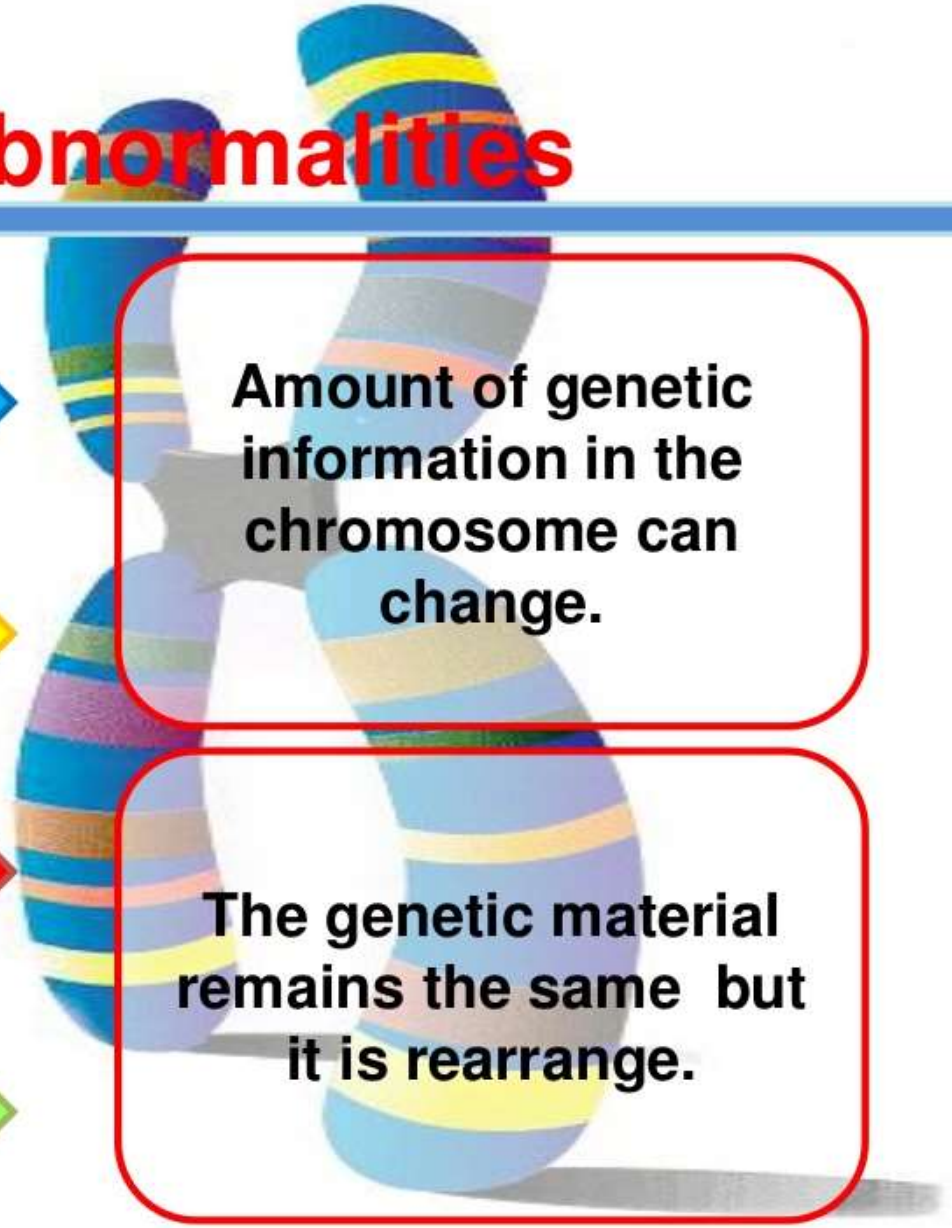
STRUCTURAL ABERRATION OF CHROMOSOMES- TRANSLOCATION

Compilation by
Dr. Dipasree Roychowdhury
Department of Botany,
Surendranath College

Structural Abnormalities

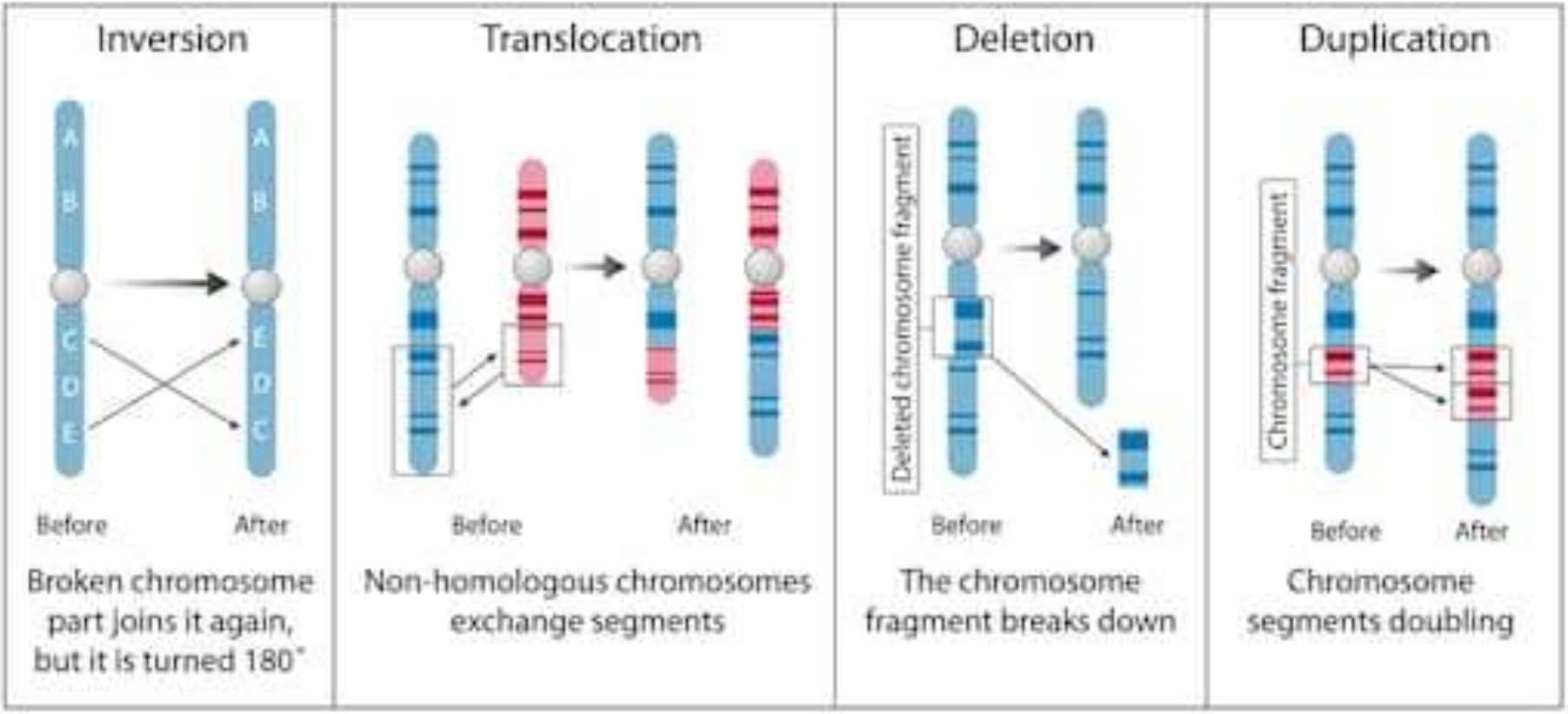
- Deletion
- Duplication
- Inversion
- Translocation



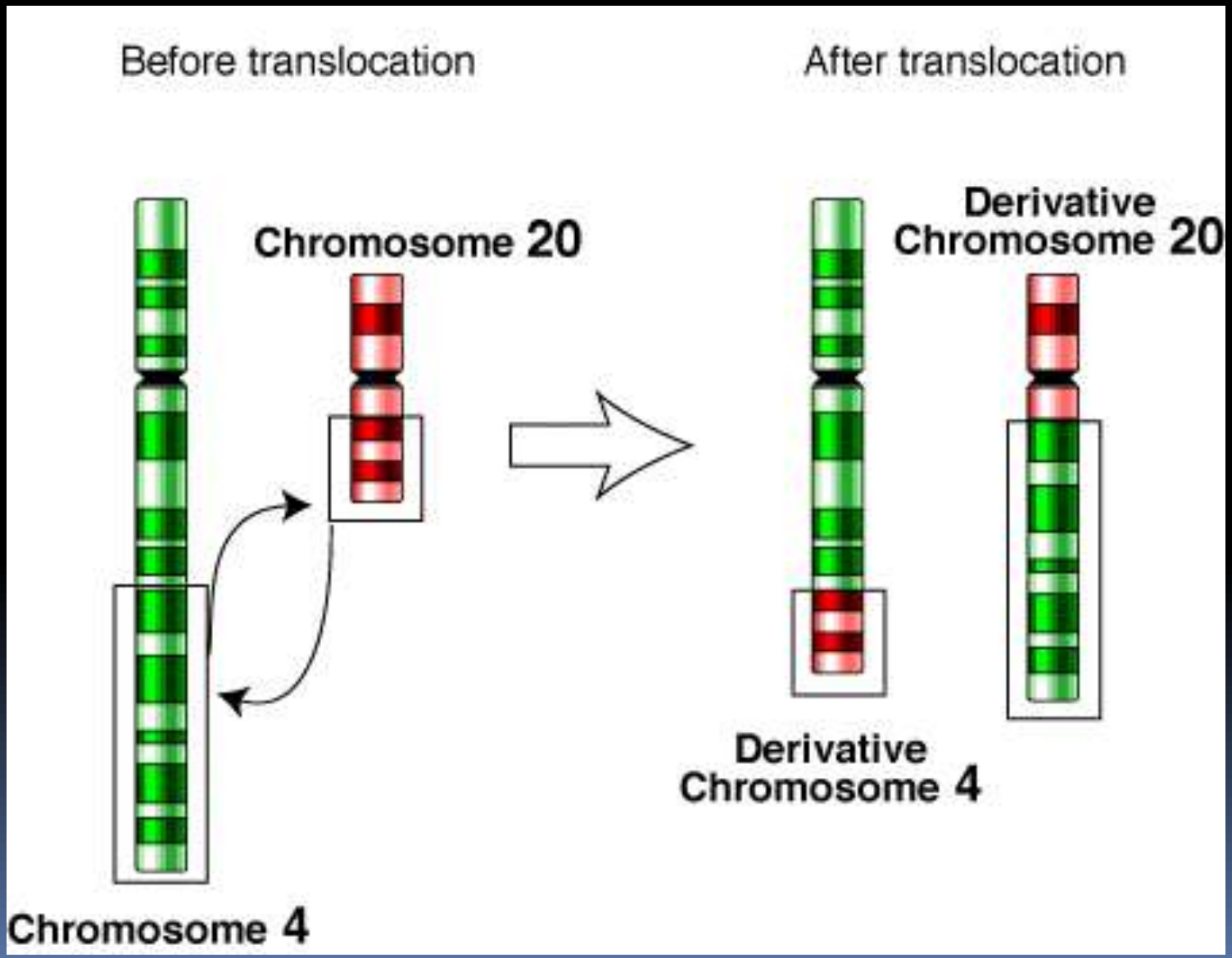
Amount of genetic information in the chromosome can change.

The genetic material remains the same but it is rearrange.

Types of Chromosomal Aberration



Translocation



What is the Difference Between Translocation and Crossing Over?

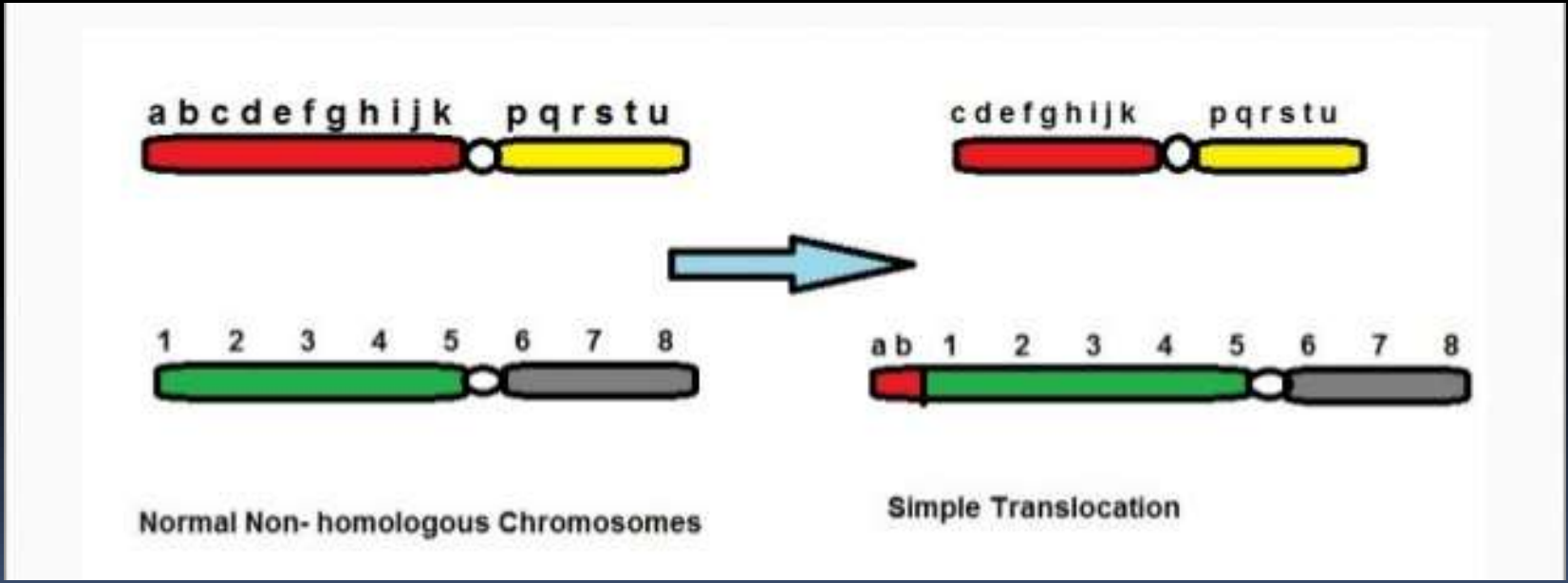
Translocation vs Crossing Over	
Translocation is the process of exchanging genetic materials between non-homologous chromosomes.	Crossing over is the process of exchanging matching segments of chromosomes between homologous chromosomes during the sexual reproduction.
Process	
Translocation is not a normal process.	Crossing over is a normal process during the meiosis.
Mutation	
Translocation is a mutation.	Crossing over is not a mutation
Occurring Chromosomes	
Translocation occurs between non-homologous	Crossing over occurs between homologous chromosomes.
Change of the Genetic Information	
Translocation results in a change in genetic information.	Crossing over does not change the genetic information.
Causing Diseases	
Translocation can cause cancers, infertility, down syndrome, XX male syndrome etc.	Crossing over between homologous chromosomes do not cause fatal diseases.
Chromosomal Abnormality	
Translocation is a chromosomal abnormality.	Crossing over is not a chromosomal abnormality.

Types of Translocation

- Simple Translocation- The broken part gets attached to one end of the non-homologous chromosome.
- Shift Translocation- Broken part gets inserted interstitially in a non-homologous chromosome.
- Reciprocal Translocation- When parts of chromosomes belonging to members of two different pairs become exchanged.

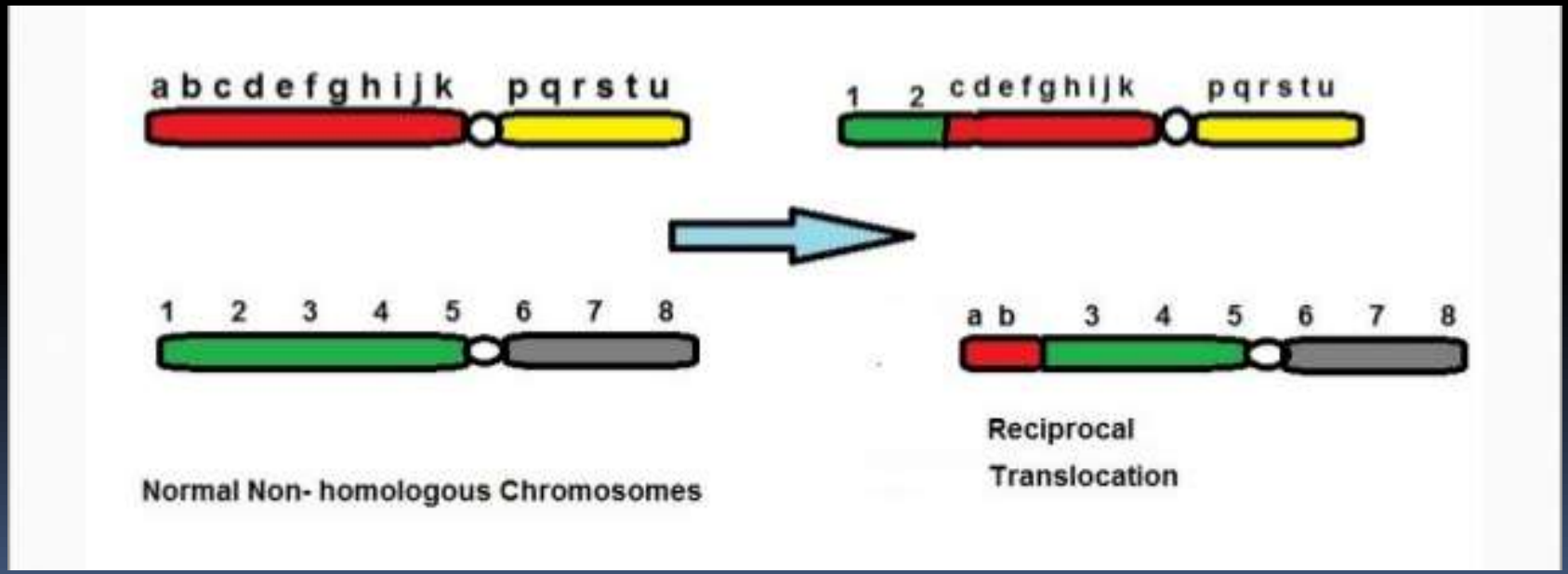
Simple Translocation

- The broken part gets attached to one end of the non-homologous chromosome



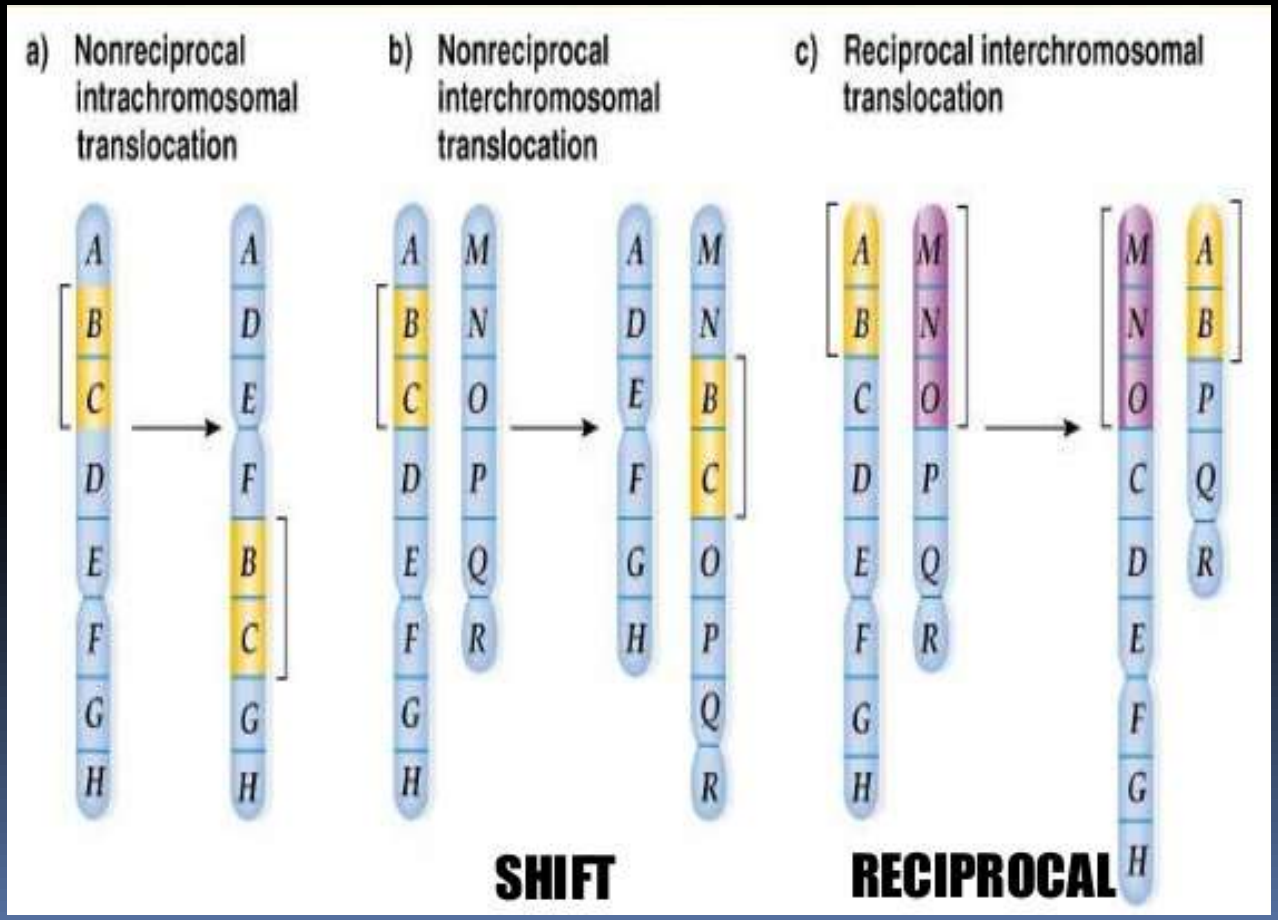
Reciprocal Translocation

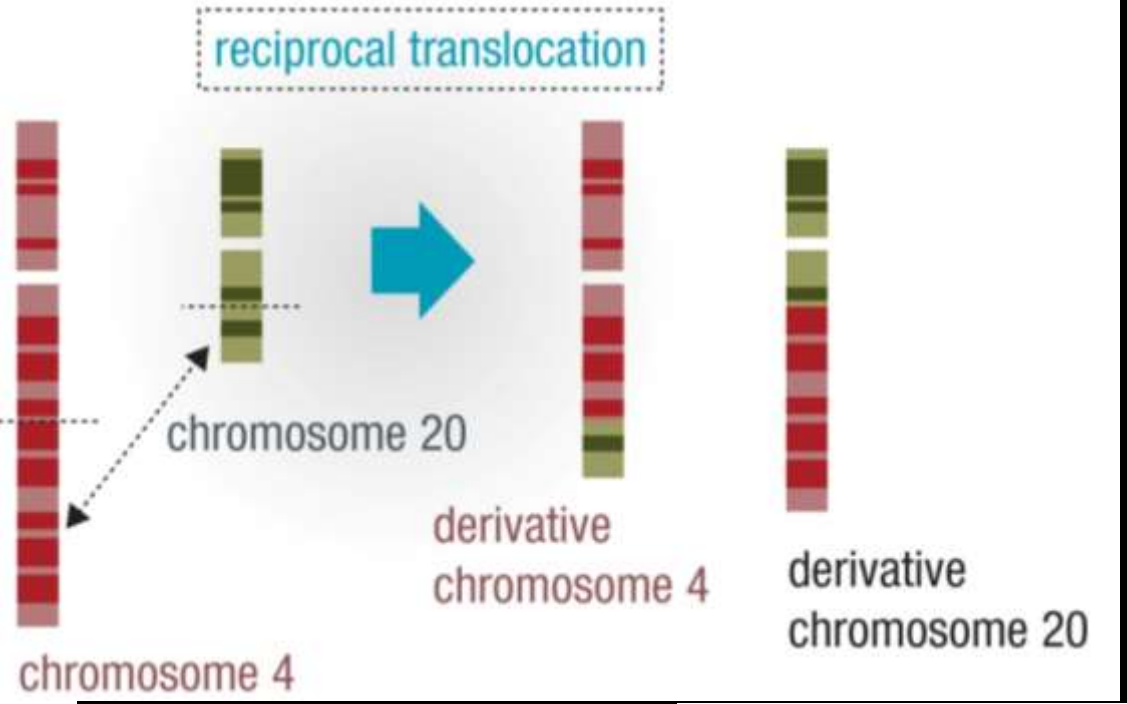
When parts of chromosomes belonging to members of two different pairs become exchanged.

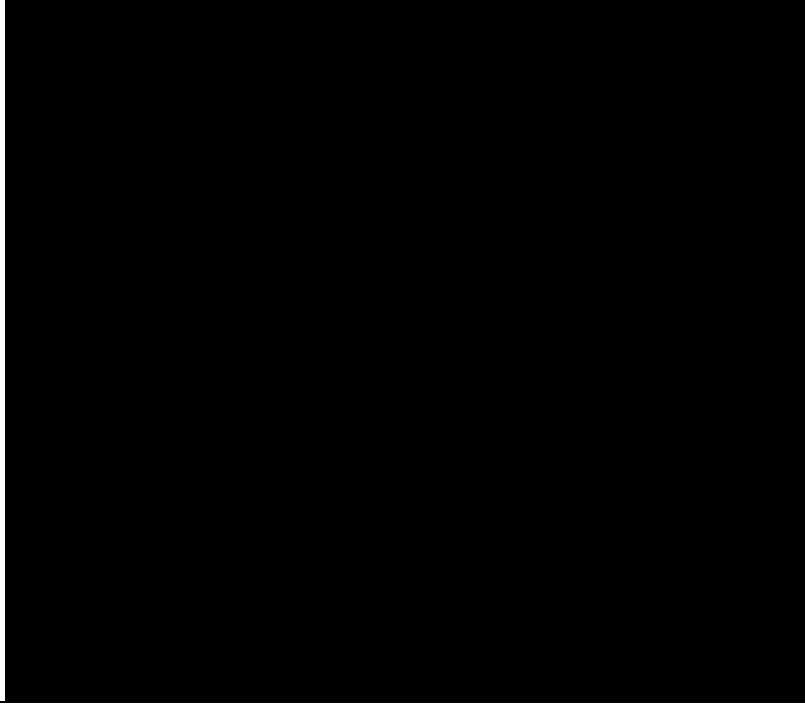


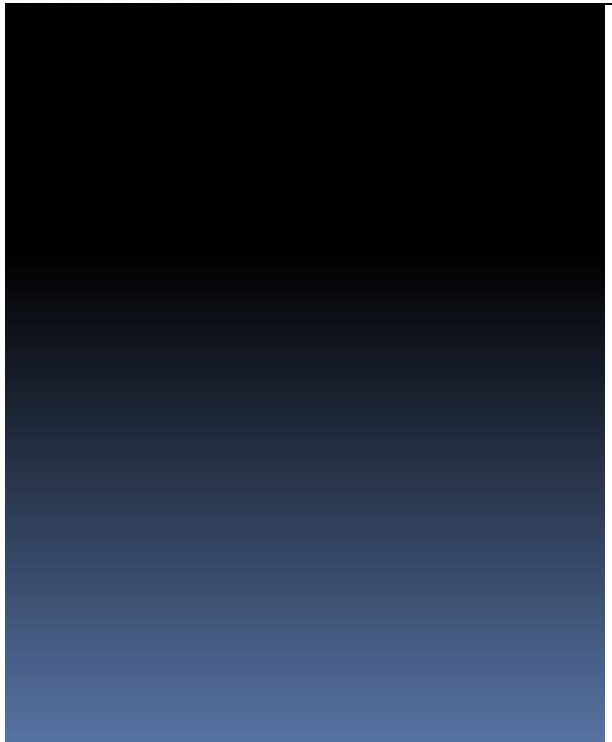
Shift Translocation

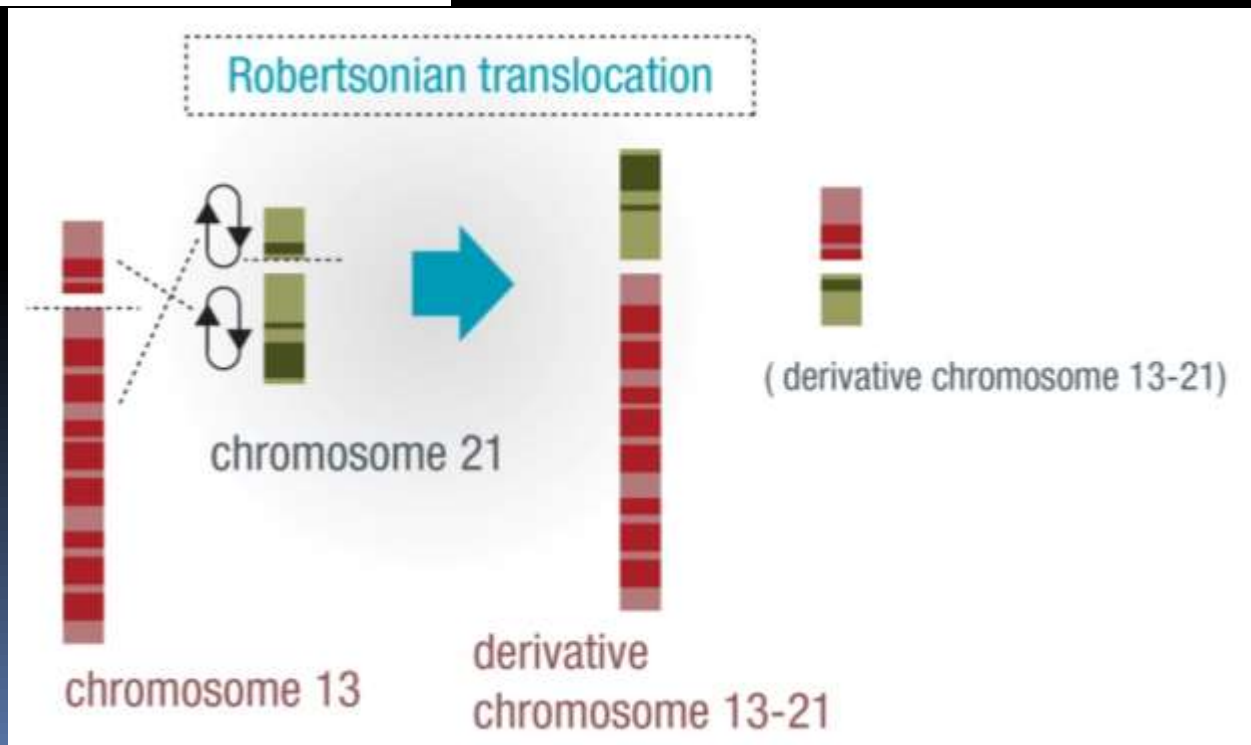
- Broken part gets inserted interstitially in a non-homologous chromosome.



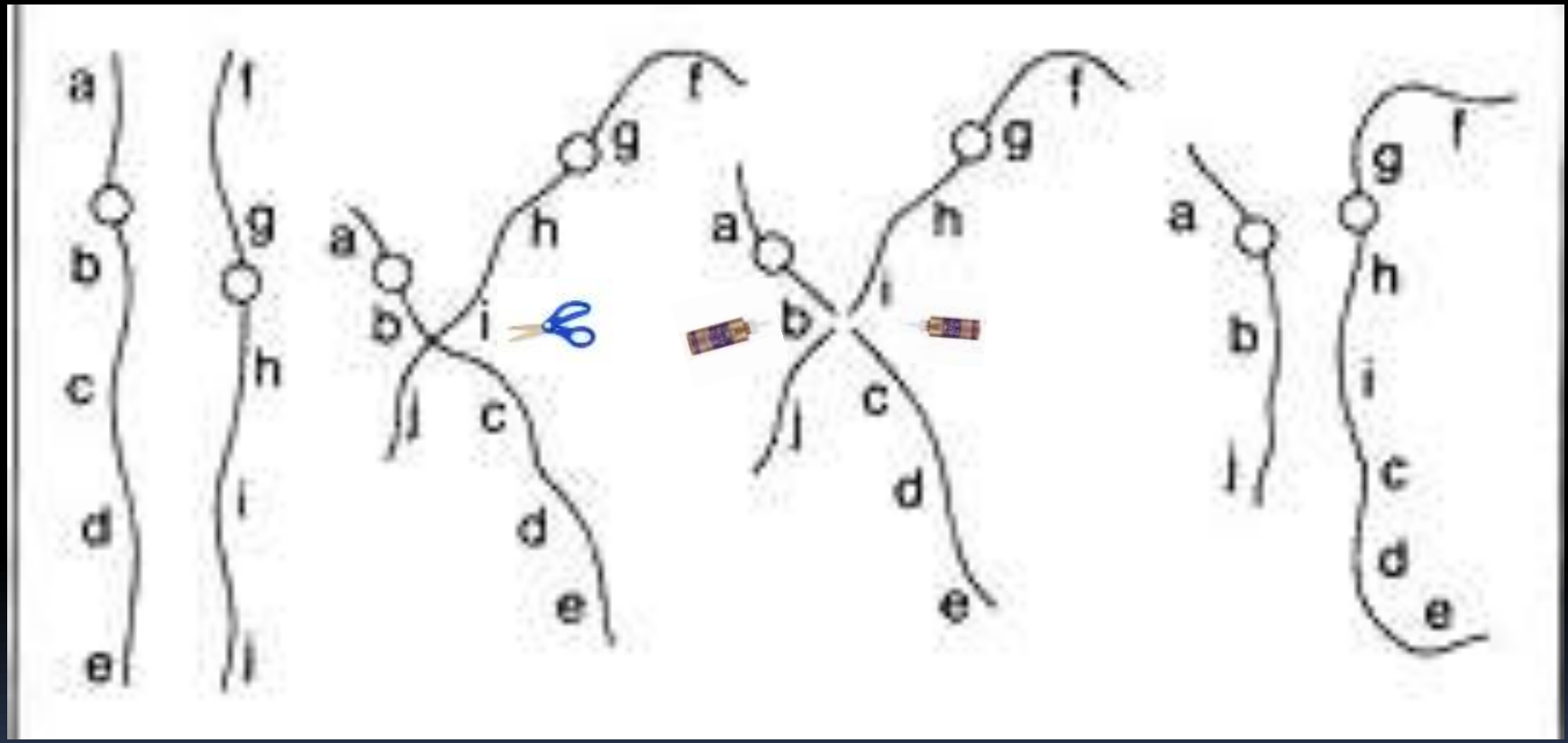

reciprocal translocation
chromosome 20
derivative
chromosome 4
derivative
chromosome 20
chromosome 4

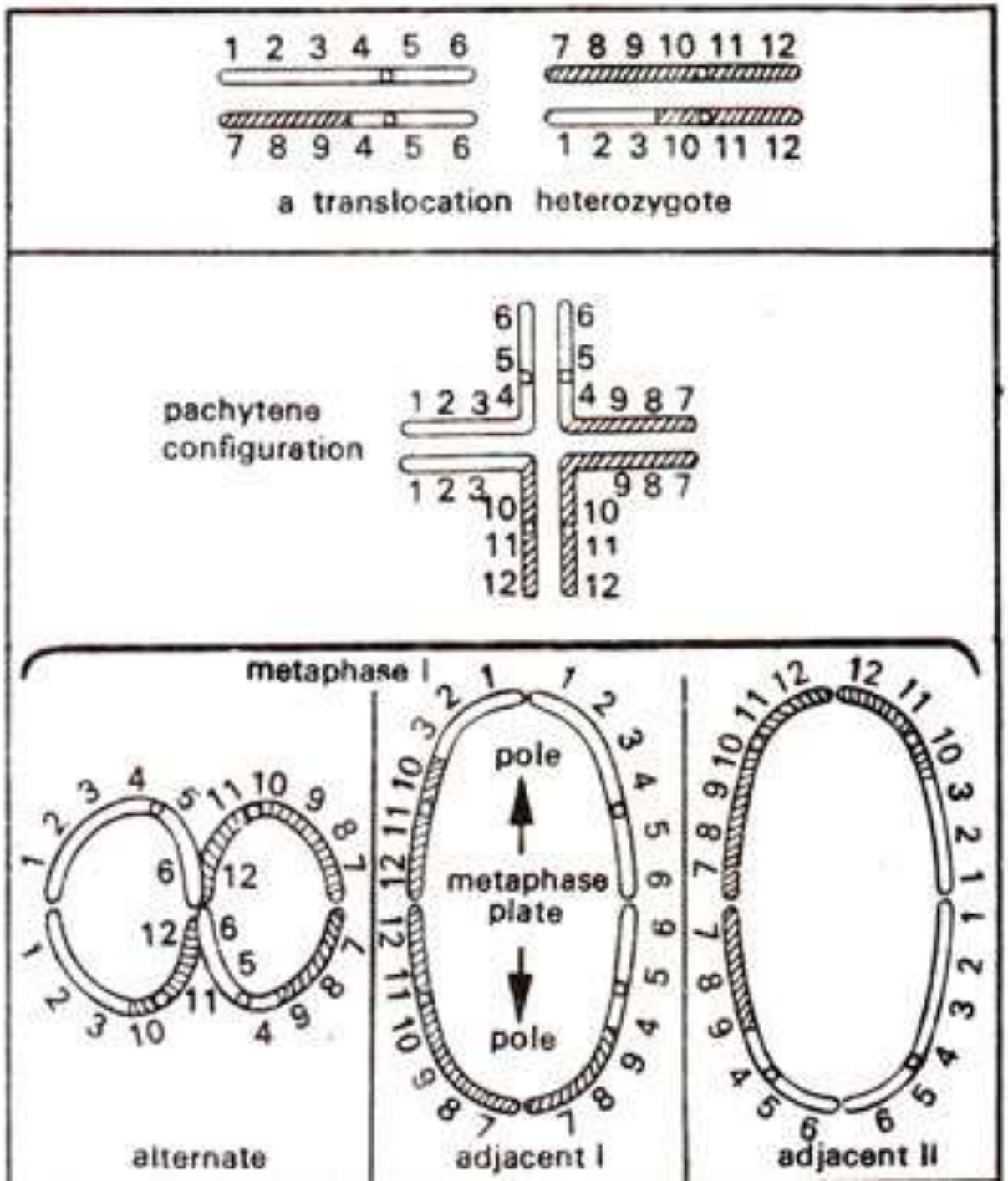


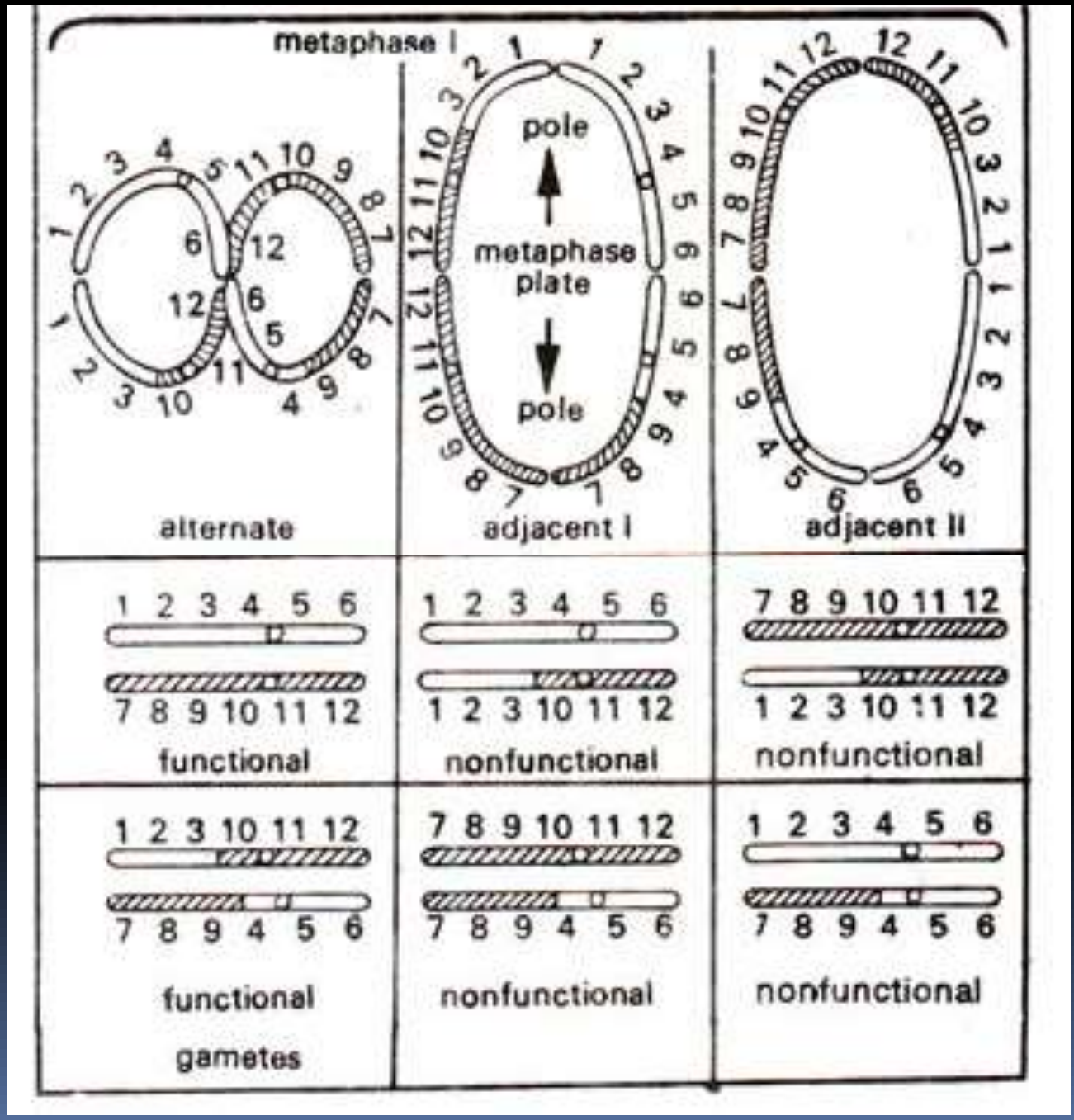



Robertsonian translocation
chromosome 21
(derivative chromosome 13-21)
chromosome 13
derivative
chromosome 13-21

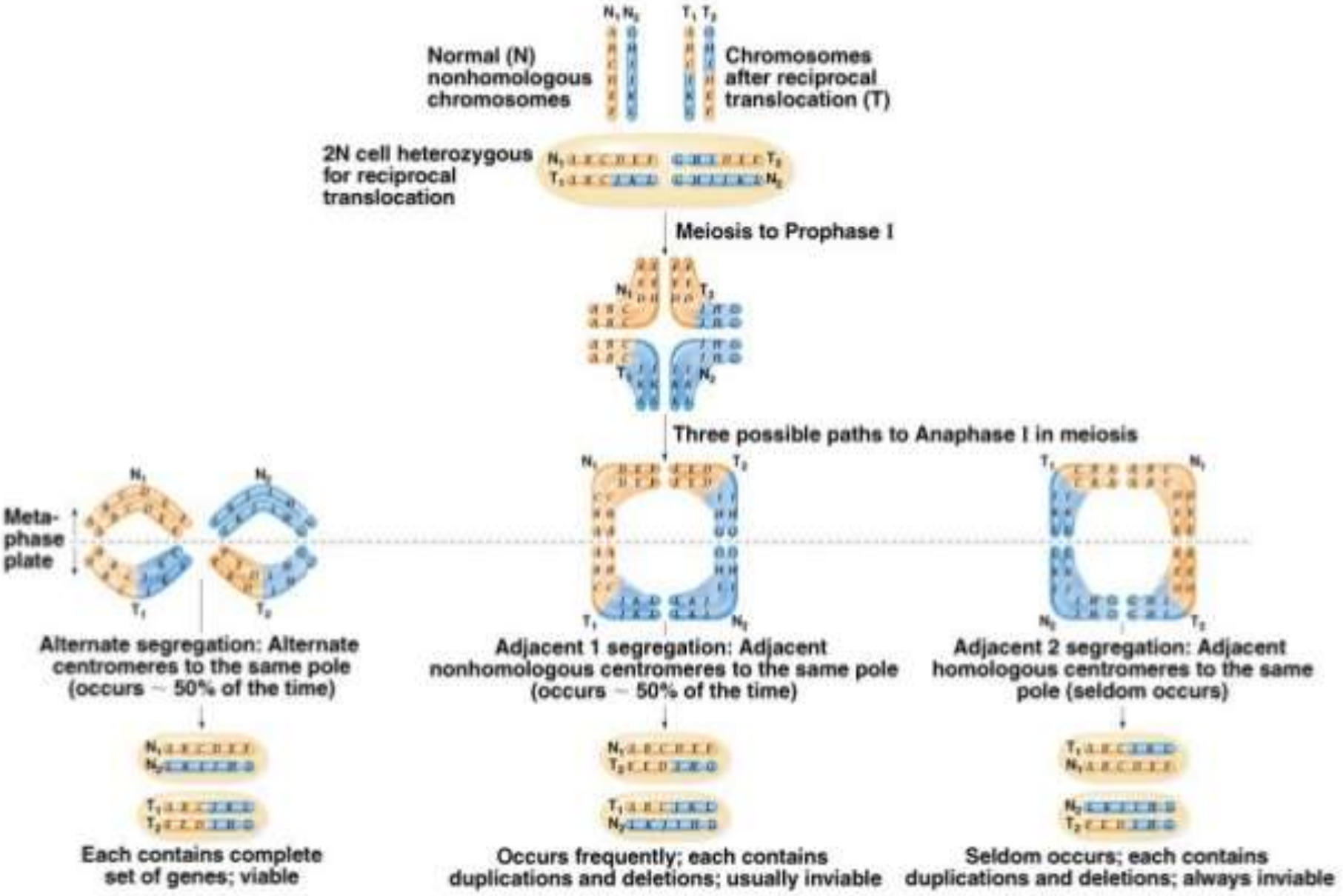
Origin: Translocation




1 2 3 4 5 6
7 8 9 4 5 6
7 8 9 10 11 12
1 2 3 10 11 12
a translocation heterozygote
pachytene configuration
metaphase I
pole
metaphase plate
pole
alternate
adjacent I
adjacent II


metaphase I
pole
metaphase plate
pole
alternate
adjacent I
adjacent II
1 2 3 4 5 6
7 8 9 10 11 12
functional
1 2 3 4 5 6
1 2 3 10 11 12
nonfunctional
7 8 9 10 11 12
1 2 3 10 11 12
nonfunctional
1 2 3 10 11 12
7 8 9 4 5 6
functional
gametes
7 8 9 10 11 12
7 8 9 4 5 6
nonfunctional
1 2 3 4 5 6
7 8 9 4 5 6
nonfunctional

Meiosis in a translocation heterozygote in which no crossover occurs



Progenies from selfing of translocation heterozygote

Gametes ♀ \ ♂	Normal gamete	Gamete with translocation
Normal gamete	Normal	Translocation heterozygote
Gamete with translocation	Translocation heterozygote	Translocation homozygote

To Do list

- Draw and describe the following:-
  - Types of translocation,
  - Origin of translocation
  - Meiotic behaviour of translocation heterozygote

- Write the answers and practice the drawings minimum 3times. Mail me the answers including the drawings done for practice by 5.4.2020.
- The Next Class is scheduled on Monday, 6.4.2020 at 12 noon.

Inversion	Translocation
An inversion is a rearrangement in which an internal chromosome segment is broken down at two different locations, flipped 180 degrees to rejoin	A translocation refers to a rearrangement in which acentric segments are exchanged between two nonhomologous chromosomes
A change in the orientation of a segment of a chromosome	Interchange of the parts of chromosomes between nonhomologous chromosomes
A single chromosome mutation	Two chromosomes are involved
Size of the chromosome does not change	Size of the chromosome changes
Does not cause abnormalities	More likely to cause a disease such as infertility, cancer or Down syndrome