

The Theory of Evolution Chapter 6

Change over time.

What is evolution?

What Do You
See?



Two faces .. or one?



**A lady at her dressing table...
or a skull?**

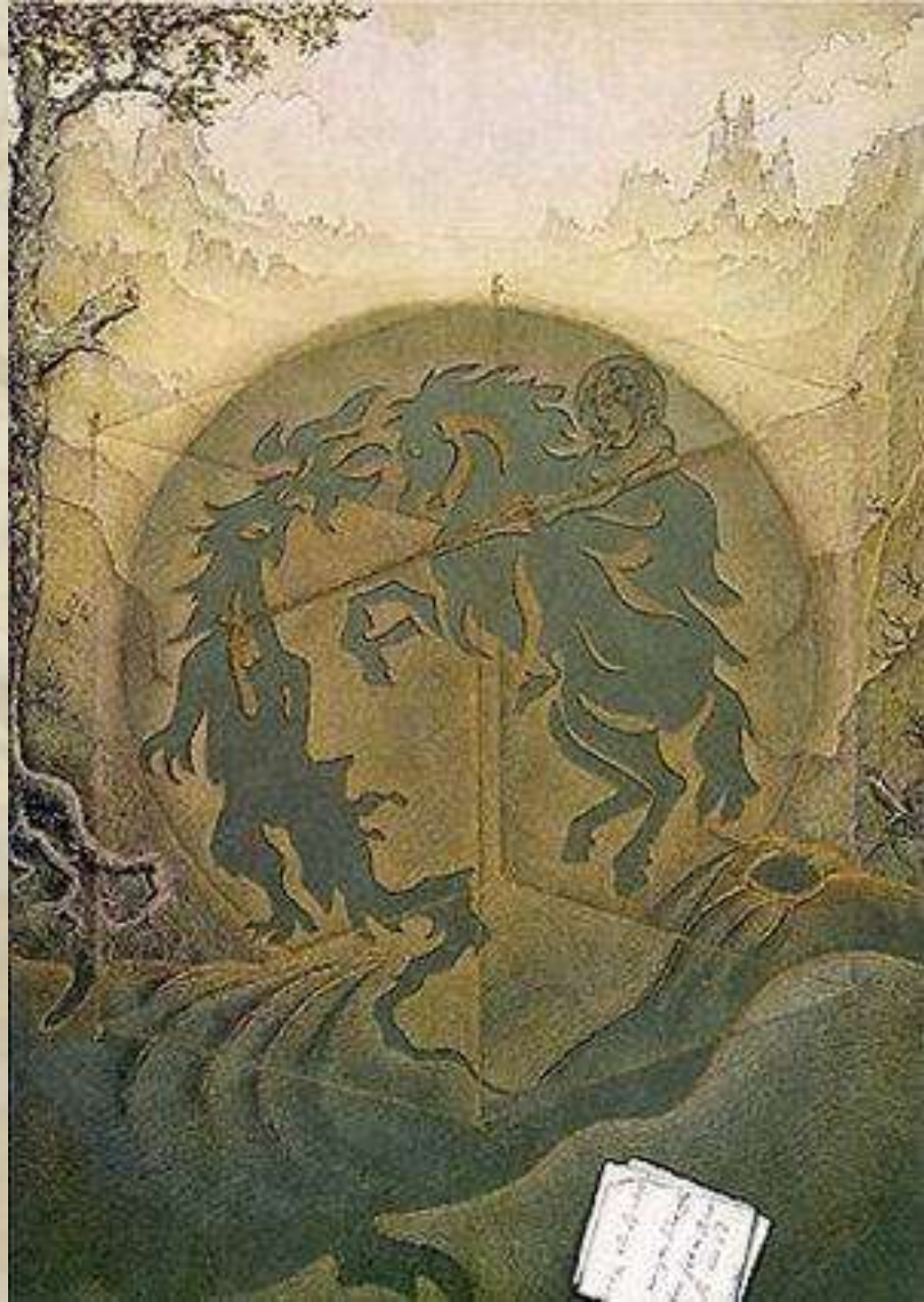
(try blinking .. or moving away from the screen)



**A man playing the saxophone?
or
A lady in silhouette?**









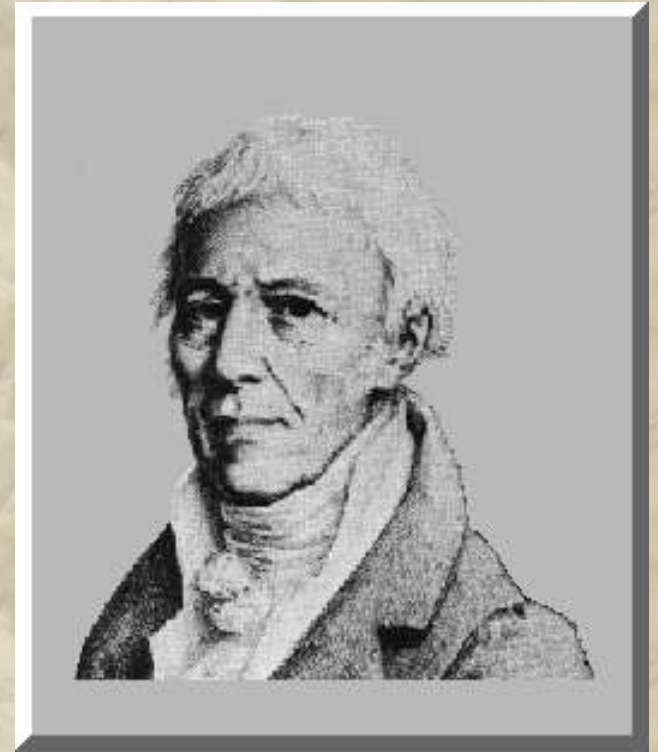




Early Evolutionist

- Jean Baptiste de Lamarck
 - Theory of Use and Disuse

*What was John Baptiste de Lamark's theory of evolution?**





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CHARLES DARWIN – 1809-1882

- ENGLISH
- TRAVELED AROUND THE WORLD ON THE BEAGLE – FAMOUS IN THE GALAPAGOS ISLANDS
- OBSERVED MANY SPECIES AND FOSSILS
- WHY DID SOME SPECIES SURVIVE WHILE OTHERS BECAME EXTINCT?



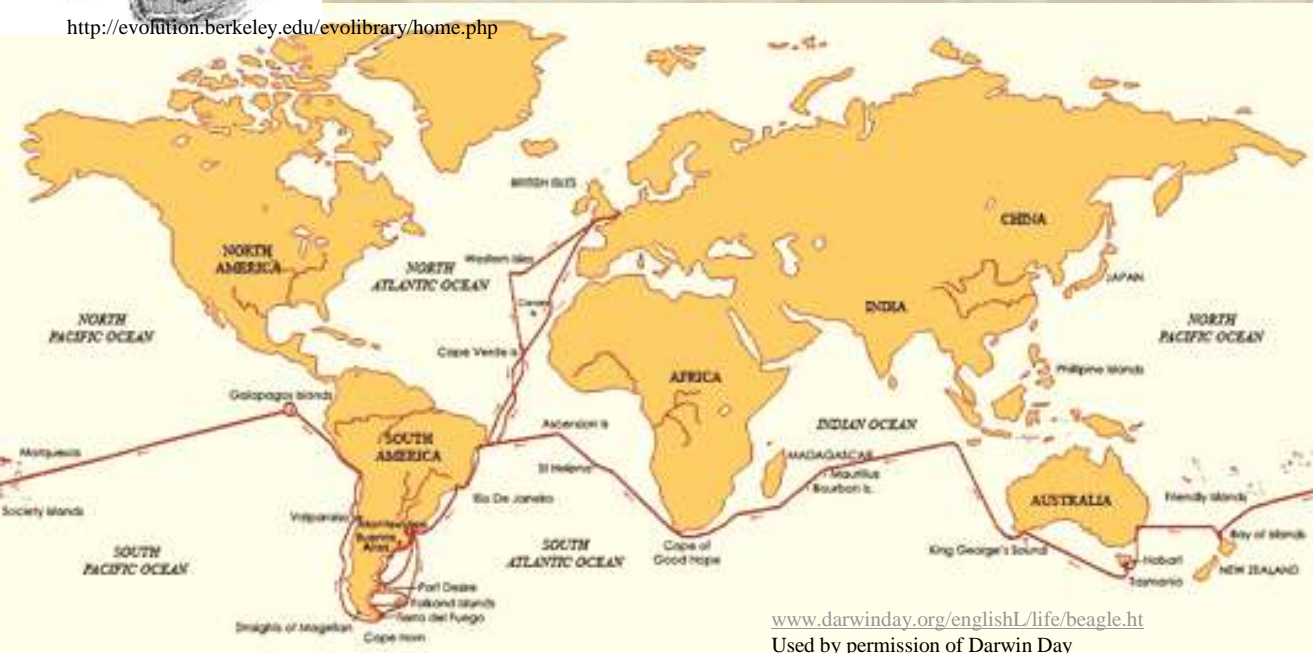
<http://evolution.berkeley.edu/evolibrary/home.php>



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www.darwinday.org/english/Life/beagle.html



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I have called this principle, by which each slight variation, if useful, is preserved, by the term Natural Selection.

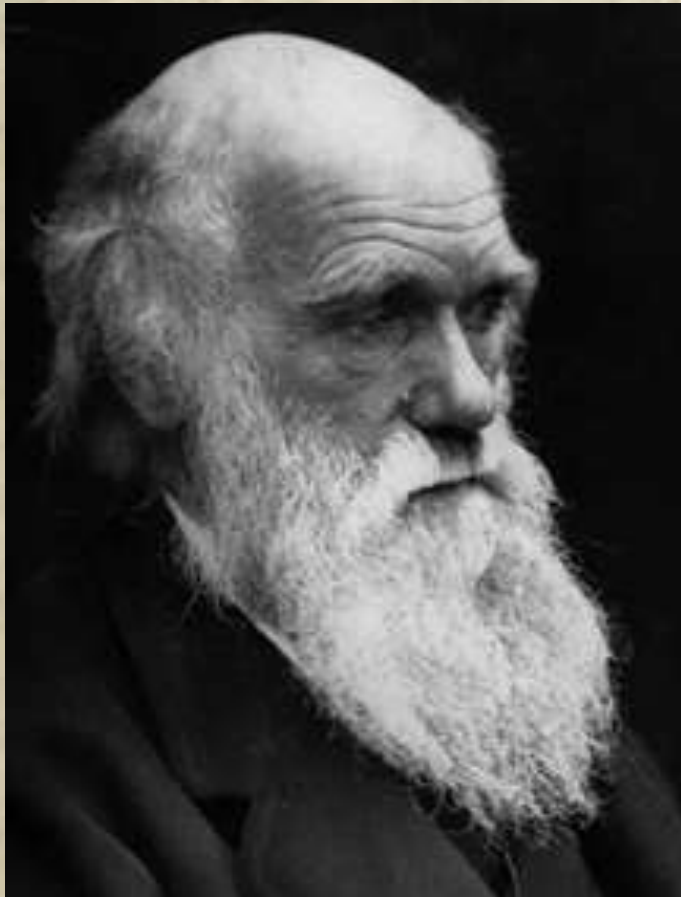
—Charles Darwin from "The Origin of Species"

Natural Selection

- organisms with traits best suited to their environments are more likely to survive



Mechanisms of Evolution



- Darwin identified four factors that govern natural selection
 - Organisms produce more offspring than can survive
 - There are variations among individuals of a species
 - Some of the offspring are better able to survive than others
 - Over time, the population begins to look more like those who are better able to survive

What are the four factors that govern natural selection?

Darwin's Book

- Darwin wrote a book describing his theory of evolution by natural selection. His book, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, was published in 1859

*Who was the man that came up with a believable and science based theory of evolution?**



Adaptation and Variation

- Variation is an inherited trait that makes it different from other organisms in a population of the same species
- The source of variation is believed by some to come from mutations
- Most mutations are harmful, but a few possibly could be beneficial
- Adaptation is any change over time that allows an organism to better survive

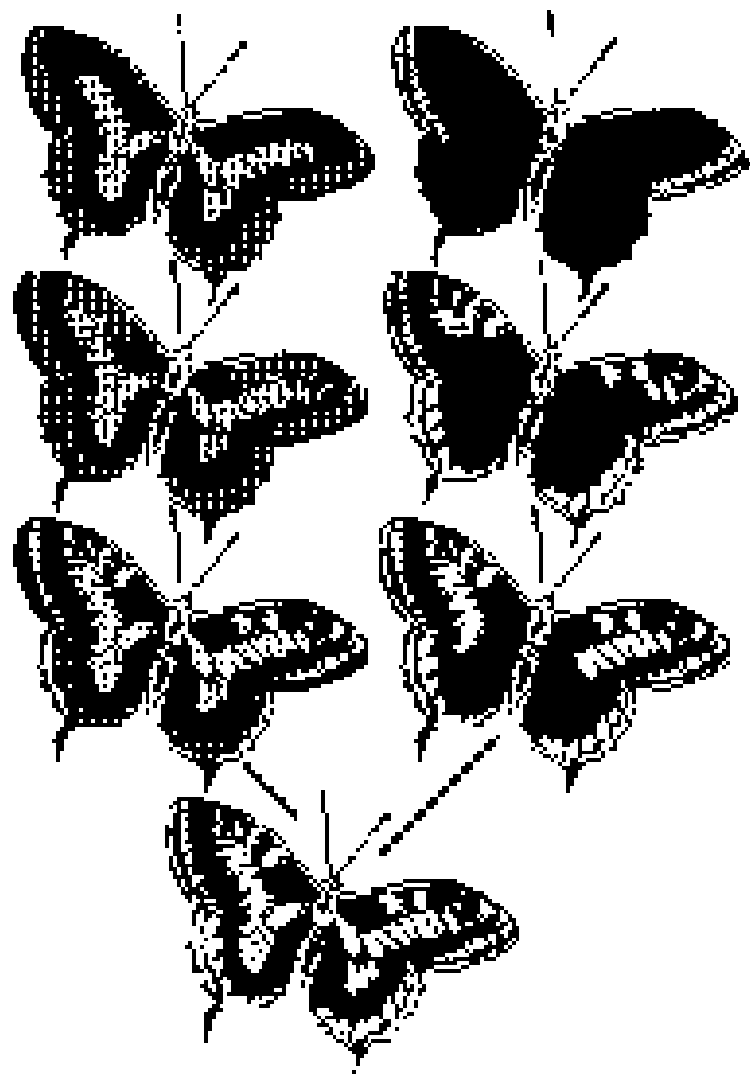


Rate of Evolution

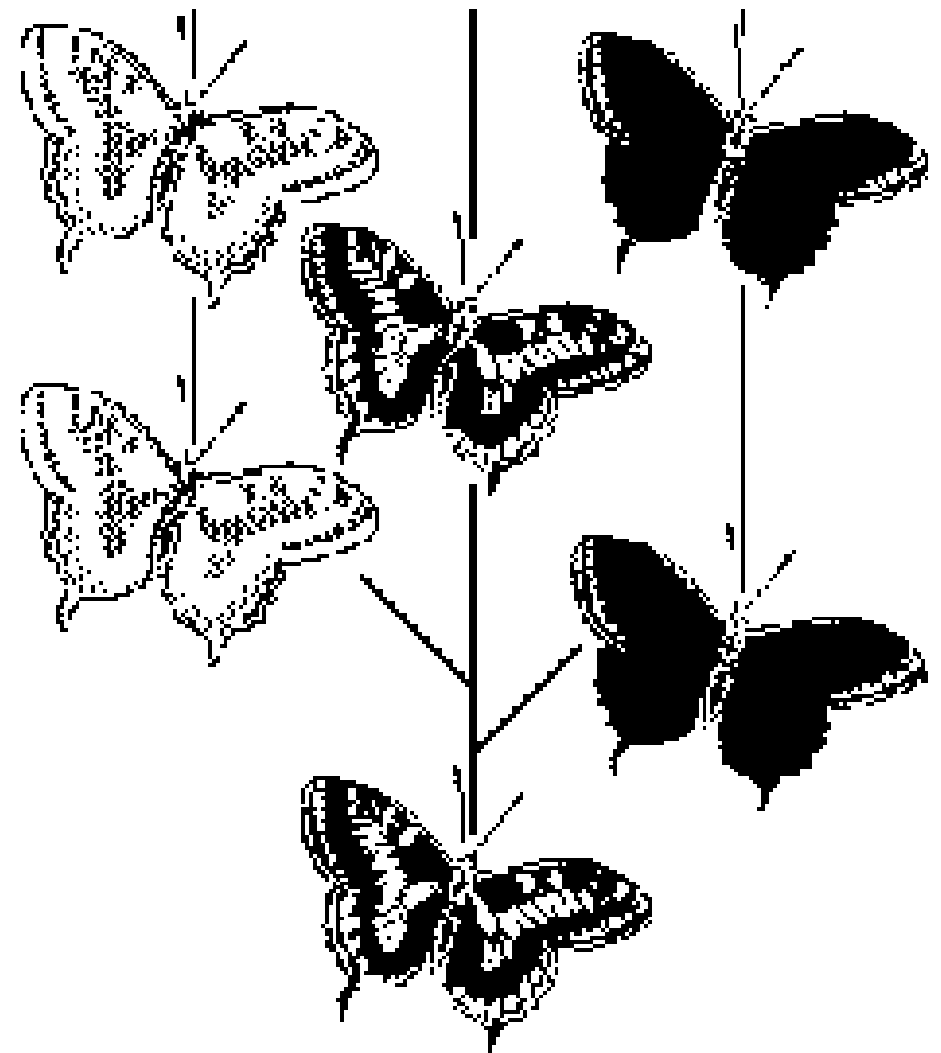
- How Fast Does Evolution Occur
 - Theory of Gradualism
 - Darwin hypothesized that the rate of evolution was steady slow and continuous
 - The apparent lack of intermediates in most evolutionary schemes is one problem with this theory
 - Theory of Punctuated Evolution
 - Shows that rapid evolutionary changes may have occurred resulting from catastrophic events taking place

*Explain the difference between punctuated evolution and gradualism.**

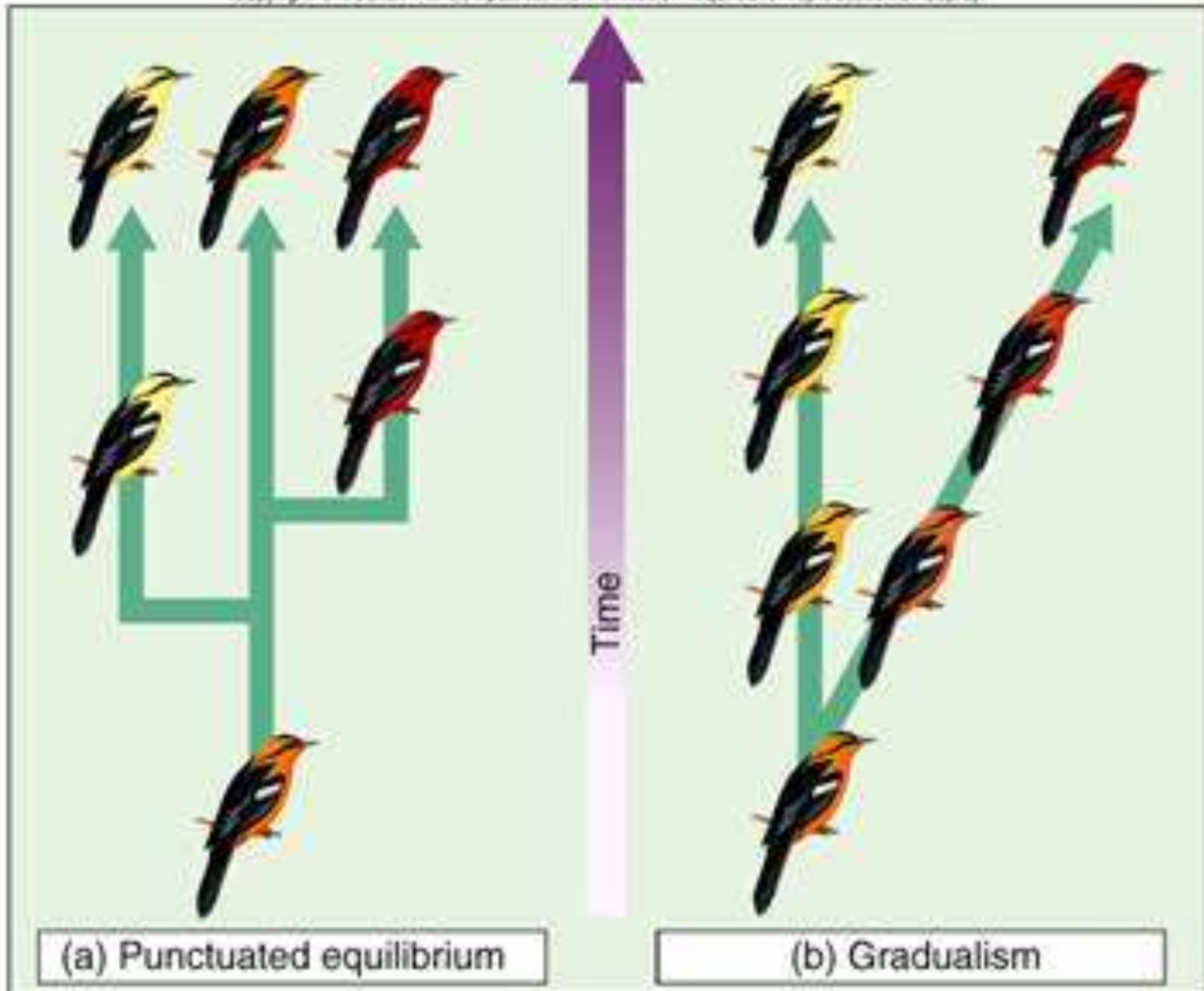
What kind of events could have caused punctuated evolution



gradualism

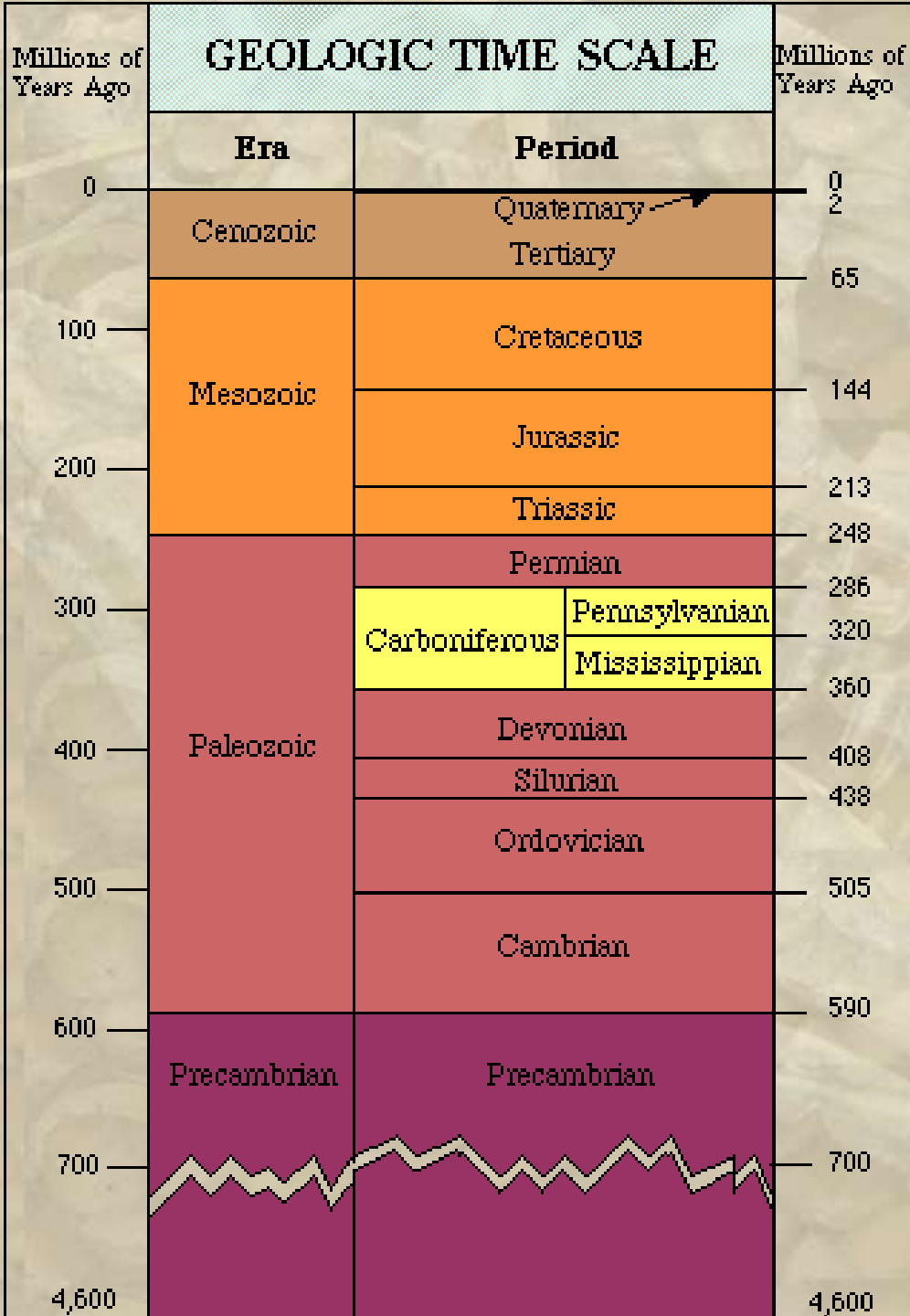


punctuated equilibrium



(a) Punctuated equilibrium

(b) Gradualism



End of the Dinosaurs

First Dinosaurs, Mammals, Birds

First Reptiles
First Amphibians

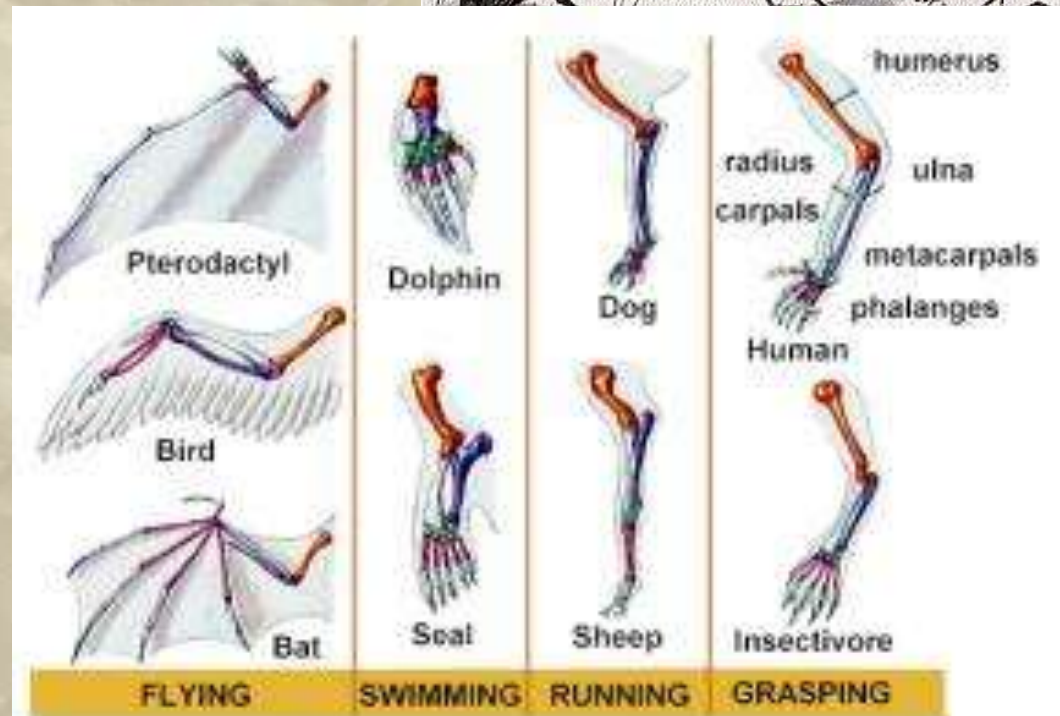
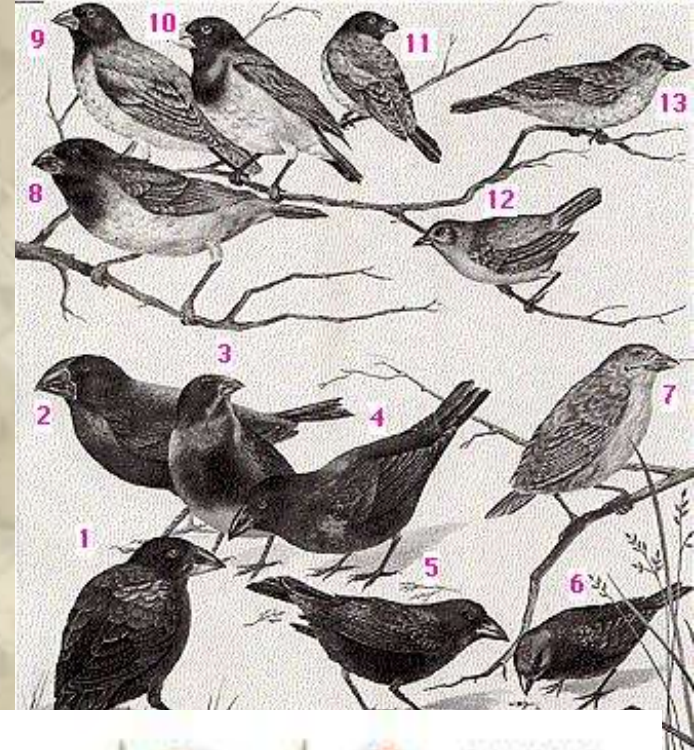
First Land Plants

First Fishes

First Invertebrates

Evidence for Evolution

- Fossils
- Dating
- Vestigial structures
- Homologous structures
- Embryology
- Comparative DNA



Fossils

- Kinds of Fossils
 - Imprint
 - Cast made in an organisms track, shell or indentation
 - Wood or bone replace by minerals
 - Organism Frozen in Ice
 - Organism Trapped in resin
- Fossil Record

*Give examples of the different types of fossils and explain each type.**

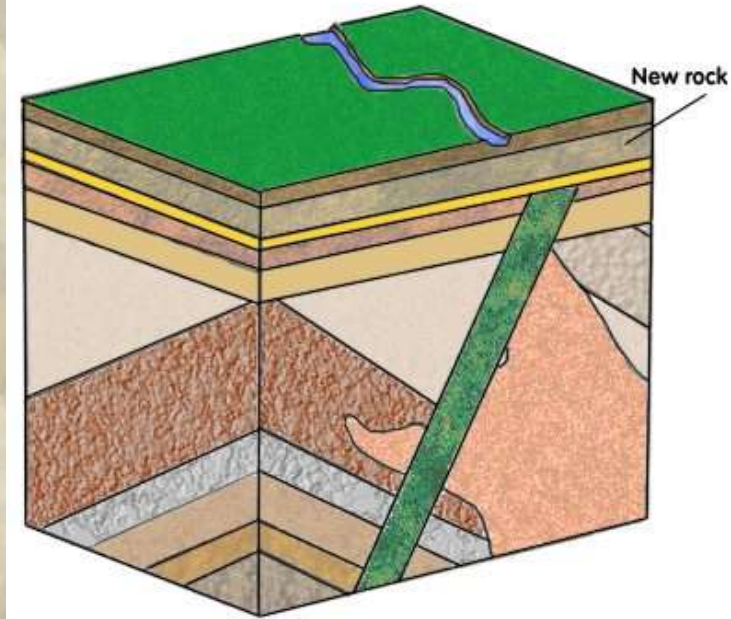


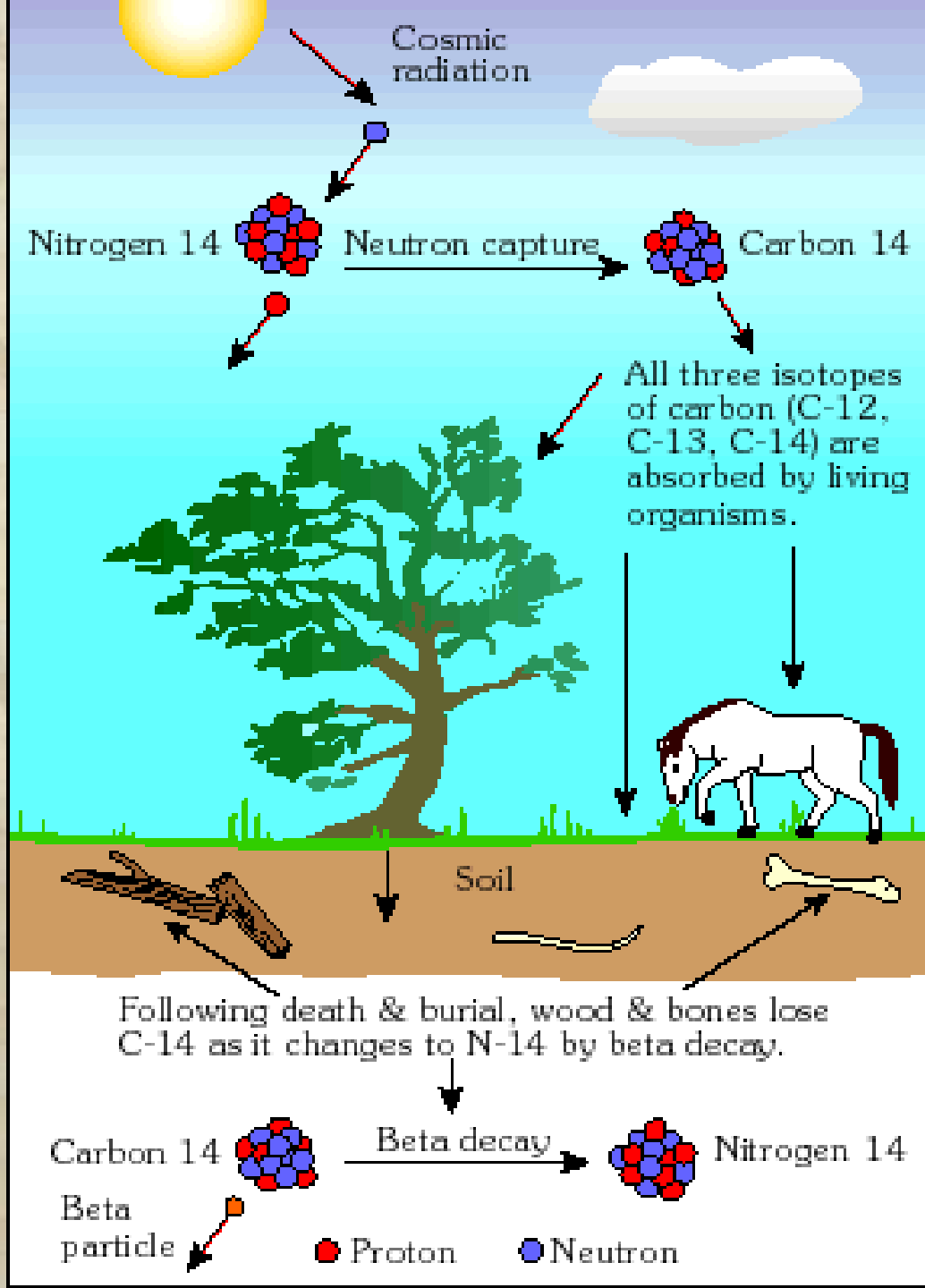
Dating

- Relative dating
This idea is based on the oldest layer on the bottom and younger layers on the top.
- Radioactive Dating

What is relative dating?

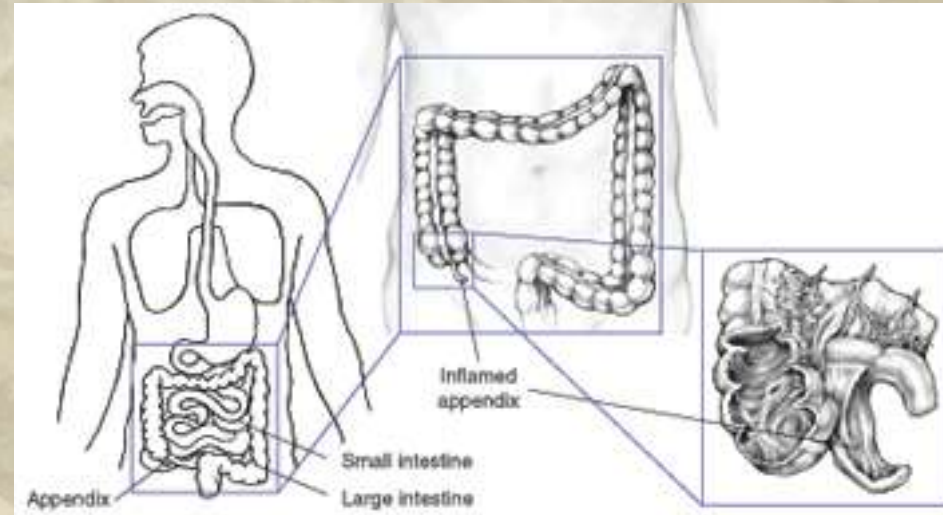
What is radio active dating?





Other Evidence for Evolution

- Vestigial Structures
A structure or organ of an organism that seems to have no apparent use
- Embryology
Comparing similarities of embryo organisms
- DNA comparisons

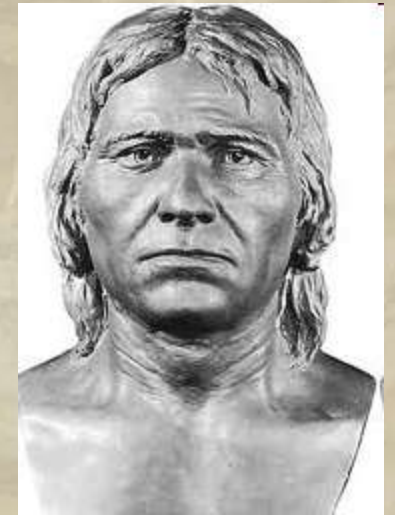
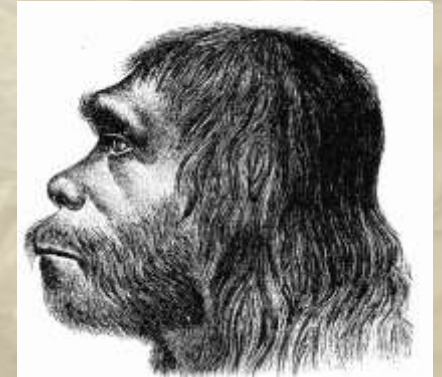


*Be able to list and give examples of evidences of evolution**

Evolution	Design/Creationism
<p>All living things came from the same ancestor that arose from a pre-biotic soup. Everything came about by totally natural processes.</p>	<p>All life was designed by an intelligent designer. Life was not just a chance of the right material in the right environment</p>
<p>Comparative anatomy with comparative structures points to a common ancestor</p>	<p>Anatomy and physiology with common characteristics point to one designer or an original design plan</p>
<p>Evolution observed and selective breeding support the theory of evolution explaining all organisms on one family tree</p>	<p>Evolution observed is the designed ability in the DNA to conserve life in an ever changing environment</p>
<p>The lack of geological intermediates point to punctuated evolution caused by catastrophic events and mass extinction</p>	<p>The lack of geological intermediates point to a designer and changes that can be documented demonstrates the designed ability to adapt</p>

Primate Evolution

- Primates
 - All have opposing thumbs
 - Binocular vision
 - Flexible shoulders and rotating fore limbs
 - Two main groups of Primates
 - Lemurs, tarsiers, & the prosimain
- Higher primates - monkeys, apes and humans
- Australopithecus
- Hominids
 - Means humanlike primate
 - Homo habilis
 - Neanderthal
 - Cro-Magnon
 - Modern humans *Homo sapiens*



*List the human ancestors of the evolution "Theory" in order.**

Some Problems for Evolution

Two main problems, which include various sub-problems:

- (1) Problems with generating the observed level of order, given only random events and selection for survival to produce this
- (2) Problems with the observed fossil record compared to expectations



Problems Generating Order

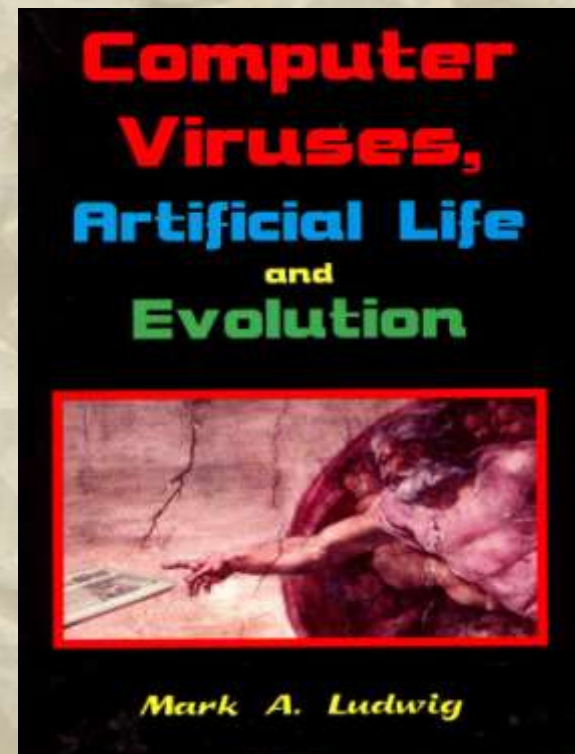
Using Merely Random
Phenomena Selected for
Survival

1. The Origin of Life

- Mutation & natural selection will not work until there is something capable of reproducing for them to work upon.

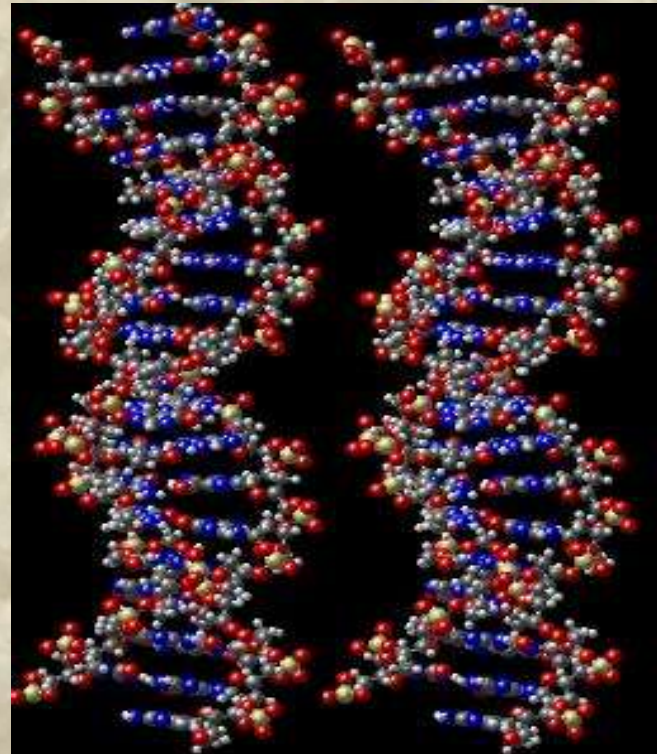
2. The Origin of Life

- Computer viruses are the closest things to life that humans have created.
- Even the simplest of these are far too complex to form by chance.



The Origin of Biochemicals

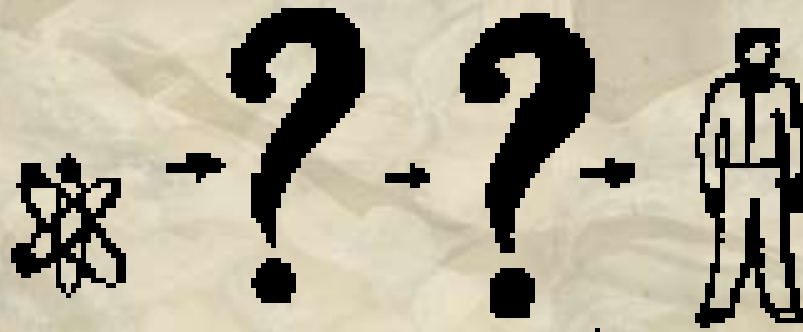
- Making DNA & RNA is far harder.
- These require a number of different environments.
- To date they have only been produced using considerable intervention by the experimenter.



Teacher Attitudes: Other Findings

- 57% of US science teachers consider evolution to be a unifying theme in biology
- 48% believe there is as much evidence for creationism as for evolution
- 33% of Pennsylvania's biology teachers do not think evolution is central to biology
- 40% of Kansas' biology teachers believe creationism is scientifically valid; more than 50% teach creationism

EVOLUTIONARY TIME LINE



ATOMS

ORIGIN
OF
LIFE

FOSSIL
RECORD



NOW CLASS,
WE DON'T HAVE
ANY DETAILS YET,
BUT WE KNOW
WE EVOLVED.



HMMM...