

# The Mechanism Behind Evolution : Natural Selection

## Natural Selection -

A set of **environmental conditions** favors, or “**selects**”, certain creatures for survival and reproduction, those less suited are less likely to survive and reproduce.

The result is over time, the characteristics of the overall population change...the survivors winning characteristics become more common, while the losers characteristics become less common...“Survival of the fittest”

Famous example...England’s Peppered Moth

2 varieties, prior to industrial revolution...black was rare, (< 2%), 50 yrs later, after the I.R.....white was rare(<5 %), then clean air legislation for 50 yrs,

1985... 50 % black

1989... 30 % black

**The population gene pool changed over many generations. This is evolution.**

If a gene pool changes enough, a new species is formed (**speciation**)

If a species cannot survive under a set of conditions, it dwindles in numbers and may go extinct.



## Artificial Selection -

**people select** which organisms are bred, because they have a characteristic suited to our needs.

A purposeful manipulation of a populations gene pool allele proportions.

## Contributors to Modern Evolutionary Theory...

### Jean Baptiste Lamarck - 1744-1829

- French naturalist, soldier, scholar
- simple life arises through spontaneous generation, and all creatures become more complex as they move up some “ladder of progress”...the first evolutionary theory

Believed the environment forces change in creatures, they change themselves in their own lifetime, so they become suited to a specific environment...characteristics used a lot become stronger and are passed on, those used less or at all disappear and don’t get passed on...the “Theory of Inheritance of Acquired Characteristics”

### Georges Cuvier - 1769-1832

- French naturalist
- challenged the belief that the created world was perfect, nothing had ever gone extinct...introduced fossils..

“Different rock layers ( strata) contain very different fossils, the deeper you go, the older and more different the fossils get from modern life”

- fossils are the remains of extinct creatures..he proposed “catastrophism”...species died out

due to large catastrophic events that changed the earth. Believed there were many in earth's history, created many different groups of fossilized life.

Got C.D. thinking...

some species have gone extinct, and over long periods of time, very different kinds of life emerge from common ancestral species.

### **Thomas Malthus - 1766 - 1834**

- English minister / scholar
- wrote a series of books on **population growth and control...**

Populations grow faster than their food supply, so eventually are forced to suffer disease, famine, war.....more deaths...to reduce a population's size and impact...so there is less competition between survivors.

Got C.D. thinking...

Sometimes a lot of young are produced, but the size of a population really doesn't change...so not all of the young survive...there must be a struggle or competition between creatures....those that have advantages "win"...to survive longer and reproduce more

### **Charles Lyell - 1797 - 1875**

- English geologist and Darwin's friend
- wrote "Principles of Geology", which Darwin would read
- **proposed "uniformitarianism"...**  
the geologic processes we see shaping earth today are slow, continuous, and create small changes that add up to huge differences. ( ex. volcanoes and erosion )

Got C.D. thinking...

Could slow, small changes in creatures over many generations result in large changes and new species ?

### **Charles Darwin - 1809-1882**

- English naturalist, geologist
- Published a theory unifying the work of all these contributors...1859... "On The Origin of Species"...race with **Alfred Russell Wallace**..another English naturalist who was coming to the same conclusions
- 5 year "HMS Beagle" circumpolar southern voyage ( trip image)...journal published
- collected fossils ( giant sloths, rodent skulls, armadillo plates ), species samples, sketched, wrote, theorized

