



উদ্দাম

একাডেমিক এন্ড এডমিশন কেয়ার

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

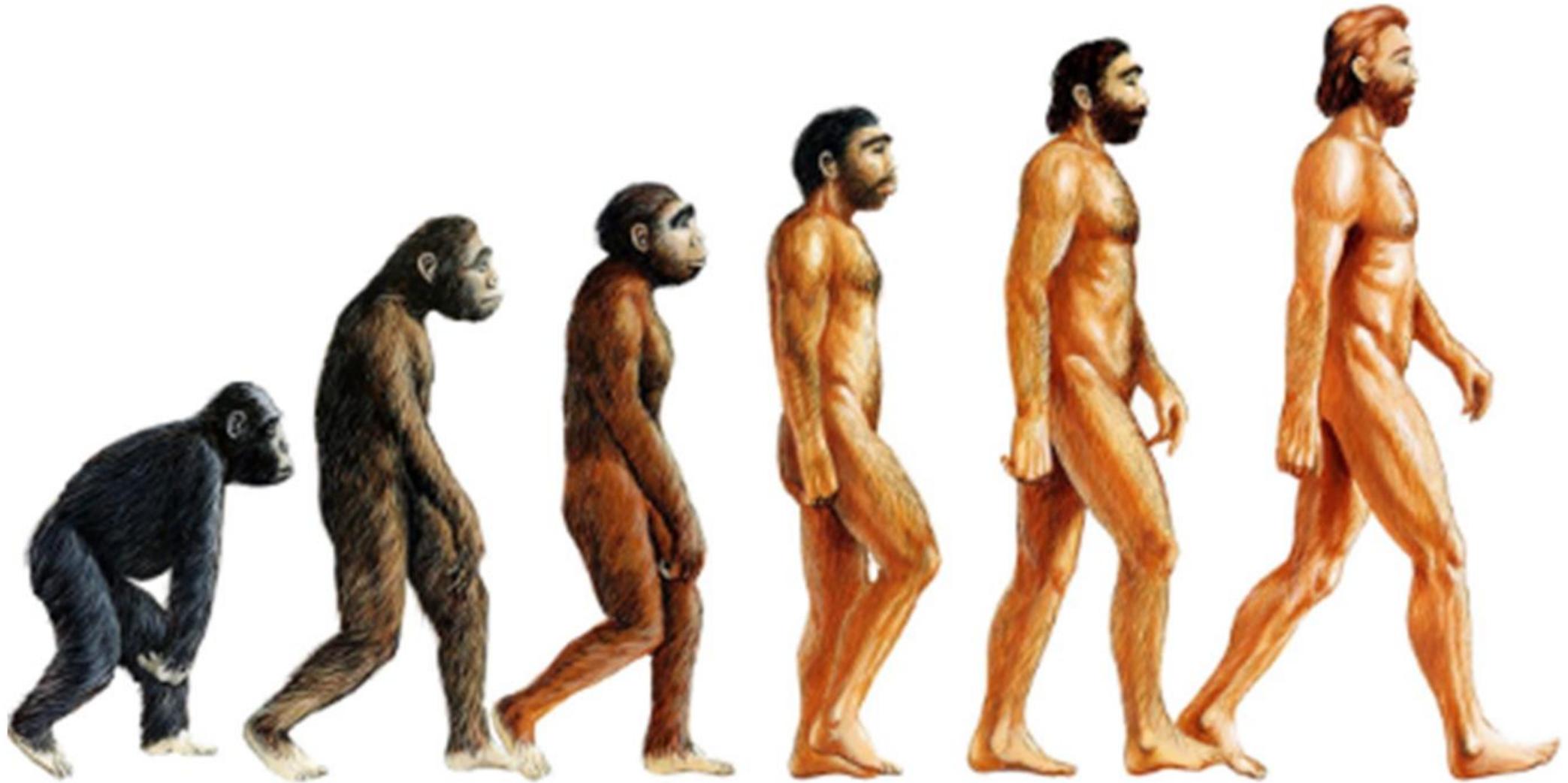
বিস্মিল্লাহির রাহমানির রাহীম

Class 10 : Chapter 12

Heredity in organisms and evolution 12.1-12.1.2

Rahatul Ishakh Anonnoy, HSC15
Dhaka Medical College K 73

Picture



Contents

1. Heredity in organisms = বংশসত্তি
2. Determining the sex of man
3. Hereditary disorders
4. Biological evolution theory

Picture

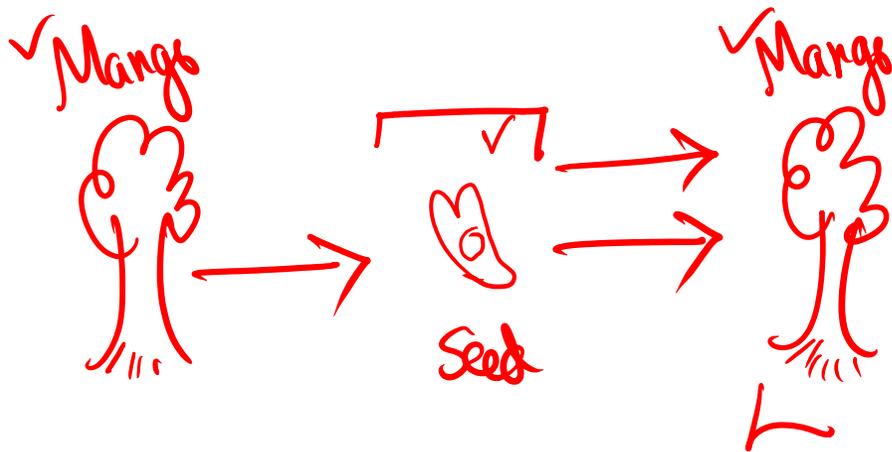


✓
96%
4%

A picture showing comparison among the skulls of human, orangoutang and macaque monkey.

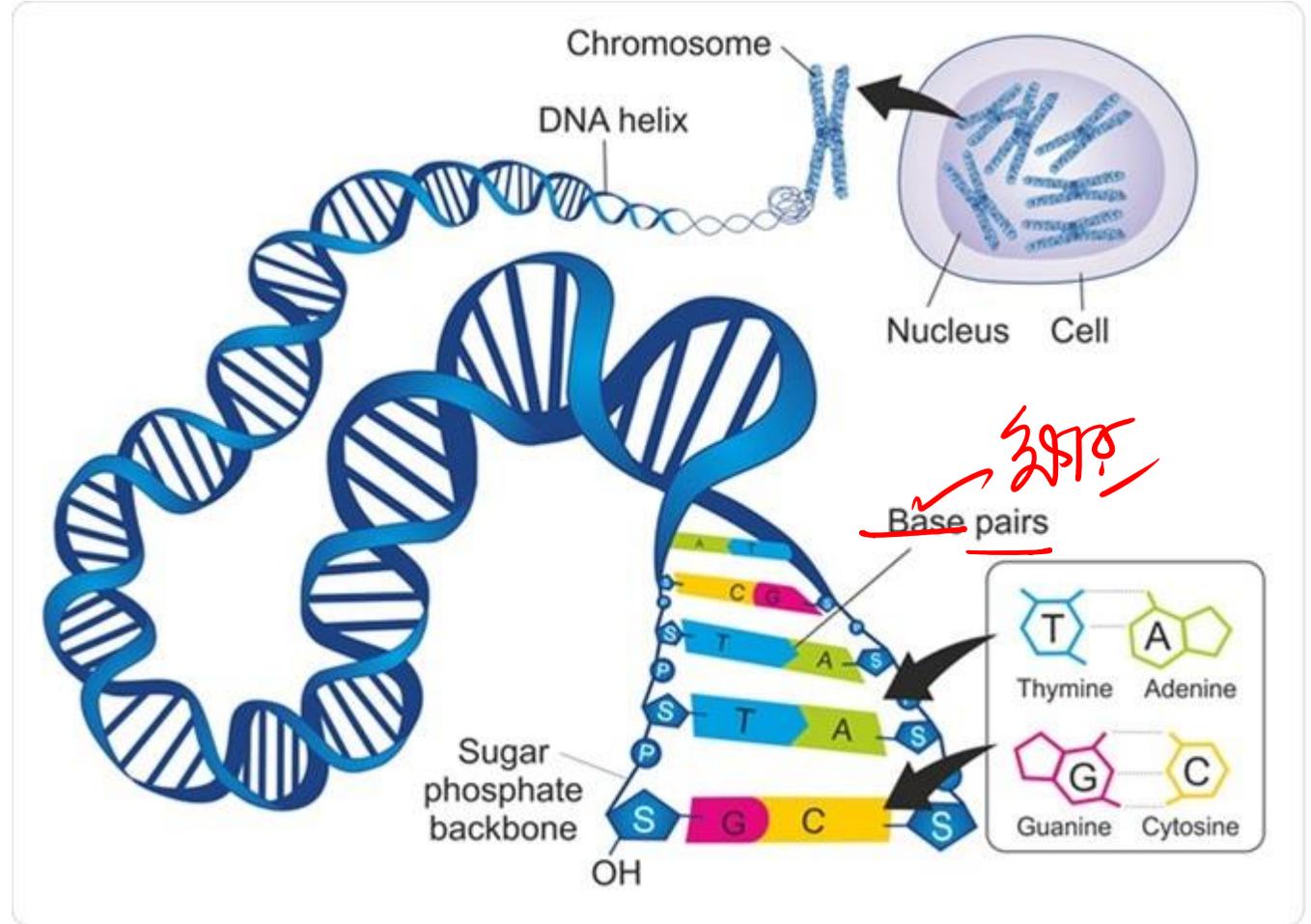
Heredity in organisms

- ✓ Heredity is the process by which the traits of the parents are passed down from generation to generation. ^{tion} ^{sys}
- In a special branch called genetics, heredity is discussed and researched in detail. ✓



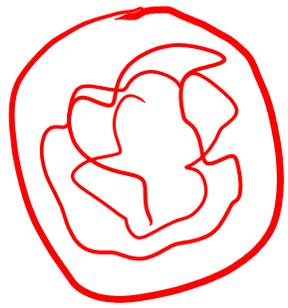
Hereditary materials

- ✓ 1. Chromosome
- ✓ 2. DNA
- ✓ 3. RNA

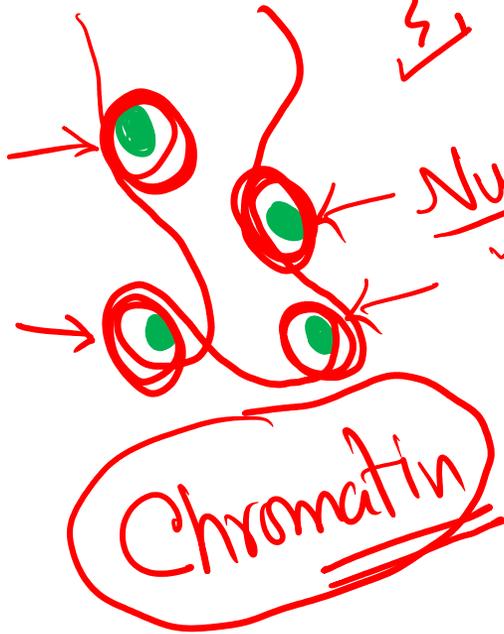


Let's tell

Chromatin, chromosome, chromatid
Where is the difference?



DNA

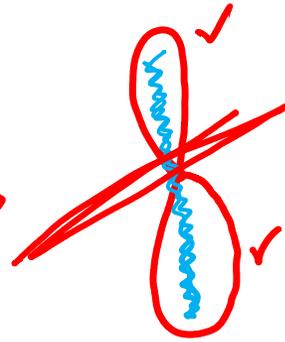


Nucleosome

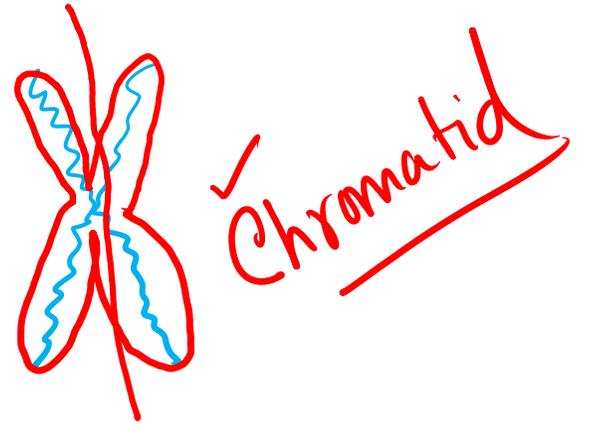
46

$\frac{2m \text{ length}}{2\mu m} \text{ cm}$

Chromosome



Arm



Chromatid

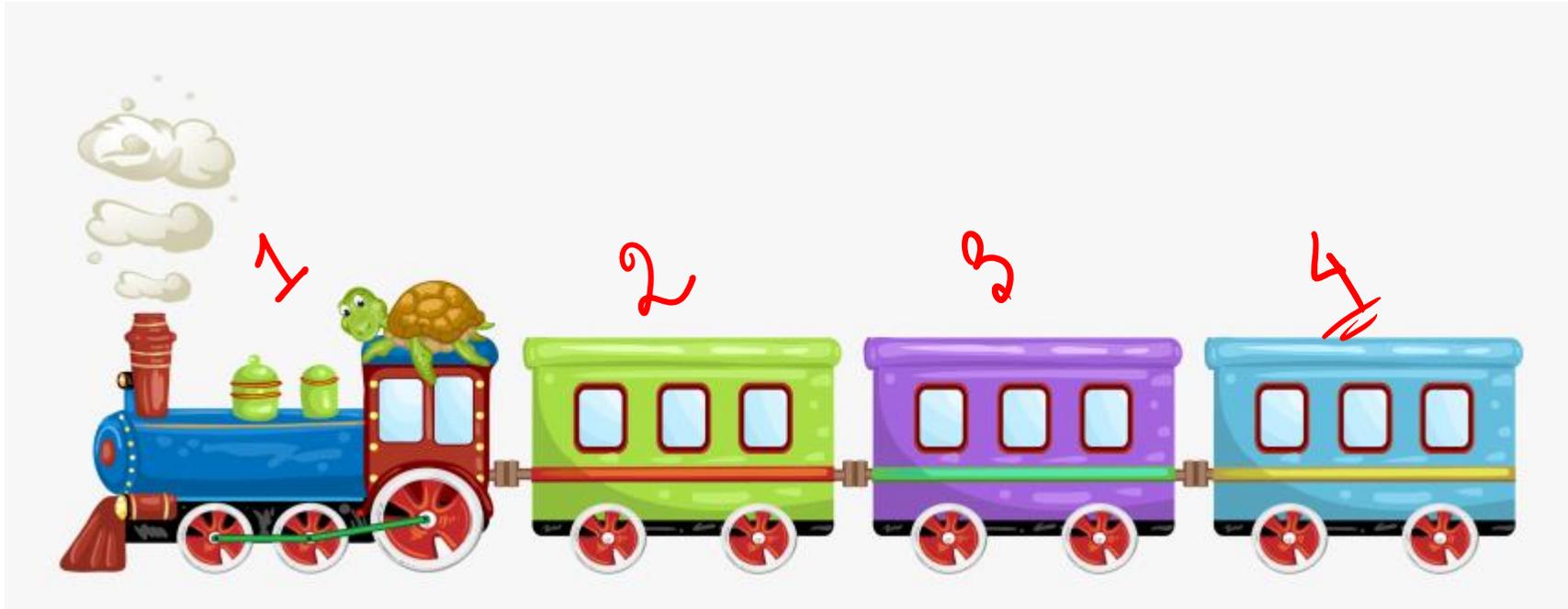
longitudinally

$\checkmark \text{ DNA} + \checkmark \text{ histone} = \text{Chromatin}$ ①

$\text{DNA} + 0 = \text{Chromatin}$ [When no histone]

$\Rightarrow \text{DNA} = \text{Chromatin}$

Comparison of chromatin and chromosomes

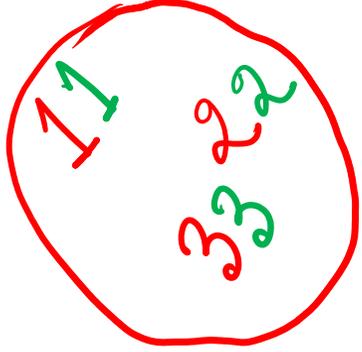


If ~~chromatin~~ is a train, then the chromosomes are like compartments

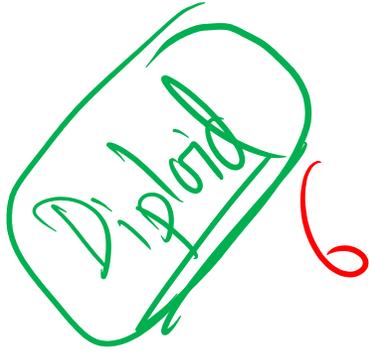
Chromosome

- Scientist Strasburger discovered it in 1875 AD
- If the cell has two sets of chromosomes, it is ~~deployed~~ ^{diploid} and If there is one set of chromosomes, it is called haploid
- The chromosome is called the physiology of heredity

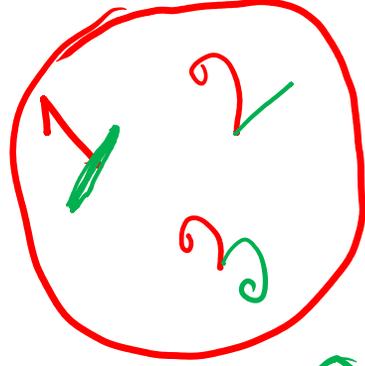
Somatic (6) 3+3



Father
Mother



Germinal



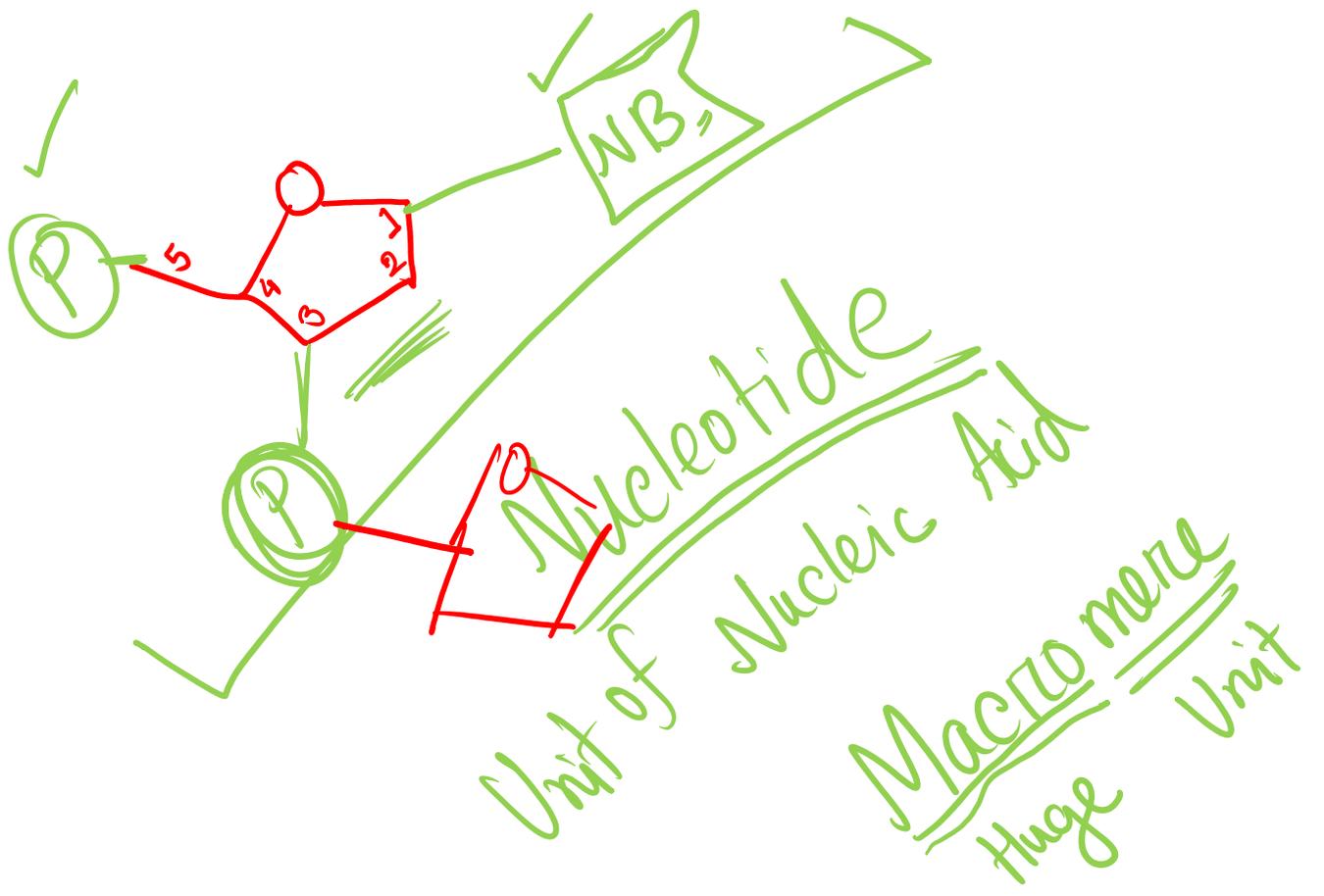
3

DNA

Deoxyribonucleic acid

de
சா. சி. சி.



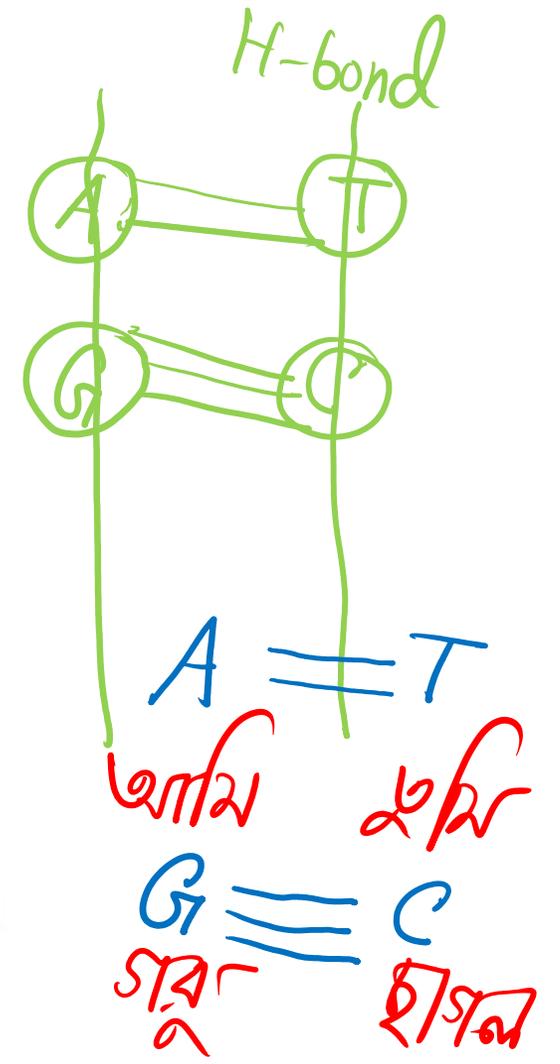
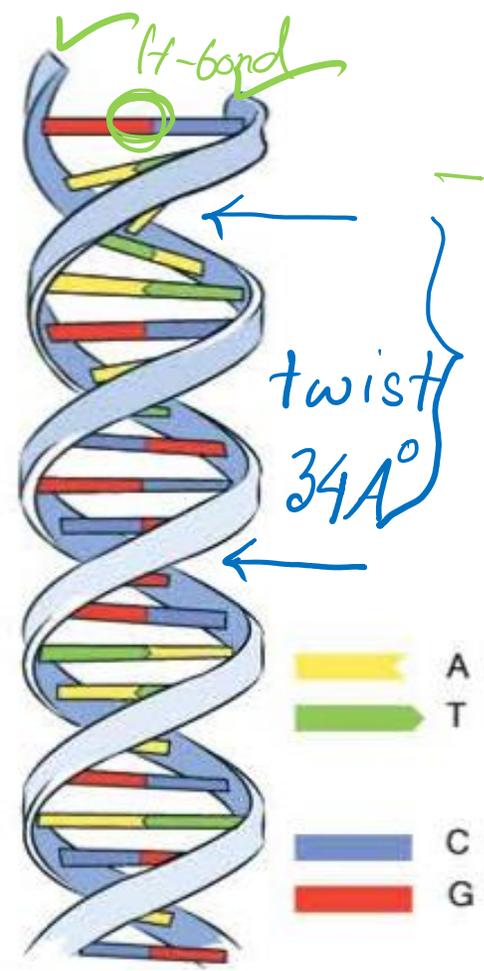
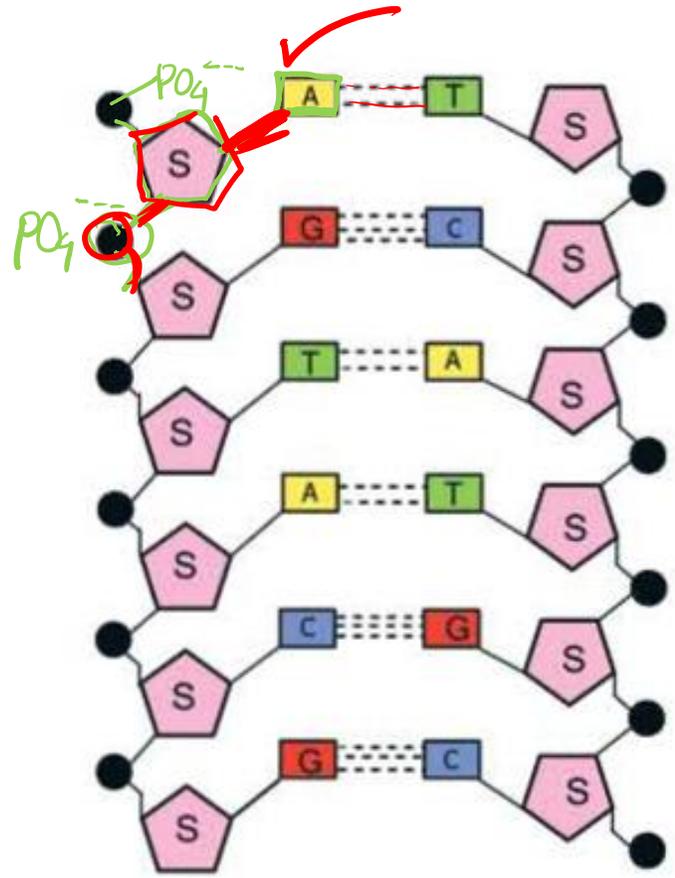


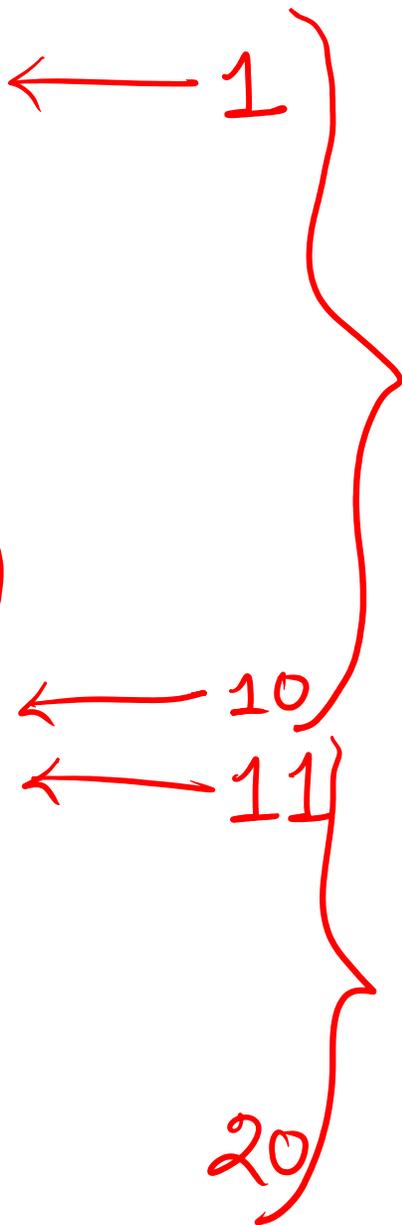
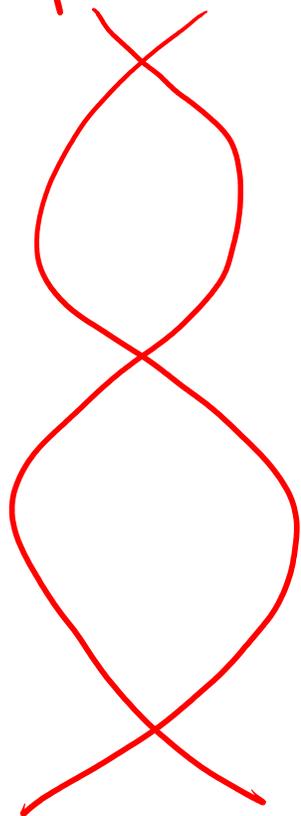
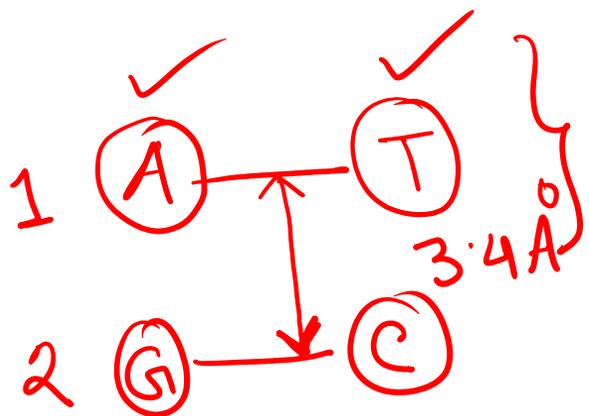
DNA

Deoxyribonucleic acid

- * DNA consists of many nucleotide units
- * Nucleotides consist of three things
 - ✓ 1. Sugars with five carbons *deoxyribose sugar ✓*
 - ✓ 2. Nitrogenous base
 - ✓ 3. Inorganic phosphate *PO₄⁻*
- * Nitrogenous base
 - ✓ Purine (adenine, guanine) *Purine*
 - ✓ Pyrimidine (cytosine, thymine) *Pyrimidine*
- * Watson & Crick described the formation of the double helix in 1953 *1963 Noble*

DNA Structure Picture





twist $\frac{34 \text{ \AA}^0}{10}$

twist = 3.4 \AA^0

$1 \text{ \AA}^0 = 10^{-10} \text{ m}$

DNA Structure

- * Adenine in one thread binds to thiamine in another thread in two hydrogen bonds
 $A = T$
- * Guanine in one source binds to cytosine in another source in three hydrogen bonds
 $G \equiv C$
- * Each rotation of the helix is 34 Å long and contains ten nucleotides in one full rotation
- * So the distance between the two adjacent nucleotides is 3.4 Å

Poll Question 01

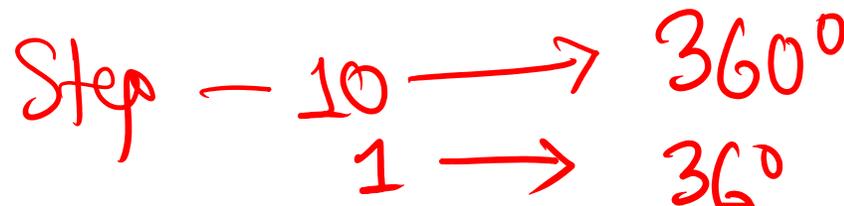
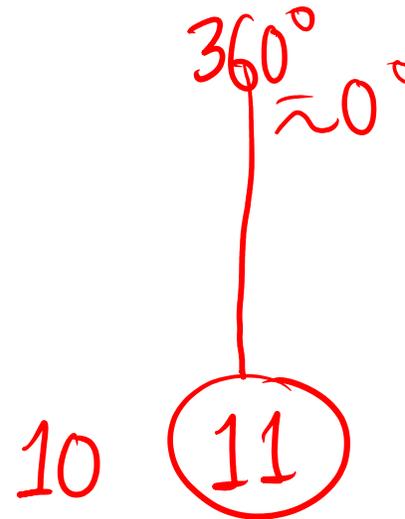
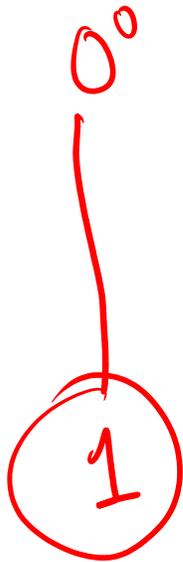
What is the angular distance between two adjacent nucleotide basepair?

(a) 72°

(b) 36°

(c) 24°

(d) 48°



The mathematical problem about DNA

If there are 26 hydrogen bonds in a DNA twist, how many cytosine are in that twist?

Suppose, the number of cytosine in that twist is X So, the number of guanine is X

Therefore, the number of hydrogen bonds in that is $3X$



If the number of cytosine is X , So the number of adenine is $10-X$

Therefore, the number of thymine is $10-X$



So, the number of hydrogen bonds in that is $2(10-X)$

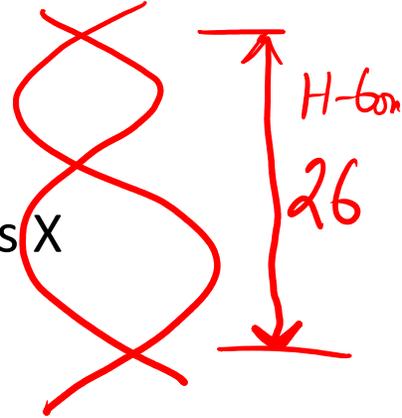
So, the total number of hydrogen bonds in the twist is $3X+2(10-X)$

According to the question, $3X+2(10-X) = 26$

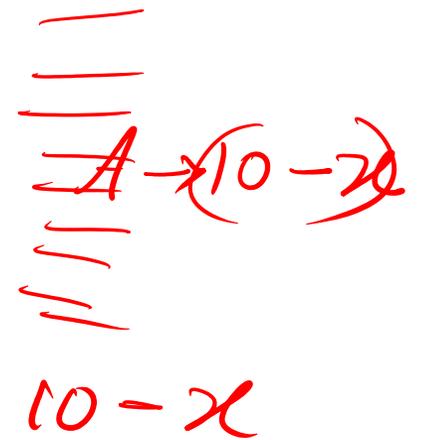
Or, $X+20 = 26$

Or, $X = 6$ ✓

The number of cytosine in the twist is 6



Cytosine?



RNA

Ribonucleic acid

* Structure al material

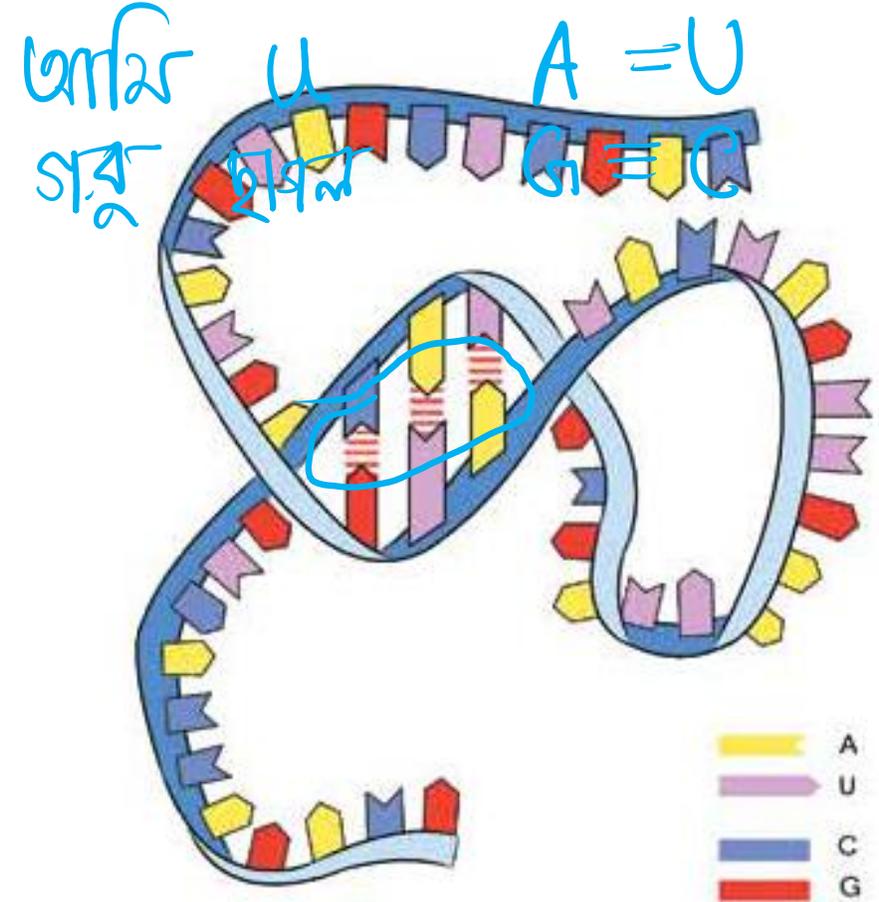
1. Ribose sugars with five carbons
2. Nitrogen base



Adenine
 Guanine
 Cytosine
 U~~U~~rasil

3. Phosphate

Dhaka U~~U~~ University
 DNA U~~U~~ Uracil
 Ramna U~~U~~ Thana
 RNA U~~U~~ Thiamine

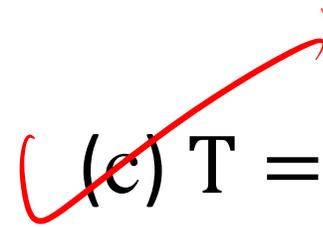


Poll Question 02

Which one is correct?

(a) $A \equiv G$

(b) $C \equiv T$

 (c) $T = A$

(d) $G \equiv T$

Gene

- * The pieces of DNA from which RNA is made are called genes

DNA → RNA → Protein → Characteristics

Central dogma
"location"

- * The location of the gene on the chromosome is called locus

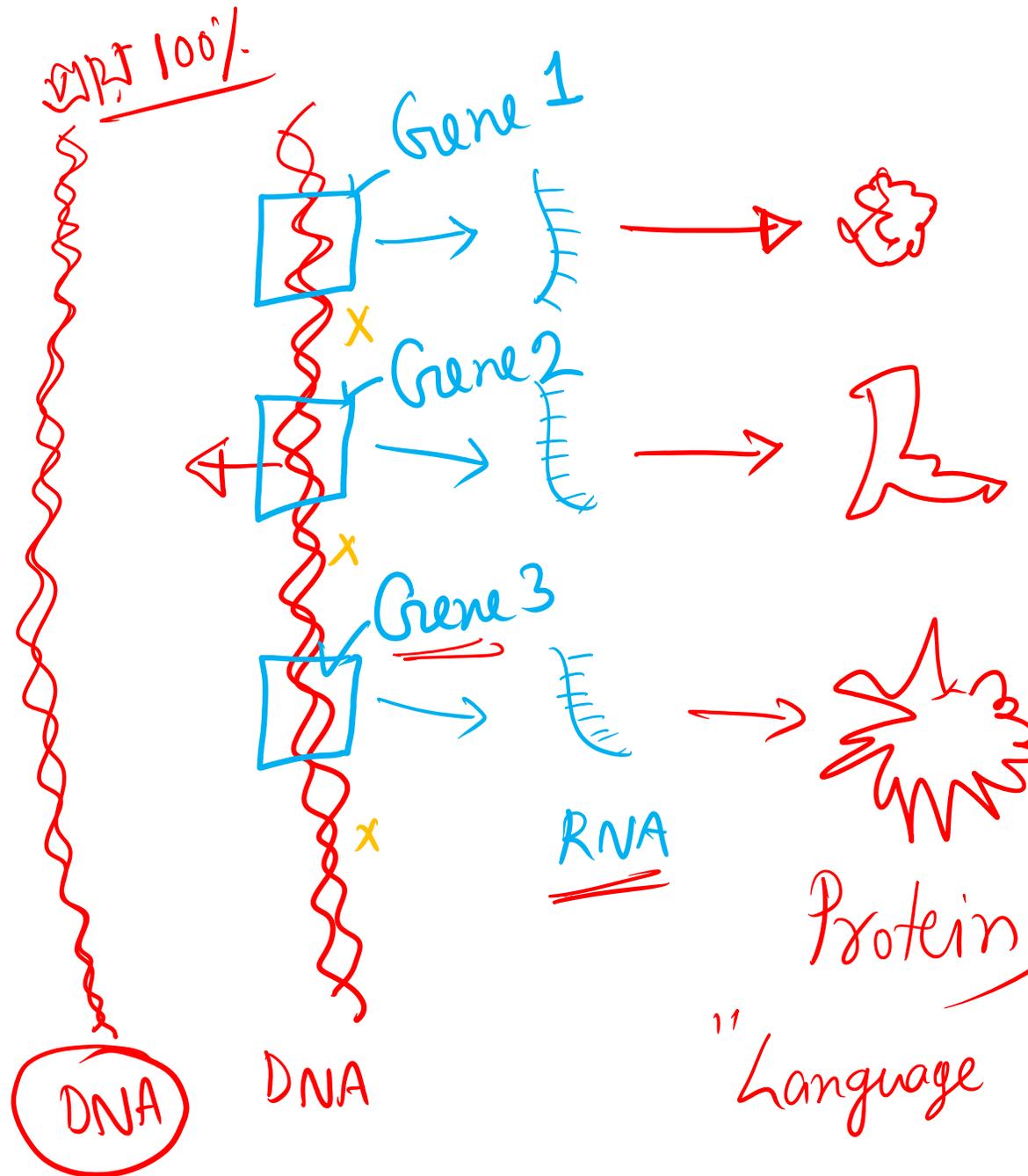
- * ^{"father of genetics"} Gregor Johann Mendel during his research on beans Mention that factor as the bearer and carrier of heredity What he did today is known as ~~gin~~ gene.

↓
g Newton
1589, 1665

gene "a"

✓
← locus of
7 chromosome

gene "a"
Scientific awakening
youtube, facebook



Melanin ↓ → white
Melanin ↑ → black

Characteristics

"Language of life"

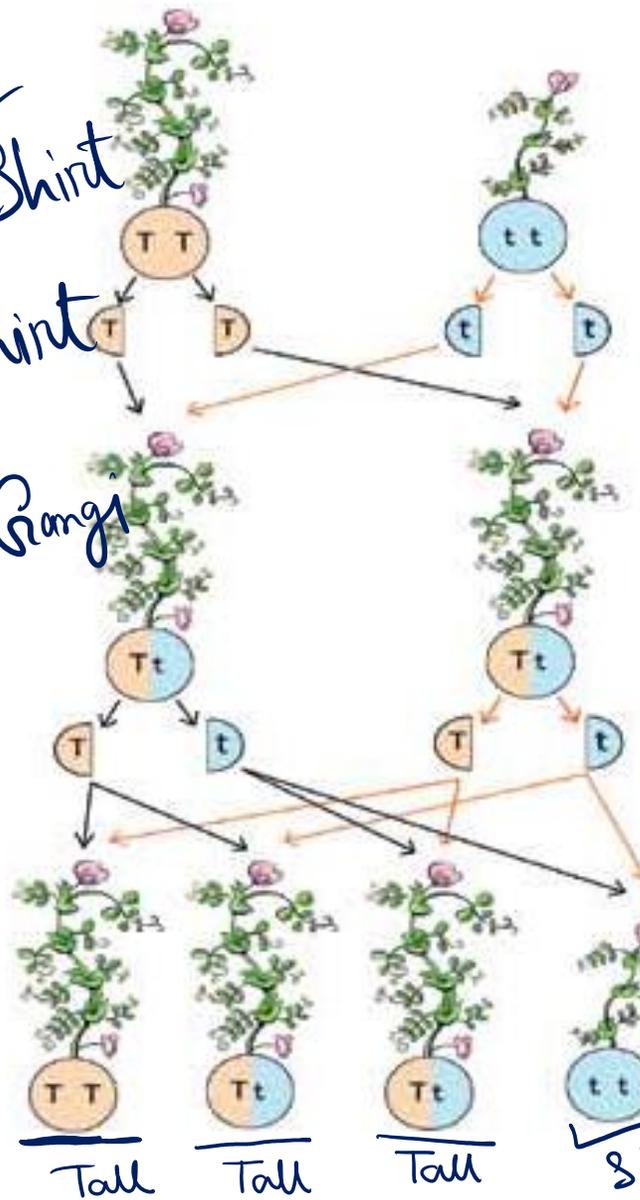
Experiment of Mendal's law

Dominant Recessive

Shirt + Gangi → Shirt

Shirt + Shirt → Shirt

Gangi + Gangi → Gangi



Parents F_0 Tt

Gamete

$T.T \rightarrow$ Tall

$\check{T}.\check{t} \rightarrow$ Short

F_1 F_1 Plant (All one tall)

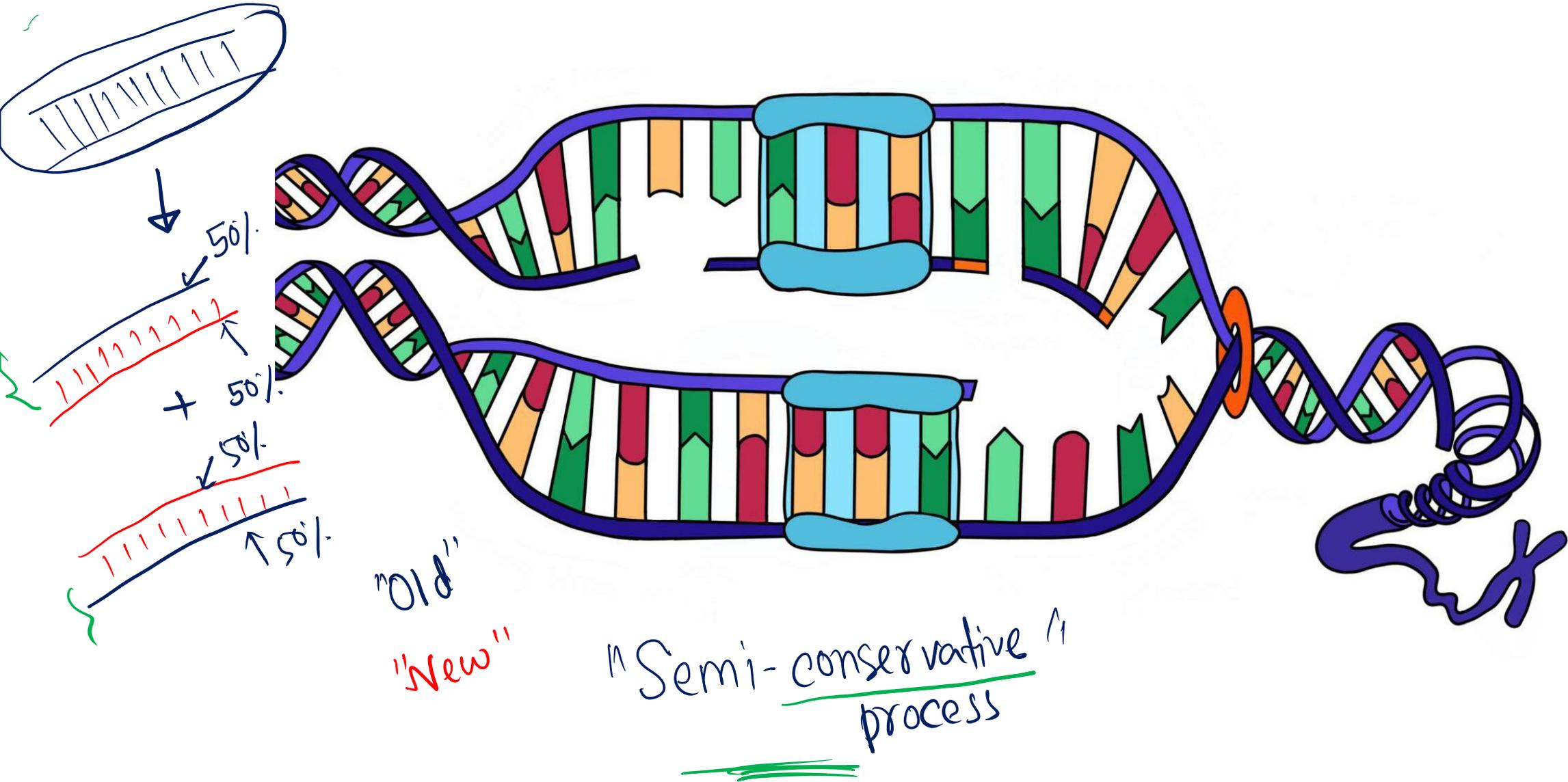
$t.t \rightarrow$ Short

F_2 F_2 Plant (3/4 tall, 1/4 short)

3:1

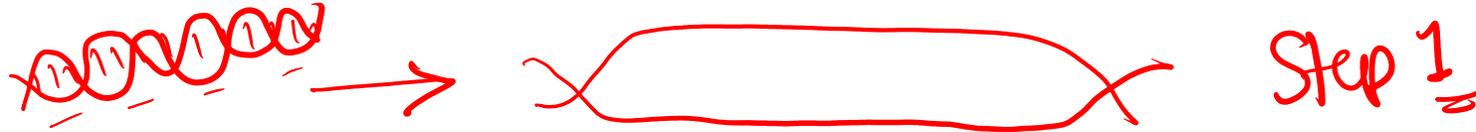
Tall Tall Tall Short

DNA replication

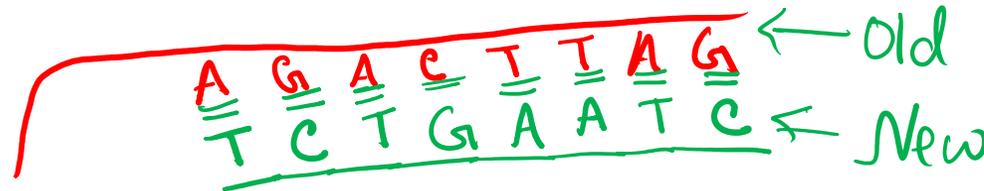


DNA replication

- * Prior to DNA replication, the hydrogen bonds in the DNA break and loosen



- * From the nucleotides floating inside the cell, adenine is added to thymine, thymine is added to the adenine site, guanine and cytosine are formed by the two enzymes to make new complementary formulas



- * Replication in this way is called semi-conservative method

Collection of organic specimen



DNA test

- * One of the most scientifically based methods of DNA testing is called DNA fingerprinting 
- * Organic specimens are collected from the bones, teeth, hair, blood, saliva, semen or tissues of the person. DNA
- * Biological samples collected from crime stalls or victims of crime
DNA design is the DNA of blood or biological samples taken from a suspect is compared with the design

Poll Question 03

Which is not a biological sample?

(a) Saliva

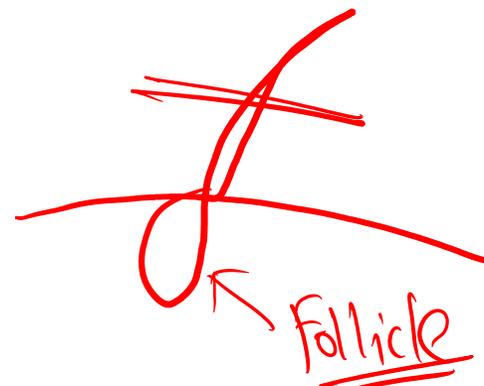
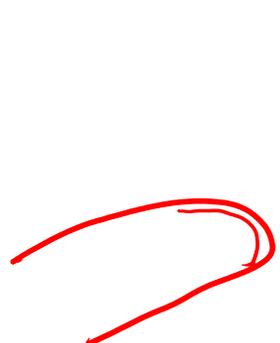
(b) Blood

(c) Nails

(d) Muscles

best

correct



Scalp

DNA
OS

DNA present
OS

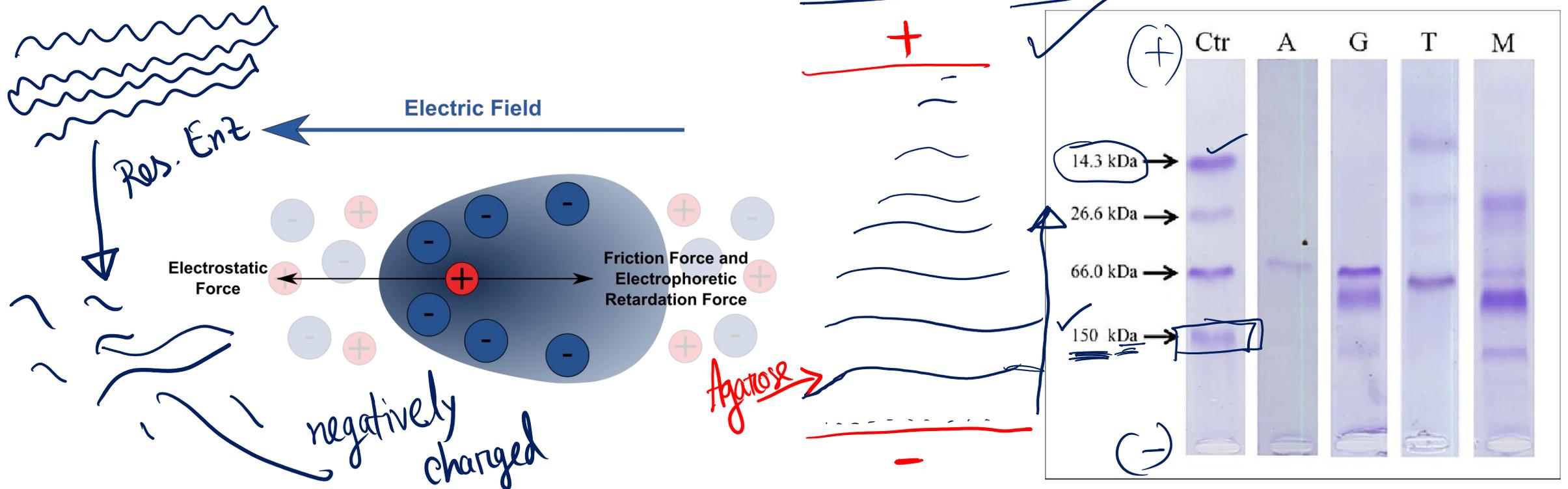
DNA Absent

Blood - OS

RBC - OS

DNA test

- * In this method, chemical DNA is first separated from the sample and multiple restriction enzymes are cut into small pieces.
- * DNA fragments are then separated into different shapes according to their length using electrophoresis using agarose or polyacrylamide gel

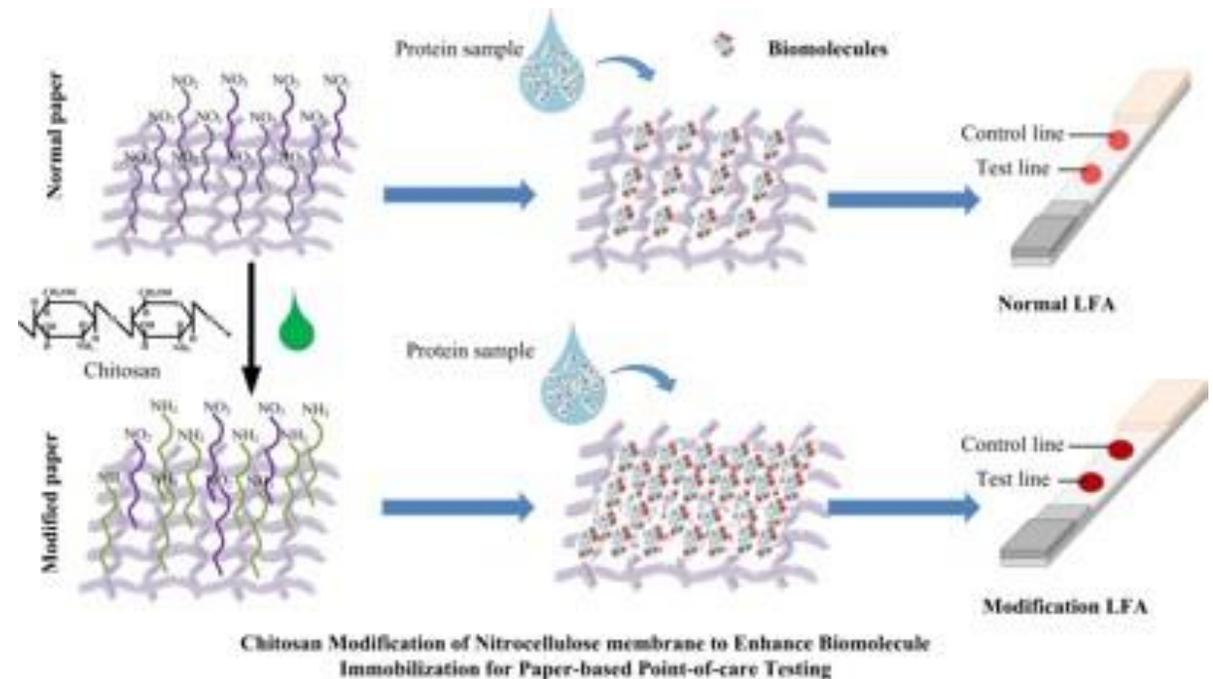


DNA test

- * Visible bands ~~are~~ are autographed on special **nitrocellulose** paper with hybridized radioactive isotope DNA probe placed on X-ray film and identified by identification and comparison of suspected samples with Mamun obtained from crime scene.



- * This method is called DNA fingerprint

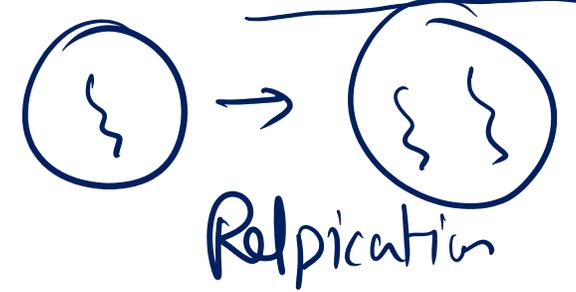
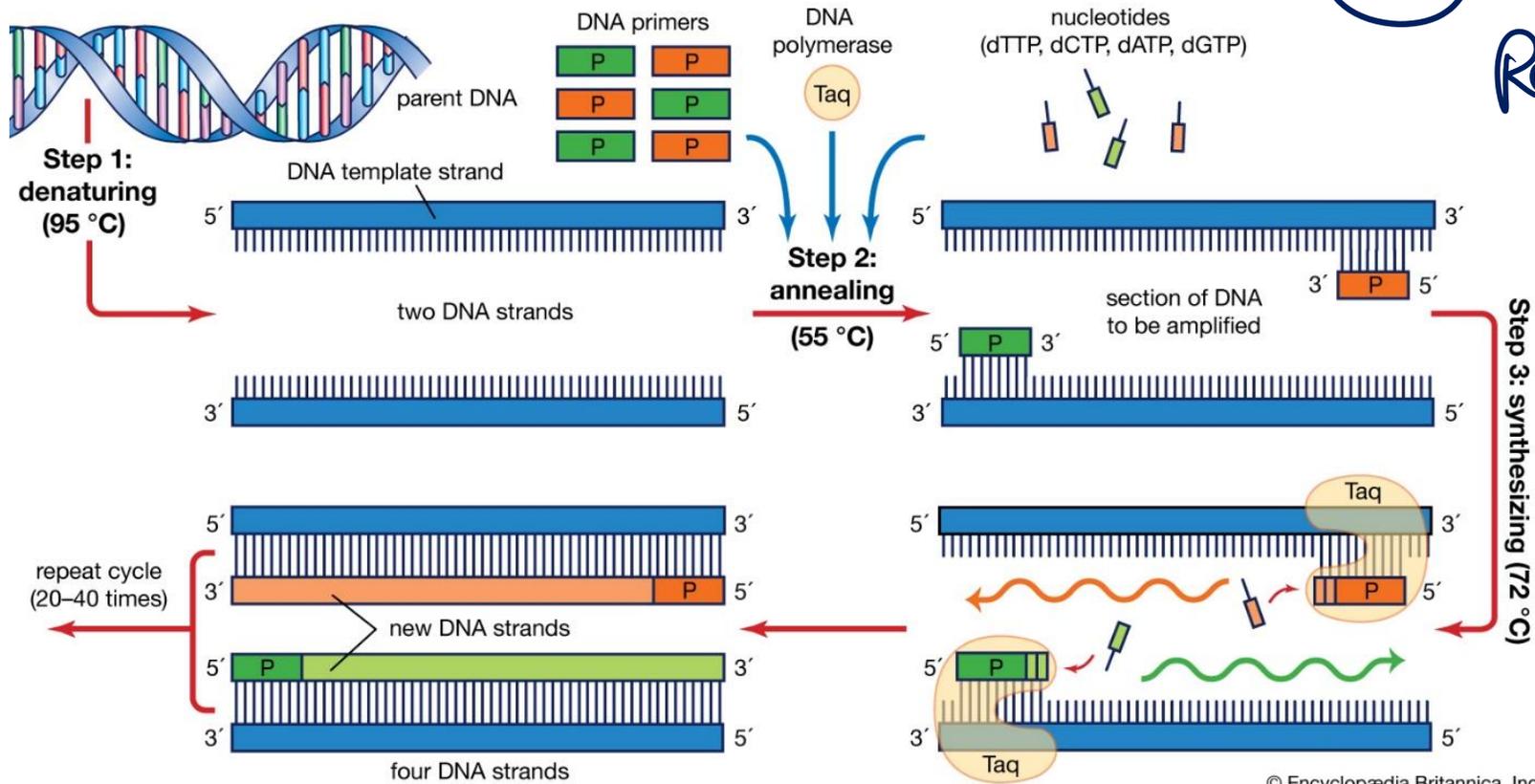


PCR

Polymerase chain reaction

* This method requires a small sample and can be done accurately in a dexterous manner

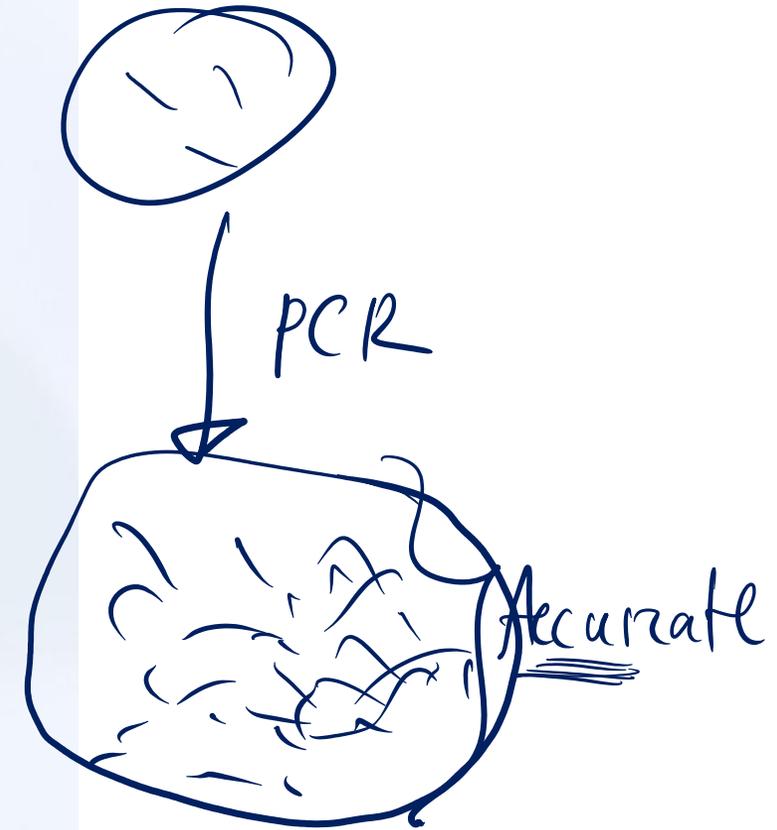
Artificial
DNA
replication



P.C.R.

PCR Machine

Covid-19
SARS
CoV-2
Swab



লেগে থাকো সৎভাবে,
স্বপ্ন জয় তোমারই হবে

D™ çvm-D‡b¥। শিক্ষা
পরিবার

Thank You