

**How does Evolution occur?** How can we get changes in organisms over time?

2 major **hypotheses** proposed: Lamarck & Darwin



**Jean Baptiste Lamarck** 1744-1829

proposed: 1-organisms see a *need* to change

2-use & disuse of parts

3-inheritance of acquired traits

1-organisms see a **need to change**

if environment changes, organisms could perceive that they needed to change in order to survive

**2-use & disuse:** if a body part is used, it becomes stronger and larger, if a body part is not used, it becomes small & weak and may disappear

body builder makes bigger muscles

**3-inheritance of acquired traits:** a characteristic you gain during your lifetime can be inherited

can you see **problems with Lamarck's hypothesis?**

body builder-big muscles are acquired trait, are offspring born with bigger muscles?

evolution of giraffe according to Lamarck

can see in fossil record, giraffes descended fr. shorter-necked ancestors

life on African savannah, lots of herbivores, lots of competition for food, lots of organisms eating grass, low bushes, low tree leaves, but high leaves on trees not being eaten

1-giraffe ancestors saw a need to have longer necks to reach those leaves

2-over a lifetime, giraffe stretched its neck to reach food using its neck, it became stronger & longer

3-giraffe passes on stretched neck to offspring

many scientists helped disprove hypothesis

1-organisms can't consciously change themselves

2-use & disuse: broken arm is not used, smaller & weaker, but comes back

3-inheritance of acquired traits: scientists cut off tails of mice  
mated mice together, offspring were born with tails  
did experiment for 20 generations, 21st generation still  
born w/tails

**Charles Darwin** 1809-1882

influences: grandfather Erasmus Darwin, evolutionist

Charles Lyell, geologist, friend

Thomas Malthus, mathematician, population studies

voyage of the Beagle: sailed around world for 5 yrs,  
collected specimens, came back & formed his theory,  
but sat on it for 20 yrs

**Alfred Russell Wallace**, young biologist, came up with  
same theory, talked to Darwin---->pushed Darwin to pub

Darwin published ***On the Origin of Species*** in 1859

**Natural Selection or "Survival of the Fittest"**

- 1-organisms produce more offspring than can survive
- 2-there is variation present among offspring
- 3-there is competition for survival
  - competition among members of same species,
  - competition among different species
  - resources are limited: water, food, mates, space
- 4-those that survive have variations that are best adapted to environment, thus they produce more offspring
- 5-variations get passed on to offspring, eventually whole population has trait, traits can accumulate leading to new species

### **evolution of giraffe by natural selection**

in pop of giraffe ancestors, there is variation in neck length  
short----->longer necks

those w/longer necks can reach food source not available to  
those w/shorter necks

thus, longer necked ancestors get more food, survive to  
reproduce more offspring

they pass on longer necks

next generation, neck length

shorter----->longer necks, etc

next generation,

shorter----->longer necks, etc

over 1000s of generations----->today's giraffe

could neck get even longer?

there is selective pressure against that, why?