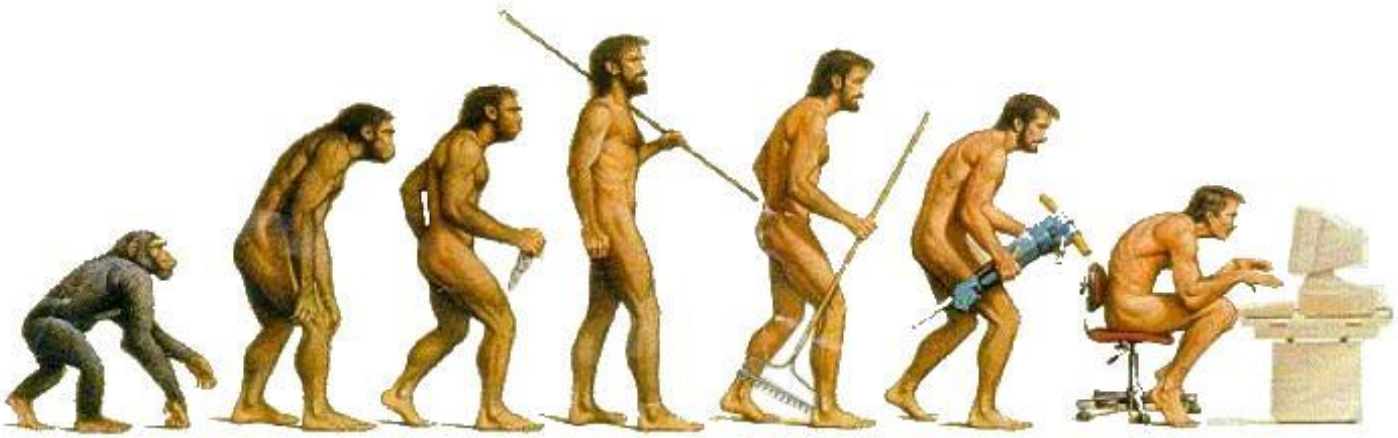
Evolution



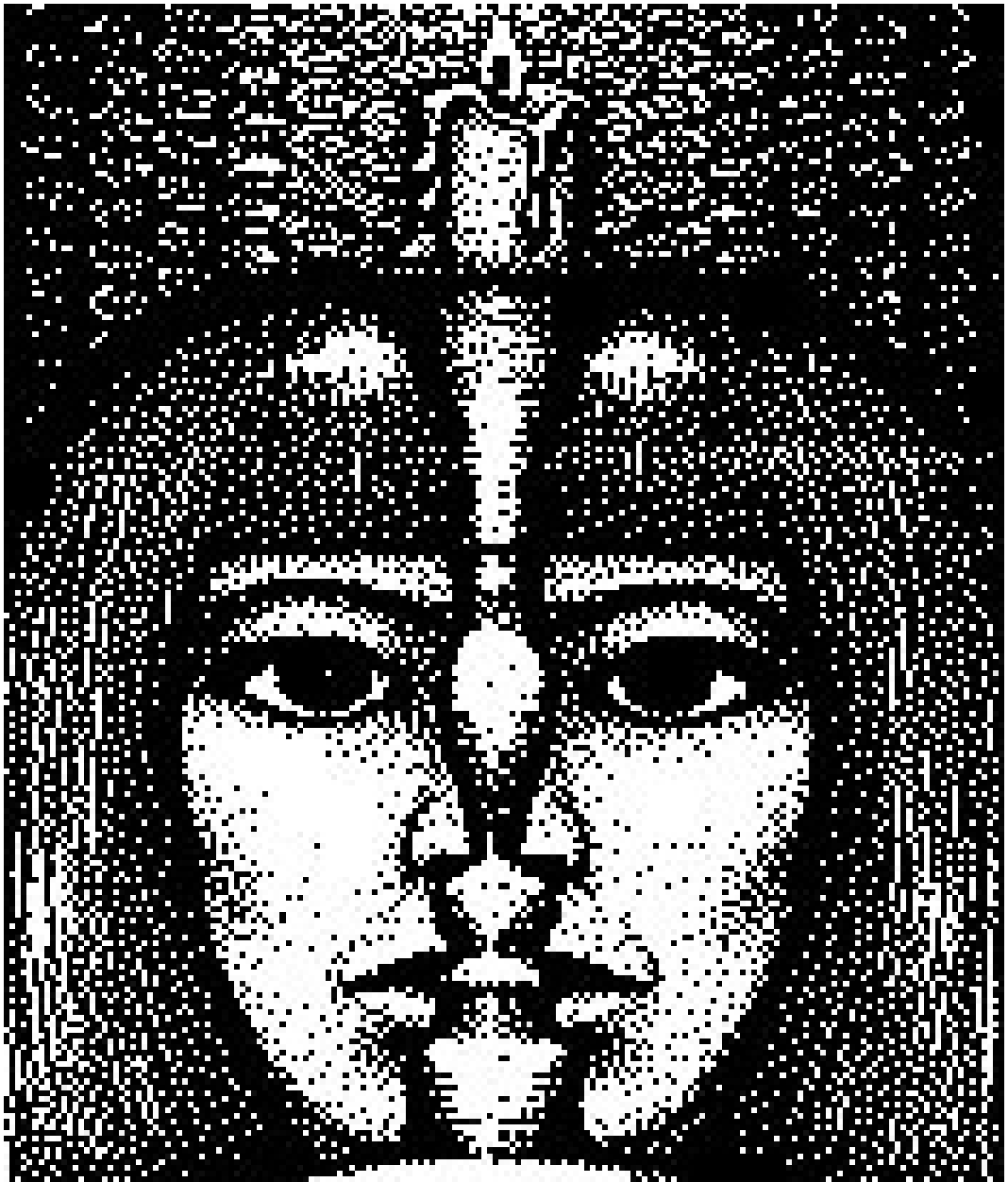
(or is it?)

Change over time

What is evolution?*

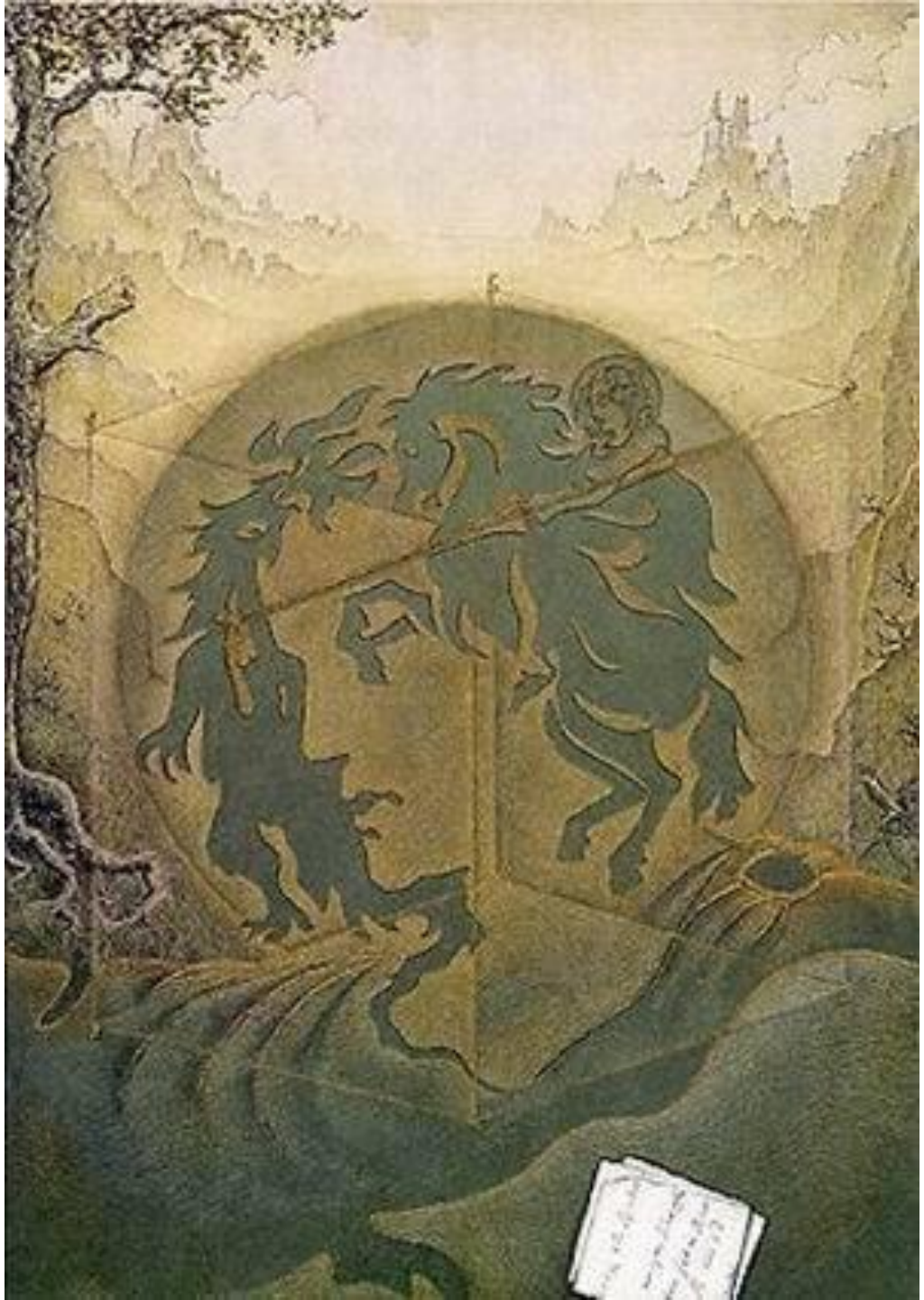
What Do You See?

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?



Evidences that support the Theory of Evolution

- Fossils
- Radio Active Dating
- Fossil Record interpretation
- Comparative anatomy and vestiges
- Similarity of embryos
- Comparative biochemistry
- Genetics and selective breeding
- Micro evolution

Give evidences used by scientist to support the theory of evolution.*

Evolution

- There are different views and it is not a set in concrete idea
  - It is a changing theory and is influenced by
    - Background
    - Desire
    - Point of veiw

Fossils

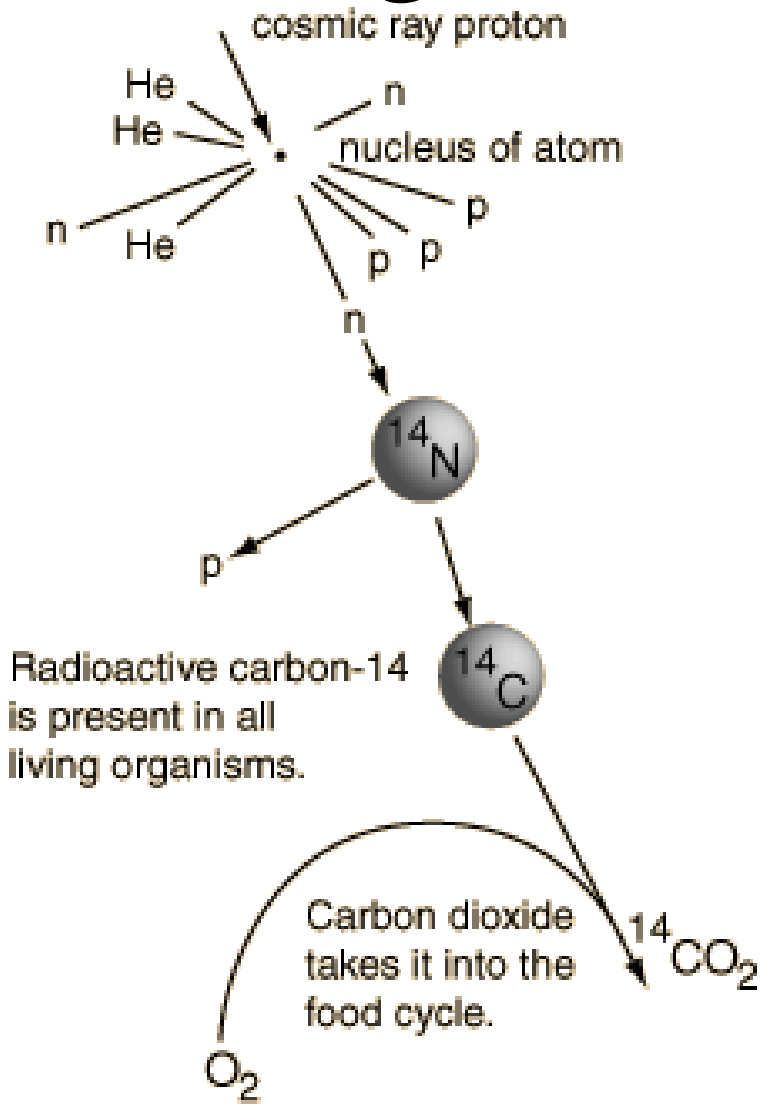
- The hard part of organisms preserved or impressions left behind
- Fossils are the hard part of organisms preserved or impressions left behind
- Lower layers are believed to be the oldest
- Upper layers are believed to be the most recent

Found in the Glen Rose limestone which is designated as Middle Cretaceous, supposedly 110 million years old and contemporary with the dinosaurs!

Radio Active Dating

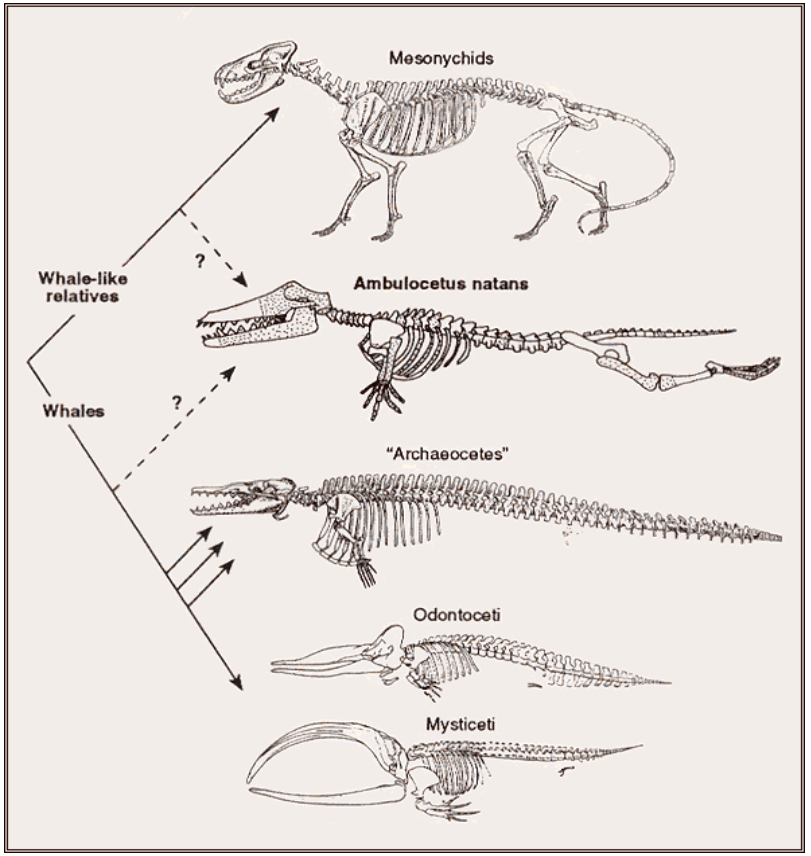
- Carbon 14
  - Carbon 14 which changes to energy with a half life of 5730 years
- Other radio active dating

Explain carbon 14 dating.*



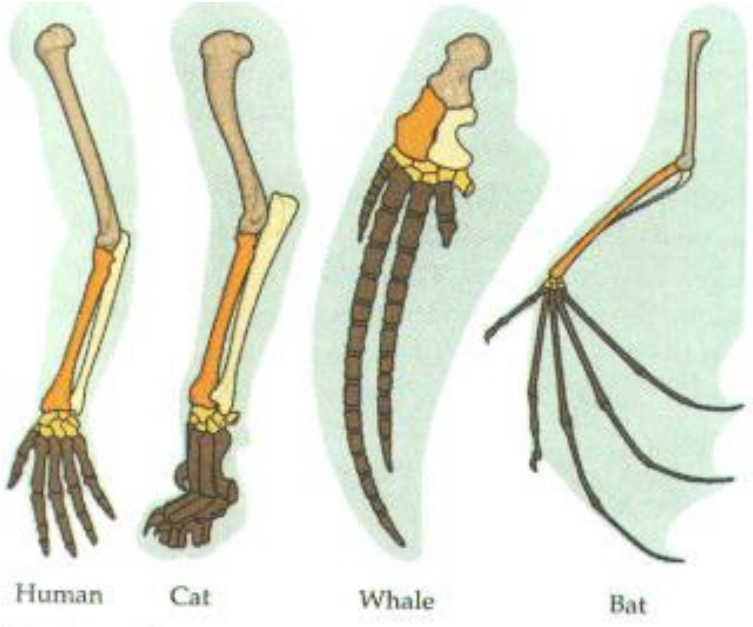
Fossil Record Interpretation

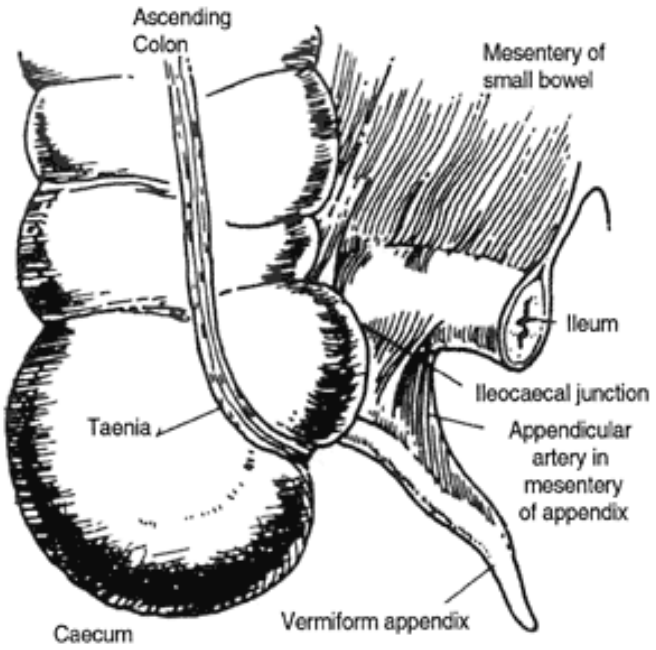
- interpreting where other organisms fit into the life history on earth



Comparative anatomy & Vestiges

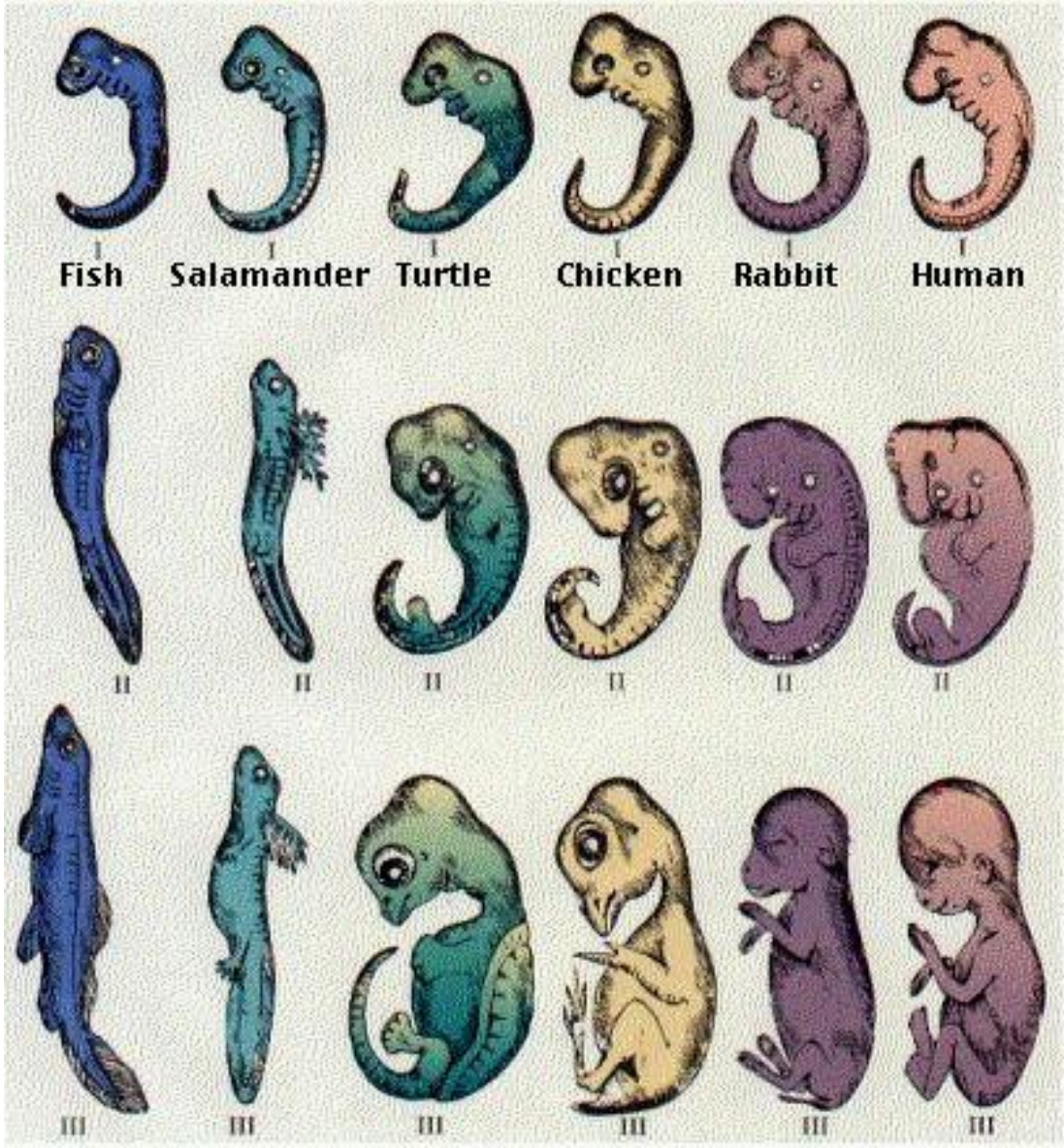
- Similarity of anatomy structures (homologous structures)
- Vestiges, structures not currently used
- The list of vestigial organs in humans has shrunk from 180 in 1890 to almost 0 in 2005





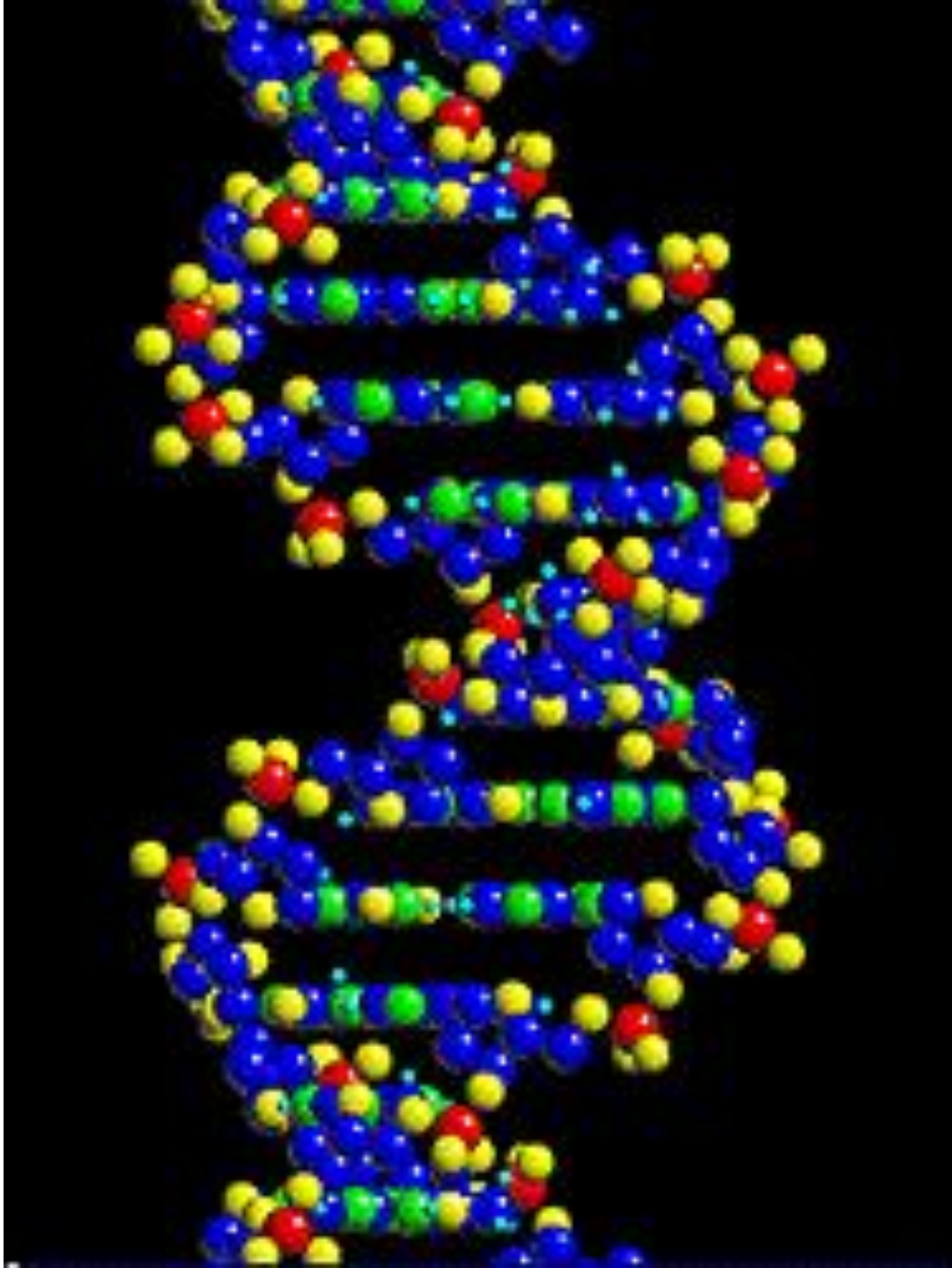
Comparative Embryos

- Similarity of embryos in development
- Ontogeny recapitulates phylogeny
- It means that an individual goes through a succession of stages in its development that resembles the stages of development that its species went through when evolving



Comparative biochemistry

- Similarity of DNA make up point to a common ancestry



Genetics and selective breeding

- point to survival of the fittest

Micoevolution

- Proves the overall theory of evolution
  - Bacteria and Penicillin
  - Peppered moth in Europe

Early evolutionist and their theories

- John Baptist Lamark
- Charles Darwin

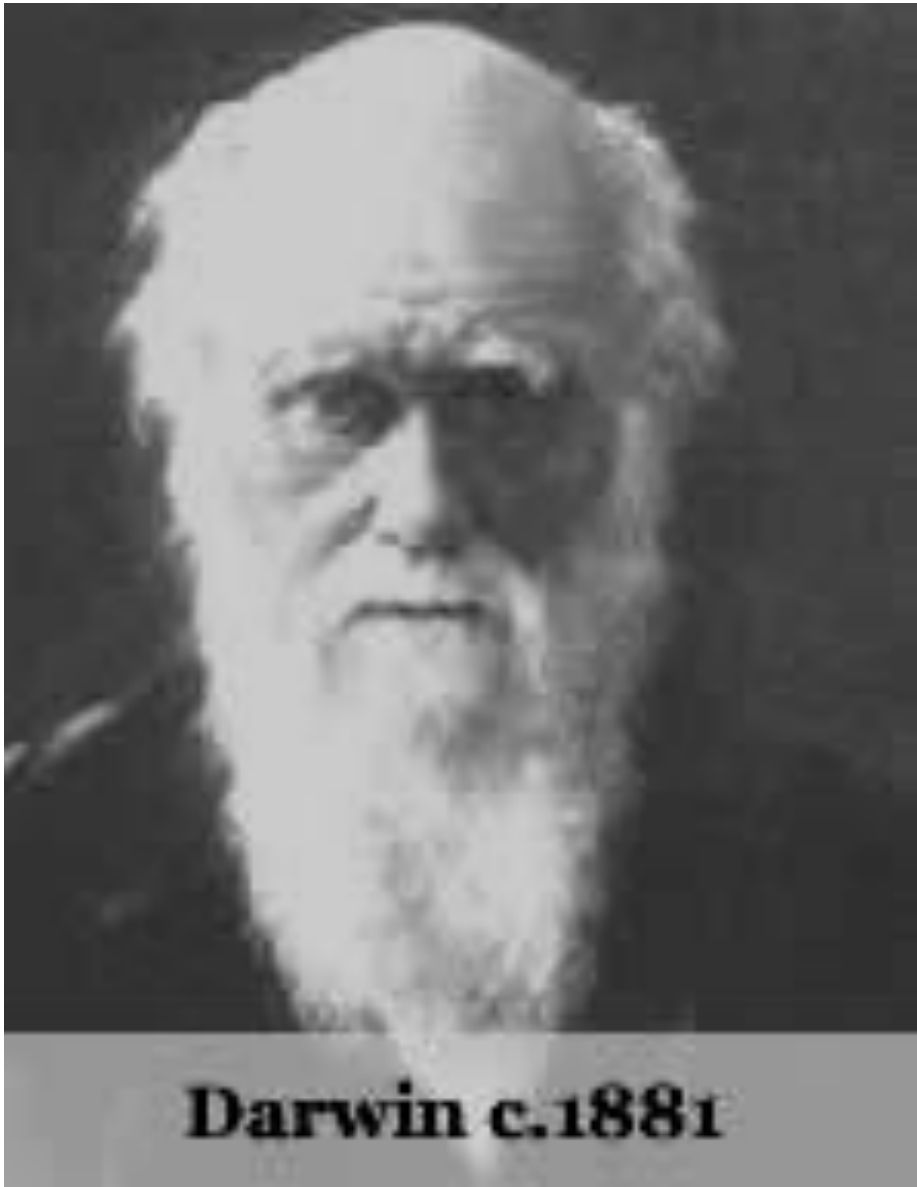
John Baptist Lamark
1809

- Theory of use and disuse
- This theory is not accepted at all but provided a framework for thinking about evolution

Explain John Baptist Lamark's theory of evolution, and what was wrong with his ideas?*

Charles Darwin

- Father of modern evolutionary theory



Development of Darwin's Theory

- At age 22 set sail on the ship HMS Beagle in 1831
- Darwin's theory developed from what he observed on the trip
- The Galapagos Island animals caused Darwin to further question how so many species could exist
- Darwin theorized that things were not independently created but evolved by natural selection

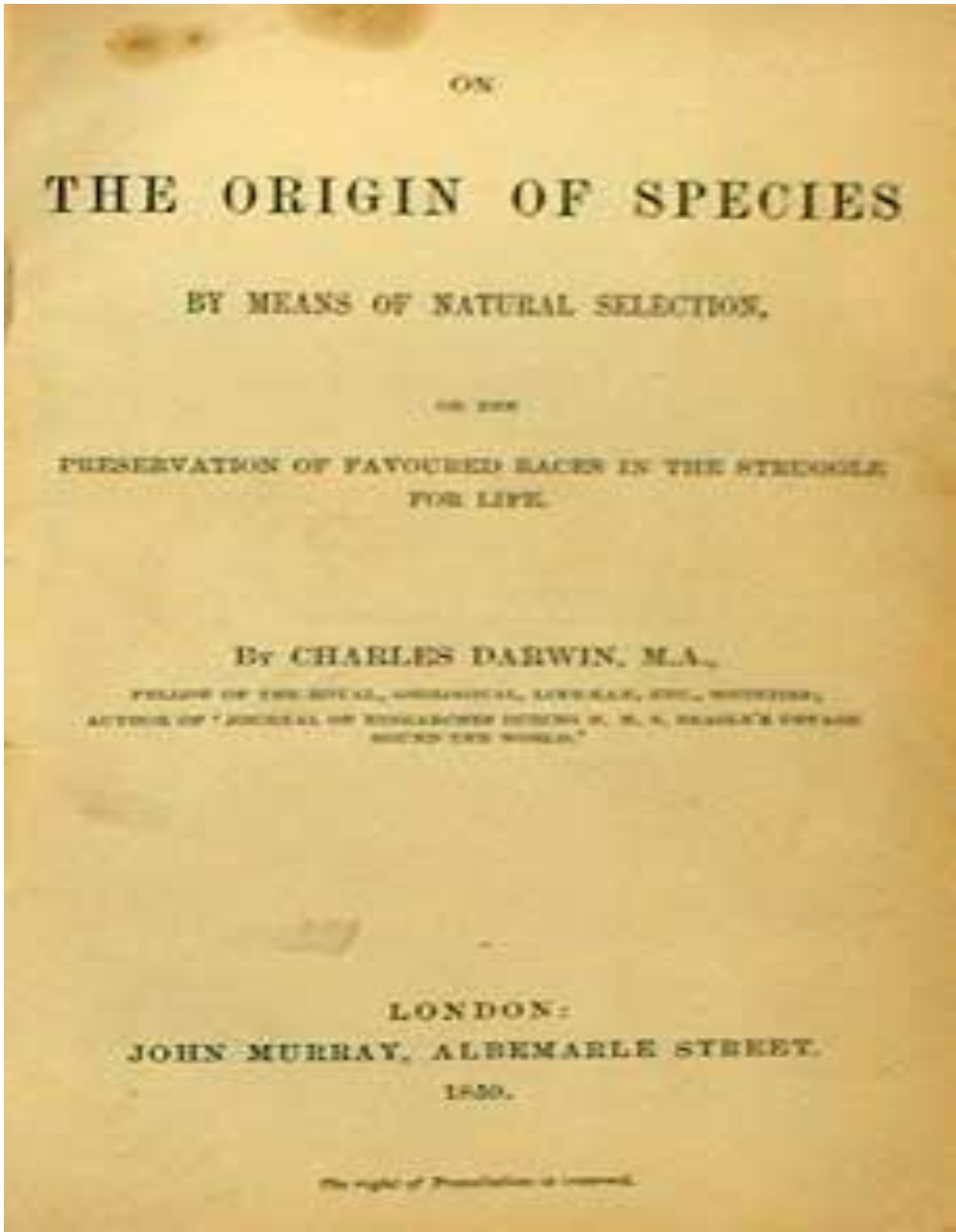
Who was the man that proposed the theory of evolution based on scientific evidence and wrote a book that made it believable for other scientist?*

Darwin's Book

- ***On the Origin of Species, by Means of Natural Selection*** ***for the Preservation of Favored Races in the Struggle for Life***
  - Natural Selection is the idea of a struggle to survive and those best equipped to survive will pass on their genetics

What was the name of Darwin's book?*

Why was this book and theory more believable than the evolution theories before his time?*


ON

THE ORIGIN OF SPECIES

BY MEANS OF NATURAL SELECTION,

OR THE

PRESERVATION OF FAVOURED RACES IN THE STRUGGLE FOR LIFE.

By CHARLES DARWIN, M.A.,

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1859.

External forces that cause natural Selection

- Over population
- Catastrophic events
- Competition
- or lack of competition
- Reproductive isolation
- Geographic isolation
- Speciation

What were the <u>external driving forces</u> of natural selection?*

Four factors that govern how organisms evolve by natural selection

(six in the text book)

- More offspring are produced than can survive
- There is variation among offspring
- Those organisms with variation more suited for their environment will survive and produce more offspring
- The resulting population will change and become more like those who are best suited for the environment

What are the four main factors that govern natural selection in an inner breeding group?*

The origin of life

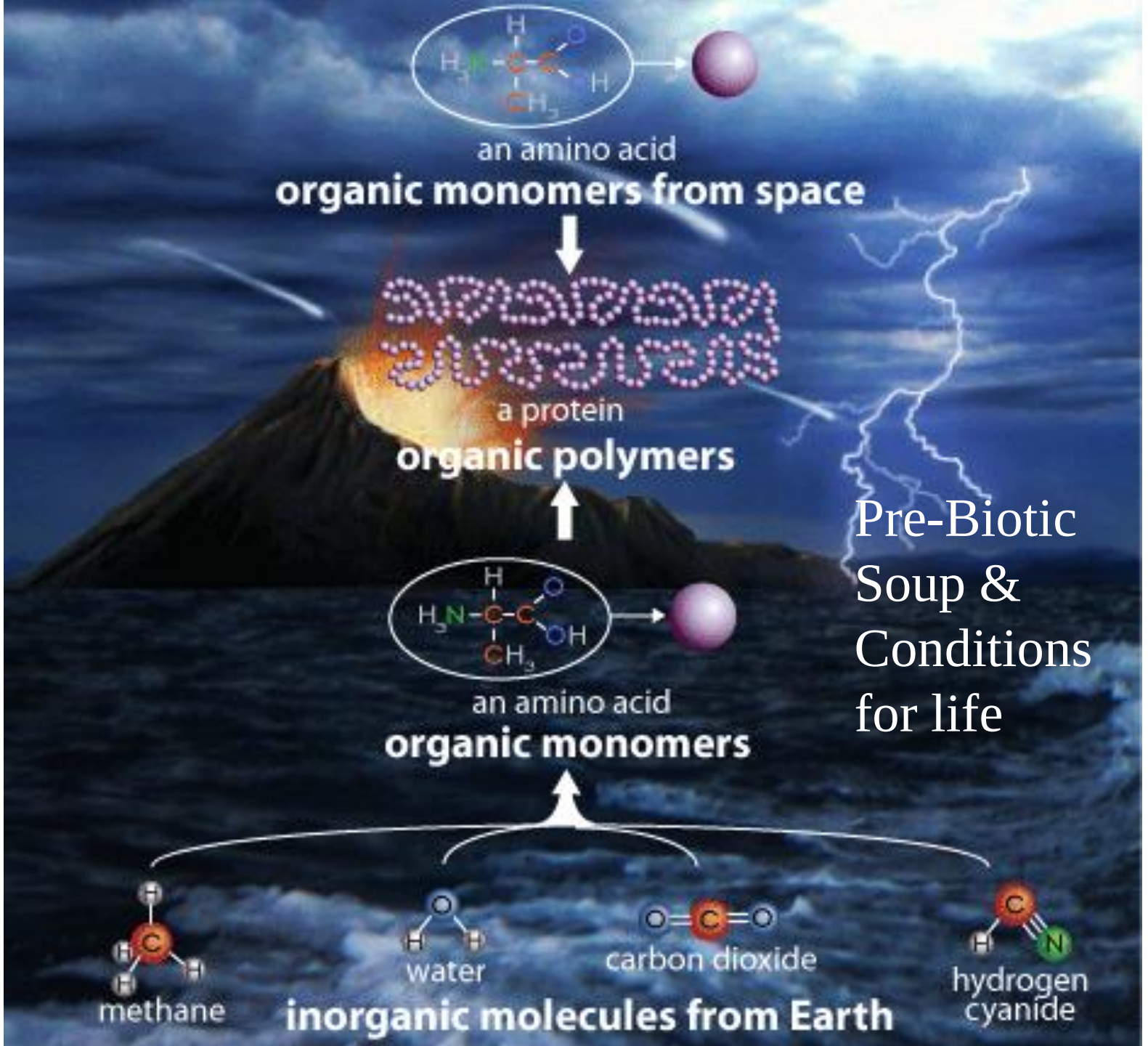
- according to the evolution theory life begin from nonliving and slowly evolved into the species of today:
  - Life began evolving about 4 billion years ago

Prebiotic soup hypothesis

(Oparin Hypothesis)

- An atmosphere of methane, ammonia, hydrogen, water vapor existed in the early environment
- Energy from lighting caused amino acids to form, and eventually DNA and life formed

According to the "Pre-biotic Soup" hypothesis name three of the four compounds or elements necessary for amino acids to form.*

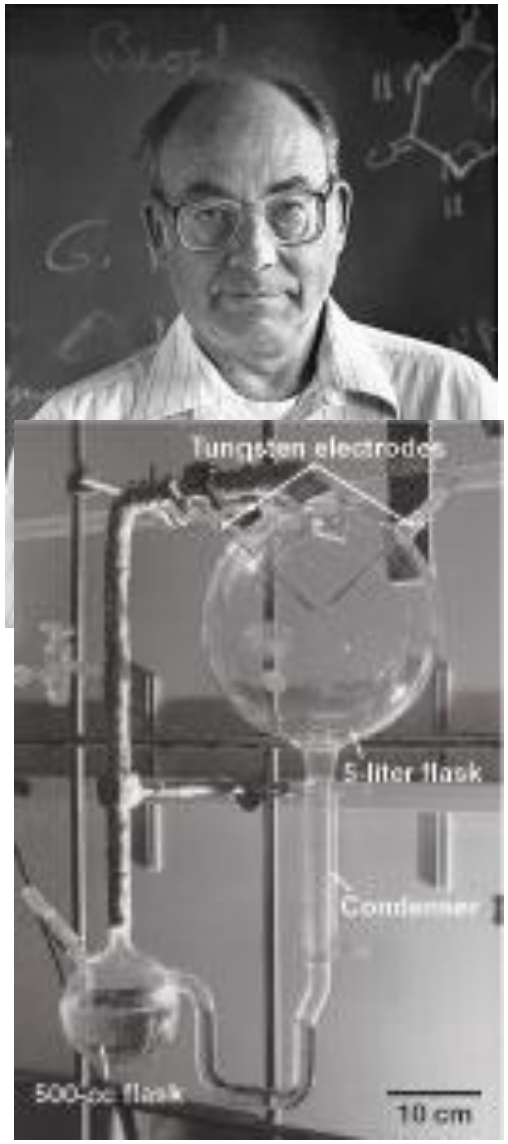


Pre-Biotic Soup & Conditions for life

Stanley Miller's Experiment

- Stanley Miller used UV light, electricity and pre-biotic soup chemical and caused a tar substance to form on the flask.
- Turned to be simple amino acids
- However no amount of coaxing could cause the amino acids to develop further
- The early atmosphere could not have had oxygen or all compounds necessary for life would be destroyed

What was Stanley Millers experiment and what significance does it have to the evolutionary theory?*



Quiz

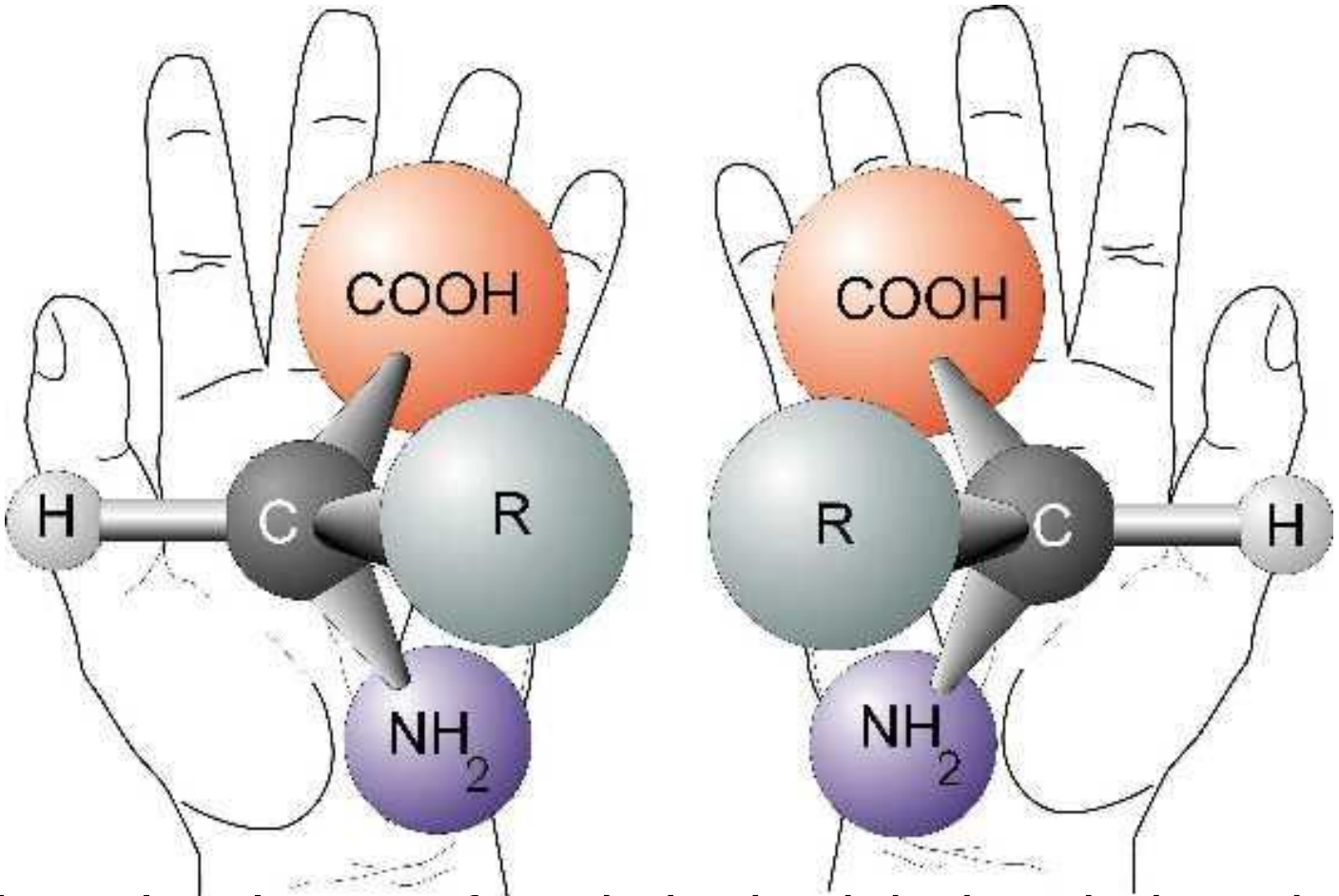
1. ***What are the four main factors that govern natural selection in an inner breeding group?***

2. ***According to the "Pre-biotic Soup" hypothesis name three of the four compounds or elements necessary for amino acids to form.***

3. ***What could be some of the external driving forces of natural selection? (name 4)***

4. ***Who was the man that proposed the theory of evolution based on scientific evidence and wrote a book that made it believable for other scientist?***

The Question



Organic molecules can form in both "right-handed" and "left-handed" mirror Images. All amino acids are composed of "left-hand" oriented molecules, while all sugars are "right-handed." **How could random molecules in a biological soup have filtered and sorted themselves to match this division?**

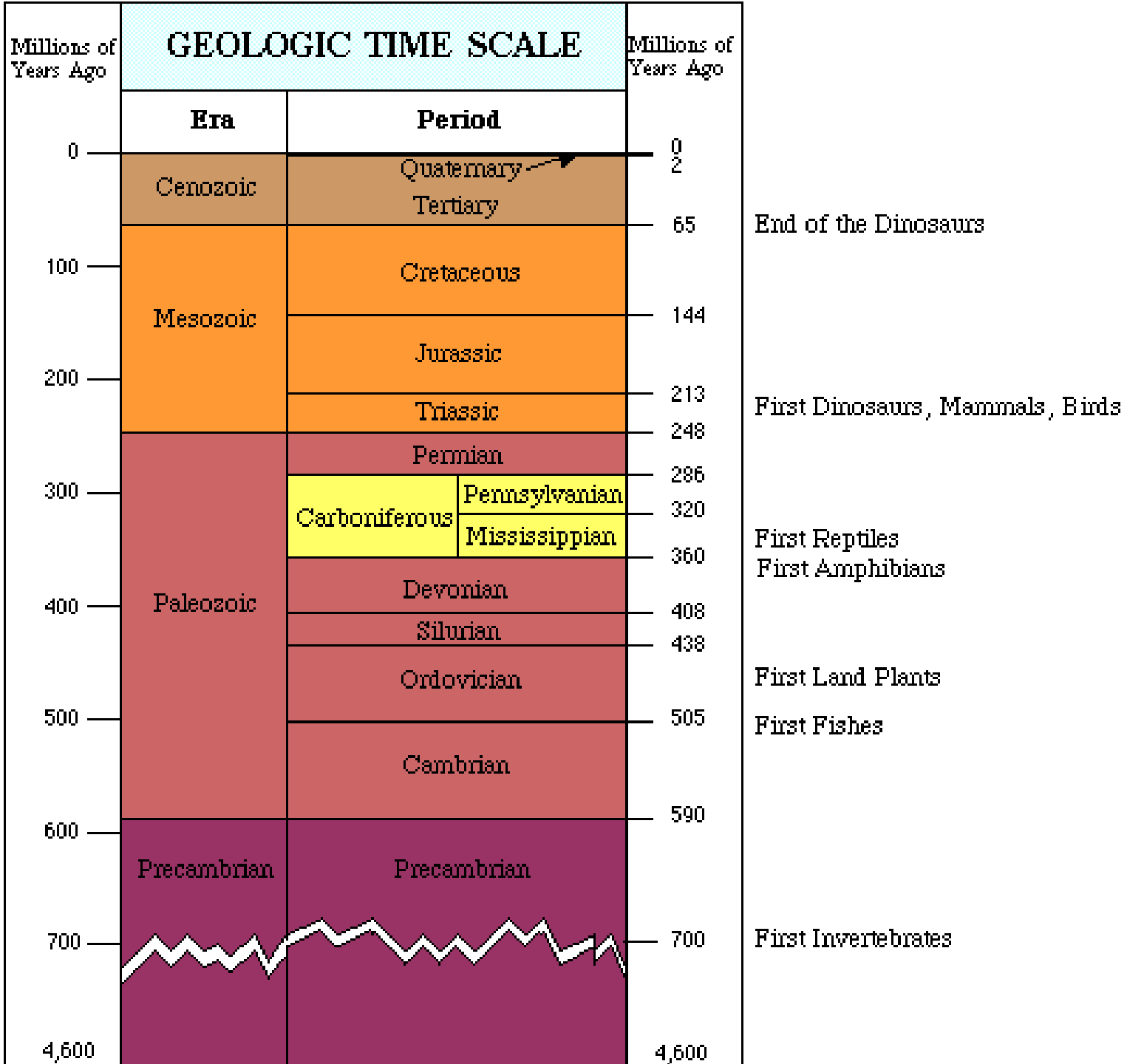
Lacking Evidence

- Today it is recognized that evidence for this idea is lacking (yet should have been found), and that any such organic molecules would break down as fast as they formed before life began, preventing a concentration of organic molecules from ever developing

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

Figures Showing Evolution

- Page 327 Figure shows how many evolutionist believe life evolved
- Page 328 puts animals in groups that evolution believes they should fit


GEOLOGIC TIME SCALE
Millions of Years Ago
Era
Period
Millions of Years Ago
0
100
200
300
400
500
600
700
4,600
Cenozoic
Mesozoic
Paleozoic
Precambrian
Quaternary
Tertiary
Cretaceous
Jurassic
Triassic
Permian
Carboniferous
Pennsylvanian
Mississippian
Devonian
Silurian
Ordovician
Cambrian
Precambrian
0
2
65
144
213
248
286
320
360
408
438
505
590
700
4,600
End of the Dinosaurs
First Dinosaurs, Mammals, Birds
First Reptiles
First Amphibians
First Land Plants
First Fishes
First Invertebrates

Adaptation and Speciation

- Adaptation – an inherited trait or set of traits that aids the chances of survival
- Speciation is when one group has changed enough that it no longer interbreeds with another group

Origin of Adaptations

Variation

- The results of genetic variety
- mutations that have taken place through the years
- It is thought that complex adaptations would require much time

Types of adaptations

- Morphological
- Physiological
- Behavioral

Morphological adaptations –

- Changes in the anatomy of the organism
- Any change in the way the organism looks
  - Coloration
    - Cryptic coloration – blending with environment
    - Warning coloration – colors that pronounce rather than hide the organism
    - Mimicry – deceptive (looks like another animal)

Name and explain three types of morphological adaptations that have to do with coloration. Give an example of each.*

Physiological adaptations –

- metabolic or chemical changes within the organism

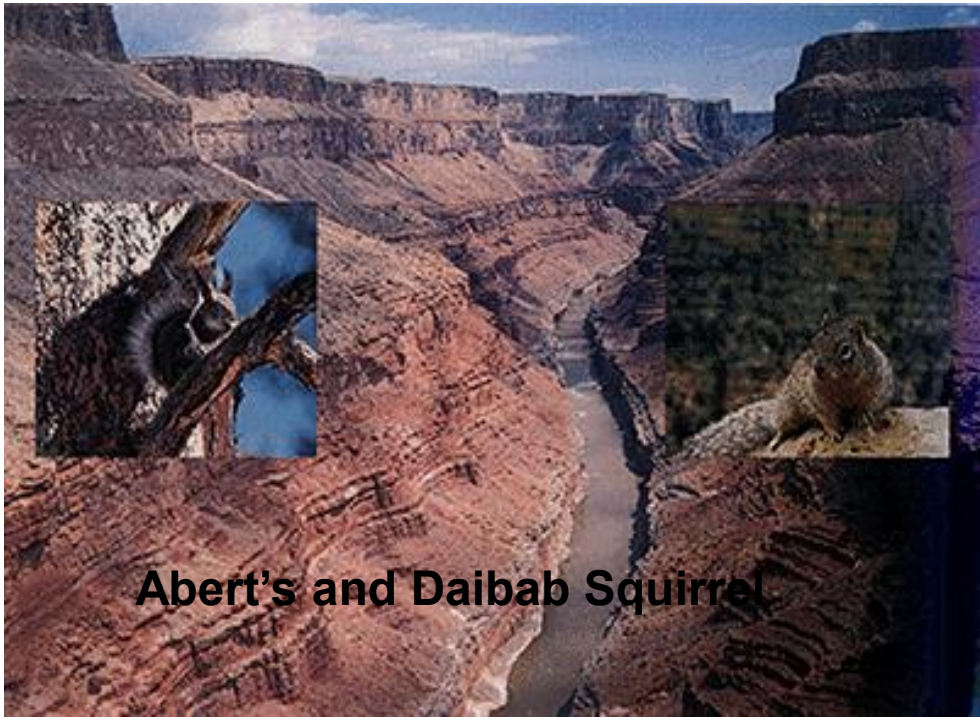
Behavioral adaptations

- Things that an organism does that could help them better survive
  - Mating rituals
  - Migratory habits

Name and explain the three types of adaptations.*

Reasons for speciation

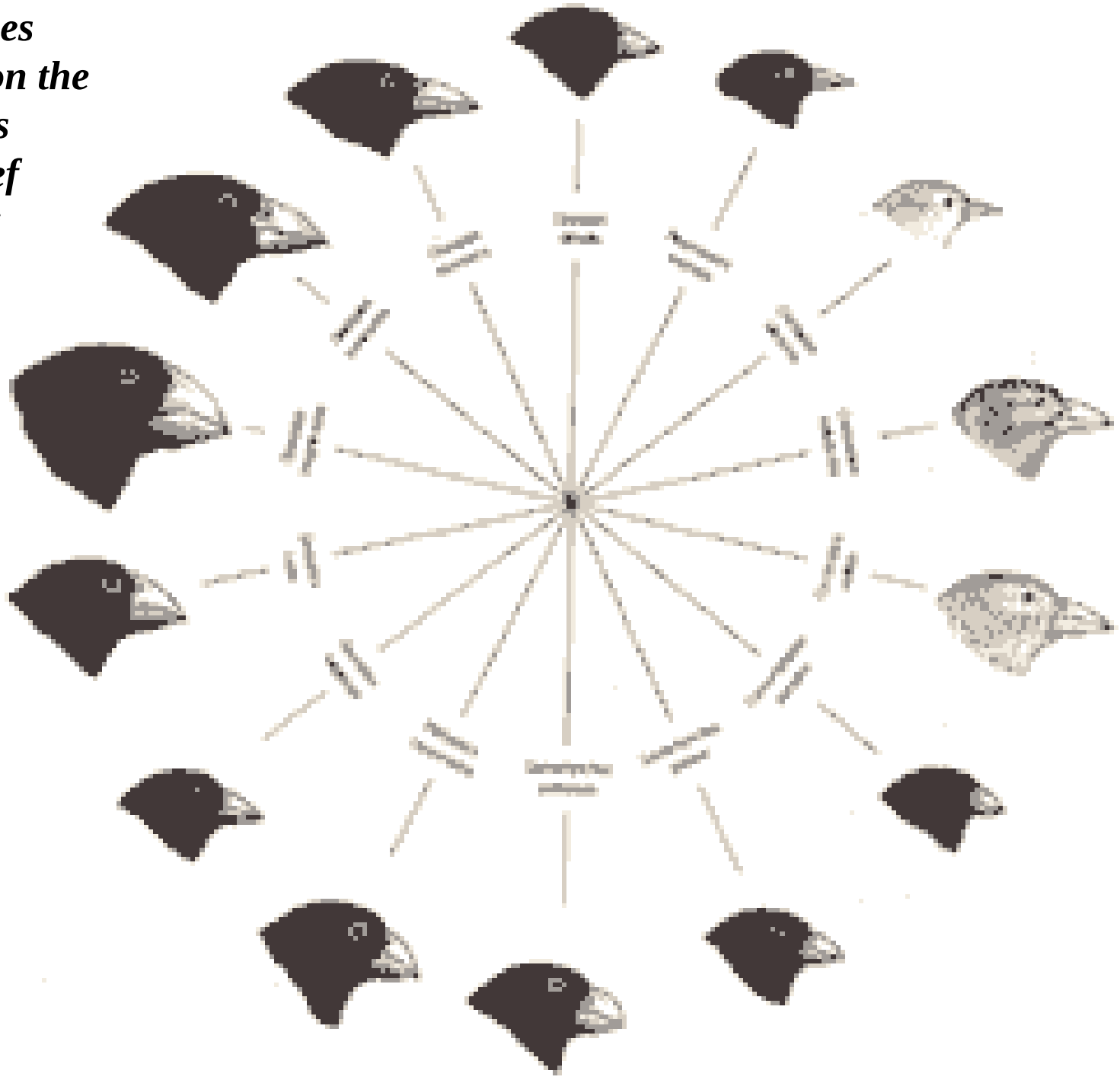
- Speciation – is any change normal breeding group of organisms so that they quit interbreeding with another group
  - Reproductive isolation
  - Geographic isolation
  - Adaptive radiation –
    - when many species evolve from a common ancestor
    - An example could be the Galapagos finches
    - Species evolve to fill the geological niche



*What is meant by speciation?**

*How does geographic isolation and reproductive isolation differ?**

How did the finches that Darwin was on the Galapagos Islands influence his belief about evolution?*



Convergent evolution

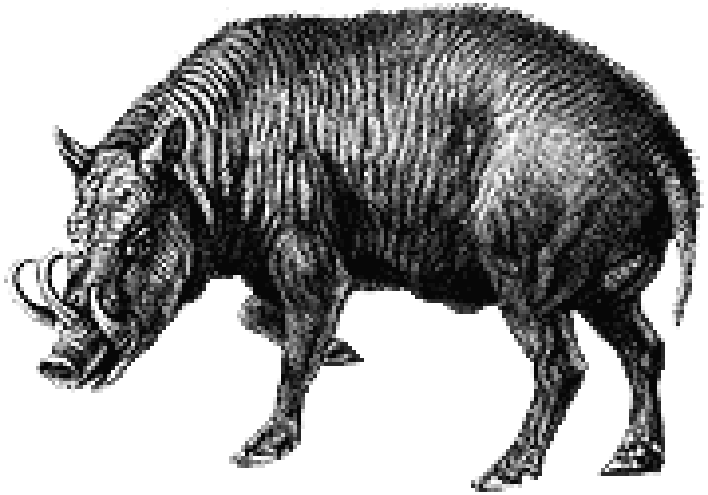
- Refers to a possible evolution where organisms that are completely different have acquire characteristic that are the same
  - A bat and a bird

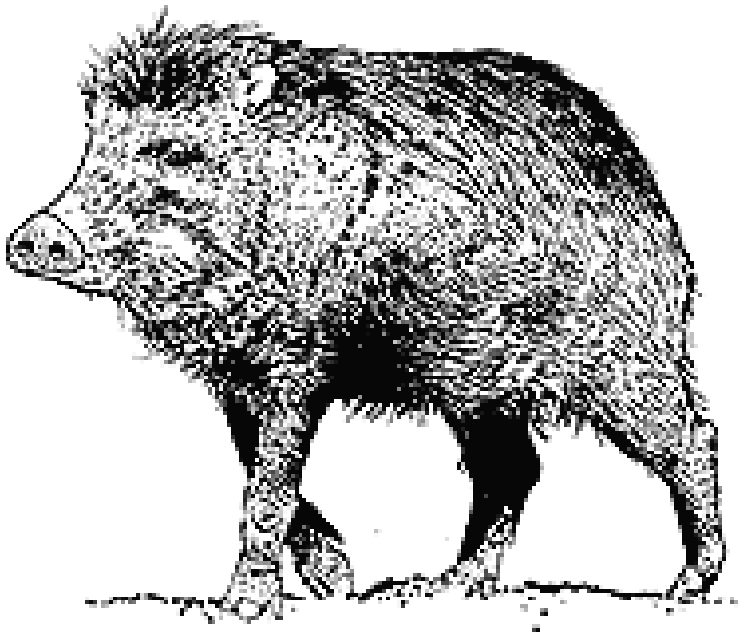
Explain and give an example of the theory of convergent evolution.*

Divergent evolution

- The idea that species with much the same origin acquire characteristics that are completely different
  - The Galapagos finches

Explain and give an example of Divergent evolution.*



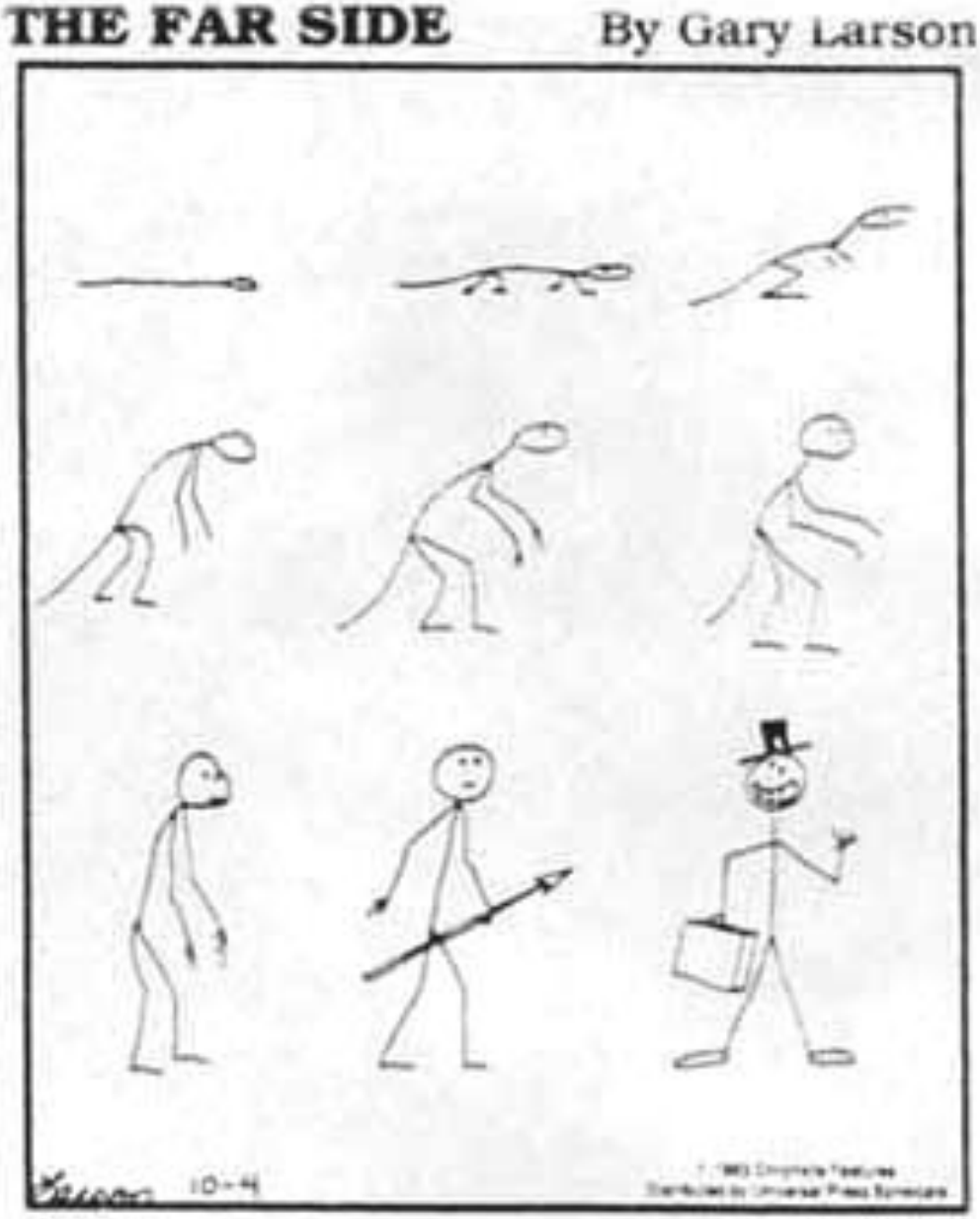


Gradualism Vs Punctuated Equilibrium (equilibrium)

- Gradualism – is the idea that evolution was a slow gradual process of billions of years
- Punctuated – is the idea that evolution went in jumps of change over a period of billions of years
- The most widely accepted theory combines both of these theories

Explain the difference between the theory of gradualism and the theory of punctuated equilibrium.*

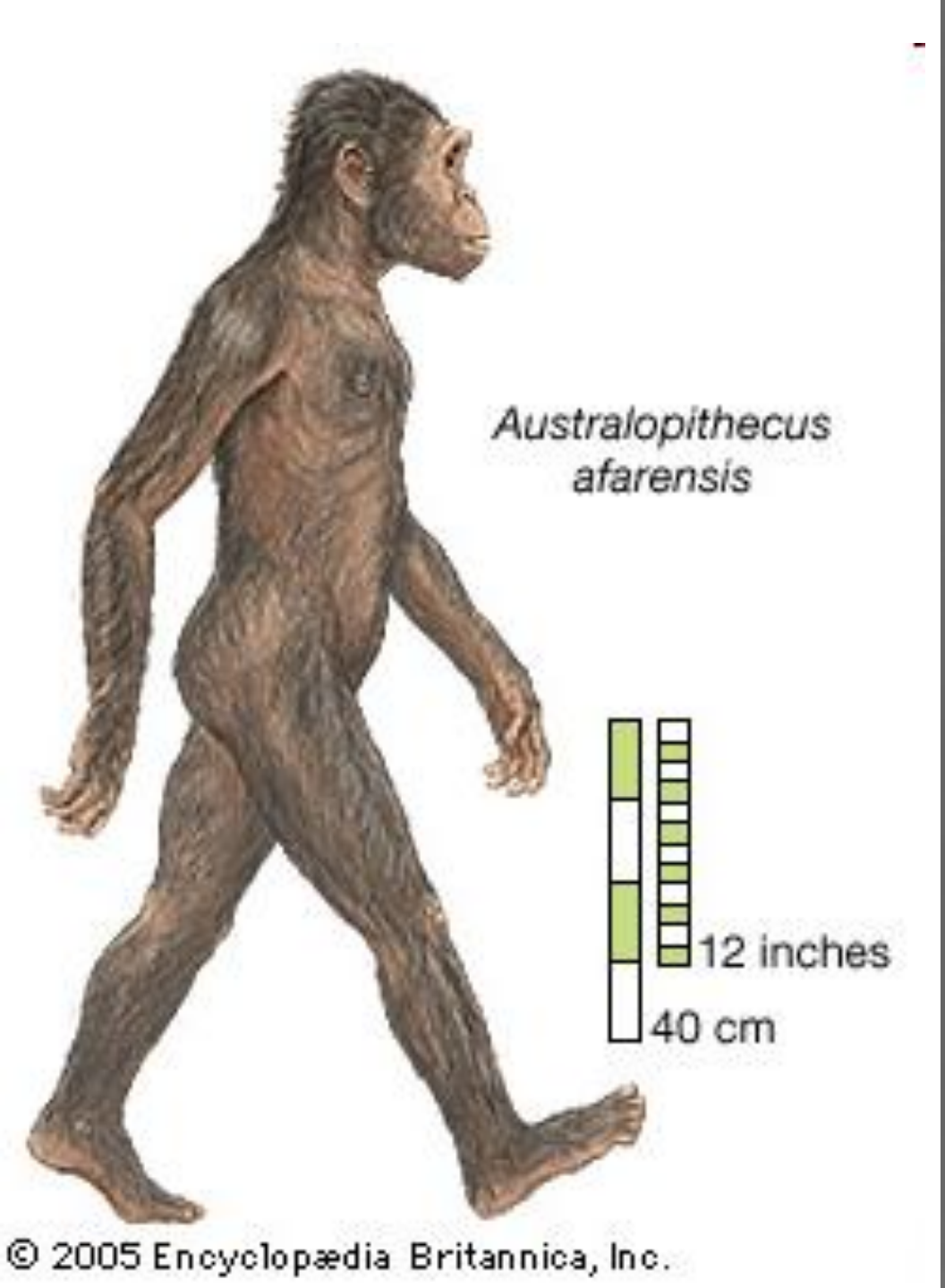
Evolution of the Stick man



Evolution of the Stickman.

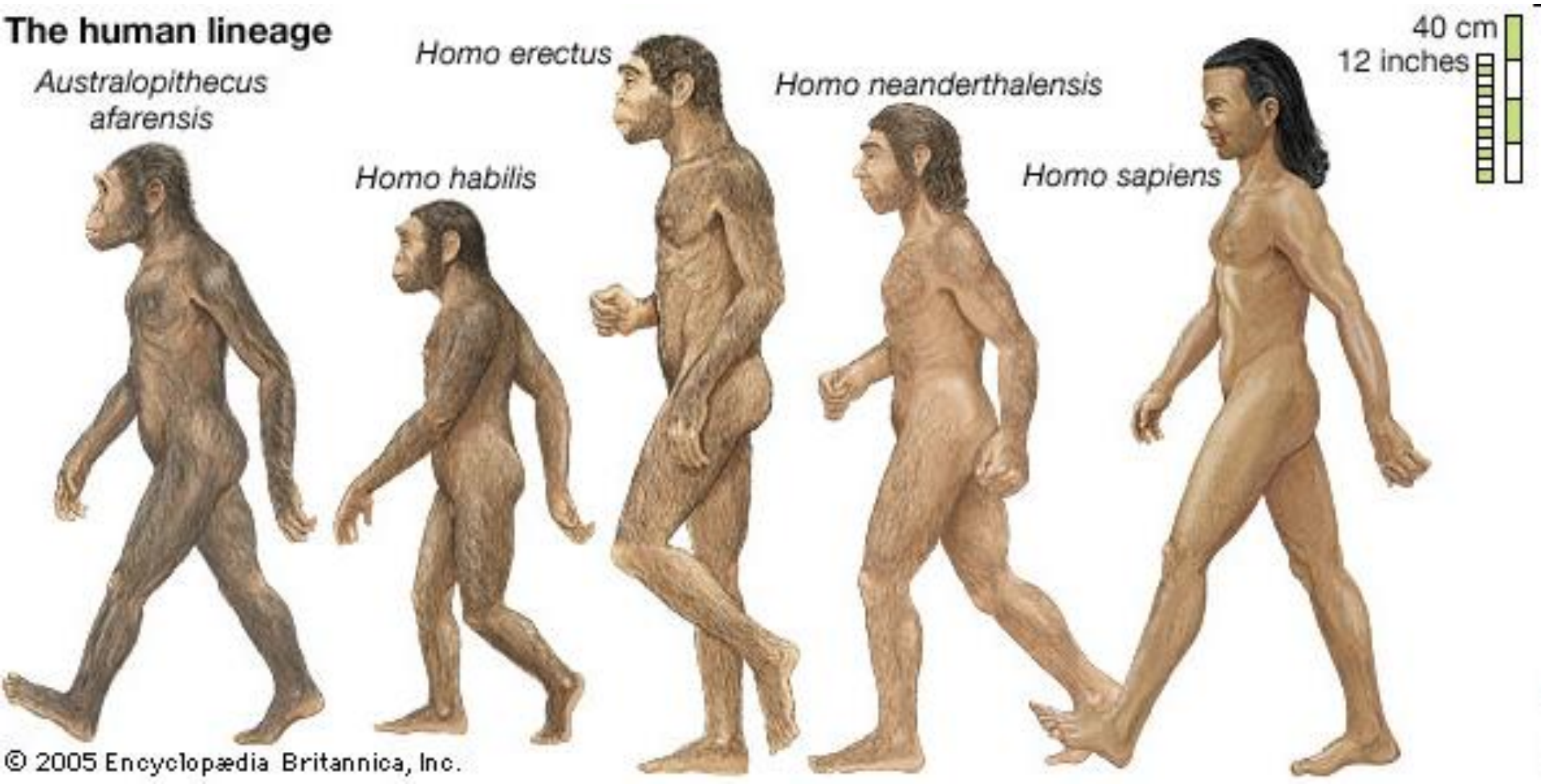
Human Evolution

- Evolutionist believe that men originated in Africa
- Evolutionist believe that man came from ape like origin
  - *Australopithecus*
  - *Homo habilis*
  - *Homo erectus*
  - Neanderthals
  - Cro-Magnon
  - Modern man *Homo sapiens*


Australopithecus
afarensis
12 inches
40 cm
© 2005 Encyclopædia Britannica, Inc.


Lucy

Artist drawing of human linage

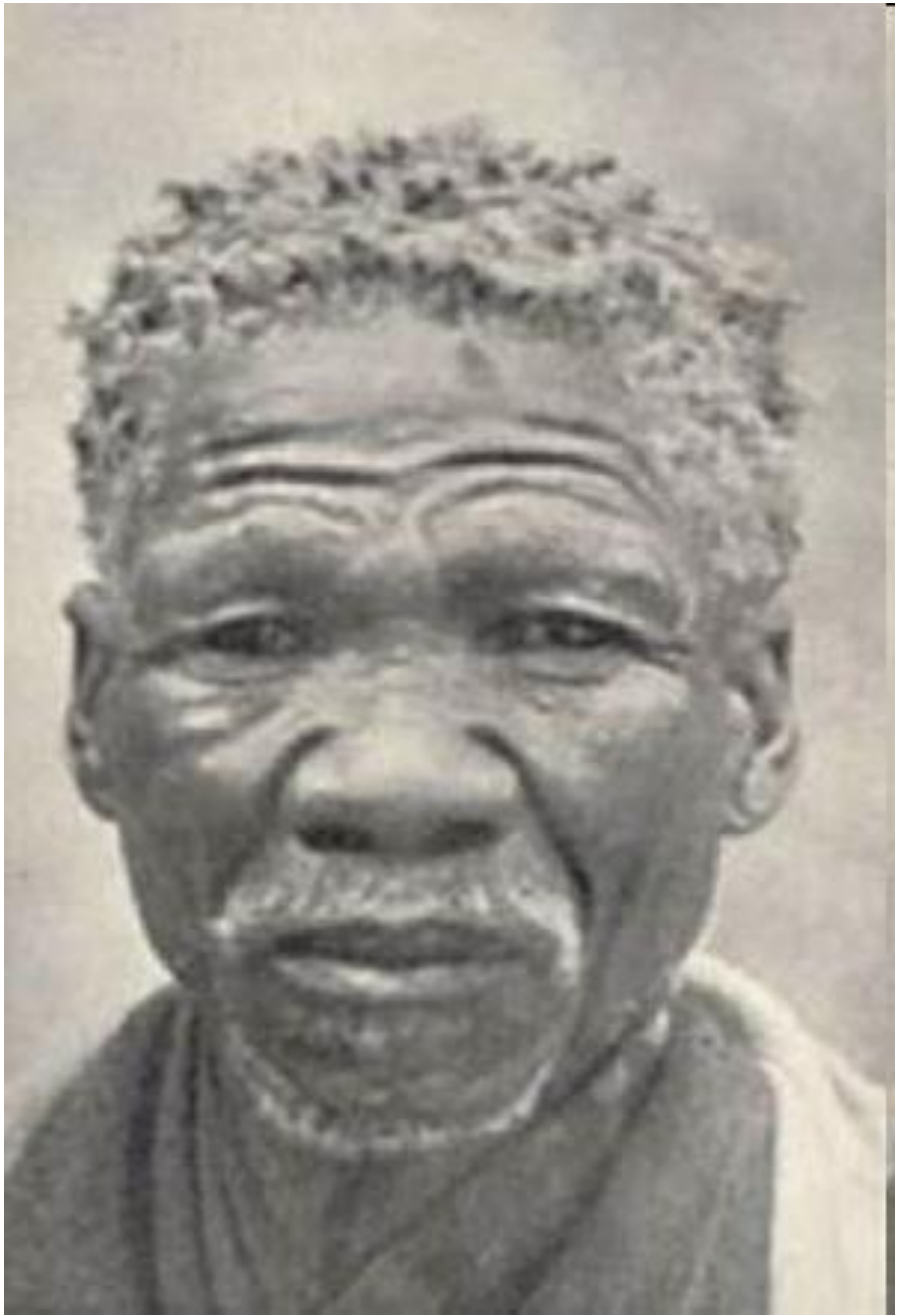


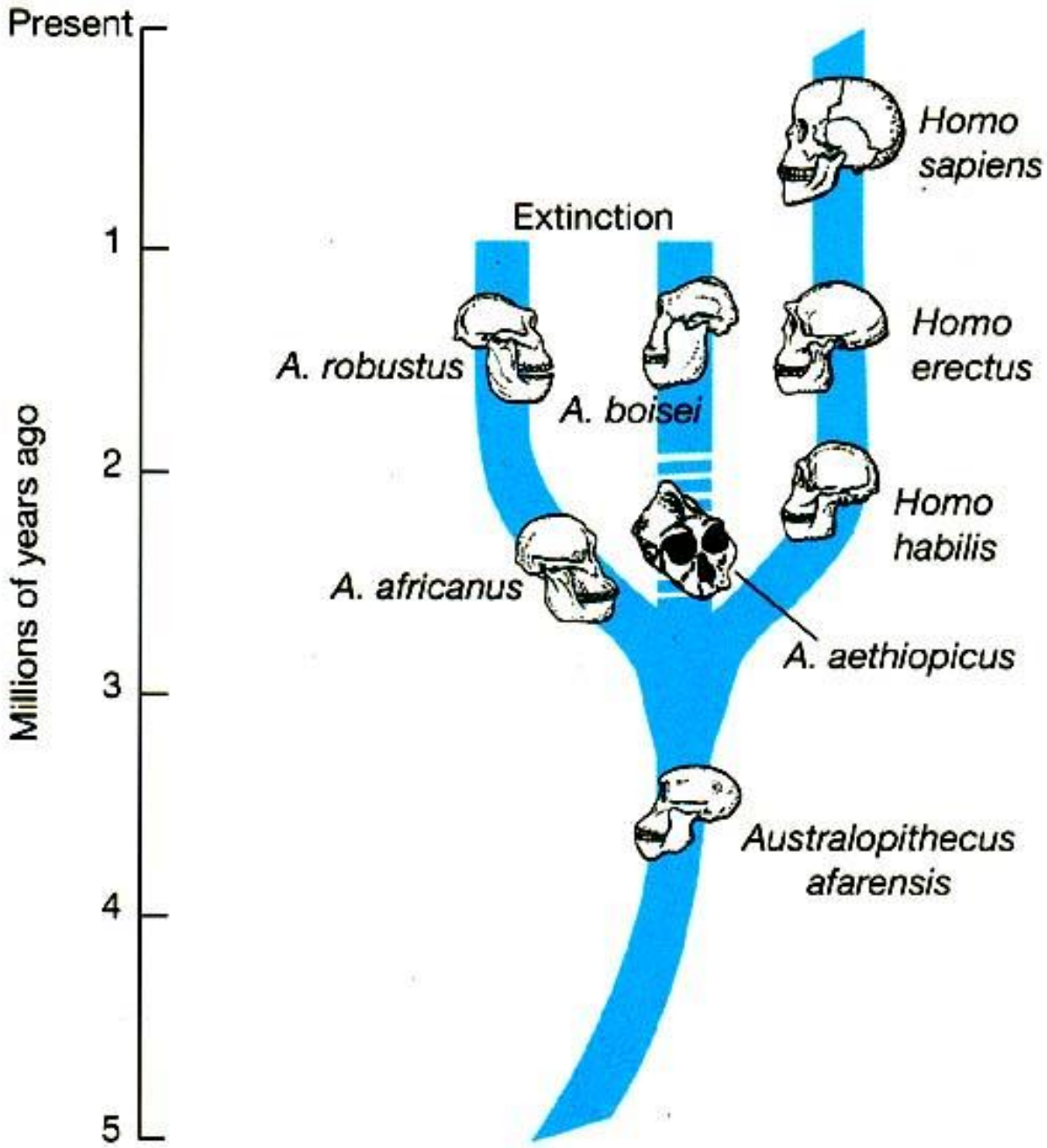
Homo erectus

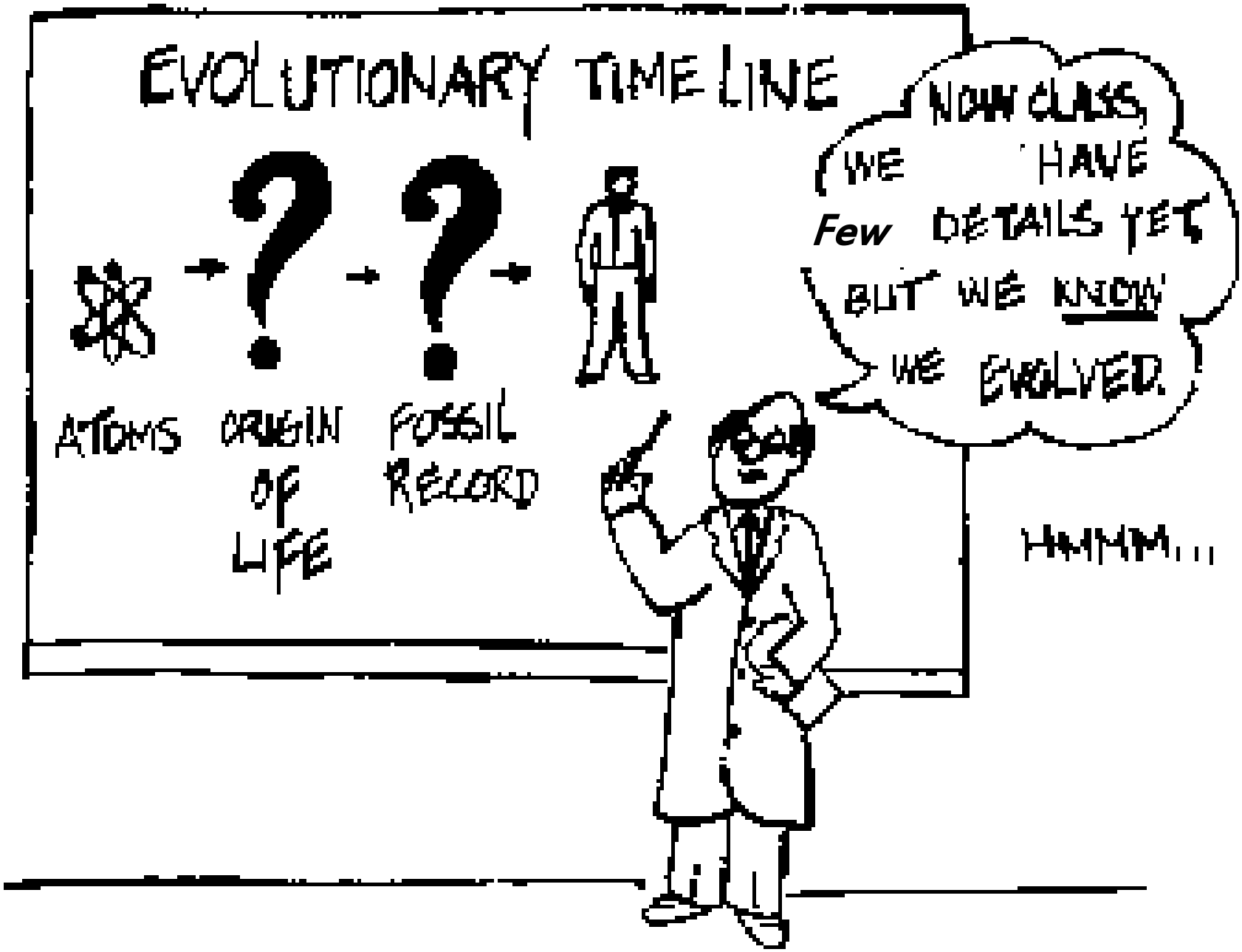
Neanderthals

Cro-Magnon

Modern human




Present
1
2
3
4
5
Millions of years ago
Extinction
Homo sapiens
Homo erectus
Homo habilis
A. robustus
A. boisei
A. africanus
A. aethiopicus
Australopithecus afarensis


EVOLUTIONARY TIME LINE
ATOMS
ORIGIN OF LIFE
FOSSIL RECORD
NOW CLASS, WE HAVE Few DETAILS YET BUT WE KNOW WE EVOLVED.
HMMM...