

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

বিস্মিল্লাহির রাহমানির রাহীম



উদ্দান

একাডেমিক এন্ড এডমিশন কেয়ার

# Class 12: Chapter 12 (12.2 to end)

## Heredity in organisms and evolution 12.2-12.4

### Lecture B-31

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# Determining the sex of people

- \* 23 pairs of chromosomes in human body cells
- \* 22 pairs of autosomes
- \* The remaining one pair is called the sex chromosome

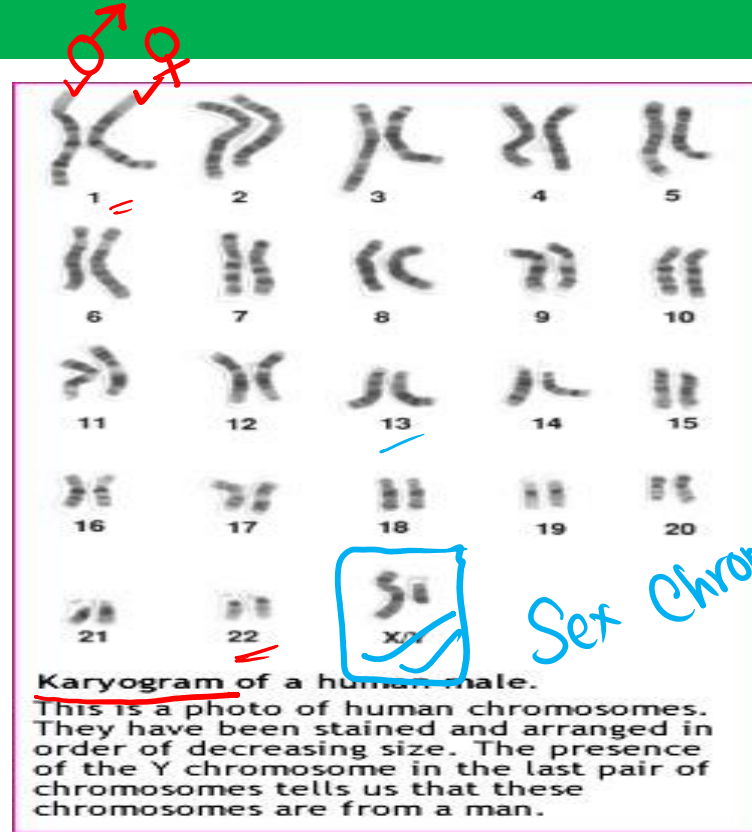
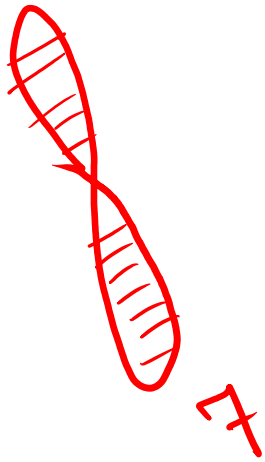
Sex  
Male  
Female

Gender  
Man  
Woman.

$23 \times 2$

$44 + X Y$

✓ Chromosome map



1-22 Autosome  
↳ Autosomal diseases

XY Sex Chromosome  
↳ Sex-linked disorders

- \* Chromosomes are numbered from 1 to 22 in descending order of their length.
- \* The remaining pair is called the sex chromosome

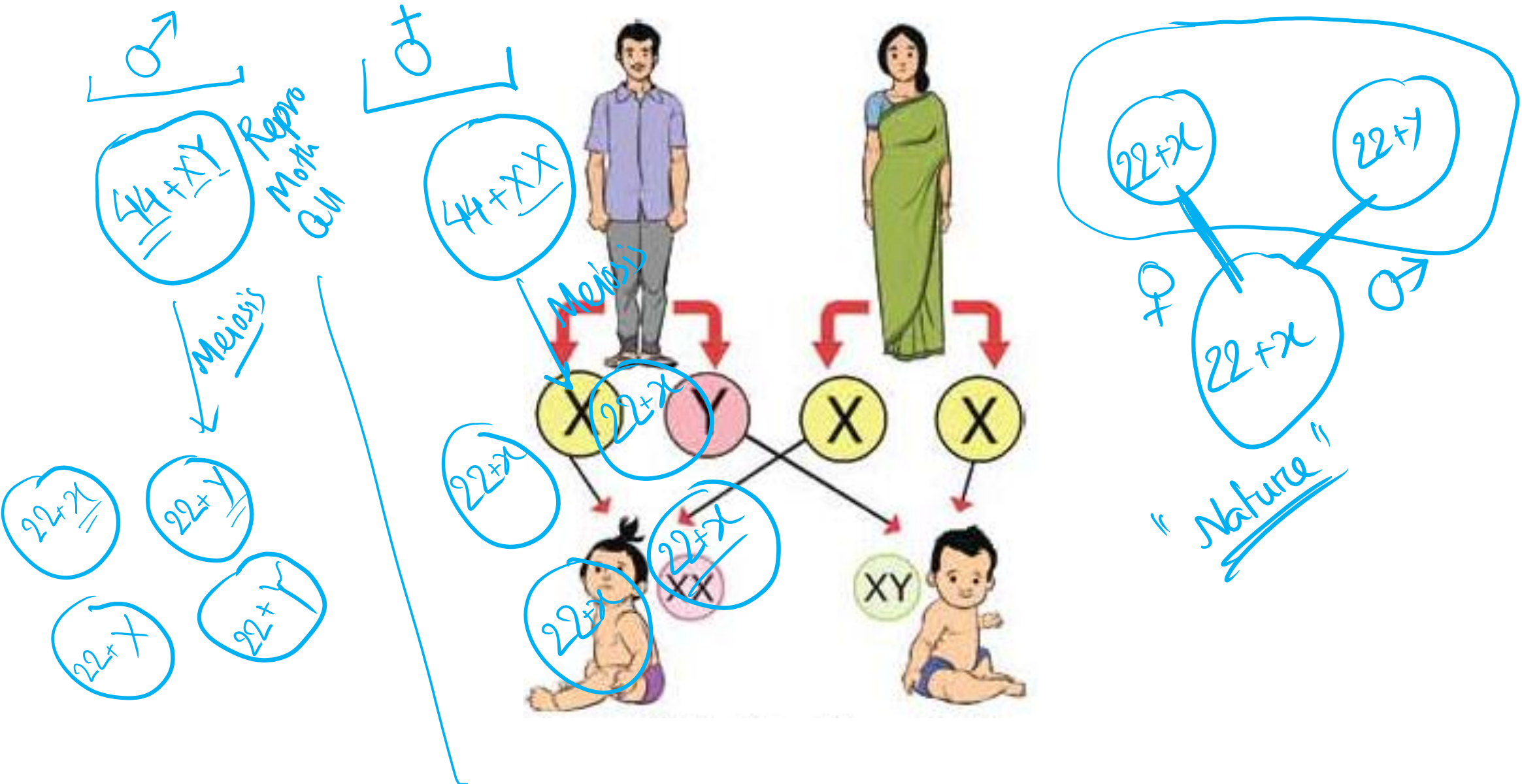
# Sex chromosomes

- \* Sex chromosomes are known as X and Y.
- \* Sex chromosomes are XX in women
- \* Sex chromosomes are XY in males
- \* If the ovum coincides with the sperm carrying the Y chromosome, a boy will be born
- \* If the ovum coincides with the sperm carrying the X chromosome, the girl child will be born

44 + XY  
Male

44 + XX  
Female

# Sex determination process of human child by sex chromosome

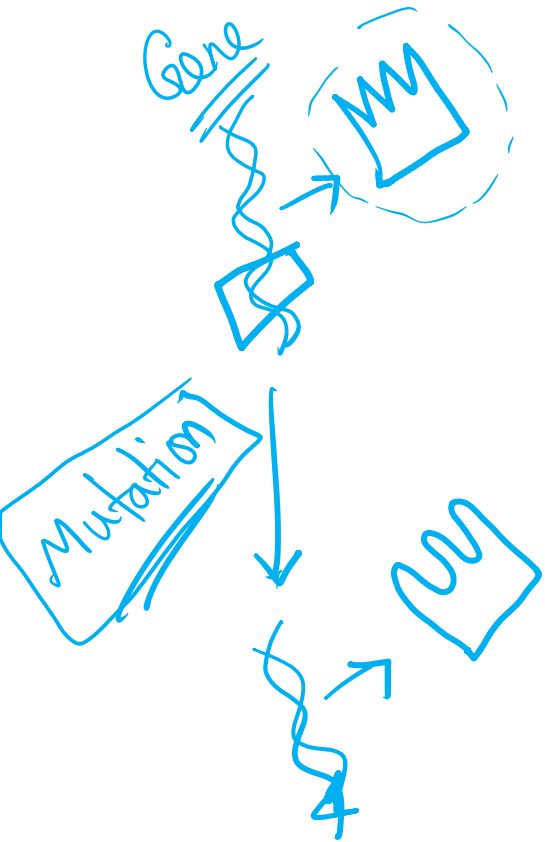


- \* Y chromosome is needed to give birth to a son and only father can carry Y chromosome
- \* So the mother has no role at all in determining whether the child will be a boy or a girl
- \* In fact, the sex of the child is determined by nature



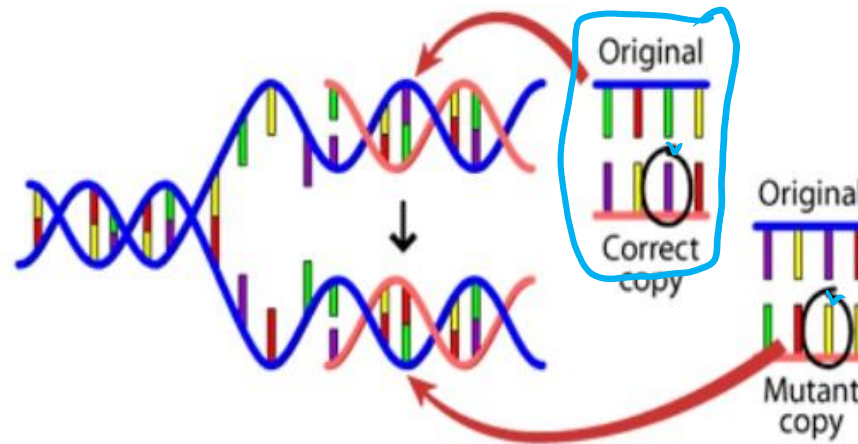
# Genetic disorders

\* Diseases caused by mutations in genes are called hereditary disorders




## Causes of Mutations

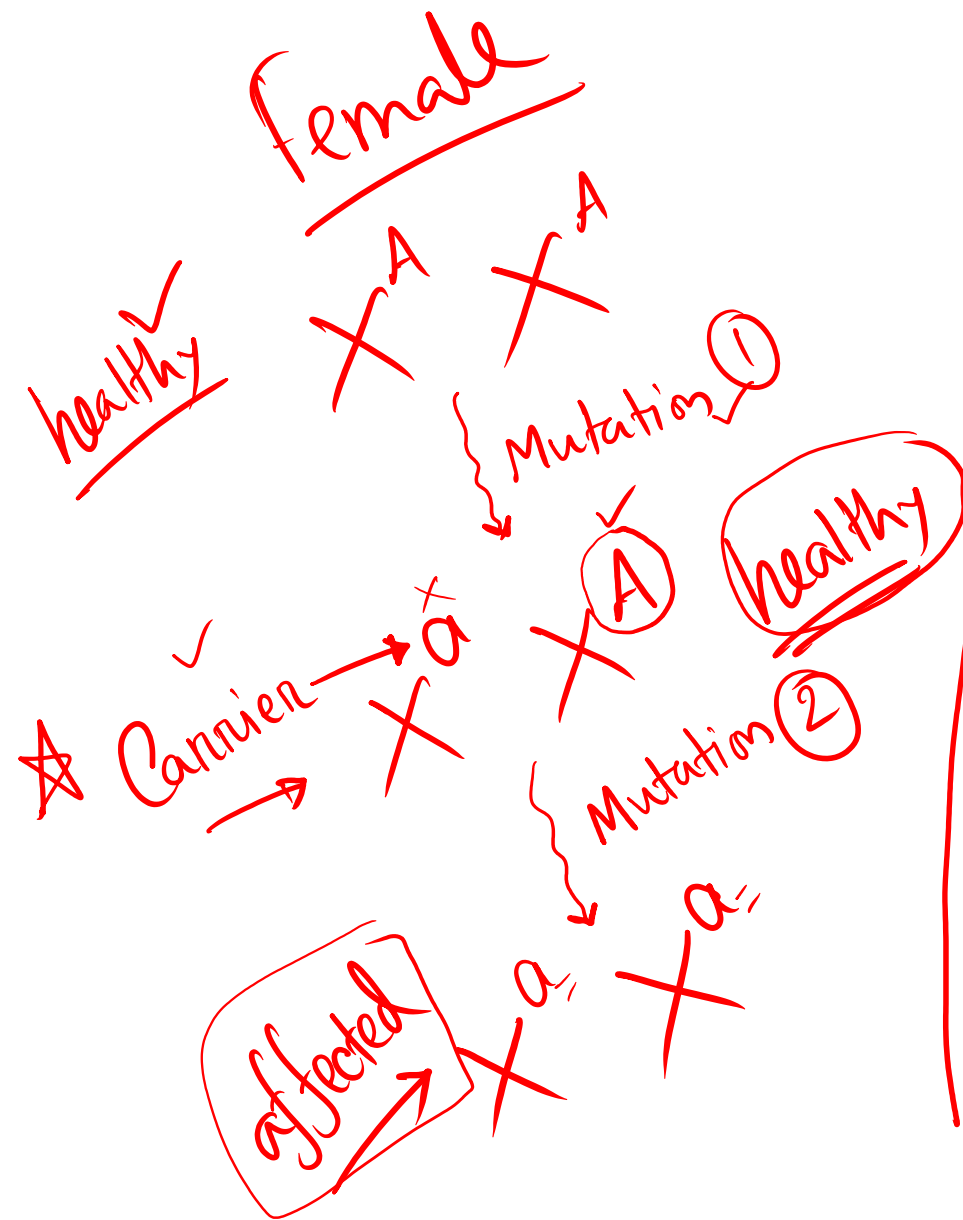
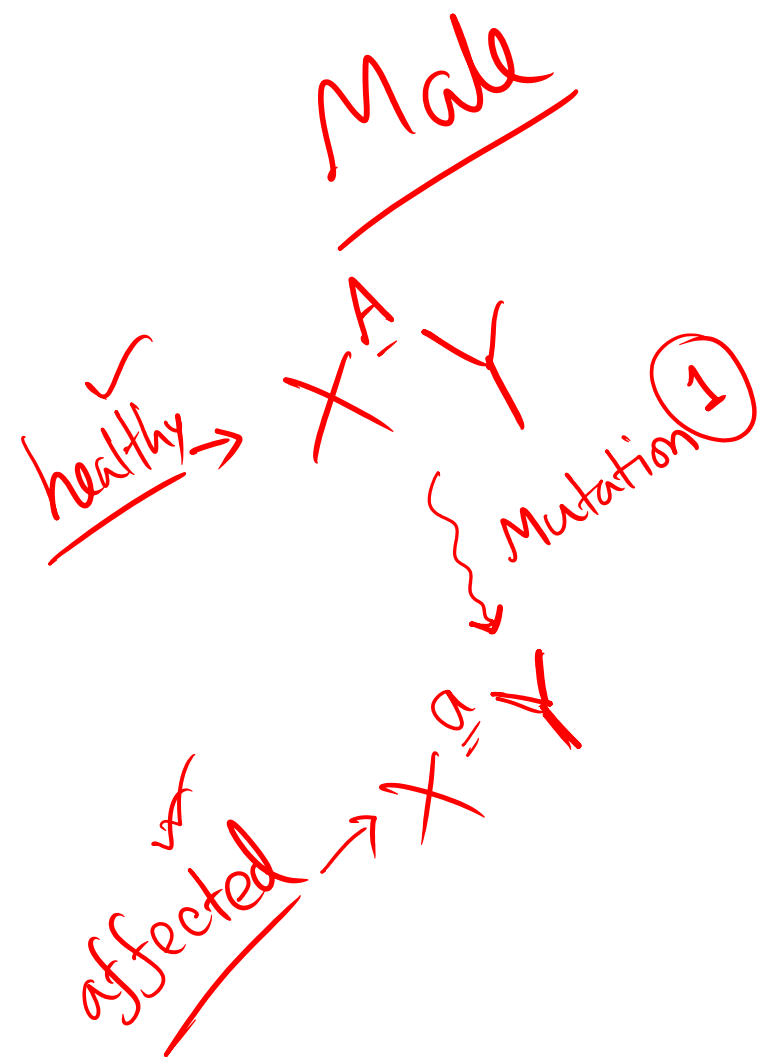
1. DNA fails to copy accurately



Mutation

# Sex linked disease

- \* Diseases caused by mutations in the sex chromosome are called sex linked diseases
- \* Because the  chromosome is small in length, it has very few genes
- \* So mutations in the X chromosome cause sex-linked diseases
- \* Since boys have only one X chromosome in their cells, so they suffer from sex linked disease due to a single mutation



Gene

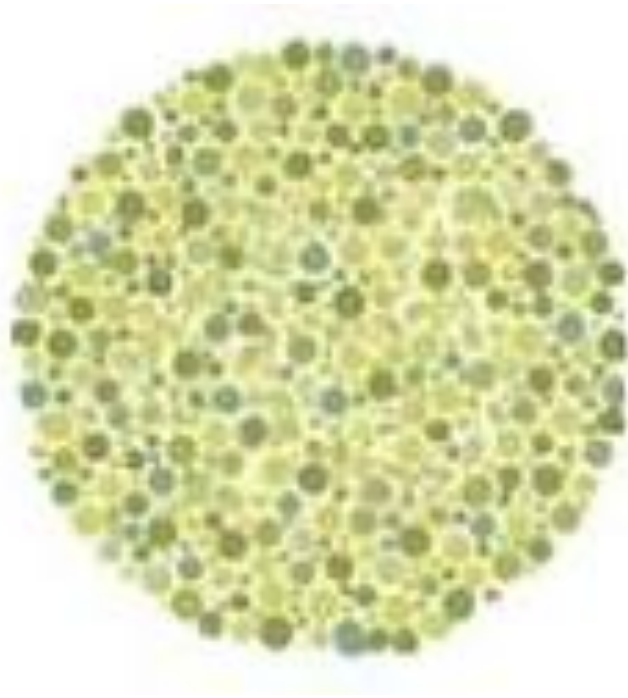
A → Mutation → a

- ✓\* In the case of girls, there are two X chromosomes, so in order to be infected, both chromosomes must have mutations
- ✓\* But mutations in the two X chromosomes are less likely to affect girls
- ✓\* Girls act as carriers when a chromosome mutation occurs

# Color blindness

- \* Color blind patients lack the pigment that recognizes the color of nerve cells in their eyes
- \* Lack of a pigment can not distinguish between <sup>✓</sup>red and <sup>✓</sup>green
- \* But if there is a lack of more than one pigment, then the patient is <sup>✓</sup>red and <sup>✓</sup>green can't make the difference between <sup>✓</sup>blue and yellow
- \* As a side effect of taking Hydroxy Chloroquine, the pigment of the eye may be lost and the patient may become color blind

# What is written in the picture?



What is written in the picture above?

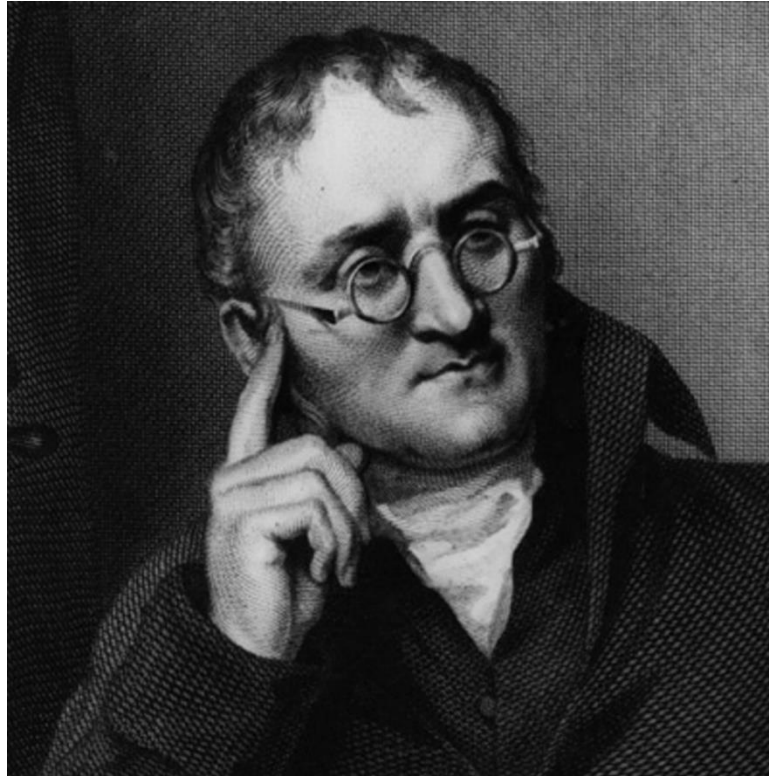
# What is written in the picture?



If you see a number in the previous picture, it means you are not normal, you are color blind

# John Dalton

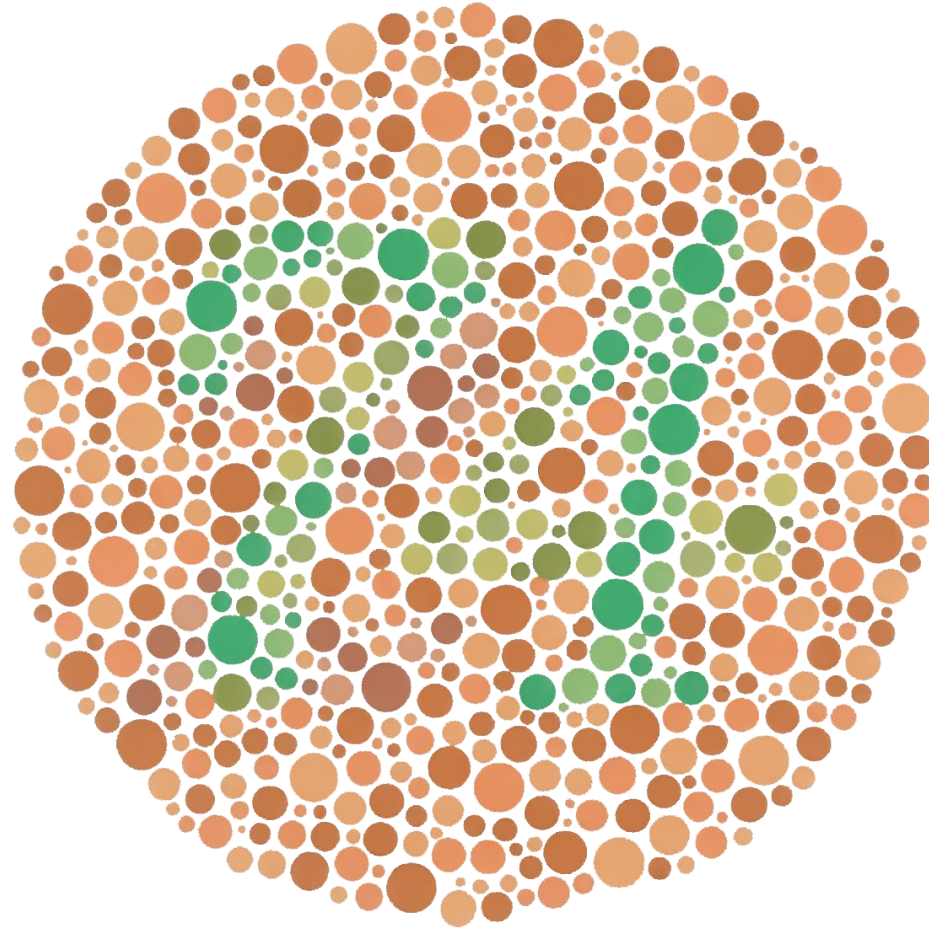
There is no reason to be sad because the famous scientist  
John Dalton was color blind



John Dalton



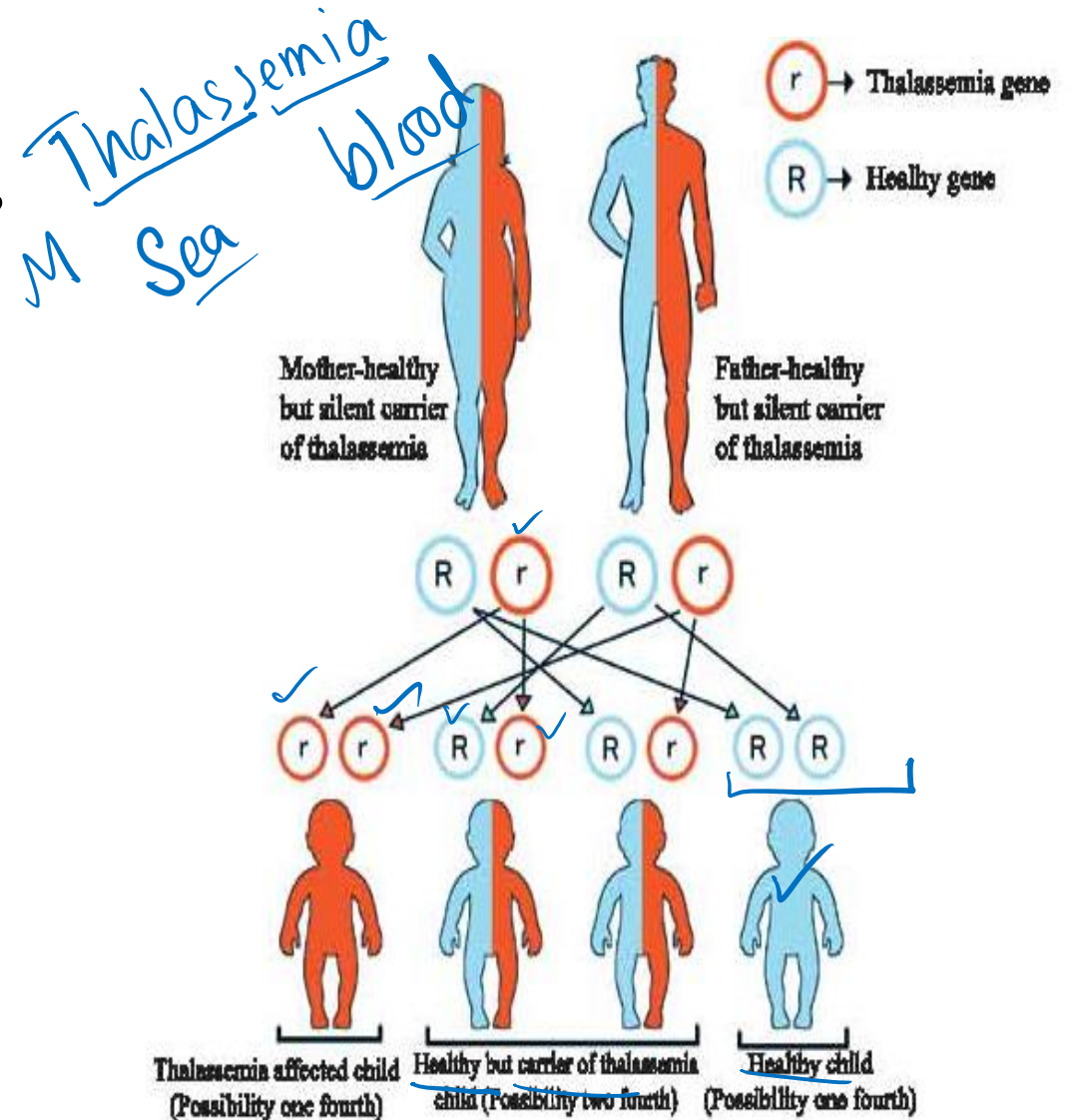
# Ishihara Test



If you can read the number, you are normal

# ✓ Thalassemia → Mutation

- \* In this disease red blood cells are destroyed due to which the patient suffers from anemia. Hb ↓
- \* It is an autosomal recessive disorder so if both parents are carriers or sick then the child will show symptoms of the disease.
- \* Marriage between cousins or close relatives increases the risk of having a child with the disease.

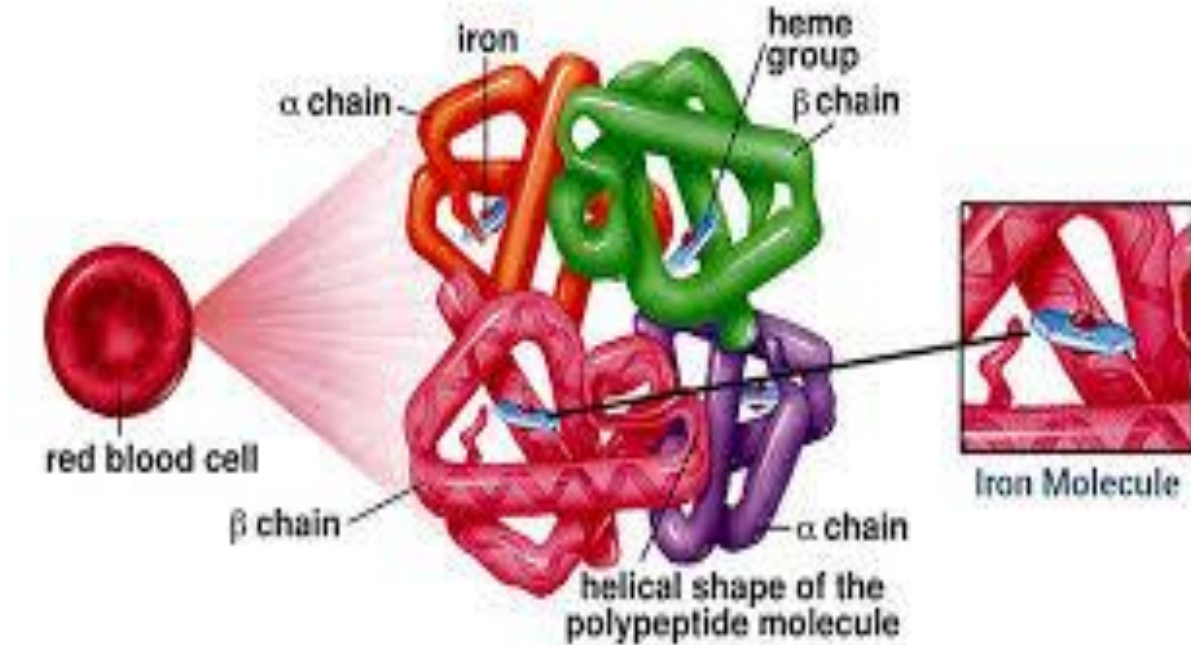




# The structure of hemoglobin

✓ Hb  
Bluish Red

Hb - 4O<sub>2</sub>  
Red



The structure of hemoglobin

\* Thalassemia causes defects in alpha or beta globulin producing genes that lead to the production of defective red blood cells

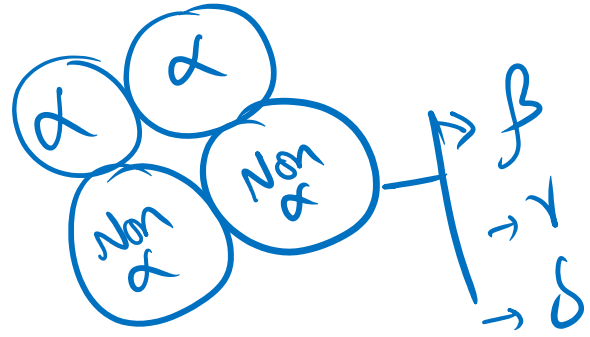
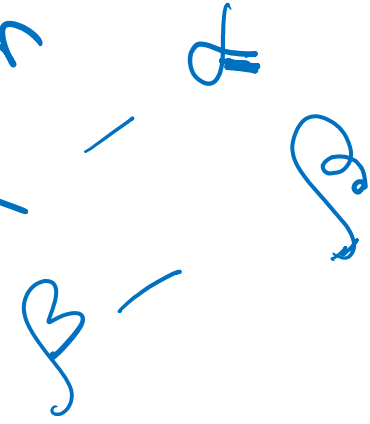
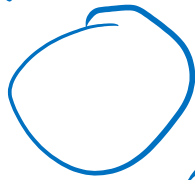
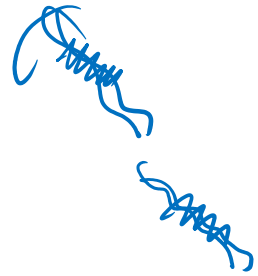


Life span  $\rightarrow$  120 days  $\downarrow$

Gene

RNA

Protein



Anemia



- \* Lack of alpha globulin causes alpha thalassemia

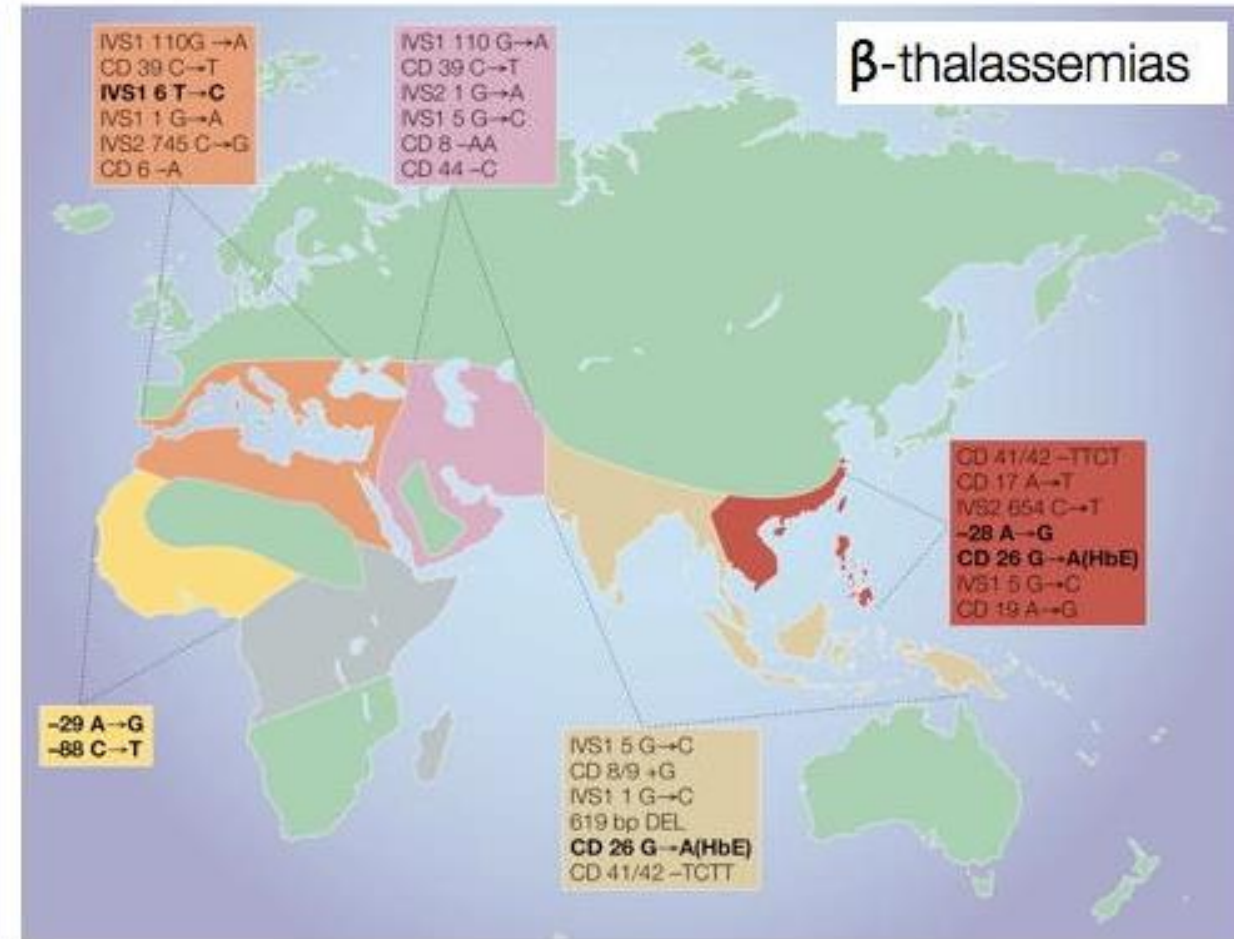
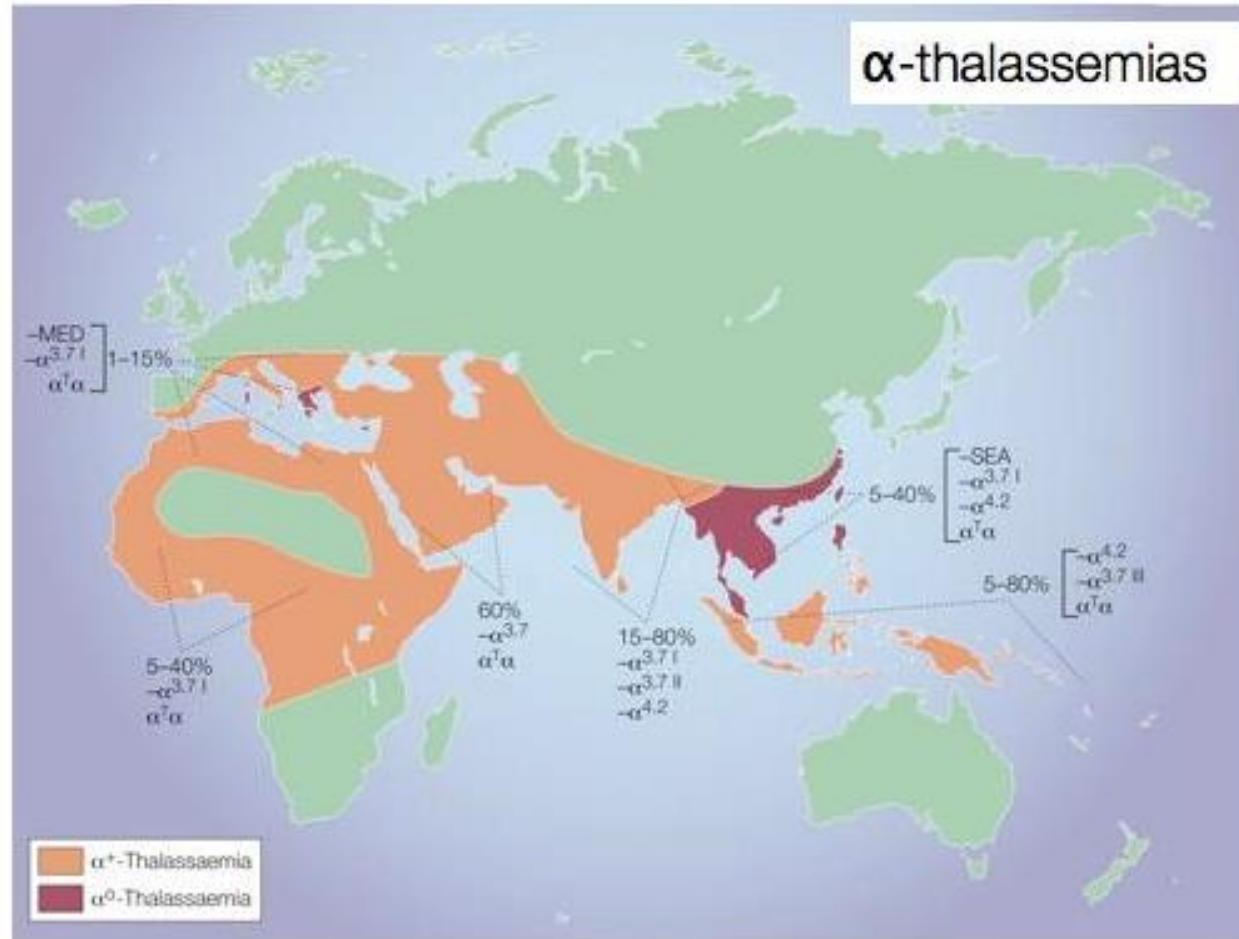
The disease is more common in people in **Southeast Asia, the Middle East and Africa**

- \* Beta thalassemia is caused by mutation in beta globulin forming gene

The disease is more common in the **Mediterranean** region, but also in some African-American Chinese and Asians.

- \* Beta thalassemia is also called **Cooley's thalassemia**

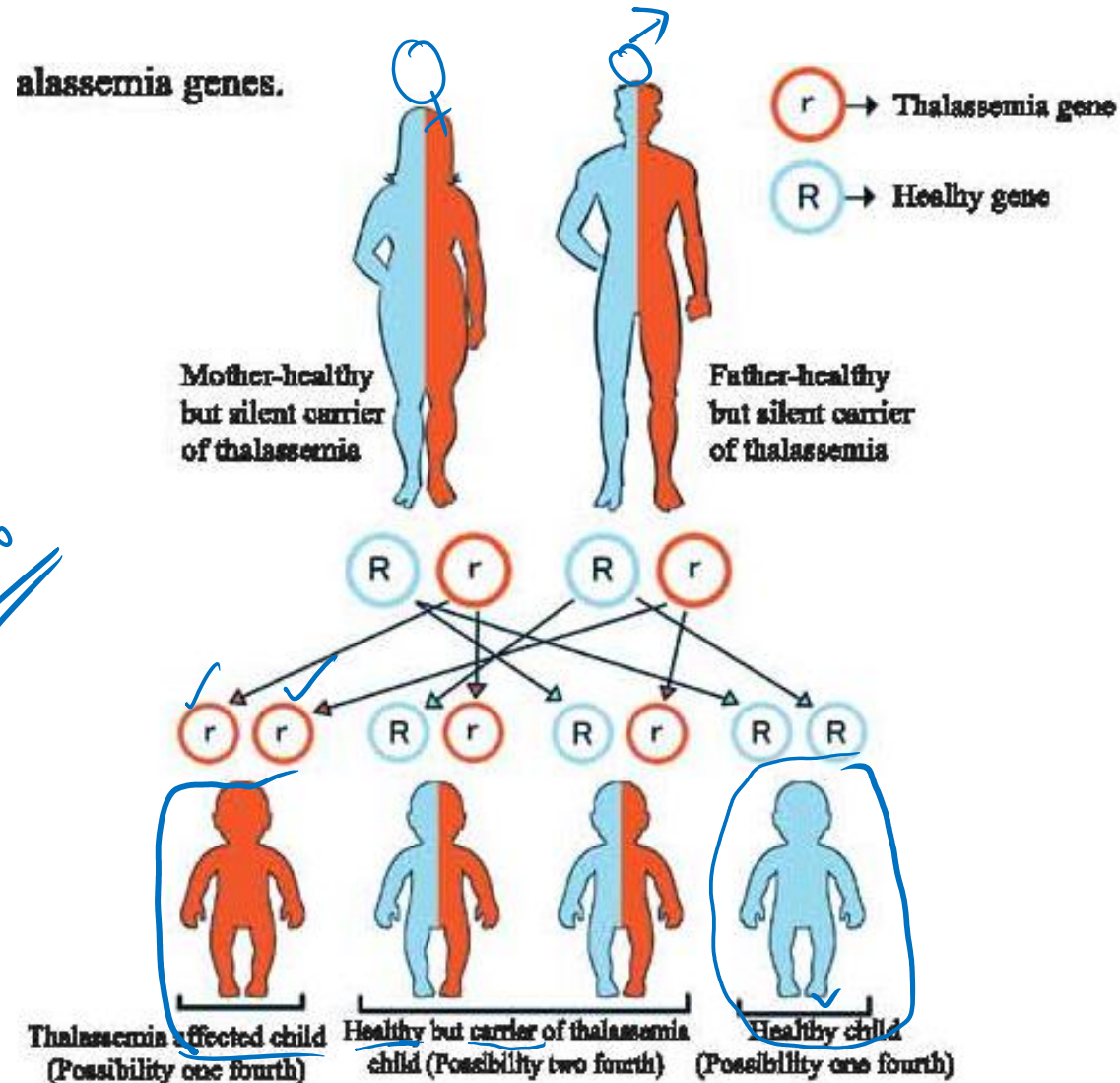
# Thalassemia on the world map



# The possibility of inheriting thalassemia from carrier father and carrier mother is one fourth.

Probability  
Possibility

25%





# Thalassemia Major & Thalassemia Minor

## Thalassemia Major



- \* In this case, the child gets the thalassemia gene from both his parents

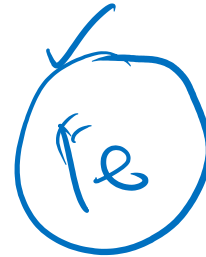
## Thalassemia Minor



- \* In this case the child gets the thalassemia gene from his parents
- \* So they usually do not show any symptoms
- \* However, thalassemia acts as a carrier of the gene

# Treatment

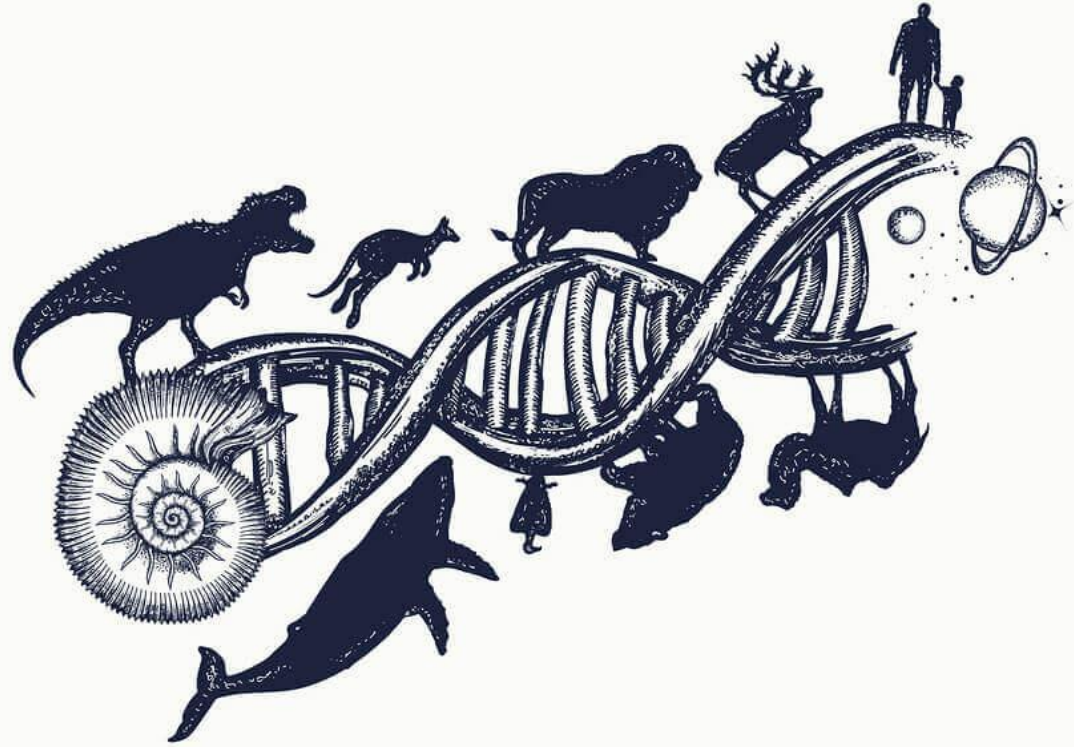
- \* Provide blood at regular intervals ✓
- \* Feeding certain medications ✓
- \* Refrain from feeding iron rich fruits ✓
- \* Thalassemia patient with liver damage will suffer jaundice, pancreatic damage will suffer diabetes, etc. Various diseases can occur
- \* Less likely to live more than 30 years if these problems start once



23L/day

Hemo  
Fe

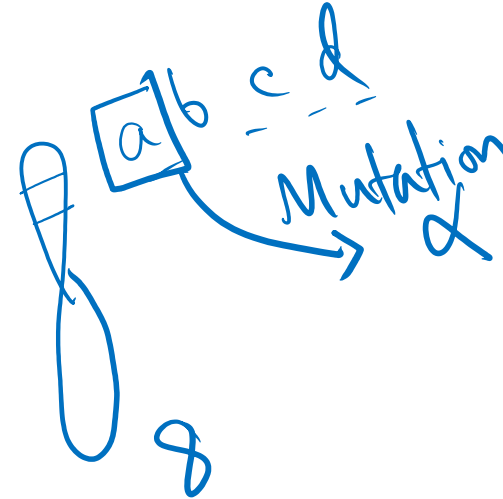
# Biological evolution theory



# Poll Question 01

What is your concept of evolution?

- (a) I believe it
- (b) I do not believe it
- (c) I do not know ✓
- (d) I do not want to comment



# Biological evolution theory

- \* The word evolution comes from the Latin word 'evolveri' ✓
- \* The English philosopher and educator Herbert Spencer first used the term evolution MCQ
- \* According to the modern definition given by Curtis Burns, evolution is specific from generation to generation  
Allyl frequency changes of one or more species in the area
- \* Once upon a time, people thought that there was no difference between the original living world and the modern living world
- \* In the 5th century BC, a scientist named Xenophan first discovered some fossils and proved that the shape of an organism's body is not immutable.
- \* ✓ In the 4th century BC, the Greek philosopher Aristotle proved that the various living things in the living world evolved from a single class of living things

# Poll Question 02

Who used the term 'evolution' first?

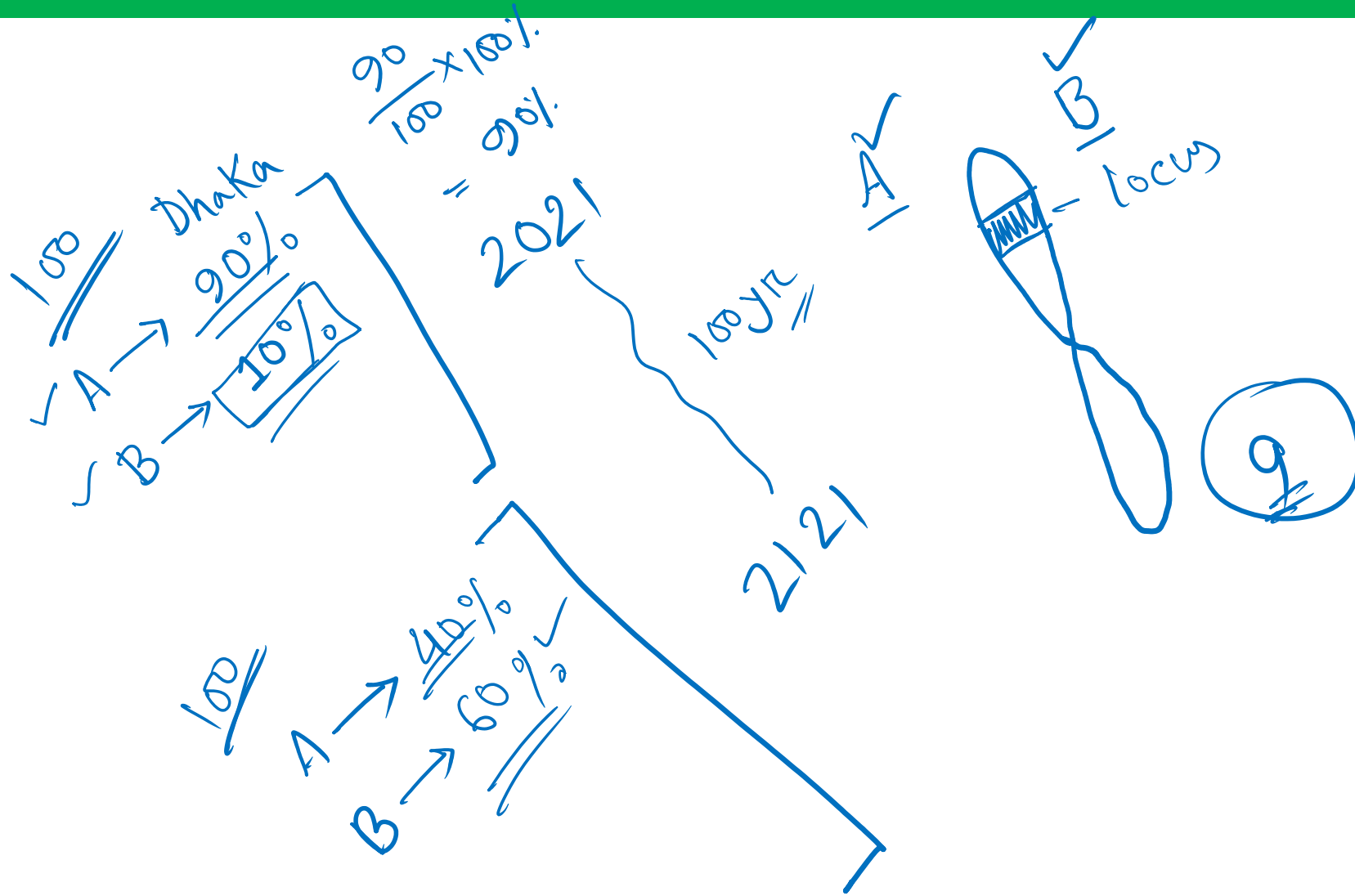
(a) Charles Darwin

 (b) Herbert Spencer

(c) Curtis Burns

(d) Aristotle

# Allele frequency

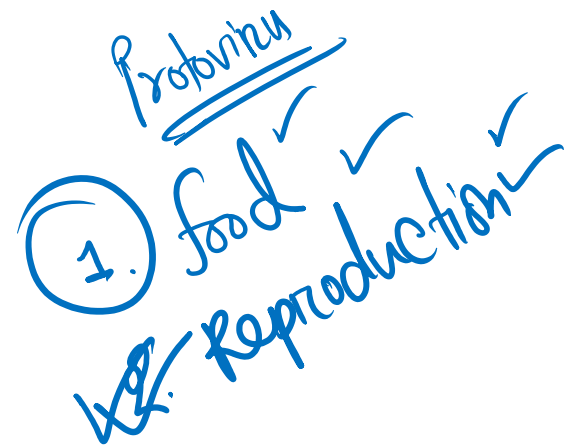


- \* **Evolution** is a slow and ongoing process. Through this process, gradually evolving from a structurally simple life to a complex life has taken place.
- \* However, there are examples of evolution in a very short time
- \* Even evolutionary complexities have occurred, such as the loss of sight due to moving away from the water and living in a dark cave in deep water.

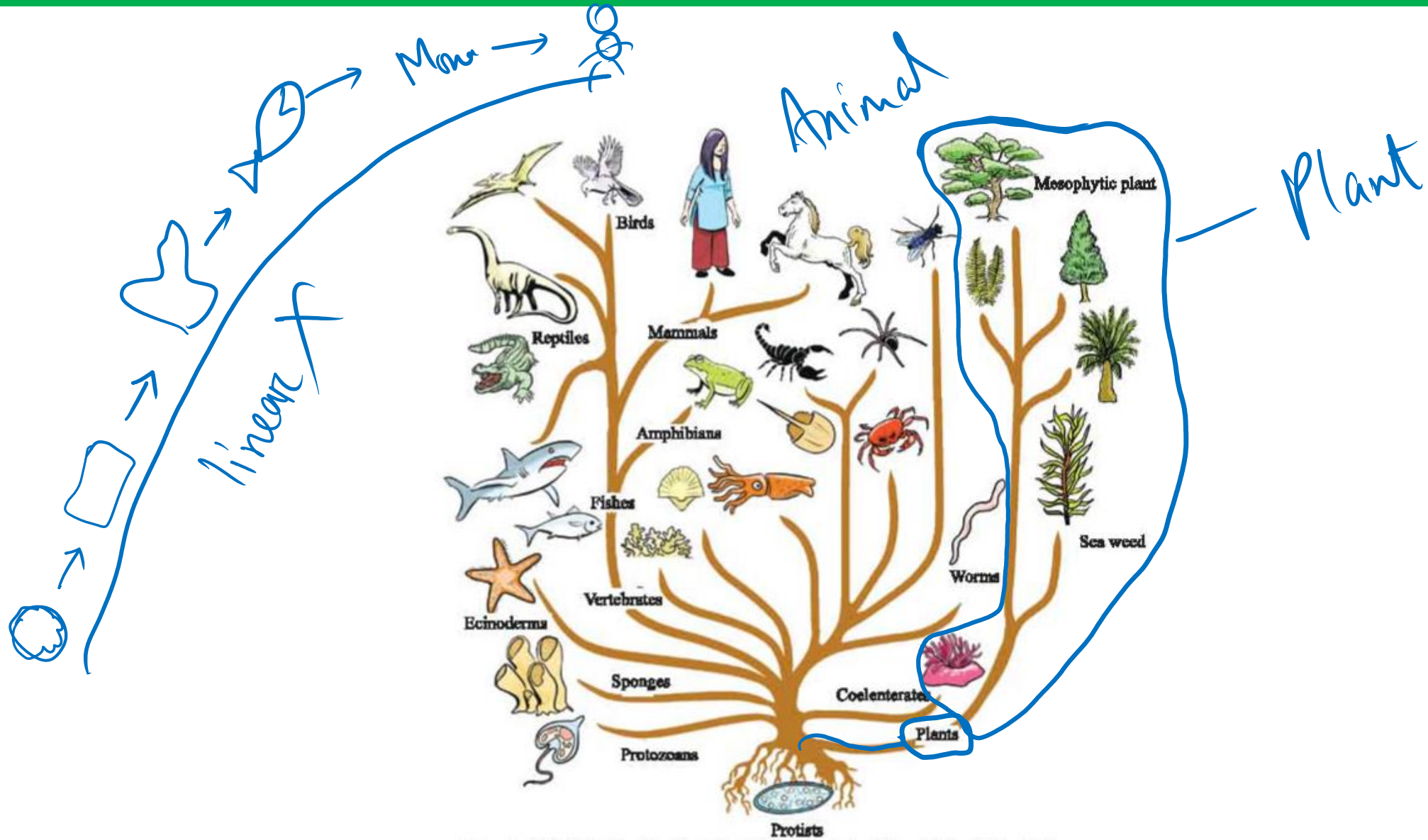


# The advent of life

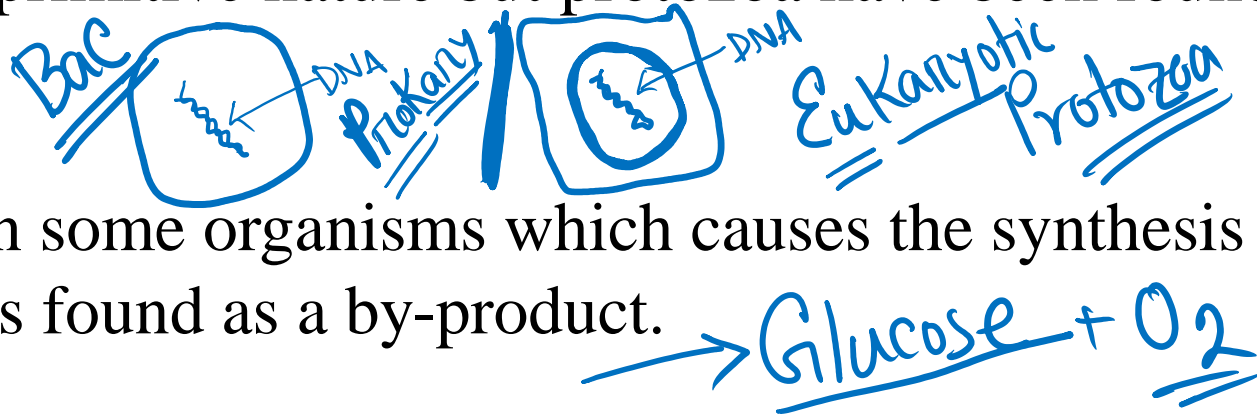
- \* About 2.6 billion years ago, the Earth's atmosphere was rich in methane, ammonia, hydrogen sulfide, and water vapor, nitrogen, and carbon-di-oxide gas, but no oxygen gas
- \* Under the influence of high temperature and ultraviolet rays, these youthful meanings combine to produce amino acids and nucleic acids.  
*unit of protein*
- \* Nucleoprotein molecules are formed from them. Nucleoproteins acquire the ability to form themselves.
- \* And this is how life begins ✓
- \* Proto virus is caused by nucleoprotein
- \* And proto viruses are viruses
- \* Virus refers to a condition that exists between the organism and the ~~root~~ *object*



# The advent of life



- \* Bacteria then emerge and protozoa are formed from bacteria
- \* Bacteria have nuclei of primitive nature but protozoa have been found to have well-formed nuclei
- \* Chlorophyll is formed in some organisms which causes the synthesis of food to start again and oxygen is found as a by-product.
- \* Then came the emergence of multicellular organisms
- \* Later, plants and animals began to evolve in two different ways
- \* So evolution does not actually take place in a straight line, but continues in a number of complex branches.



# Poll Question 02

Formation of nucleic acid required-

(a) Low Temperature & Infrared ray

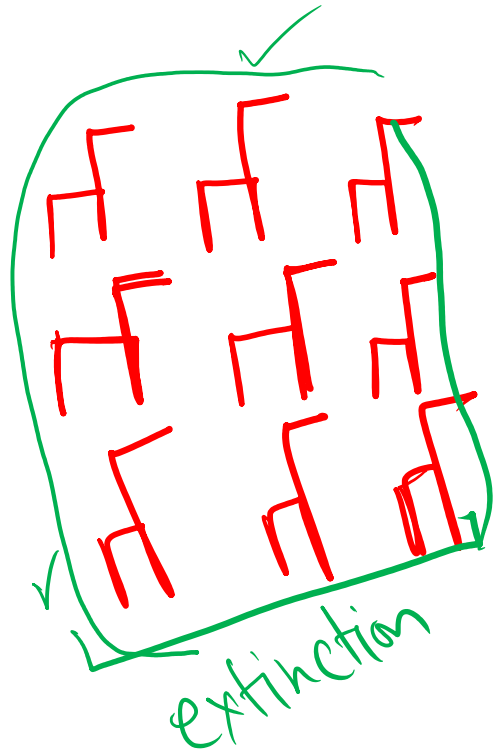
(b) High Pressure & Ultraviolet ray

~~(c)~~ High temperature & Ultraviolet ray ©

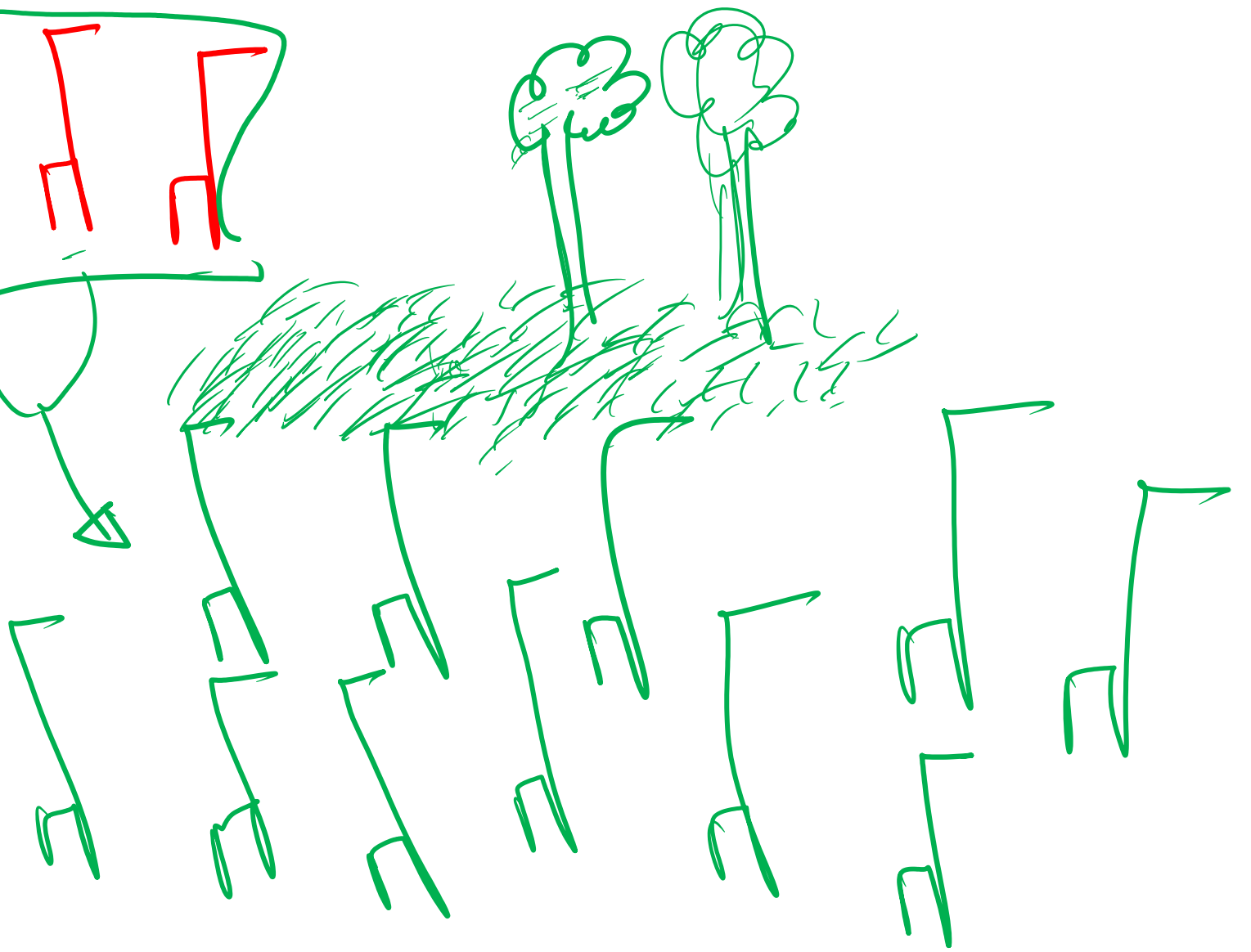
~~(d)~~ High temperature & Ultraviolet ray

# Darwinism *Theory*

- \* Scientist Charles Darwin was born in Shrewsbury, England
- \* While transporting to the Galapagos Islands in the Pacific Ocean, he was fascinated by the amazing features of the flora and fauna of the region.  
*plant* *Animal*
- \* Based on the information gathered, he published his doctrine in a book entitled Origin of Species by Means of Natural Selection in 1859, almost 20 years after his return to England in 1837.
- \* Another contemporary scientist, Alfred Wallace, cites natural selection as the cause of biological evolution.

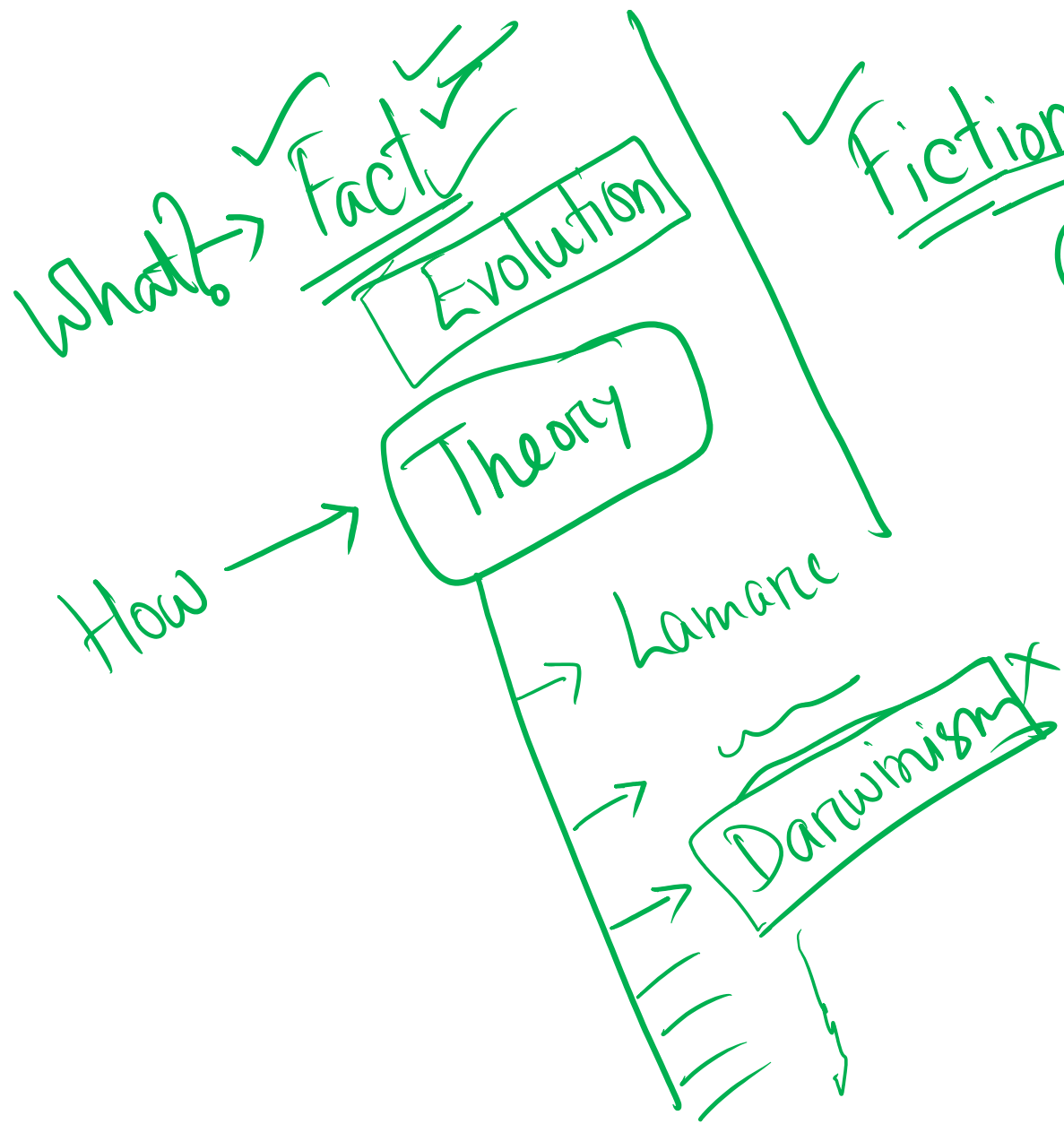


Nature



# The general truths that occur in nature in Darwin's view

- \* Excessive reproduction
- \* Limited food and accommodation
- \* Struggle for existence
  - International struggle
  - International struggle
  - Struggling with the environment
- \* Variation or change in the organism
- \* Natural selection
- \* Origin of new species



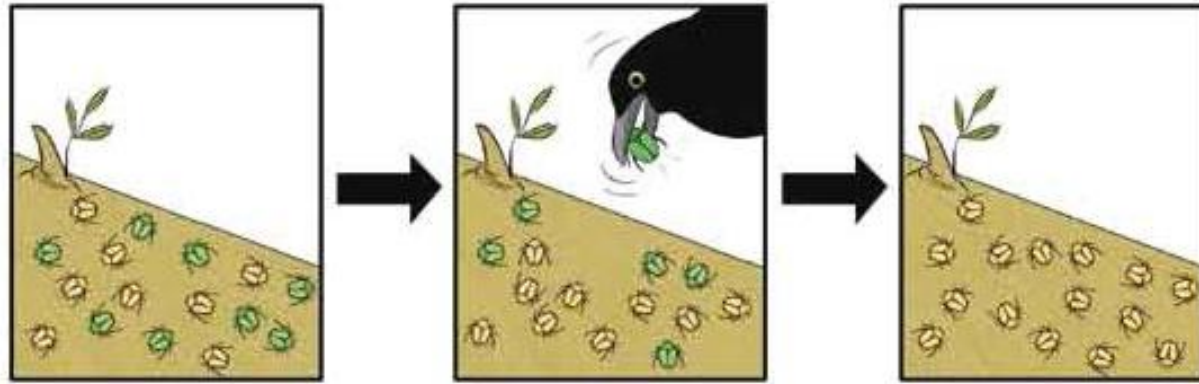
✓ Fiction

Crusifiction → muslims

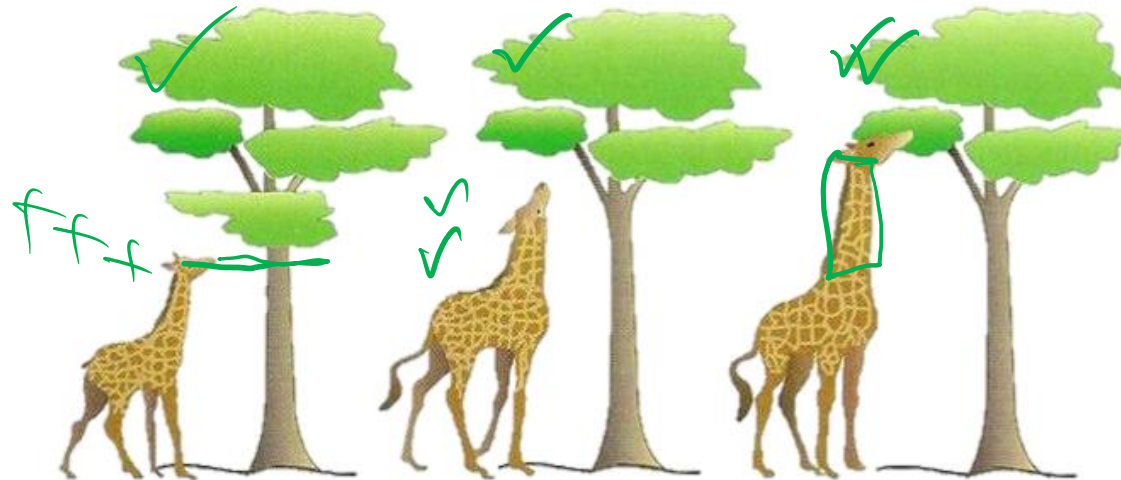
Crusifixion → Christ



# Natural selection



**Figure : 12.13 The chronological picture of struggle for survival between two living organisms. Green beetles could not adjust with the environment and were easily marked and later on consumed by birds. But brown beetles survived.**



Natural selection ✓

# The importance of evolution is due to the survival of the species

During the evolution of new species through evolution, many species are lost in the womb of time

The giant elephant has disappeared but the cockroach has survived

This process of adapting to the path of evolution is often called adaptation

Evolution has been possible experimentally in the laboratory and this is proof of the reality of evolution

Some more evidence for evolution remains to be gathered, but no scientific evidence against evolution has been found so far, so evolution is a book of novels with a few torn pages.

লেগে থাকো সৎভাবে,  
স্বপ্ন জয় তোমারই হবে

D™çvm-D‡b¥। শিক্ষা  
পরিবার

**Thank You**