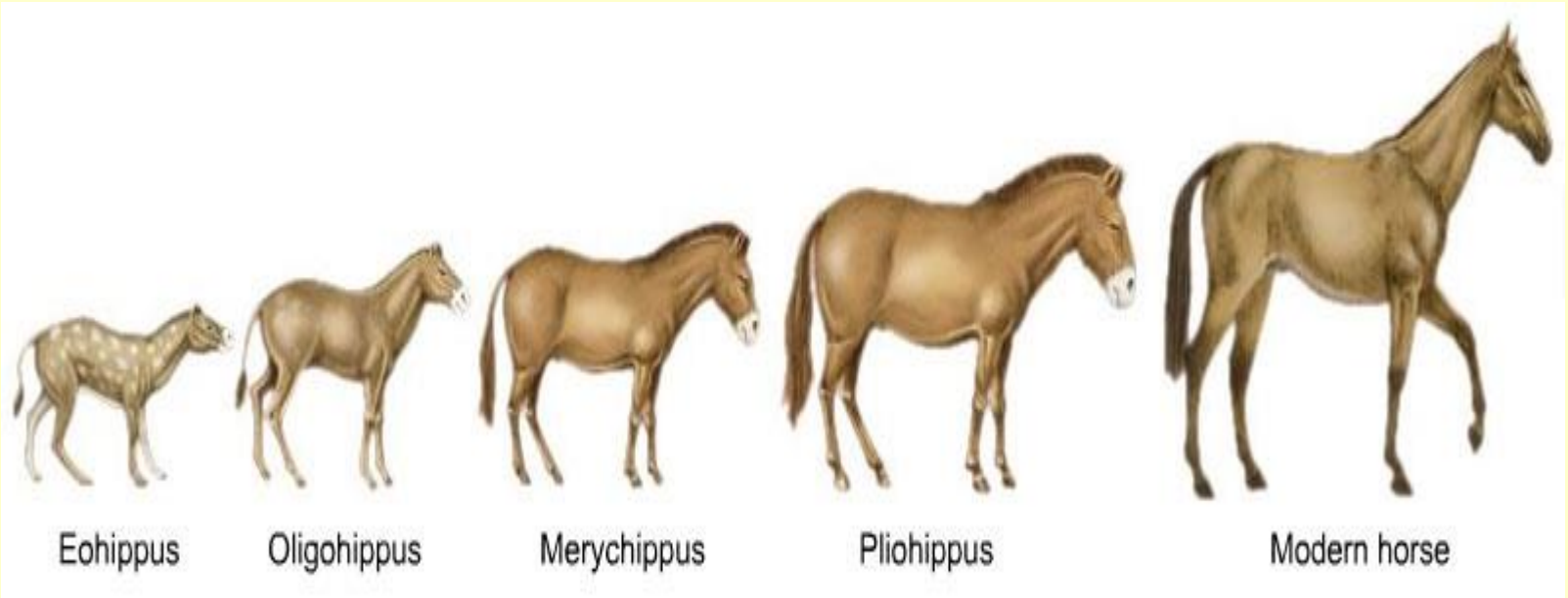


# EVOLUTION

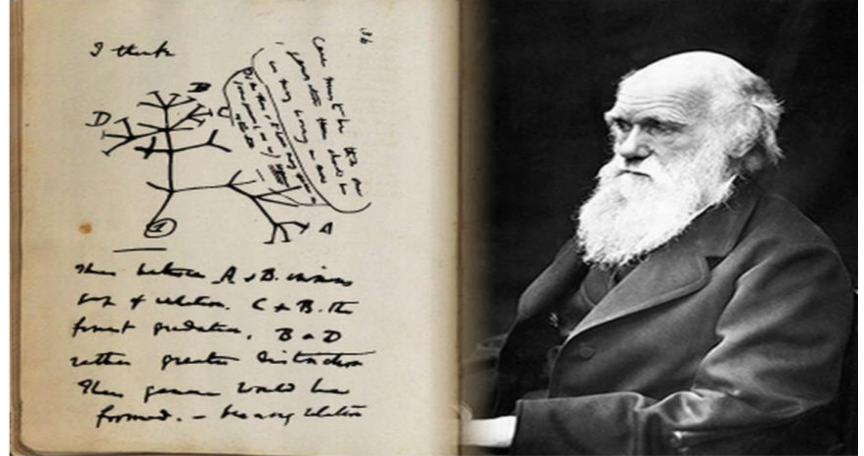


**What is it?**

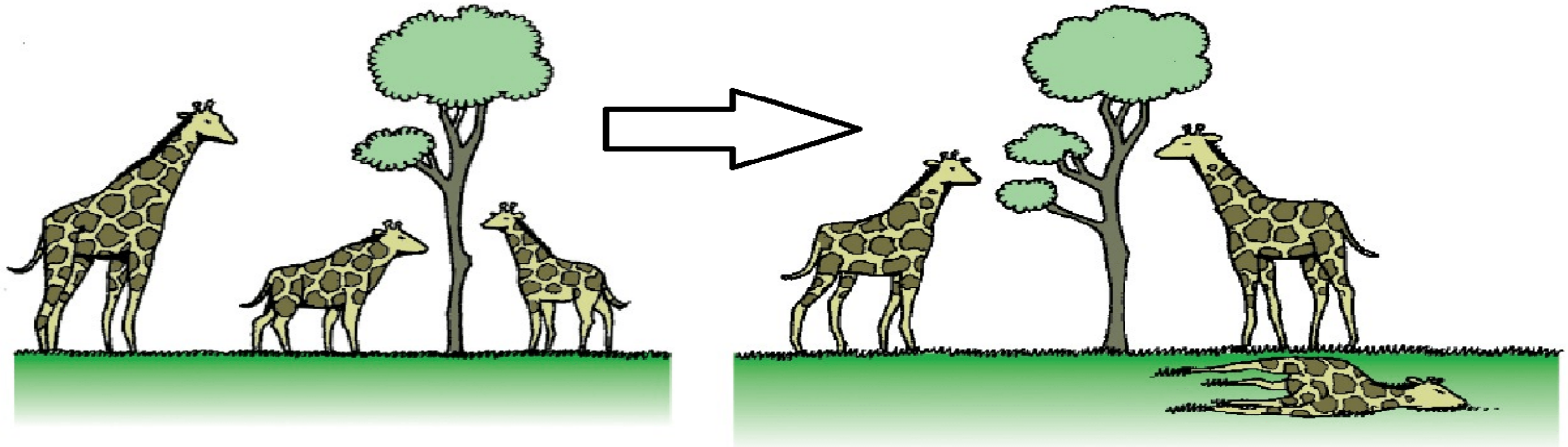
**Does it really happen?**

**If it is happening, how does it work?**

# Charles Darwin → Natural Selection

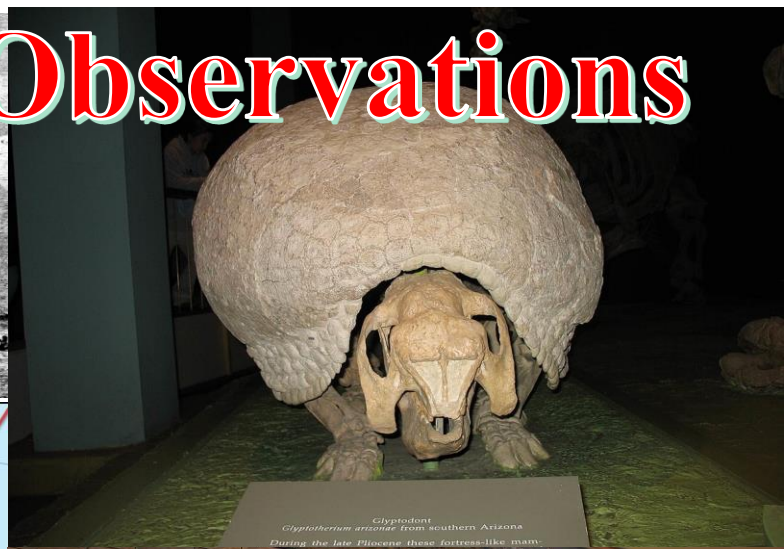
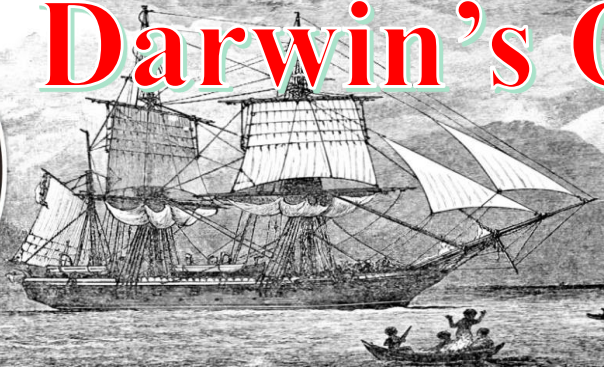
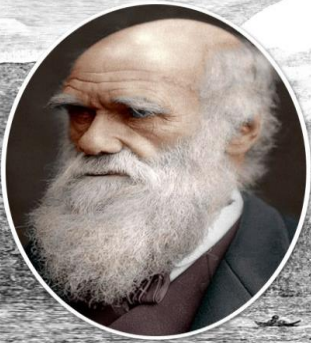


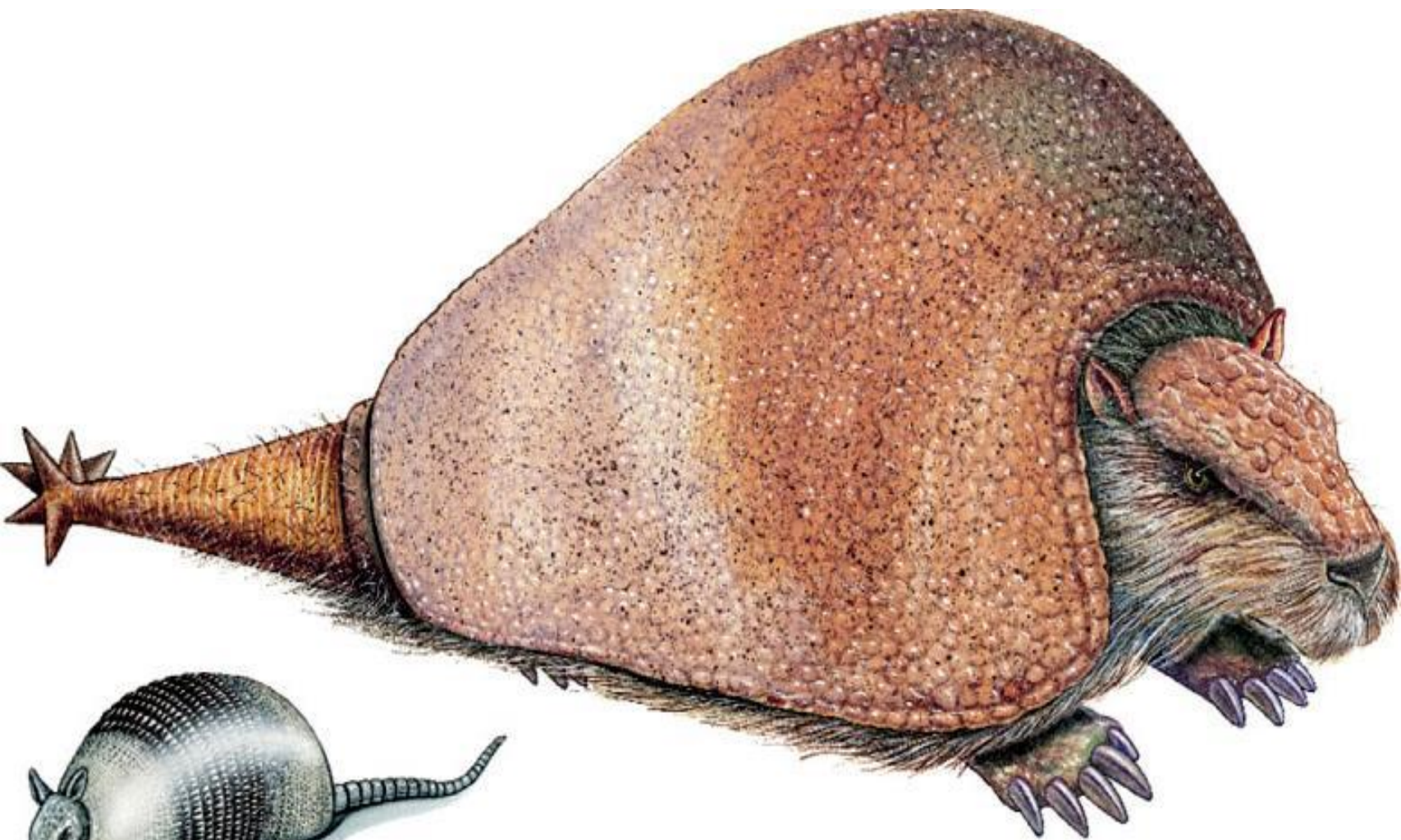
One of the notebooks contained Darwin's famous 'Tree of Life sketch'  
WIKIMEDIA COMMONS, ALEX LEGGATT



## Natural Selection in action

# Darwin's Observations





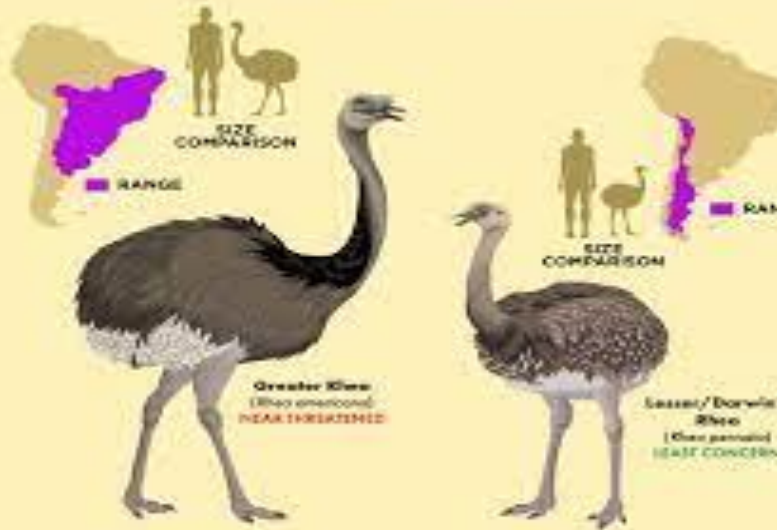
Armadillo

Glyptodont

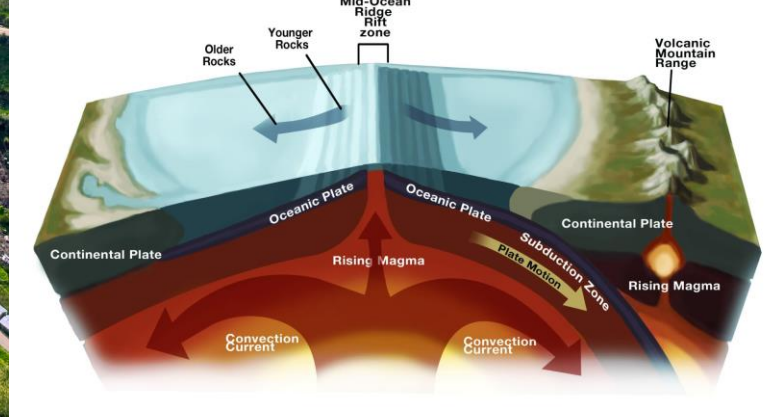
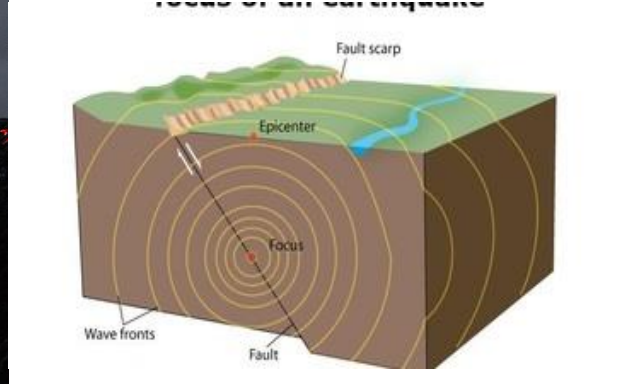




## KNOW YOUR RHEA









# Ground finches

large  
cactus  
ground  
finch



small  
ground  
finch



medium  
ground  
finch



sharp-beaked  
ground finch



large  
ground  
finch



**Long-tailed Mockingbird**



**Galapagos Mockingbird**



**Hood Mockingbird**



**Chatham Mockingbird**



**Charles Mockingbird**

# DARWIN'S Studies:

## Population Dynamics



House Mouse  
Litter Size: 3-14  
Litters/Year: 5-10  
Max Offspring/Year: 140



American Robin  
Clutch Size: 3-5  
Clutches per Year: 1-3  
Max Offspring/Year: 15



African Elephant  
1 calf every 2-4 years



High  
Fecundity

Low  
Fecundity

**More individuals are produced than can survive.**

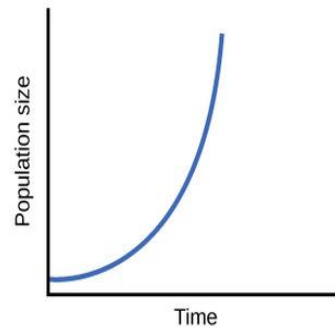


Eastern Cottontail Rabbit  
Litter Size: 1-12  
Litters/Year: 1-7  
Max Offspring/Year: 84

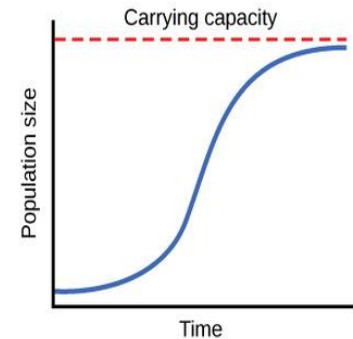


Spotted Owl  
Clutch Size: 2-3  
Clutches per Year: 1  
Max Offspring/Year: 3

Exponential Growth



Logistic Growth



There must be  
a struggle  
to survive -  
Competition



There is lots of  
variation within  
a population



Is it possible that certain structures,  
behaviours and physiological  
processes are better than others ?

# Offspring Inherit Parents' Traits



Widow's peak or not?



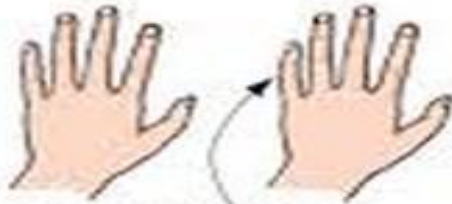
Can roll the tongue or not?



Which thumb is on the top?



Length of second toe?  
Is it longer than your big toe or not?



Little finger straight or crooked?



ear lobe hangs free

Darwin's point



ear lobe attached

no Darwin's point



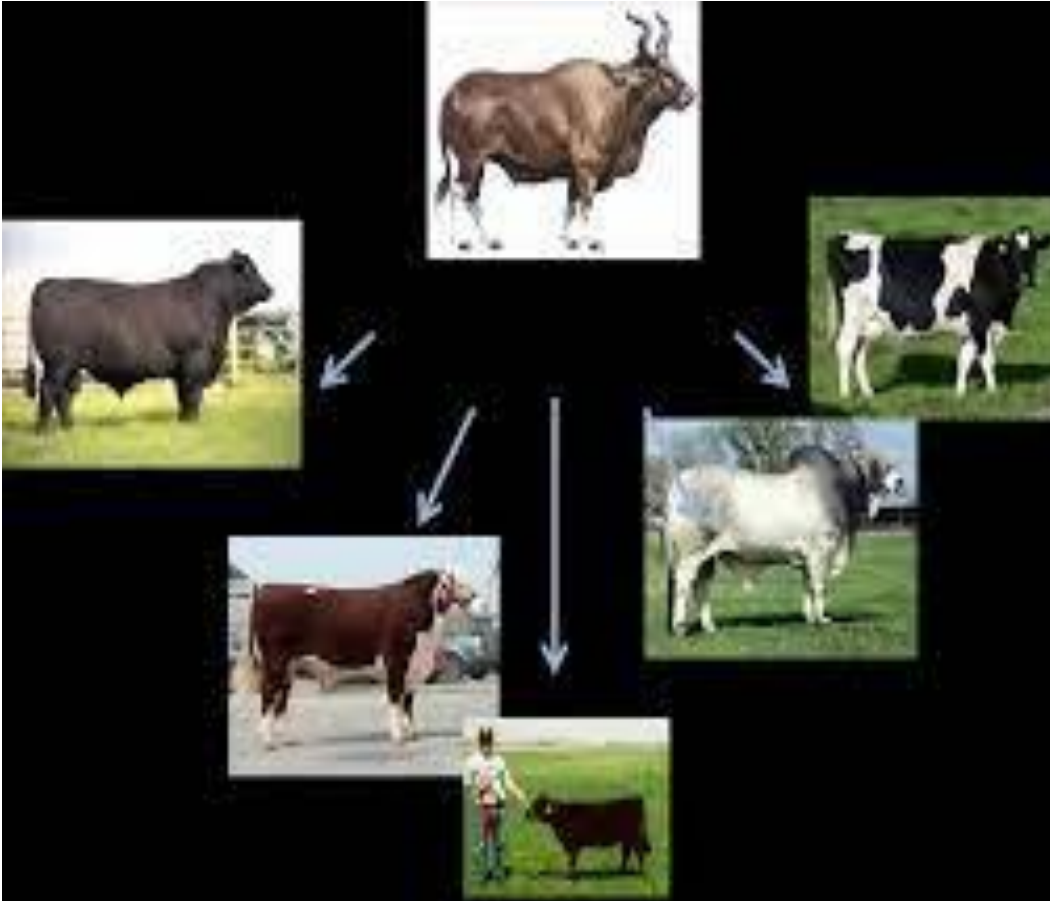
front teeth close together



front teeth with a definite gap

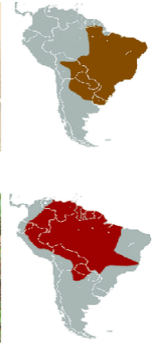
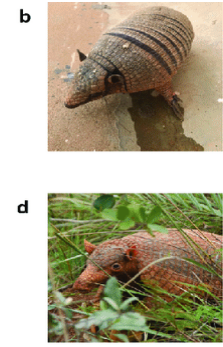
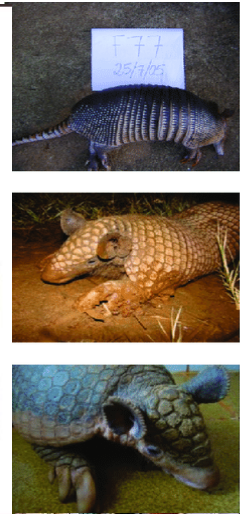
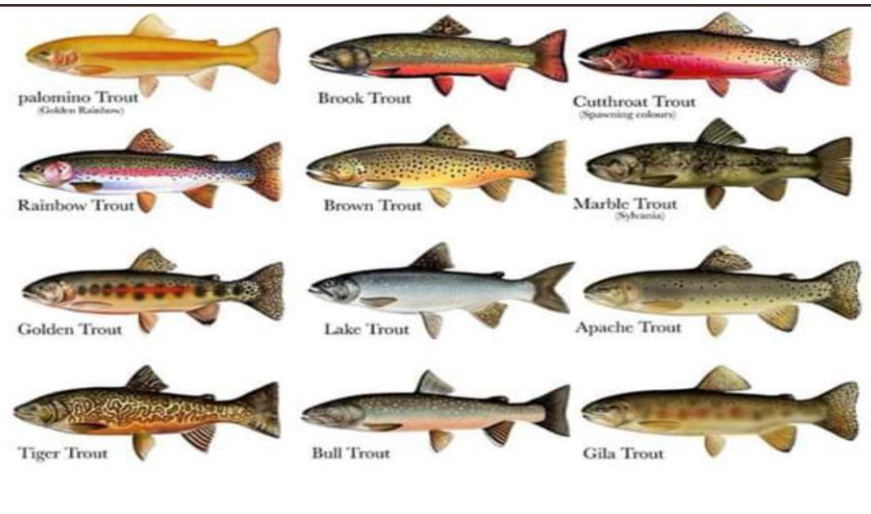


# Artificial Selection –Livestock and Crops



**If Humans  
Can do it .....  
Can't Nature ?**

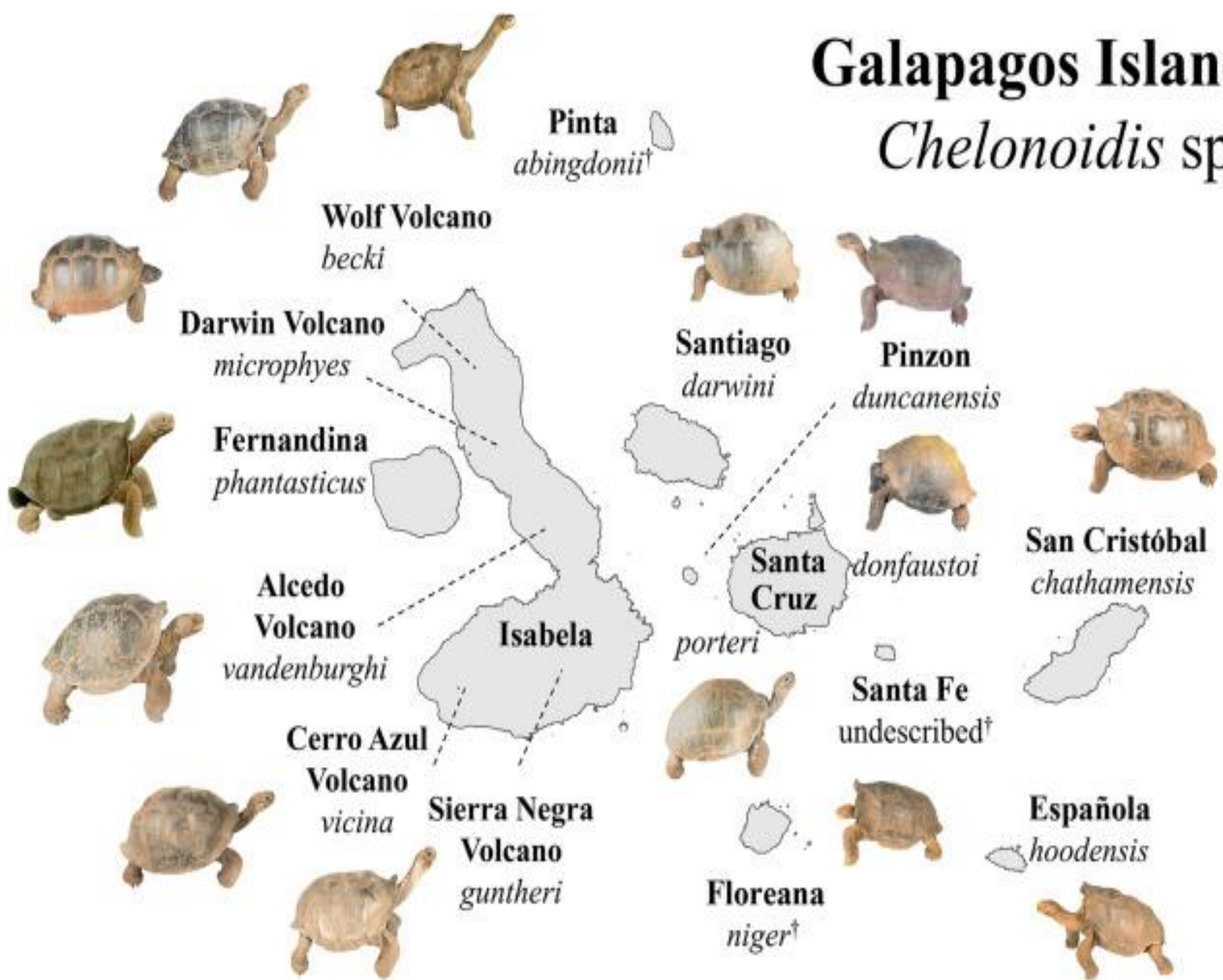
# So Many Different Species !



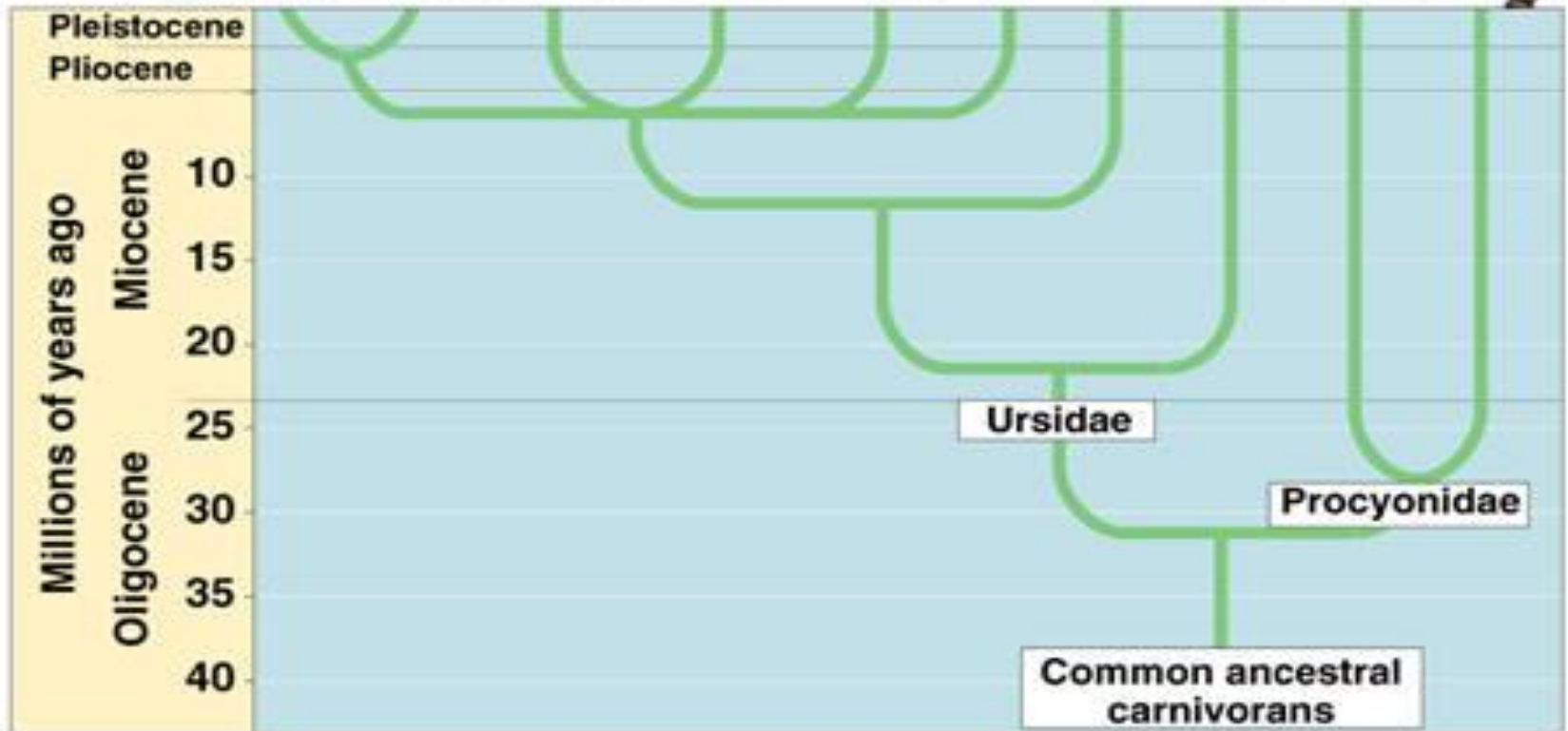


# Galapagos Islands

*Chelonoidis* spp.



# Diverging species from common ancestral Species



# Two Competing Theories

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Early giraffes probably had short necks that they stretched to reach food.

a. Lamarck's proposal



Their offspring had longer necks that they stretched to reach food.



Eventually, the continued stretching of the neck resulted in today's giraffe.

## Inheritance of Acquired Characteristics

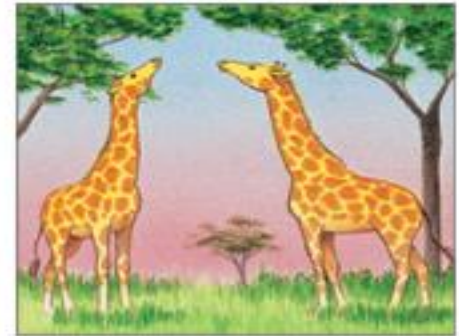


Early giraffes probably had necks of various lengths.

b. Darwin's theory

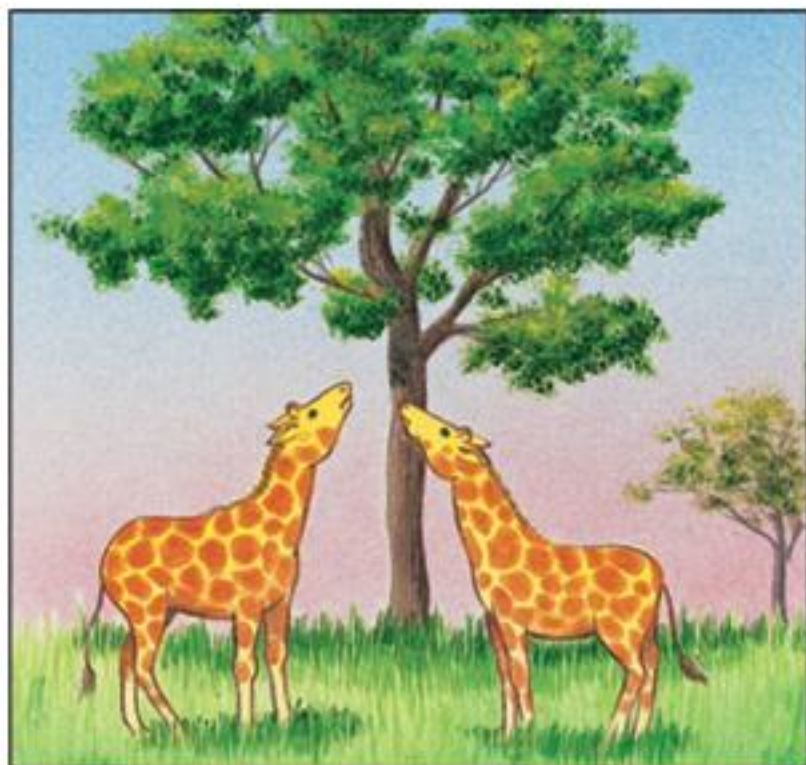


Natural selection due to competition led to survival of the longer-necked giraffes and their offspring.



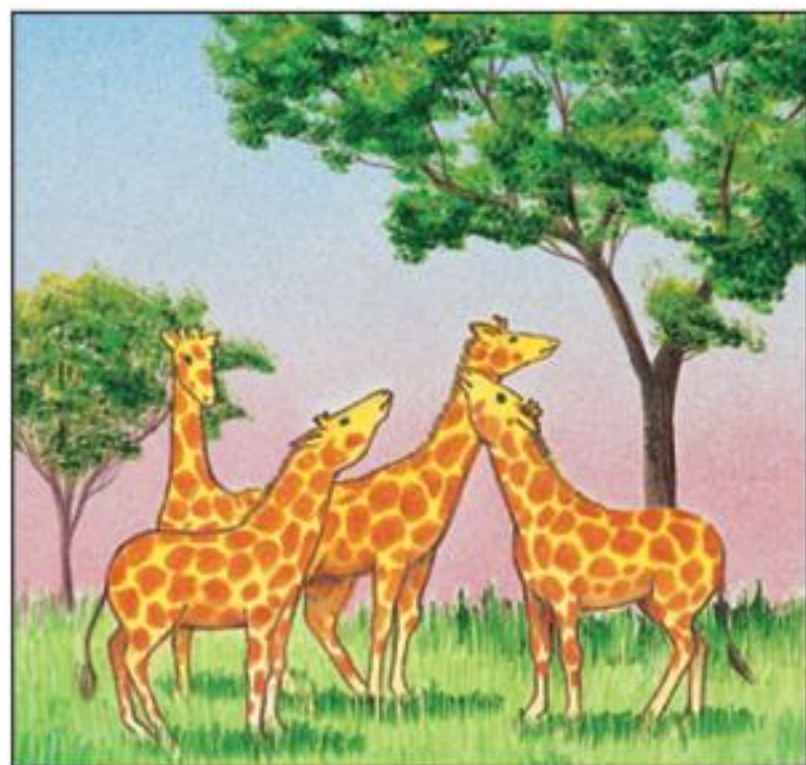
Eventually, only long-necked giraffes survived the competition.

## Natural Selection – Survival of the Fittest



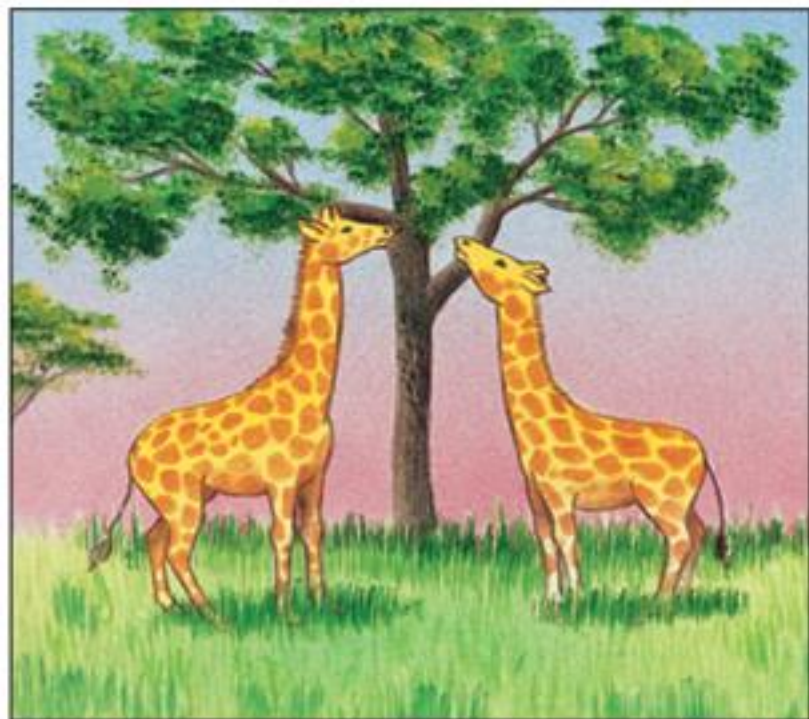
**Early giraffes probably had short necks that they stretched to reach food.**

**a. Lamarck's proposal**



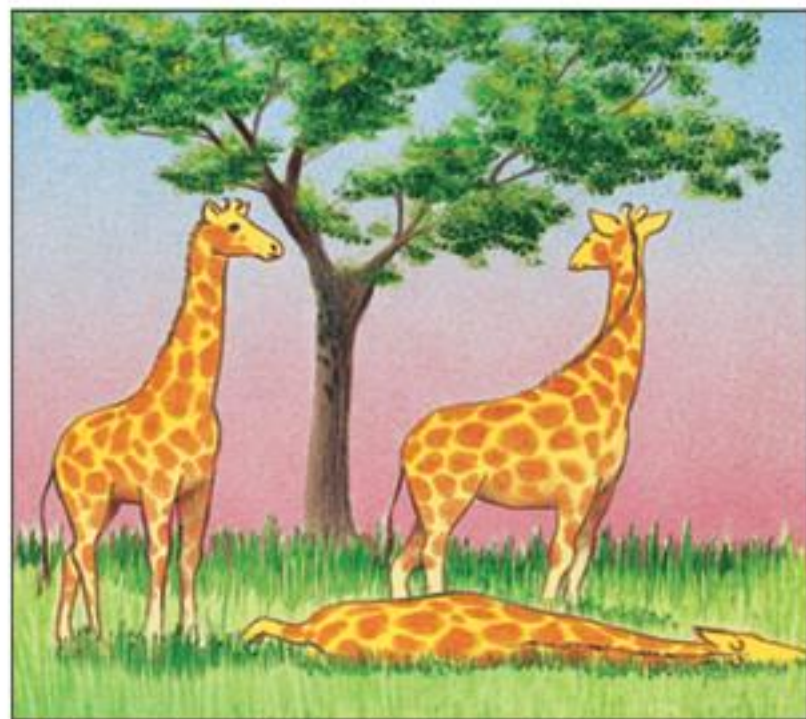
**Early giraffes probably had necks of various lengths.**

**b. Darwin's theory**



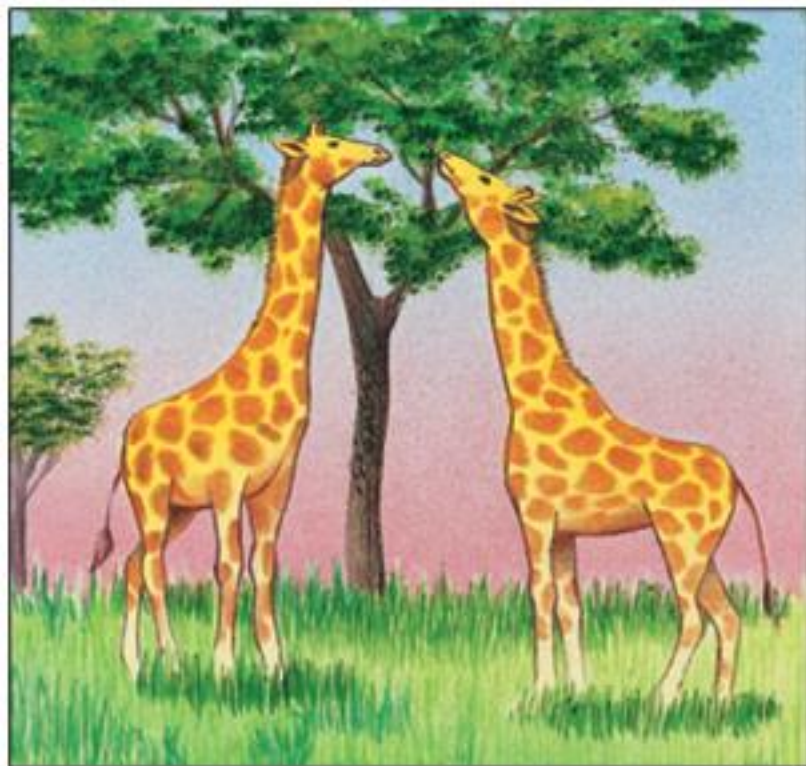
**Their offspring had longer necks that they stretched to reach food.**

**a. Lamarck's proposal**



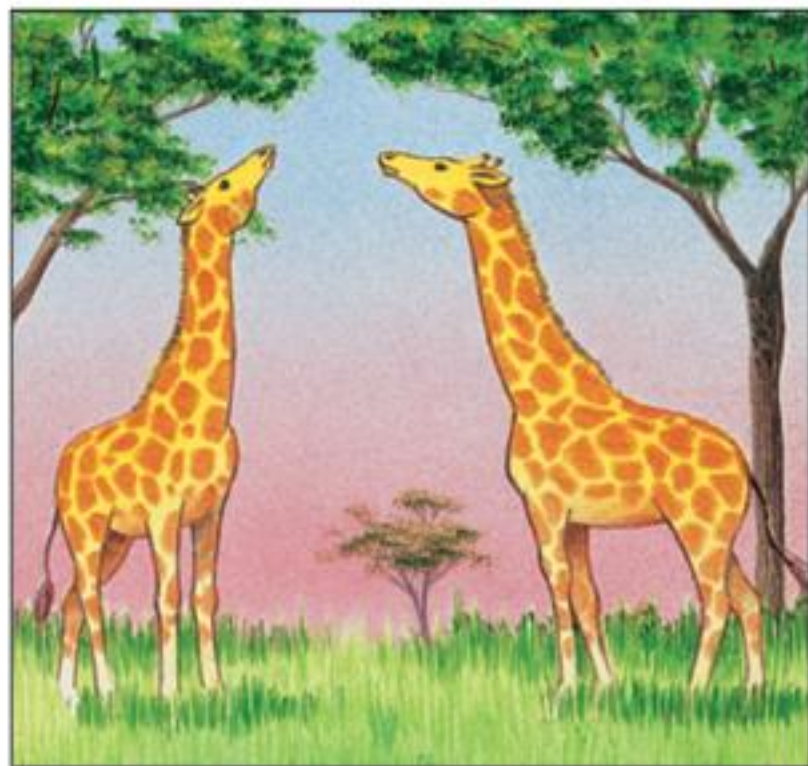
**Natural selection due to competition led to survival of the longer-necked giraffes and their offspring.**

**b. Darwin's theory**



**Eventually, the continued stretching of the neck resulted in today's giraffe.**

**a. Lamarck's proposal**



**Eventually, only long-necked giraffes survived the competition.**

**b. Darwin's theory**

