of descent

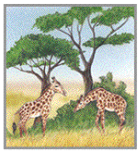
- ✓Divergent evolution
  - ✒Separation of one species into two species.
  - ✒Adaptive radiation
- ✓Convergent evolution
  - ✒Independent development of similar features.

Theories of Macroevolution

- ✓Survival of the fittest
  - ✒Reproductive capacity
- ✓Gradualism
  - ✒Giraffe
- ✓Punctuated Equalibrium
  - ✒Gould
  - ✒Long periods of stasis
  - ✒Cataclysmic events
    - ☞Disruptive selection

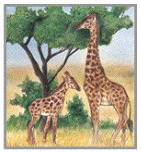
- ✓Pulse theory
  - ✒Stabilizing selection
- ✓Lamarkism

Lamarck versus Darwin



Lamarckism

Ancient giraffes had short necks



Darwinism

Ancient giraffes had varying neck lengths.

With climate change, giraffes stretched necks to reach tall food trees.

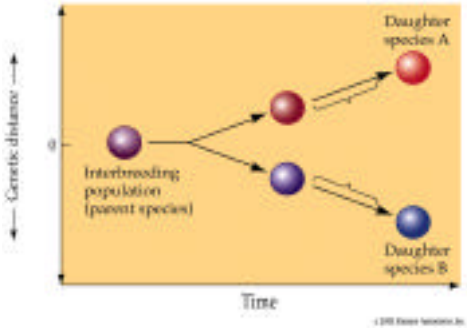
With climate change, long-necked giraffes could feed on tall trees; short-necked ones could not.

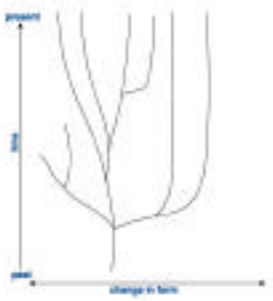
Giraffes acquired long necks from stretching for food and passed this trait to offspring.

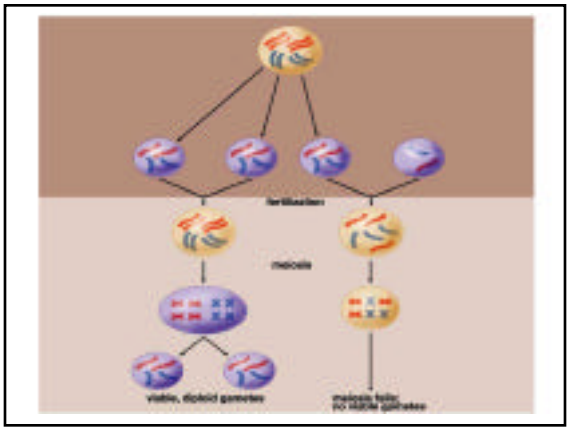
Short-necked giraffes died; long-necked giraffes survived to reproduce.

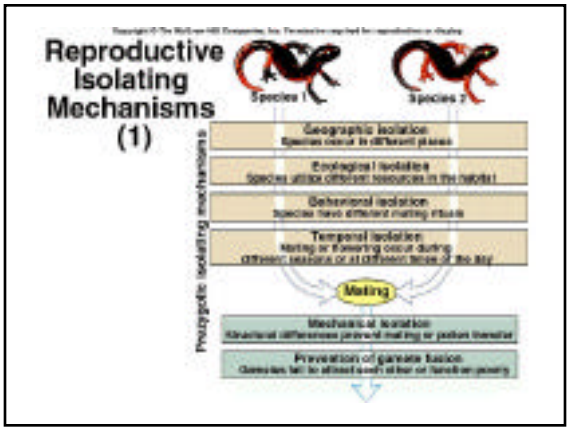
Inheritance of acquired characteristics

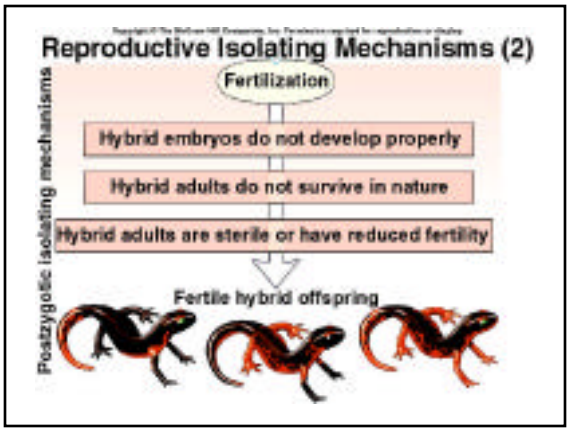
Gradualism

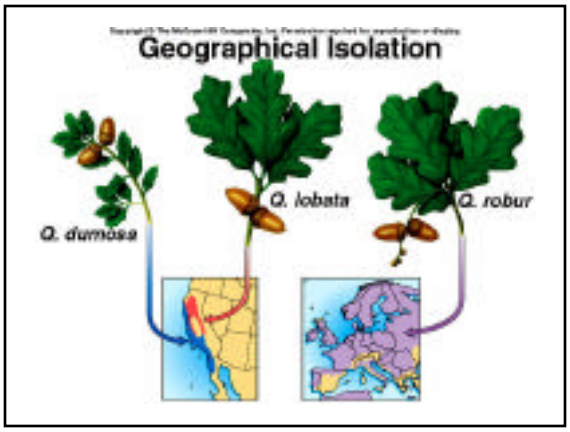












Barriers that isolate populations

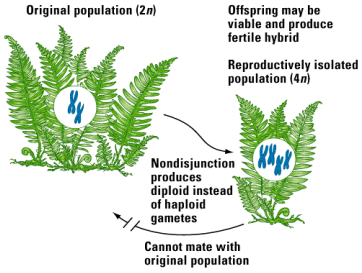
✓Prezygotic barriers prevent syngamy.
- ➨Ecological isolation
- ➨Temporal isolation
- ➨Behavioral isolation
- ➨Mechanical isolation
- ➨Gametic isolation

✓Postzygotic barriers make the zygote inviable.

Reproductive Isolation

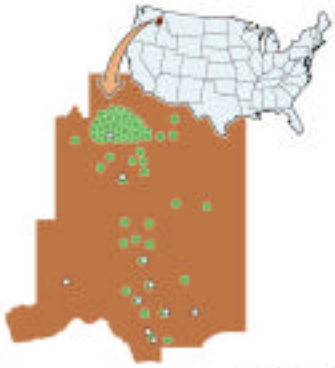
Periodic Isolation

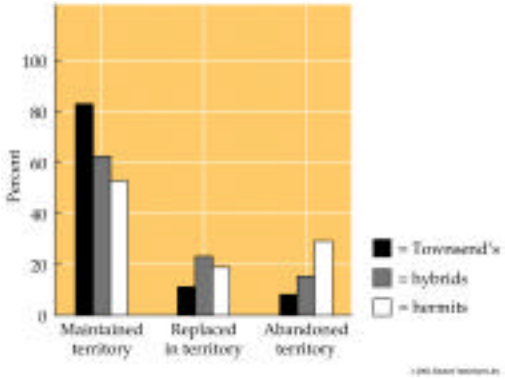
Reproductive isolation by polyploidy

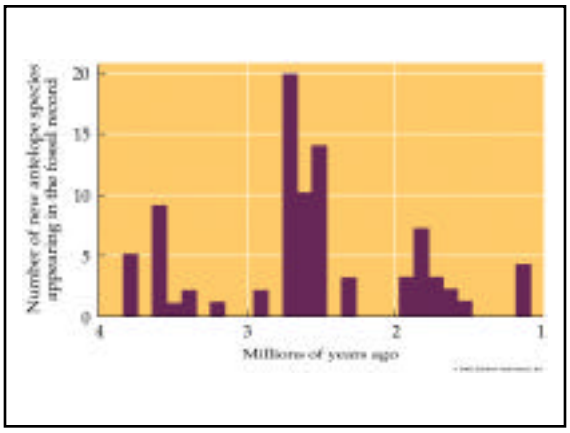


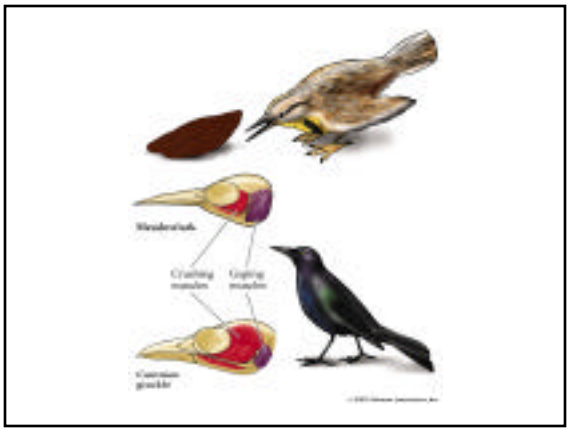
Sympatric

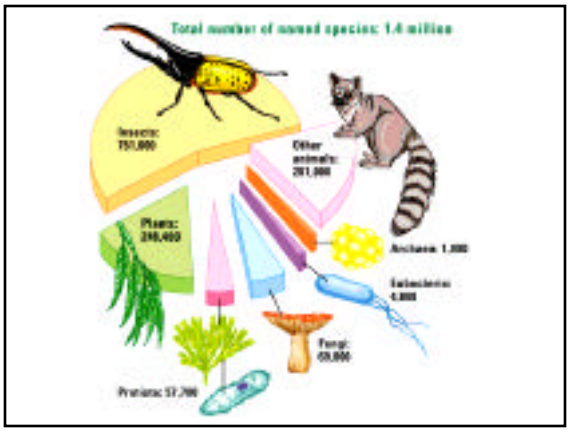
Polyploids out perform their parents











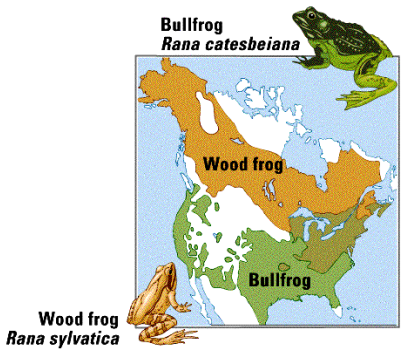
Defining “species”

✓1942 Mayr -

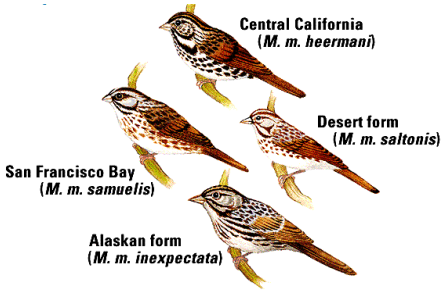
- ☛“Groups of actually or potentially interbreeding populations, which are reproductively isolated from other such groups.”

✓The largest unit of a population of similar organisms in which gene flow is possible.

These two species look different from each other and do not interbreed



Races or subspecies



Subspecies of the song sparrow, *Melospiza melodia*

Barriers that isolate populations

✓Prezygotic barriers prevent syngamy.

- ✒Ecological isolation
  - ☞Differences in the way the species live
- ✒Temporal isolation
  - ☞Different times when they reproduce
- ✒Behavioral isolation
  - ☞Mating behaviors
- ✒Mechanical isolation
  - ☞Complementary of male and female reproductive organs
- ✒Gametic isolation
  - ☞Gamete incompatibilities

Barriers that isolate populations

✓Postzygotic barriers make the zygote inviable.

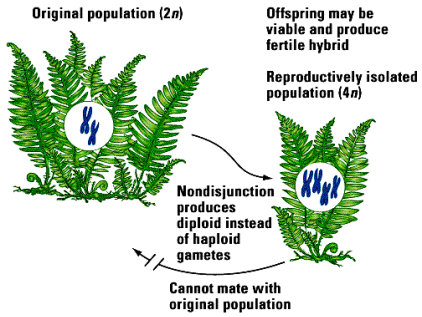
- ✒Hybrid sterility - a mule
- ✒Hybrid inviability - often die because of chromosomal and genetic incompatibilites

Reproductive Isolation

prezygotic

Reproductive isolation by polyploidy -

postzygotic



Geography and gene flow

✓Allopatric speciation

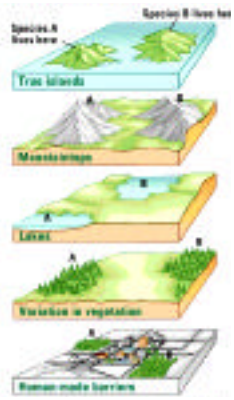
- ✒Geographical isolation

✓Sympatric speciation

- ✒Disruptive selection

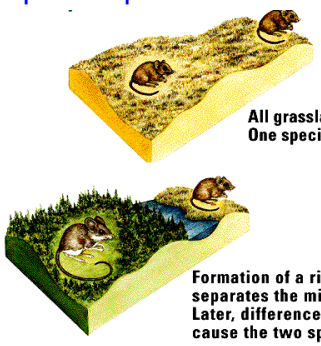
✓Parapatric speciation

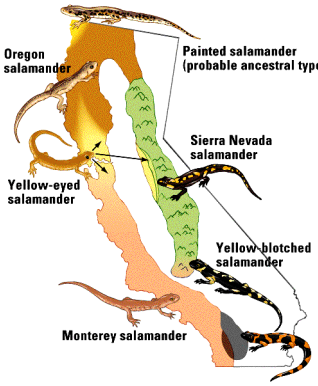
- ✒Intermediate between allo-and sym-patric speciation
- ✒Some contact exists between species.



Geographic barriers

Allopatric speciation





Sympatric speciation

Patterns of descent

- ✓Divergent evolution
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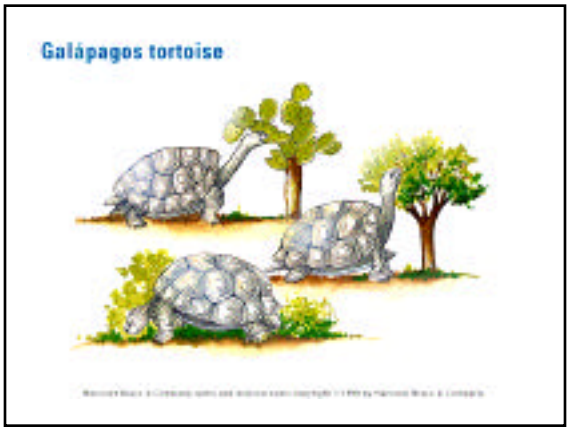
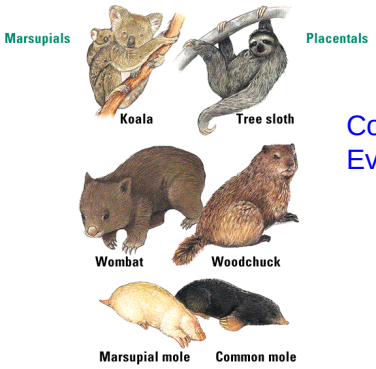
  - ✒Adaptive radiation
- ✓Convergent evolution
  - ✒Independent development of similar features.

Adaptive radiation



Convergent evolution

Land bridge



Convergent Evolution

Convergent evolution