Class 3 – 28th March 2025, 9.30am


# LS1201

## Introduction to Biology II

## Part B - Evolution

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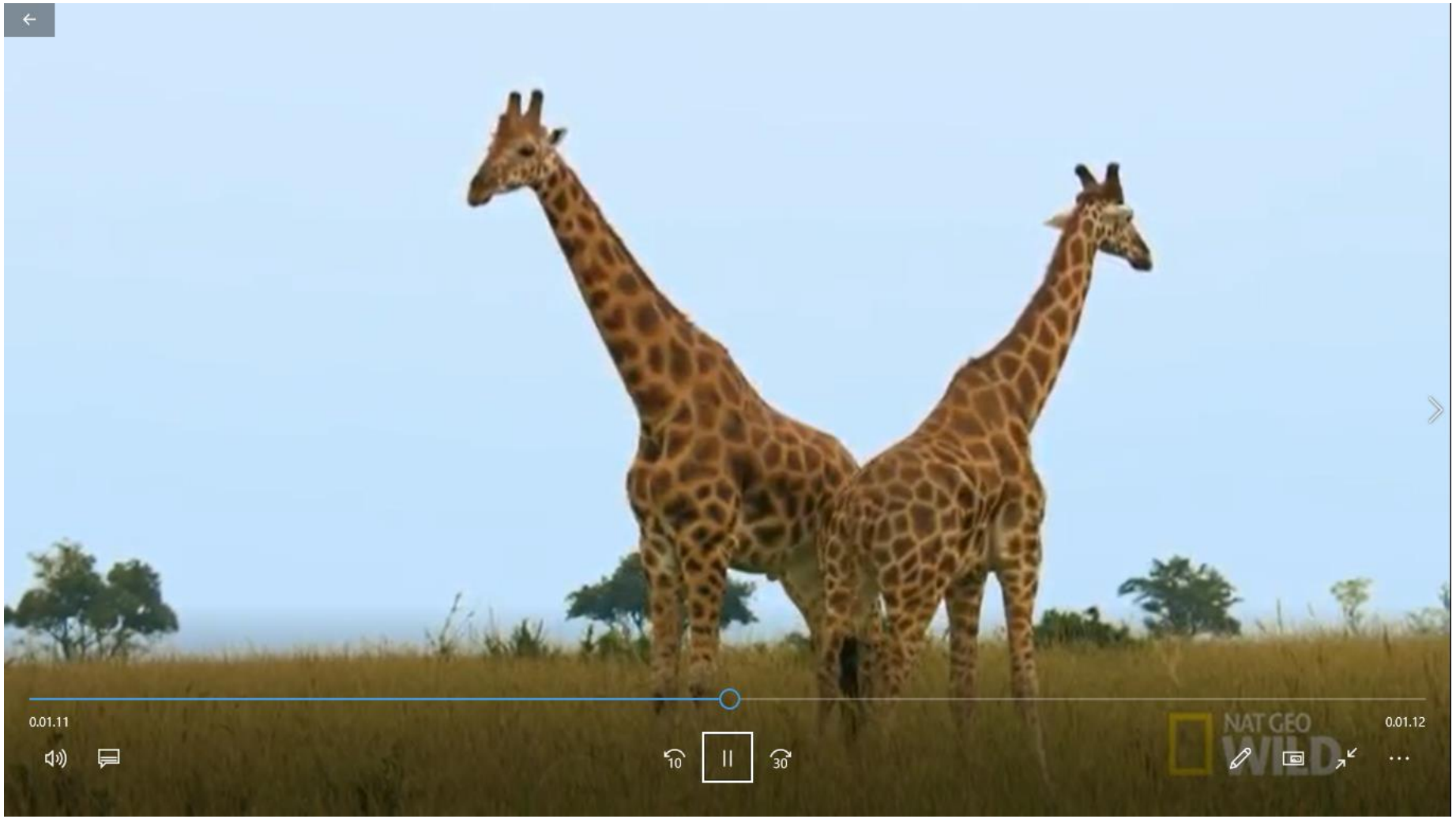



Giraffe video

# Lamarck’s Theory of Evolution

**Importance**

For the first time it was proposed that

Organisms adapt to their environment

## Internal assessment – 2

Write a poem about the cuckoo song from the point of view of the Reed warbler
5 to 15 lines. Regional language is fine as well, but provide English translation.

Total = 3 marks
Deadline – 28th March 25, 2pm.

## Internal assessment – 3

1. What are the two different possible reasons for the Giraffe to have such a long neck that we discussed in class? (0.5+0.5 marks)

2. Can you come up with one additional possible reason for such a long neck and such a long leg for these Giraffe. (1+1 marks)

3. Can you think of a circumstance in which the Giraffe's neck will start getting shorter? (1 mark)

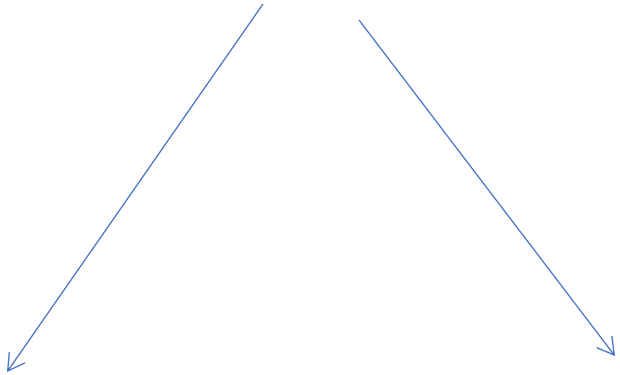
Total = 4 marks

28th March 25

# Creationism

All living things are made by God

Only God can make new forms

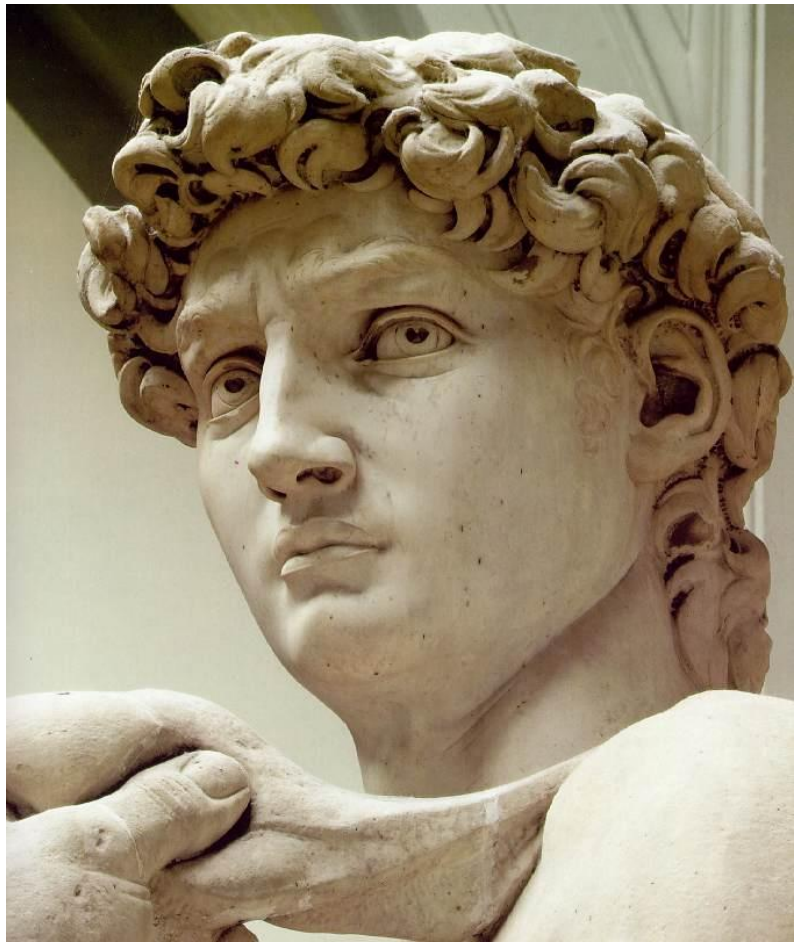


Origin of life

Diversity of life

~ 2 million life forms (species)

# What's special about Evolutionary Biology?



# Creationism

GOD

Religion

Connection between religion and society curtailed our thoughts on the subject of Evolution

# What's special about Evolutionary Biology?

## Connection between life and religion

- Almost all over the world people believed that life was created by GOD
- Questioning this concept or doubting it was considered a crime

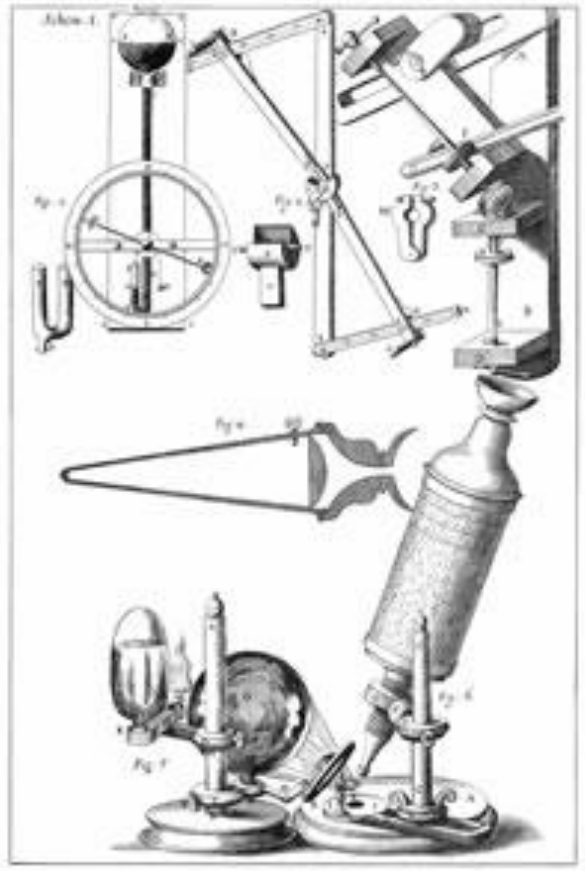
  - Copernicus 1543, On the revolution of celestial spheres
  - Bruno 1600, Sun another star and intelligent creatures lived outside of earth as well
  - **Vanini 1621, Naturalist, ancestors of humans were apes**
  - Galileo 1663, Sun centric rather than earth centric view

# What's special about Evolutionary Biology?

Robert Hook 1653

- King of England and Royal Society asked him to draw detailed pictures of insects. He took over this job at the age of 26

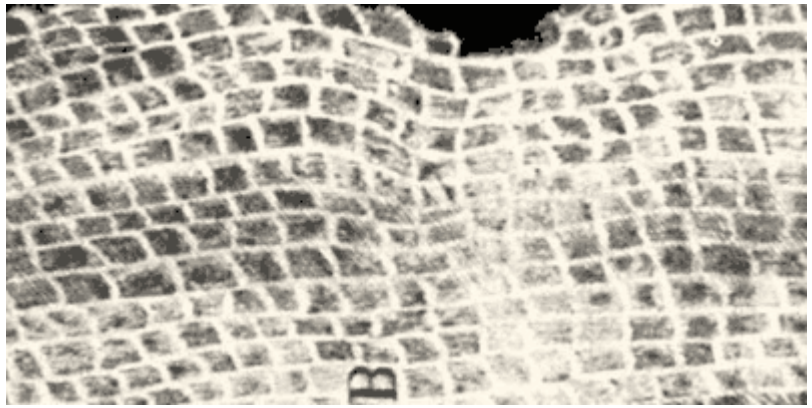
- He achieved 50 X magnification and this changed his view of the world



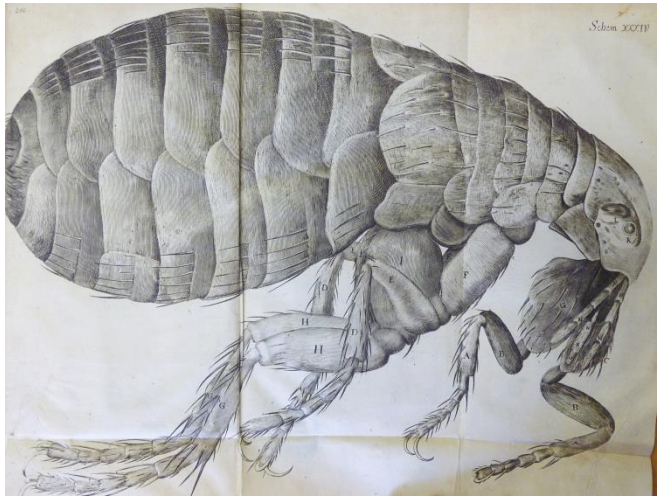
*Hooke's Drawing of his Microscope from Micrographia*

# Some drawings made by Hook

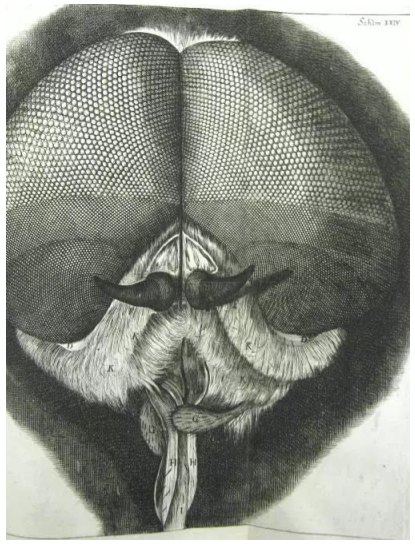
Ant



Plant cells



Flea



Drone Fly (head)

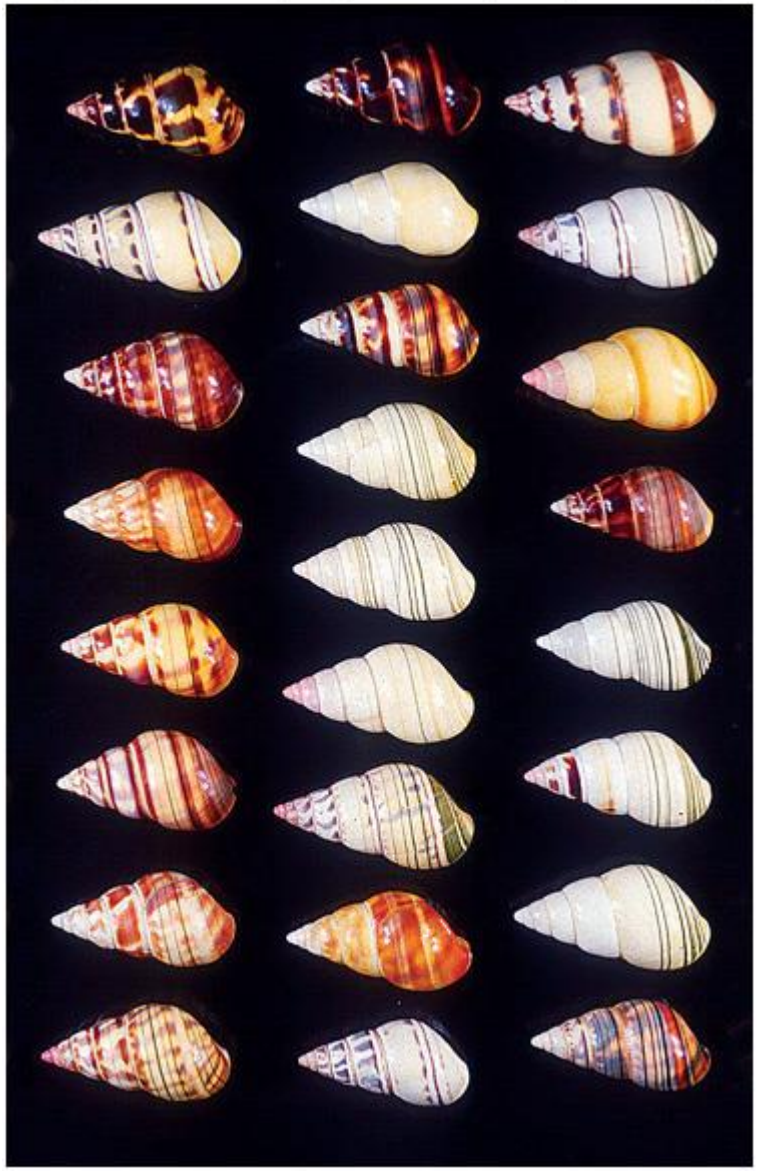
# Evolutionary Biology

- No disrespect to any Religion or God

- Idea is to examine if any scientific explanation is possible for the presence of millions of other life forms on earth and the variation we see within them

# Variation – difference in a given trait among organisms of the same species





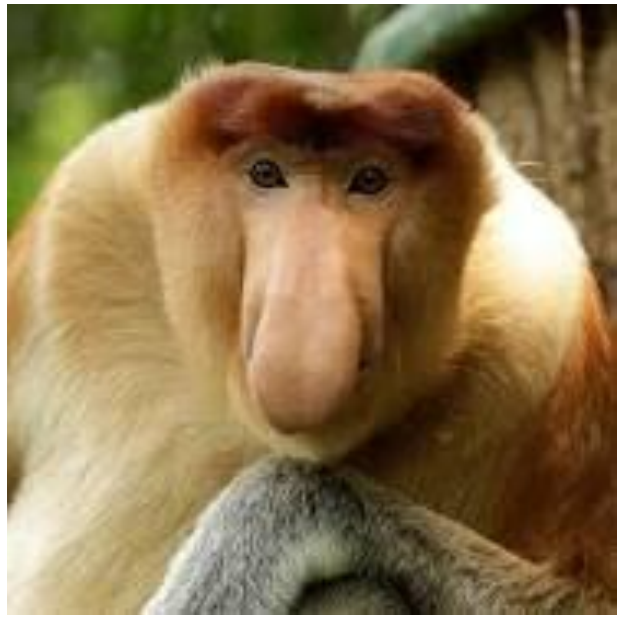
Mutation

# Variation
# Implications of variation

- Variation in individual organism will cause changes in the ability of organisms to live

# Operational Pathway

Spontaneous mutation → Variation = Elongated



Proboscis Monkey

# Before
# the theory of Natural selection

## Some facts

- Palaeontology – Study of fossils documents that earth has seen a much larger number of species and most of these species are currently extinct
- Living organisms were classified in an hierarchical manner, with each level incorporating similarities across several organisms
- Artificial selection – changes induced by man in the form of selective breeding leads to a large variety of individuals within the same species in a short period of time.

Starfish from 100 million years ago

# Paleontology

Wasp from 16 million years ago

Age of the earth - billions of years

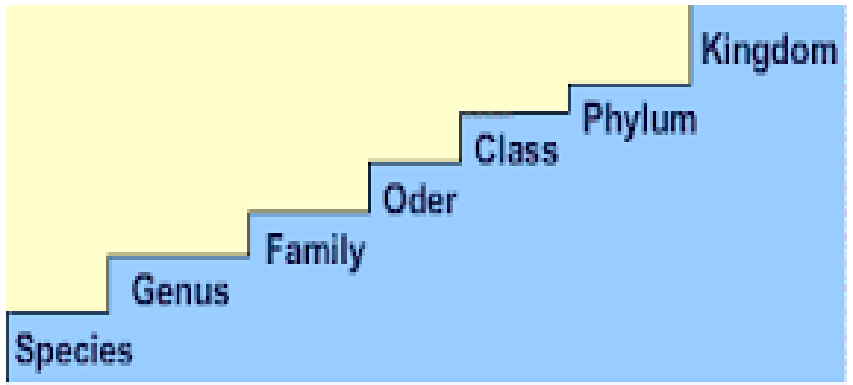
~ 95% of species that were present on earth are now extinct

This did not happen at one time period but has been a slow process in which different life forms arise and disappear

As you examine deeper – older strata fossils are more dissimilar to creatures that live now

Million = $10^6$

# Hierarchical classification



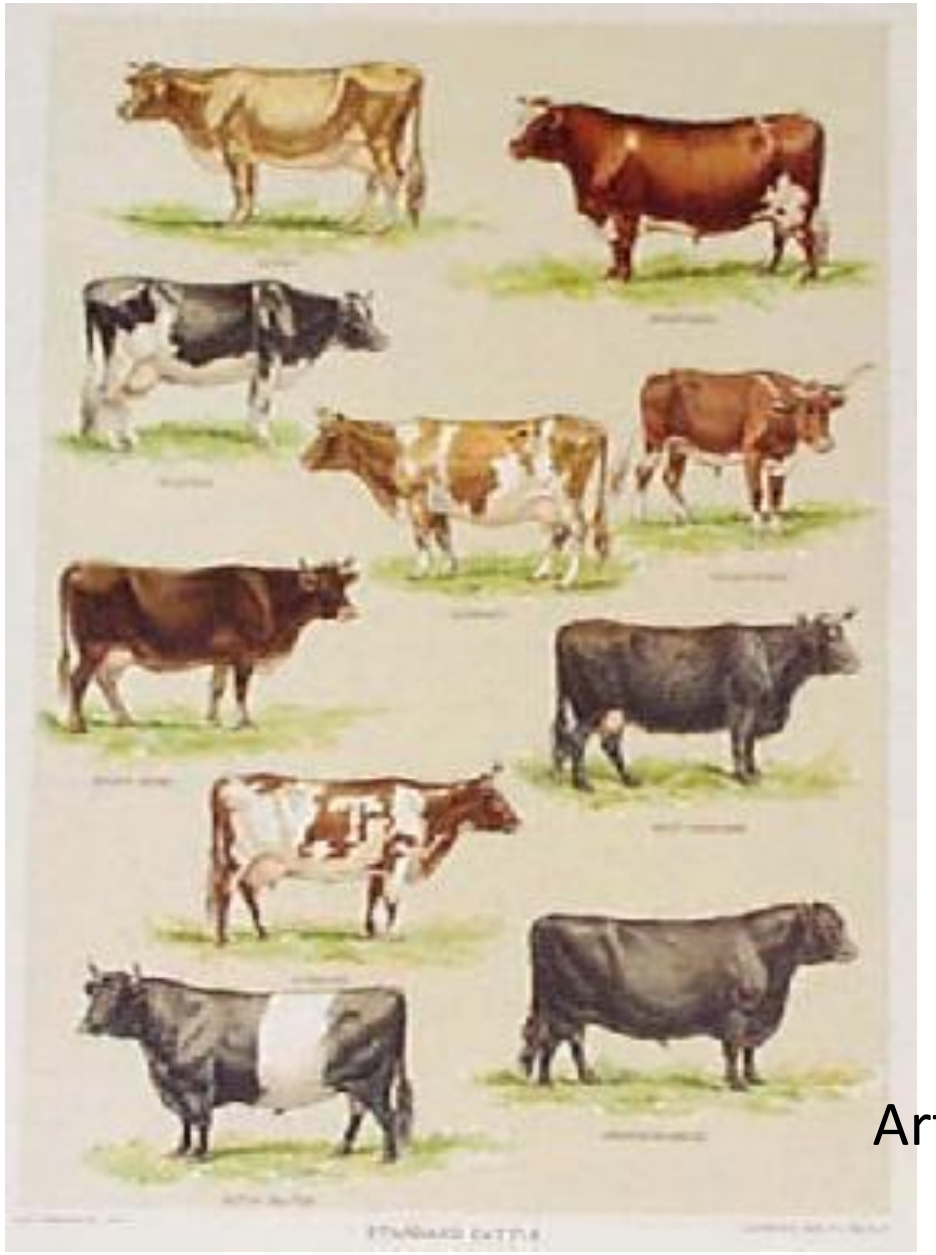

- Classification is the process by which any thing is grouped into conventional categories based on some easily observable characters
- Organize vast number of plants, animals into categories that could be named, remembered and studied
- Study of one organism of a group gives the idea about rest of the members of that group

# Diversity

Artificial Selection

The breeding of plants and animals to produce desirable traits. Organisms with the desired traits, such as size or taste, are **artificially** mated or cross-pollinated with organisms with similar desired traits. This  whole exercise is carried out by humans.

# Artificial Selection



Artificial Selection

# Before
# the theory of Natural selection

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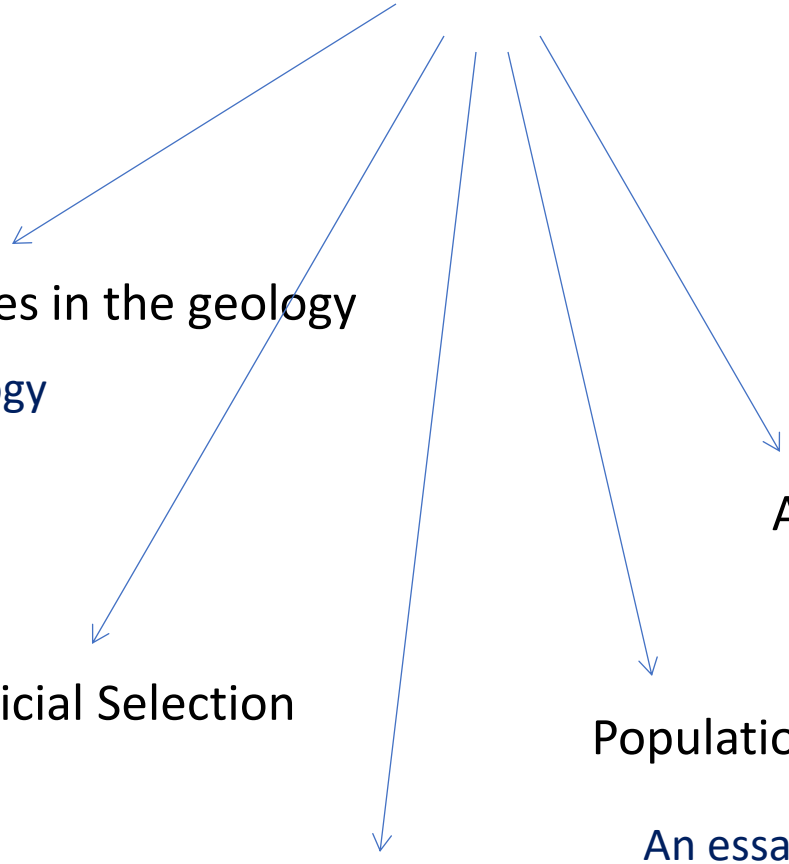
# Questions

- Above mentioned facts were making people question if God had indeed made all these creatures we see around us.
- Can there be a alternate explanation?
- If we can create so many different varieties in a short period of time, in the billions of years through which life has been present on earth can new species be generated?
- Does God determine the phenotype of organisms? Or can they it be determined by some other process.

Before
the theory of Natural selection

**Information at hand**



Gradual changes in the geology

Principles of Geology
Charles Lyell

Artificial Selection

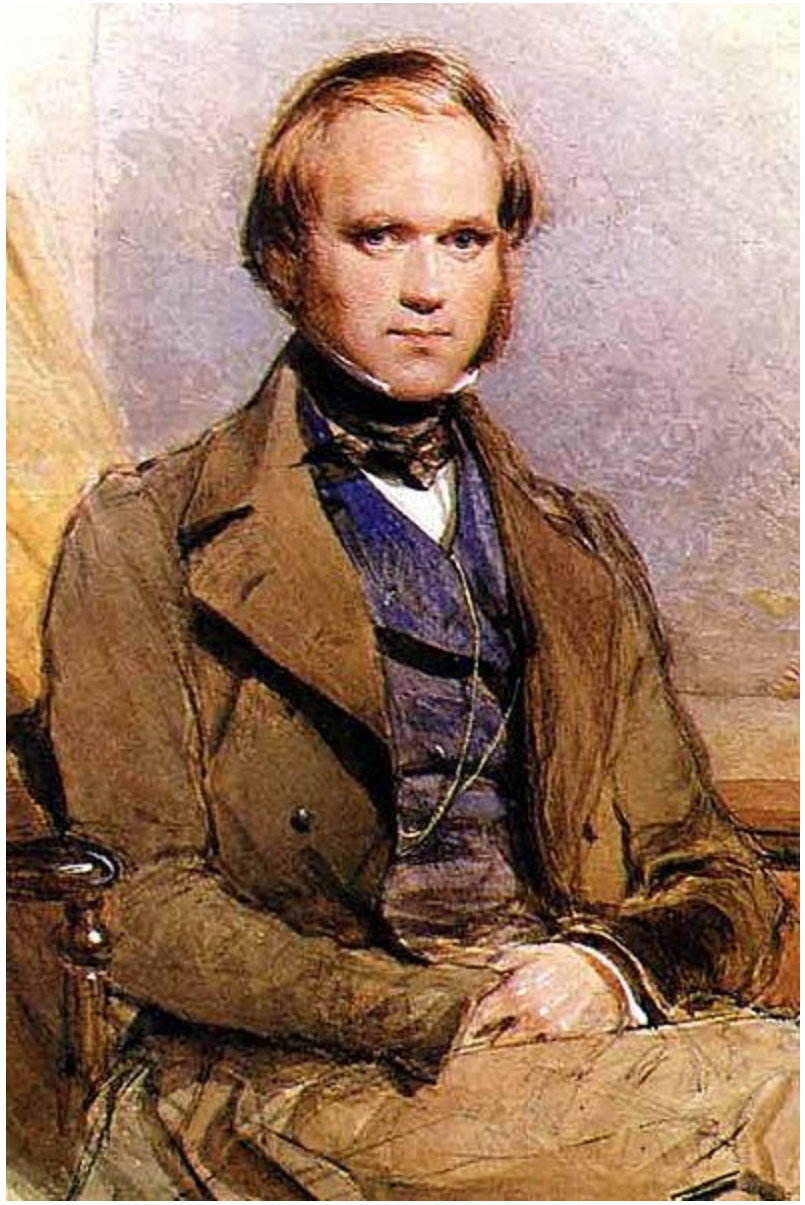
Paleontology
Animal forms appeared and disappeared

Adaptation to the environment

Lamarck's theory

Population dynamics

An essay on the principle of population
Thomas Malthus



Charles Darwin
1809 - 1882

Alfred Russel Wallace
(1823-1913)

Scottish origin

Lawyer who did not practice,  worked as a surveyor in England and Wales

Mischief – Brazil 1848
Collect specimens from Amazon rainforests for profit

Return trip – all specimens burnt down.

1854 – 1862 Malaysia and Indonesia
to collect 125,000 specimens, of which 1000 were new to science

1858 – Posts Natural selection theory to Darwin

1862 – Returns to UK