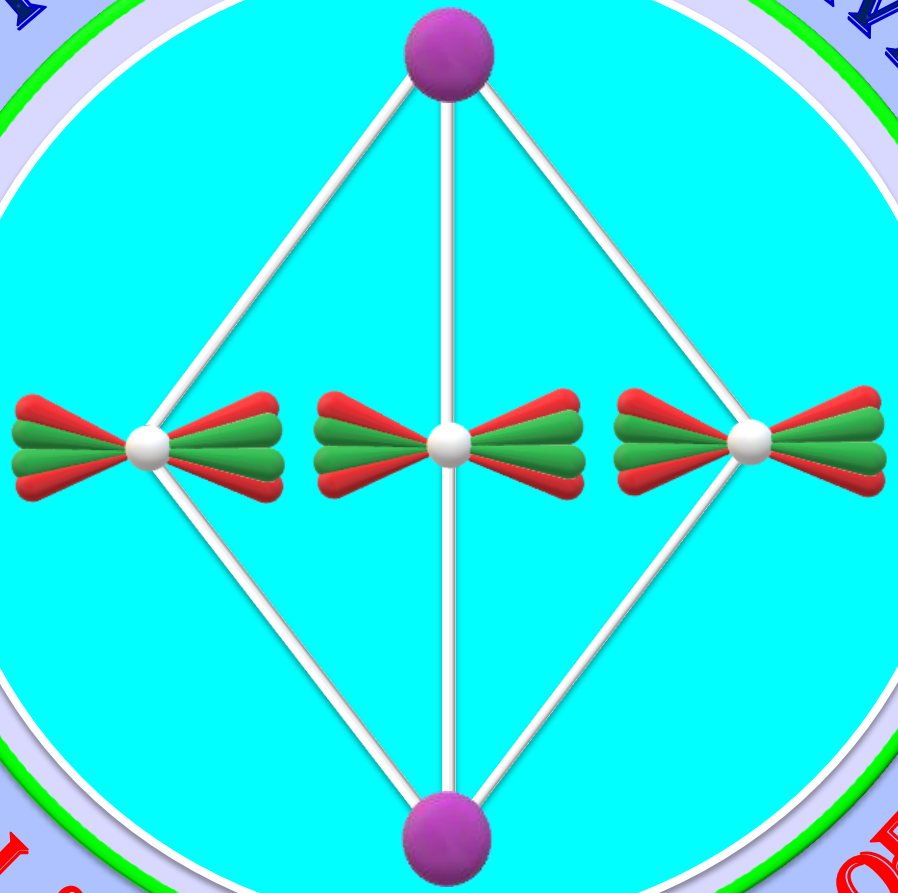
CELL CYCLE AND CELL DIVISION



MEIOSIS-I & II, SIGNIFICANCE OF MEIOSIS

Meiosis-I

Prophase-I

Prophase-I is the first stage of meiosis. It is the longest phase which is sub divided into the following stages.

Leptotene

Zygotene

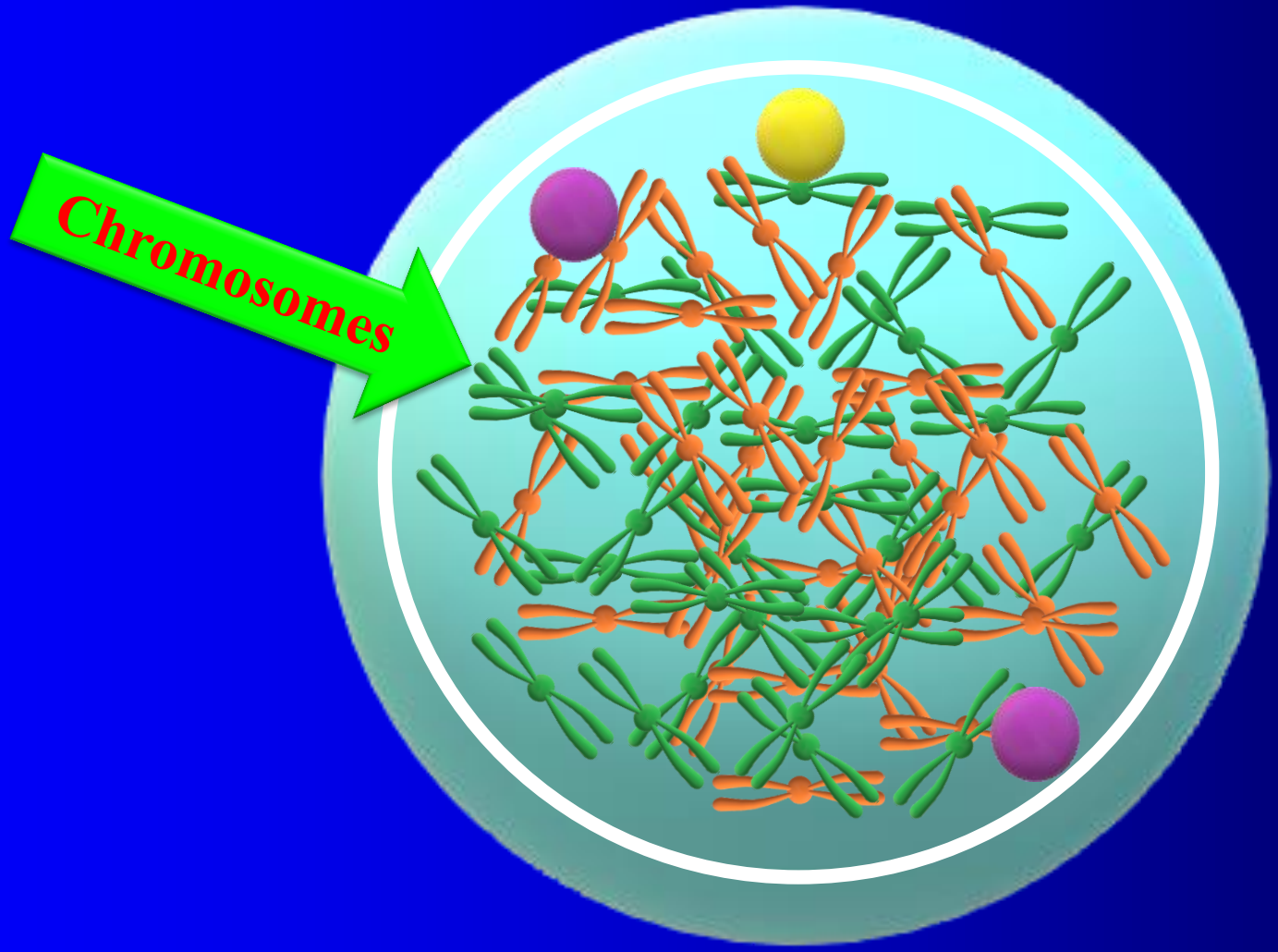
Pachytene

Diplotene

Diakinesis

B. John Ebenezer

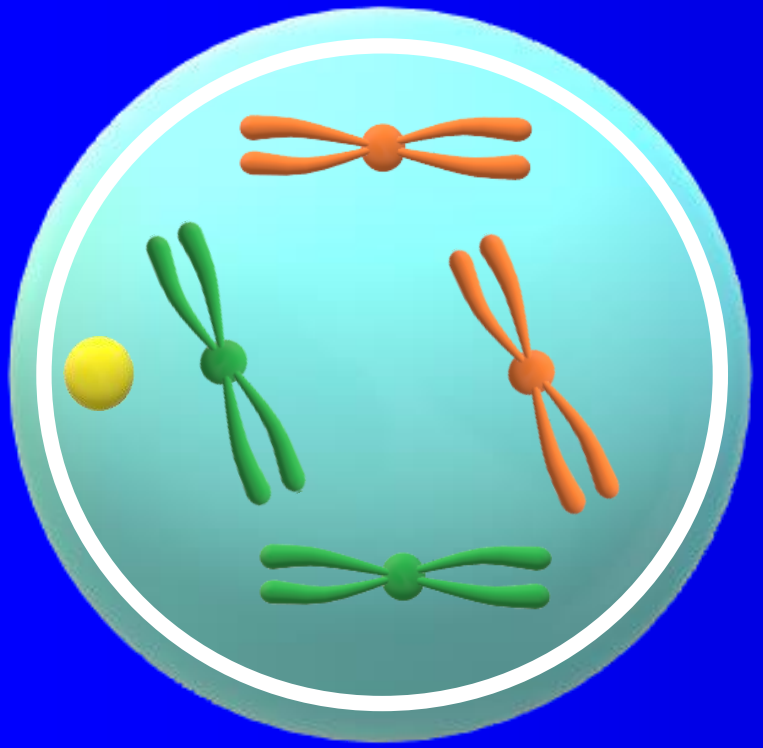
Prophase-I



Condensation of Chromosomes

B. John Ebenezer

Leptotene

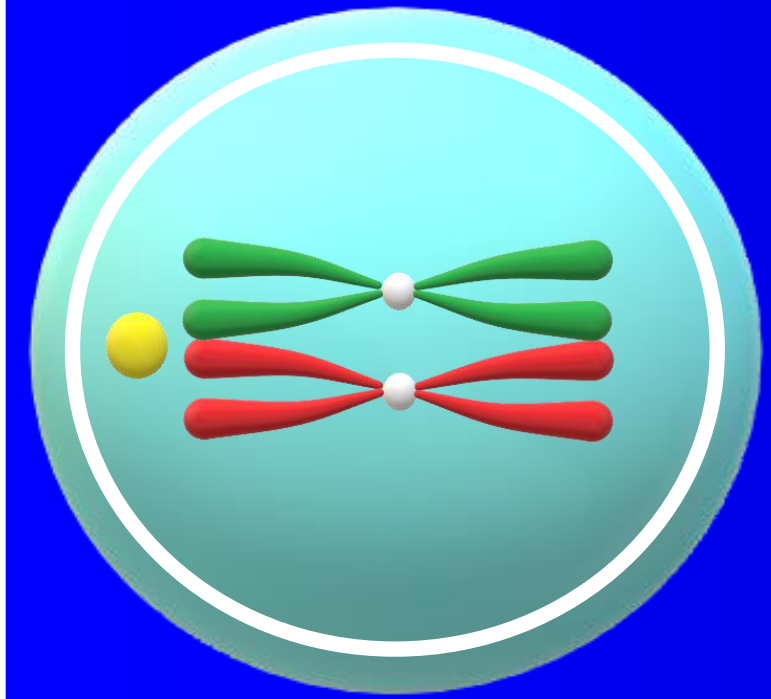


The chromosomes become gradually visible under the light microscope.

The **compaction of chromosomes** continues throughout leptotene.

B. John Ebenezer

Zygotene



Pairing of paternal and maternal chromosomes occurs. This **pairing of chromosomes** is called synapsis.

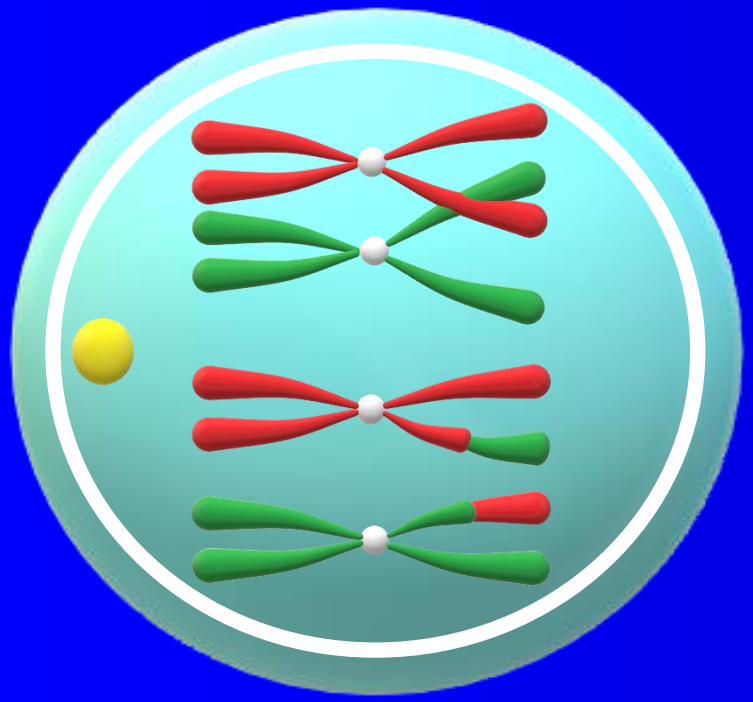
Such paired chromosomes are called **homologous chromosomes.**

Synapsis is accompanied by the formation of a complex structure called **synaptonemal complex.**

The complex formed by a pair of synapsed homologous chromosomes is called a bivalent or a tetrad.

B. John Ebenezer

Pachytene



Crossing over is the **exchange of genes** between two homologous chromosomes which occurs at chiasmata.

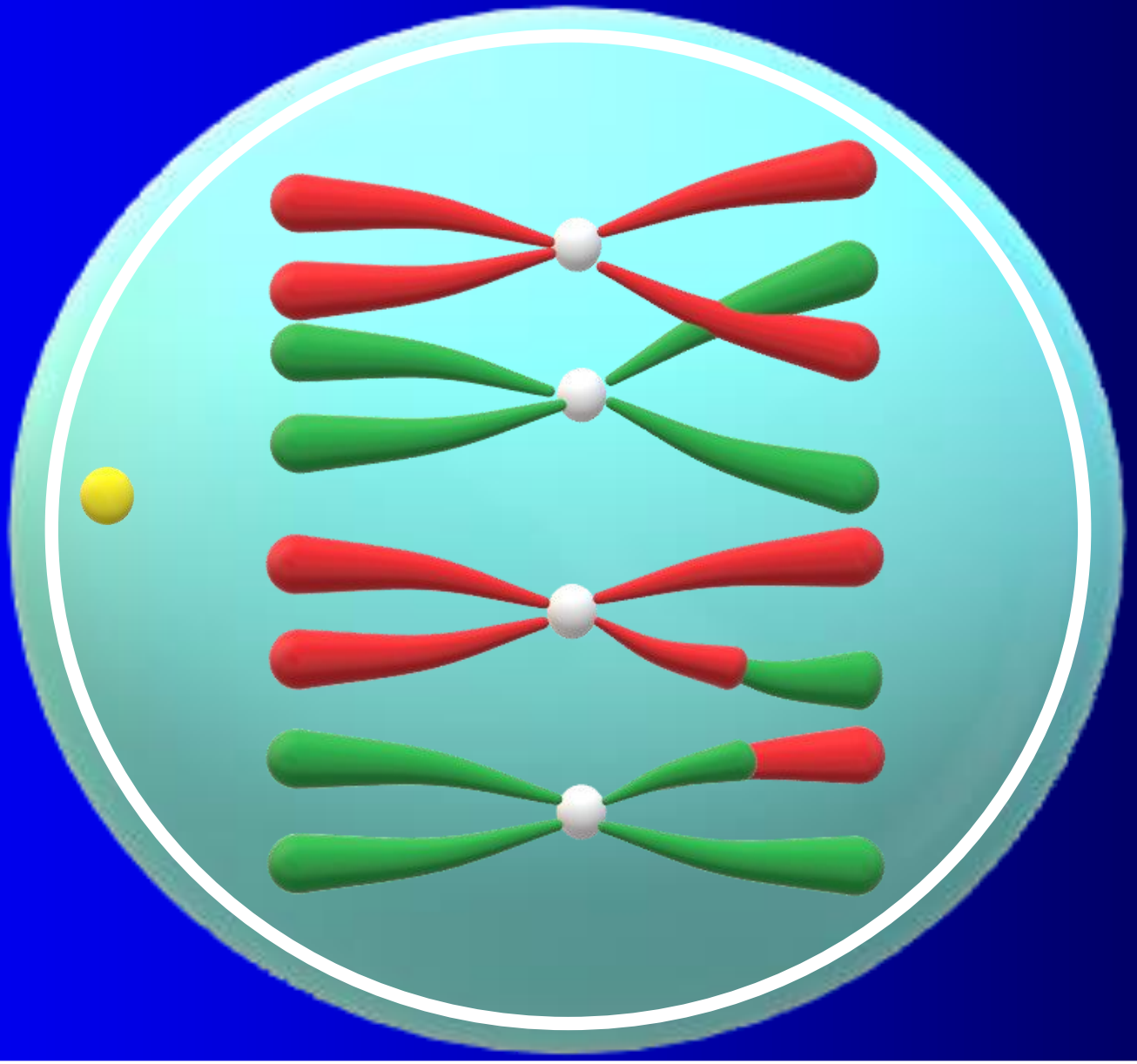
It is an enzyme-mediated process and the enzyme involved is called **recombinase**.

It leads to **recombination of genetic material** in the two chromosomes.

Recombination leads to the formation of **new characters and variation**.

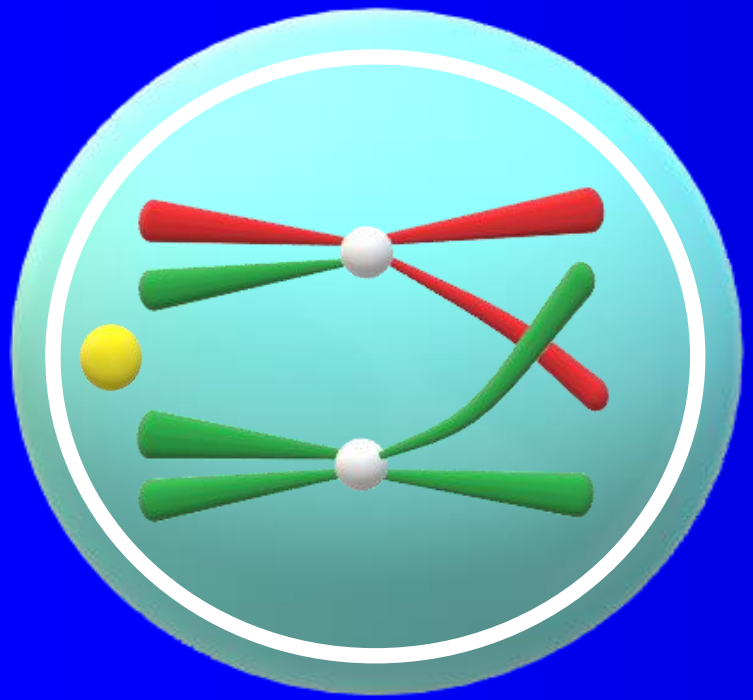
B. John Ebenezer

Pachytene



B. John Ebenezer

Diplotene



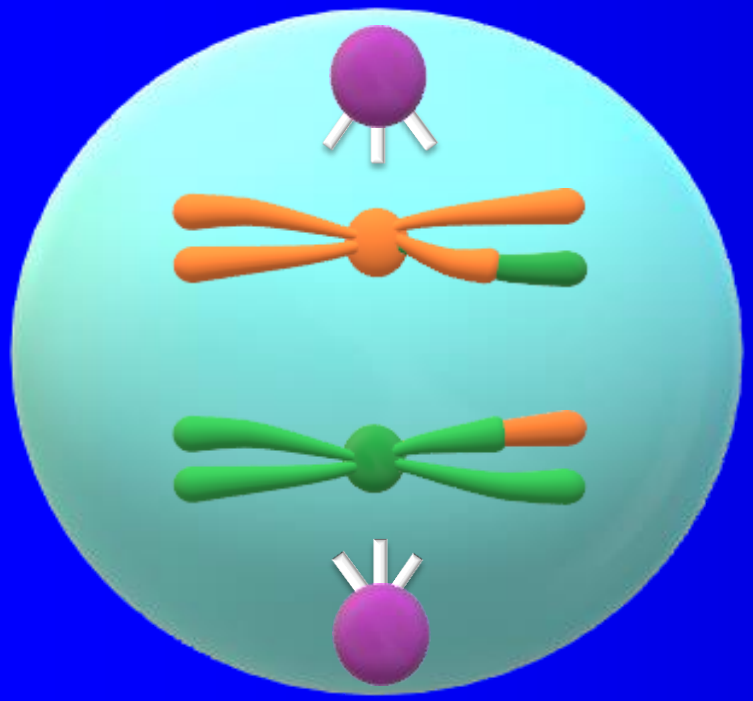
These X-shaped structures are called chiasmata.

Dissolution of the synaptonemal complex occurs.

The **separation of recombined homologous chromosomes** from each other except at the sites of crossovers is known as dissolution of synaptonemal complex.

B. John Ebenezer

Diakinesis



Terminalisation of chiasmata occur.

The **sliding of chromosomes** which occurs at chiasamata towards the ends is known as ***terminalization***.

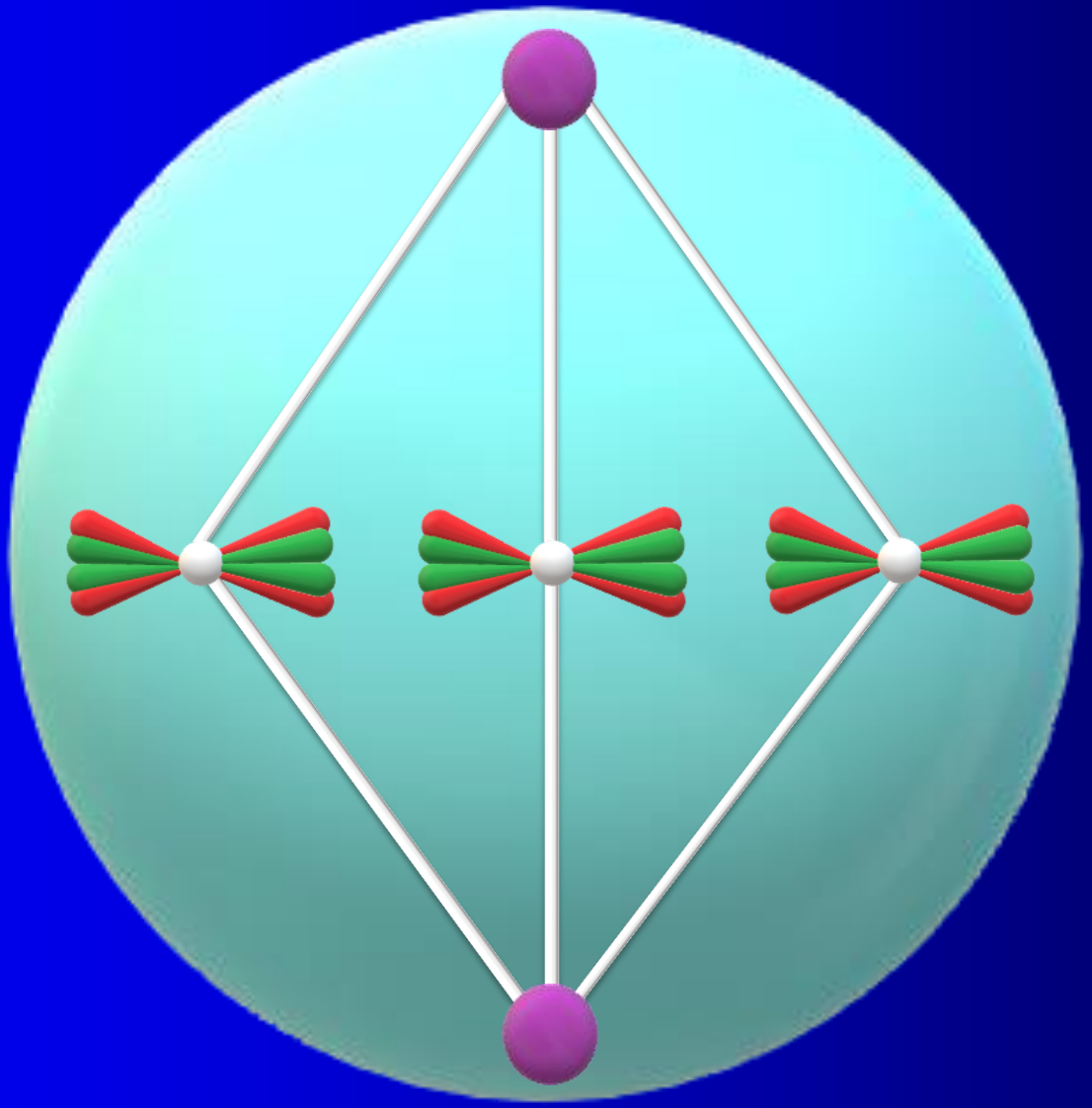
Chromosomes are fully condensed.

The meiotic spindle is assembled for the next division of homologous chromosomes.

The **nuclear membrane** and the **nucleolus disappear** at the end of diakinesis.

B. John Ebenezer

Metaphase-I

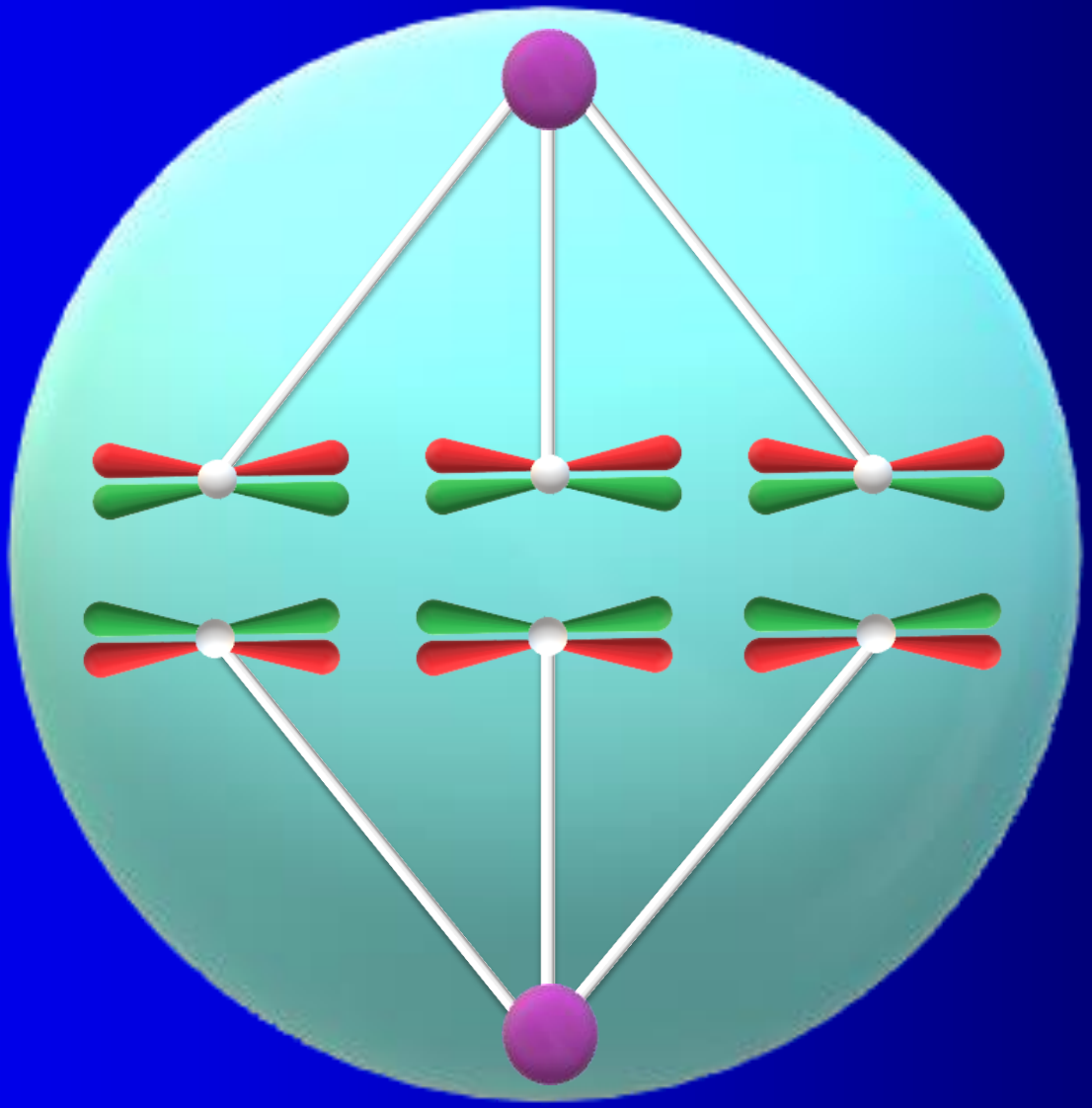


Alignment of Chromosomes at the Equator

Attachment of Spindle Fibres with the Centromeres of chromosomes.

B. John Ebenezer

Anaphase-I



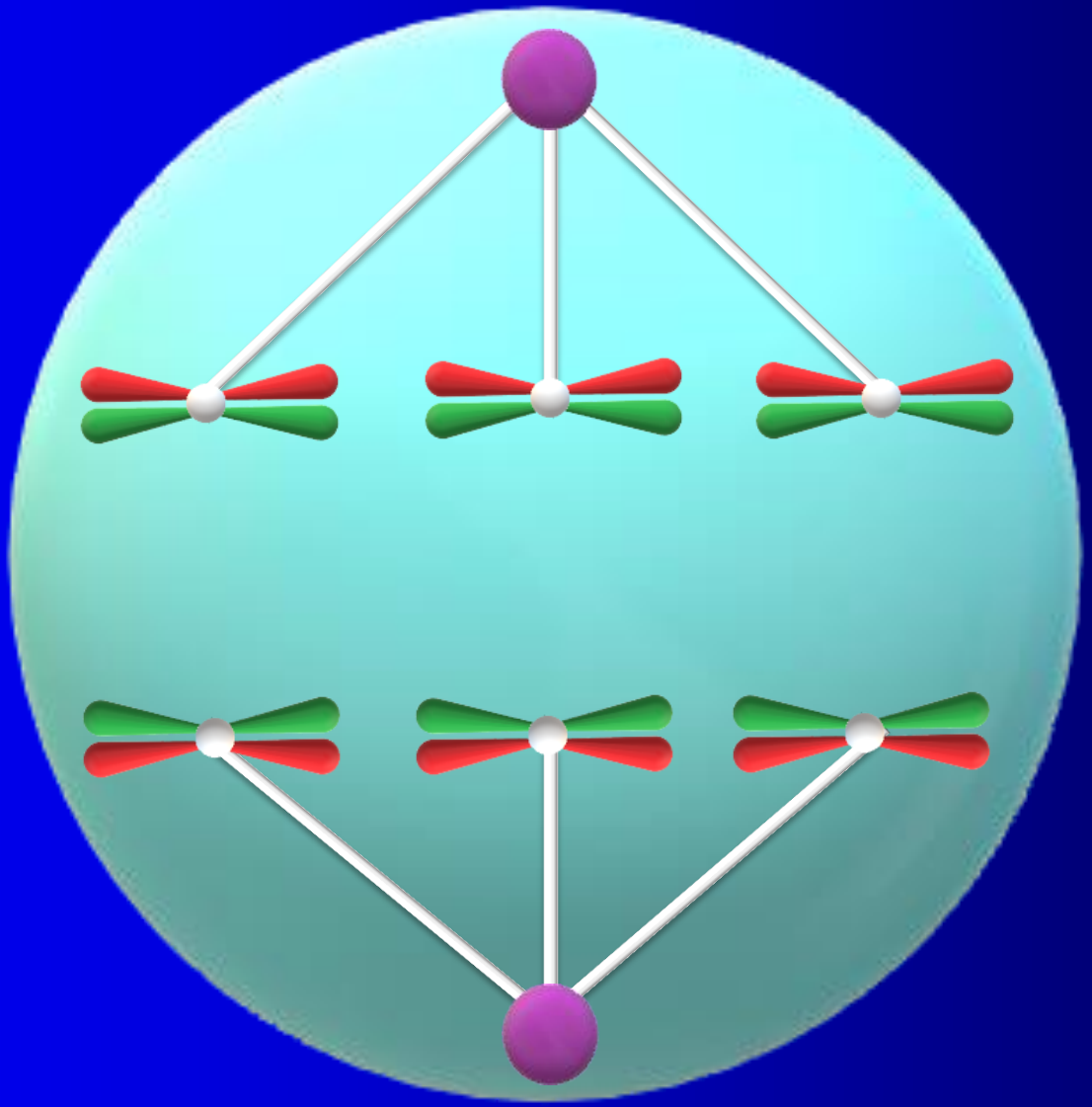
Contraction of Spindle Fibres

Splitting of Centromeres

Movement of Chromosomes towards the opposite poles.

B. John Ebenezer

Anaphase-I



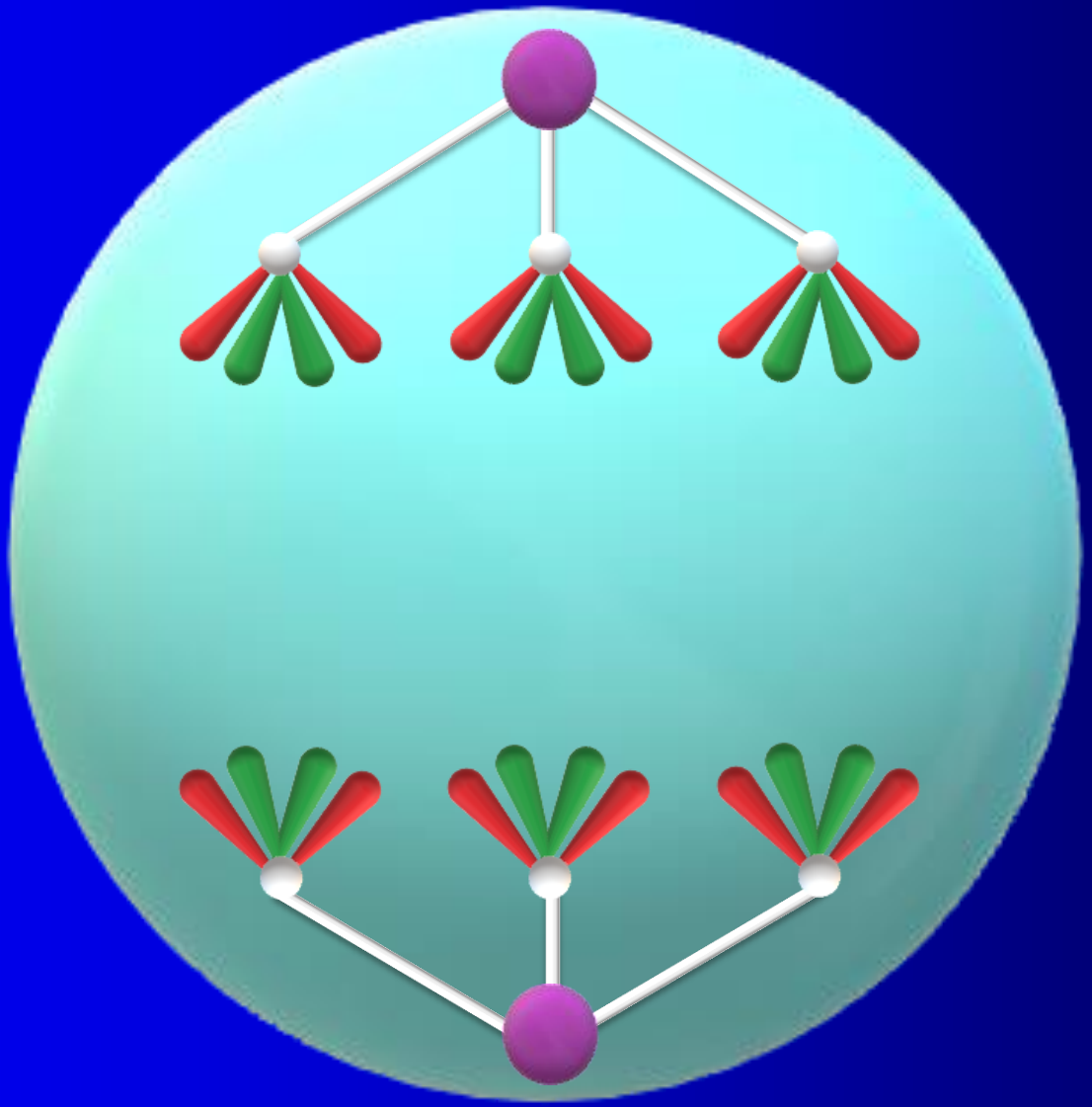
Contraction of Spindle Fibres

Splitting of Centromeres

Movement of Chromosomes towards the opposite poles.

B. John Ebenezer

Anaphase-I



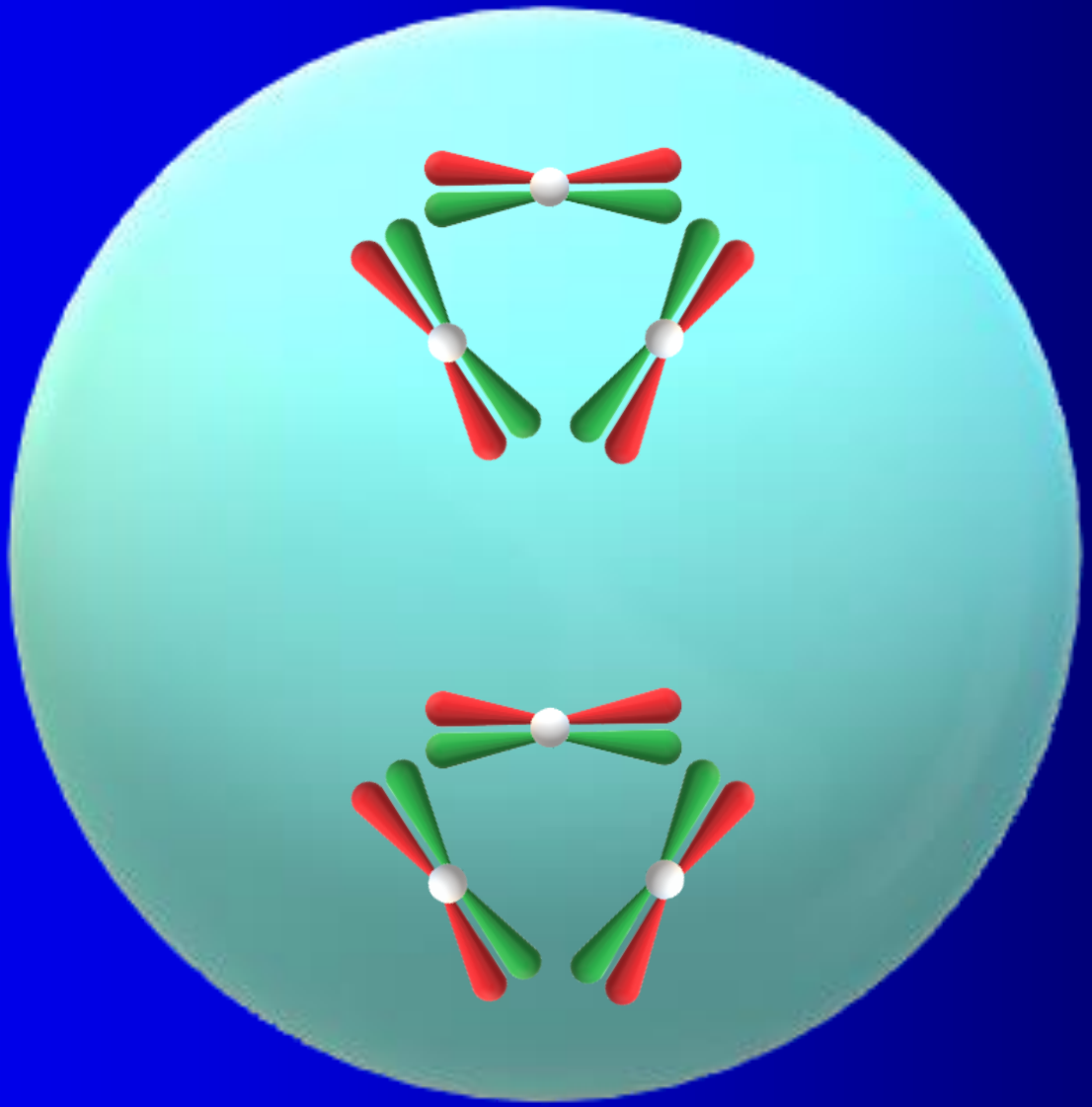
Contraction of Spindle Fibres

Splitting of Centromeres

Movement of Chromosomes towards the opposite poles.

B. John Ebenezer

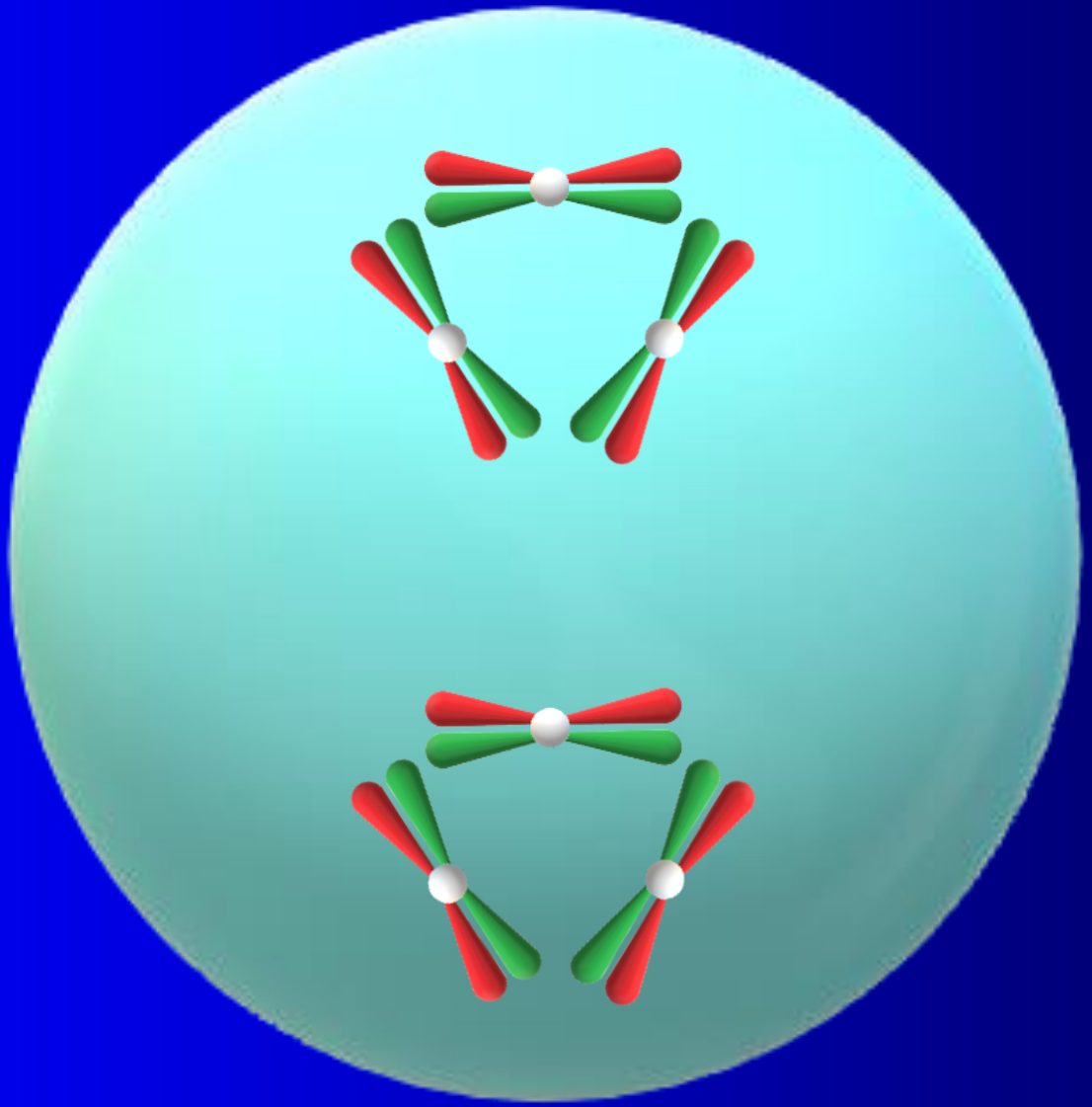
Telophase-I



Disappearance
of
Centrioles
and
Spindle Fibres

B. John Ebenezer

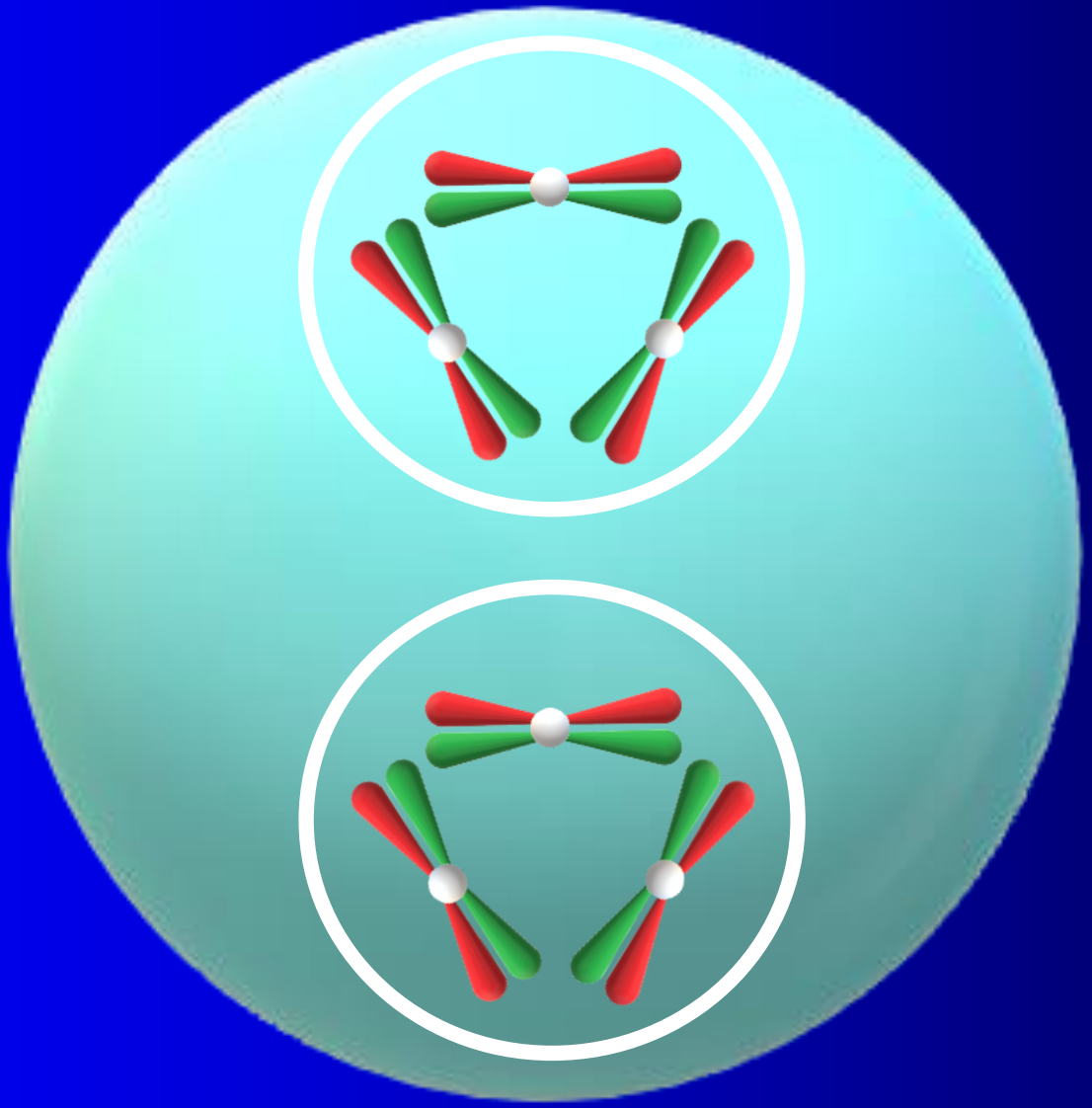
Telophase-I



Chromosomes have reached the opposite poles completely.

B. John Ebenezer

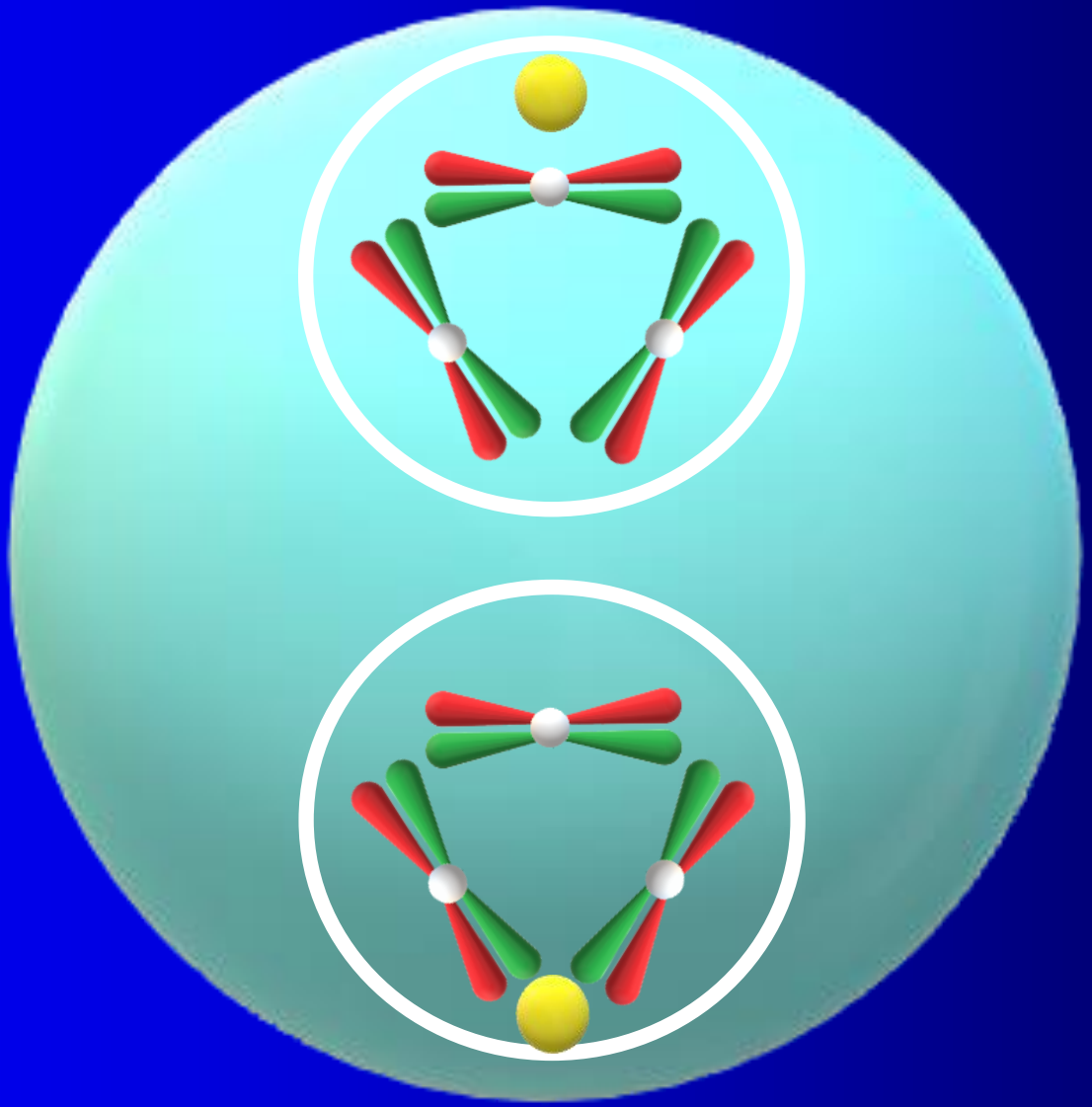
Telophase-I



Reappearance of Nuclear membrane

B. John Ebenezer

Telophase-I



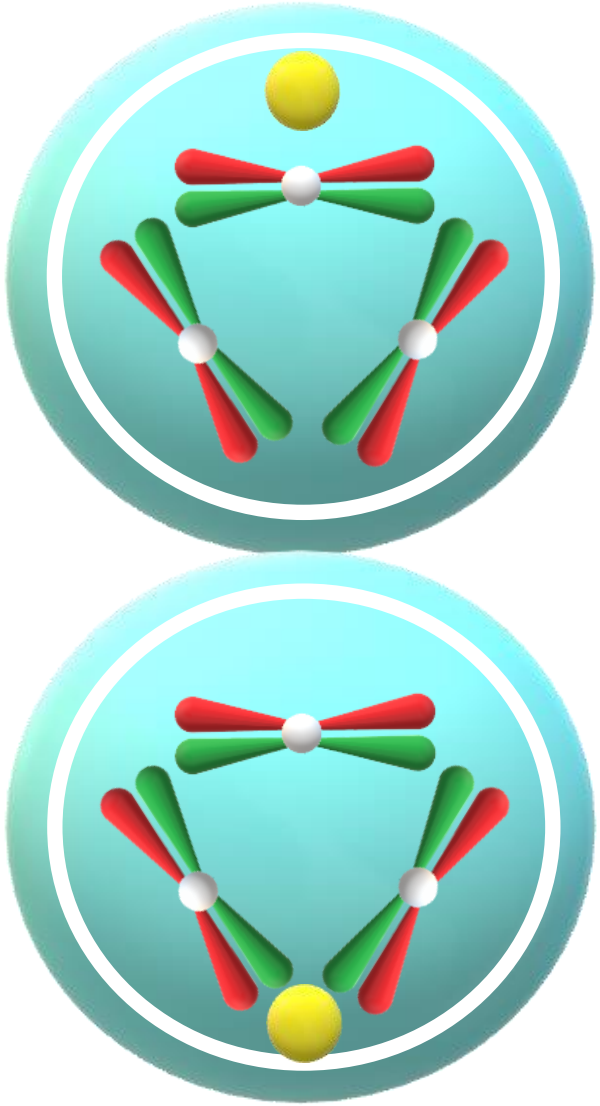
Reappearance of Nucleolus

B. John Ebenezer

Cytokinesis

Cytokinesis

Two cells
are formed at
the end of
Meiosis-I



Cytokinesis occurs in two ways.

In plants, a cell plate appears at the middle of the cell

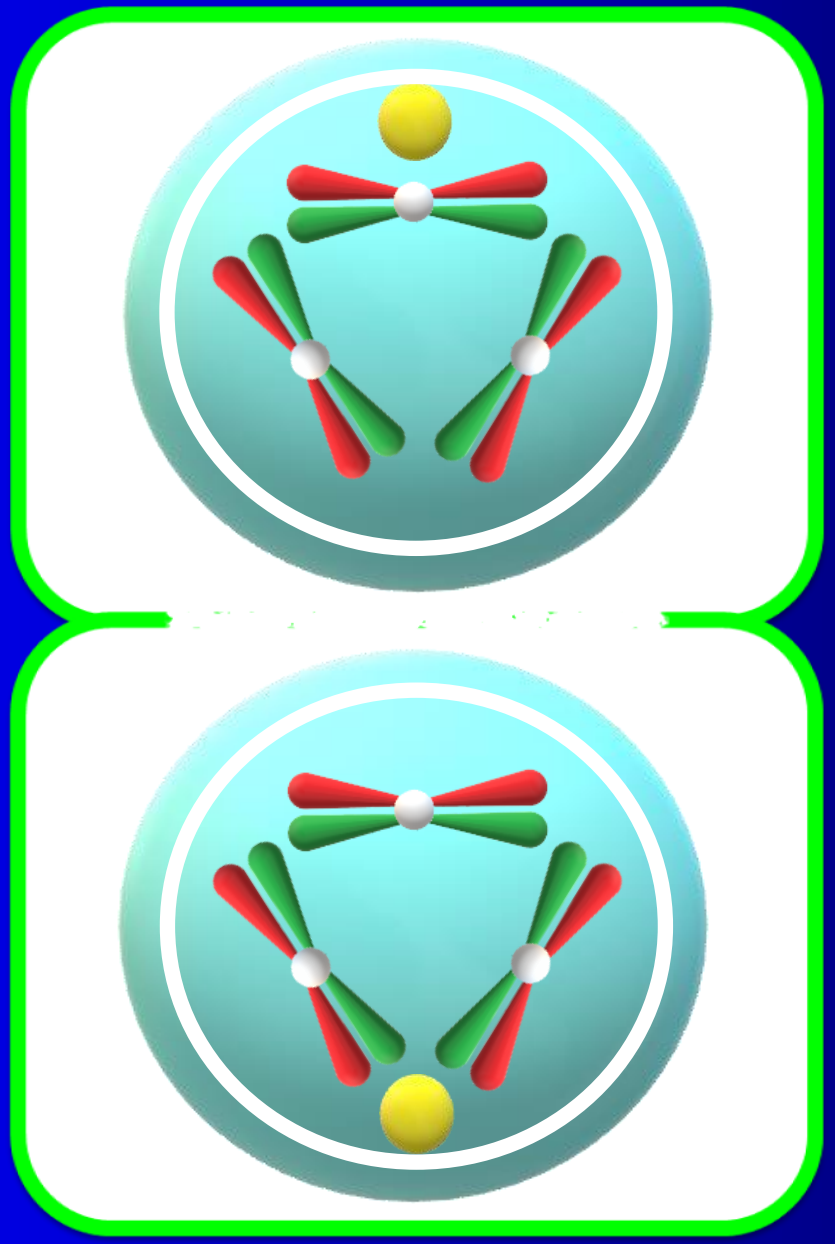
Which gradually extends towards the

periphery of the cell and divides the cell into two.

B. John Ebenezer

Cytokinesis

Constriction of cell Membrane



In animal cell,

a constriction of cytoplasm occurs

at the periphery of the cell which deepens

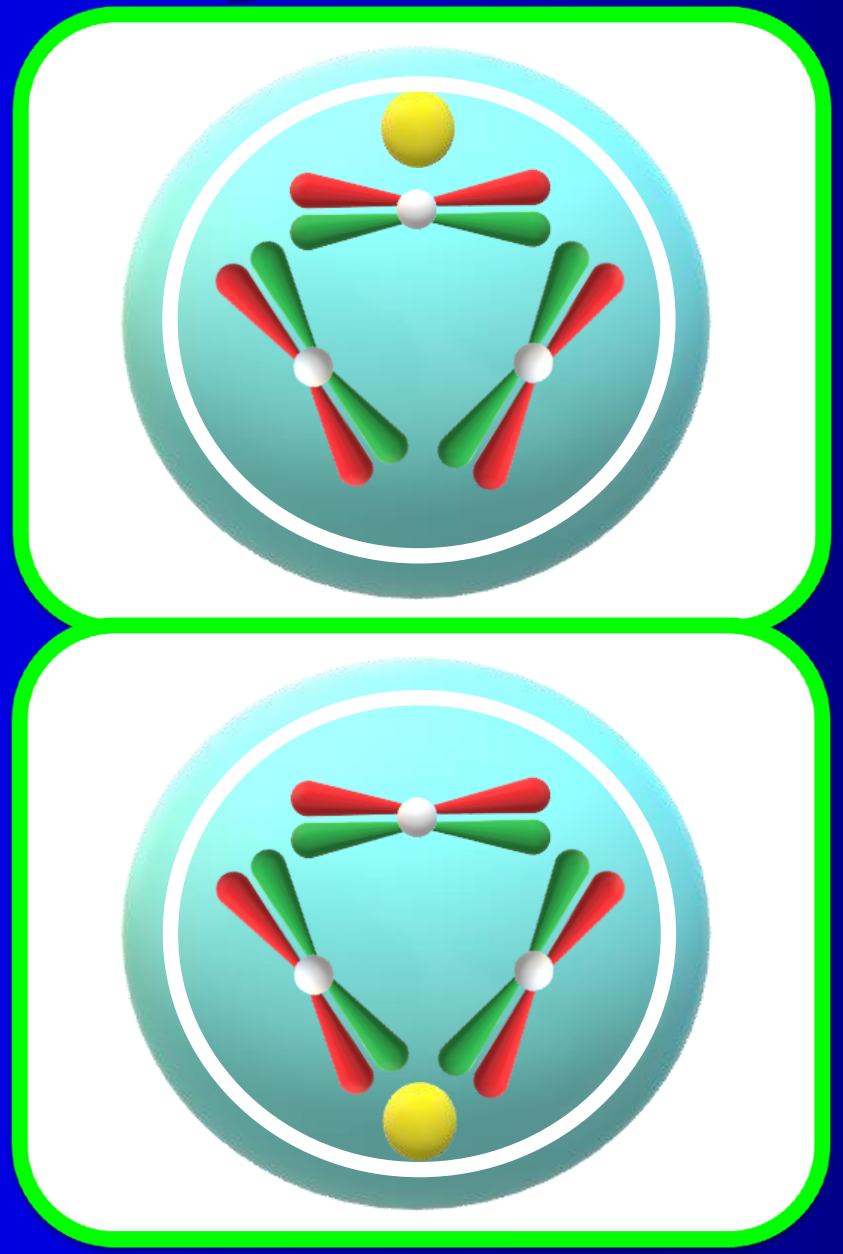
gradually towards the center of the cell and

divides the cell into two.

B. John Ebenezer

Cytokinesis

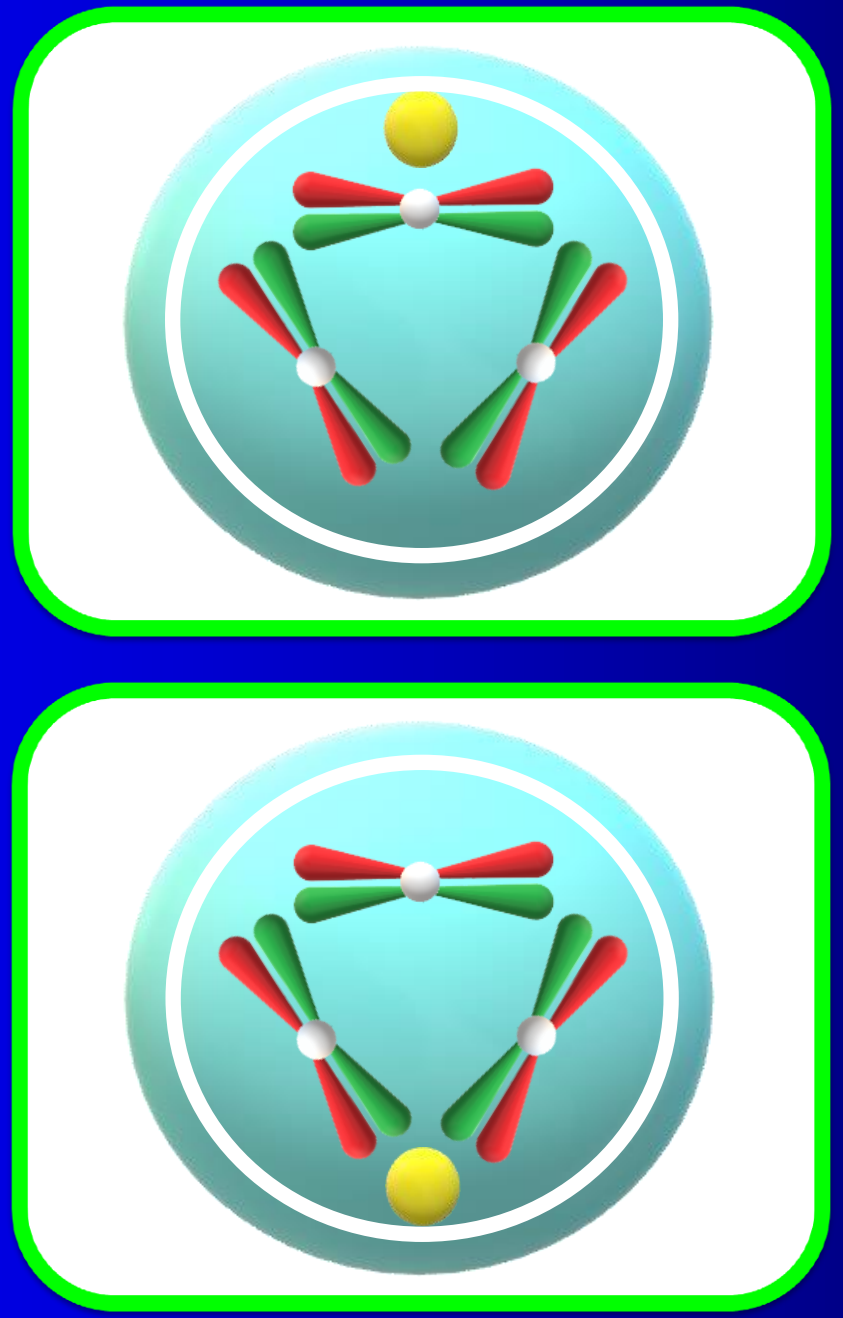
The constriction deepens towards the centre and divides the cell into two



Formation of Two Daughter Cells

B. John Ebenezer

Cytokinesis

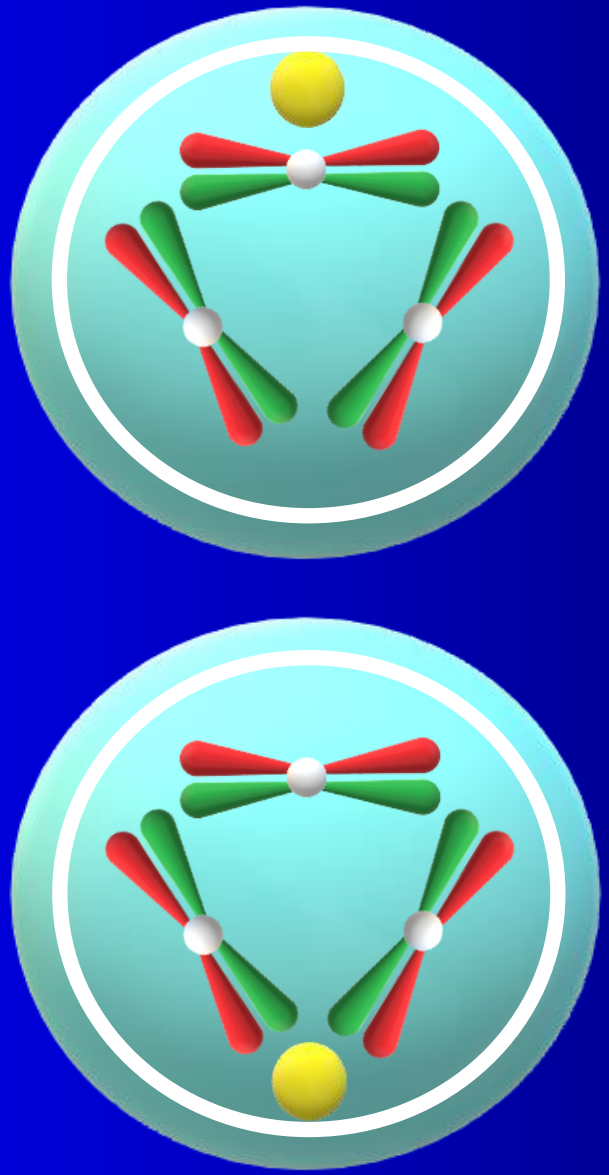


Two Daughter Cells are formed

B. John Ebenezer

Meiosis-II

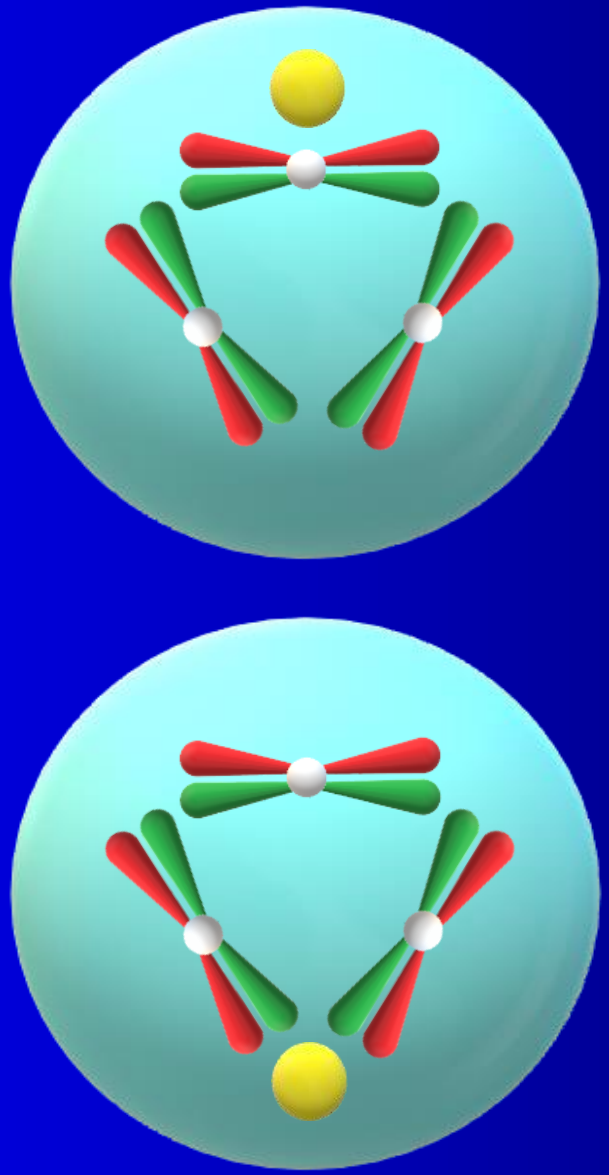
Prophase-II



Condensation of chromosomes occurs

B. John Ebenezer

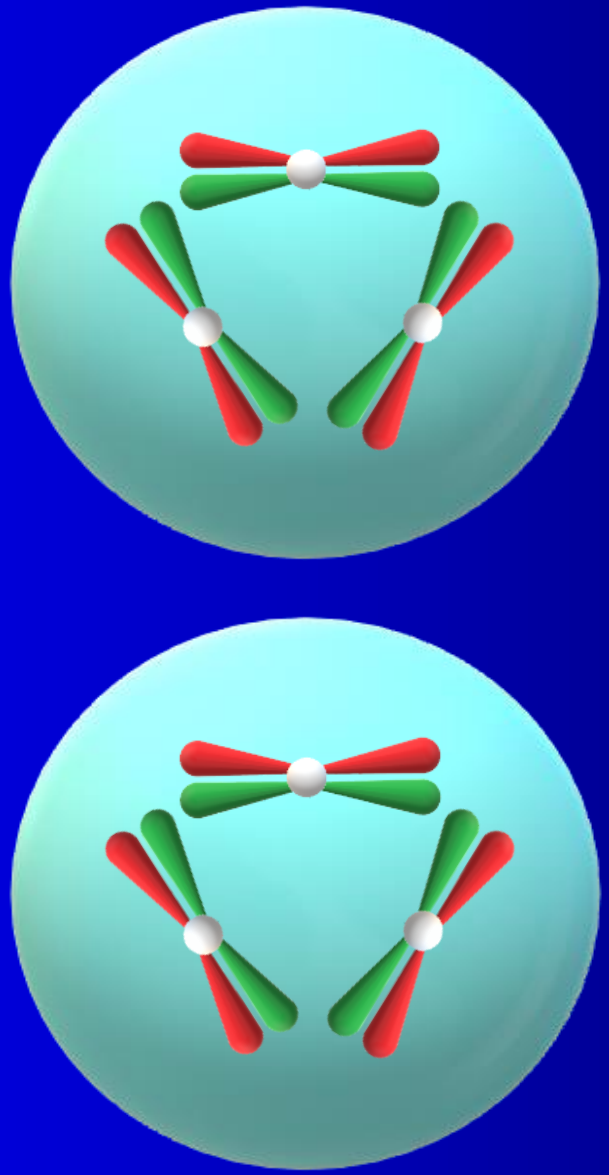
Prophase-II



Nuclear Membrane disappears

B. John Ebenezer

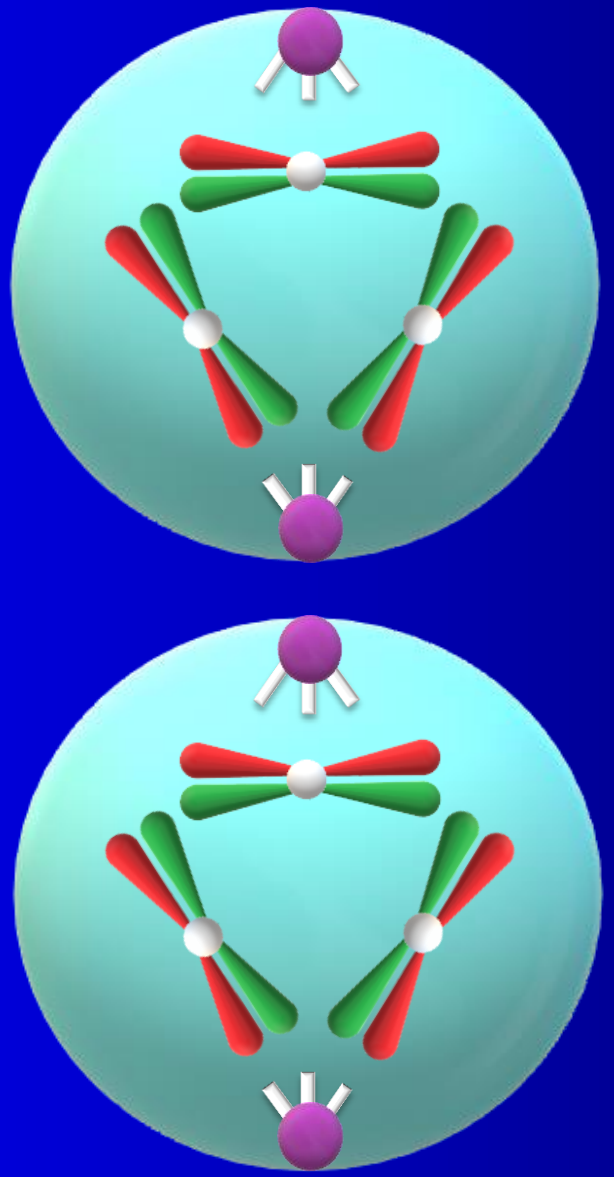
Prophase-II



Nucleolus disappears

B. John Ebenezer

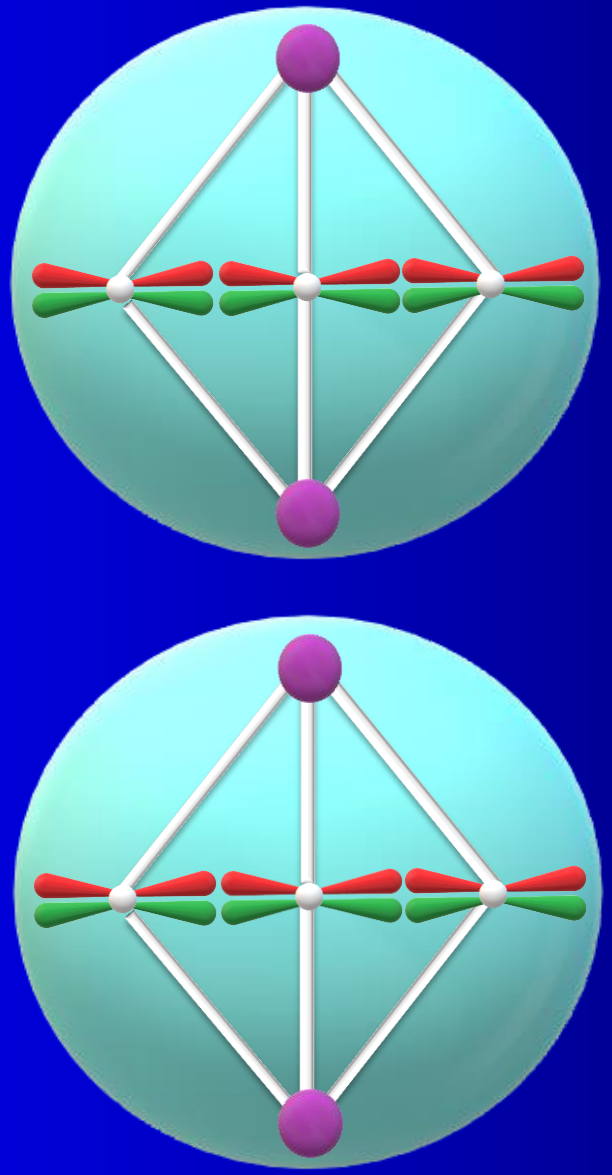
Prophase-II



Centrioles start developing spindle fibres

B. John Ebenezer

Metaphase-II



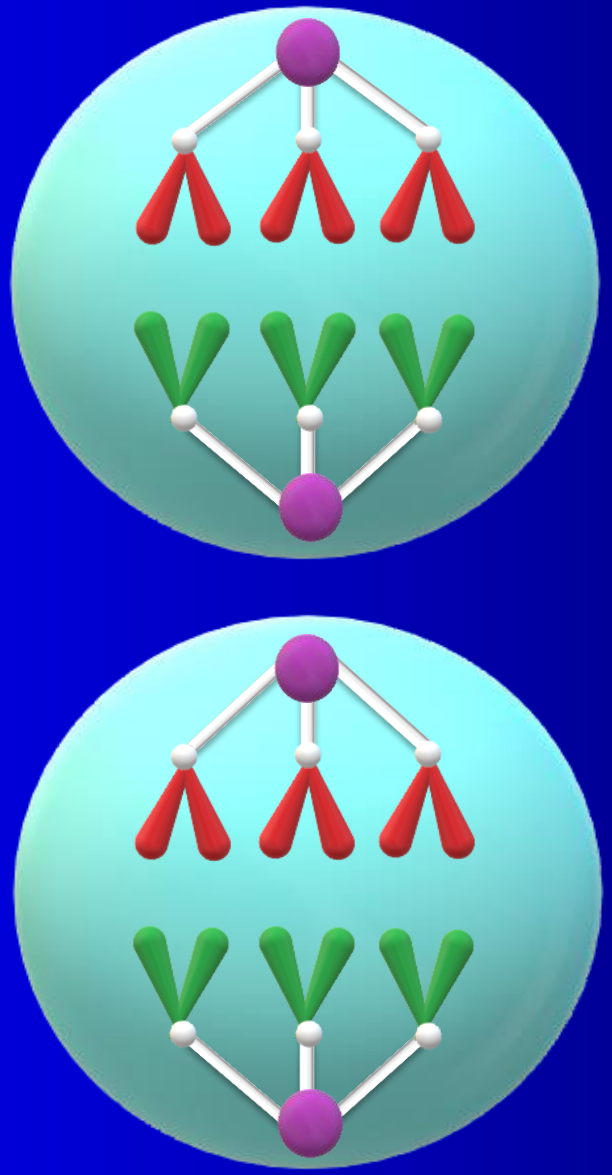
Alignment of Chromosomes at the Equator

Attachment of Spindle Fibres

with the Centromeres of chromosomes.

B. John Ebenezer

Anaphase-II



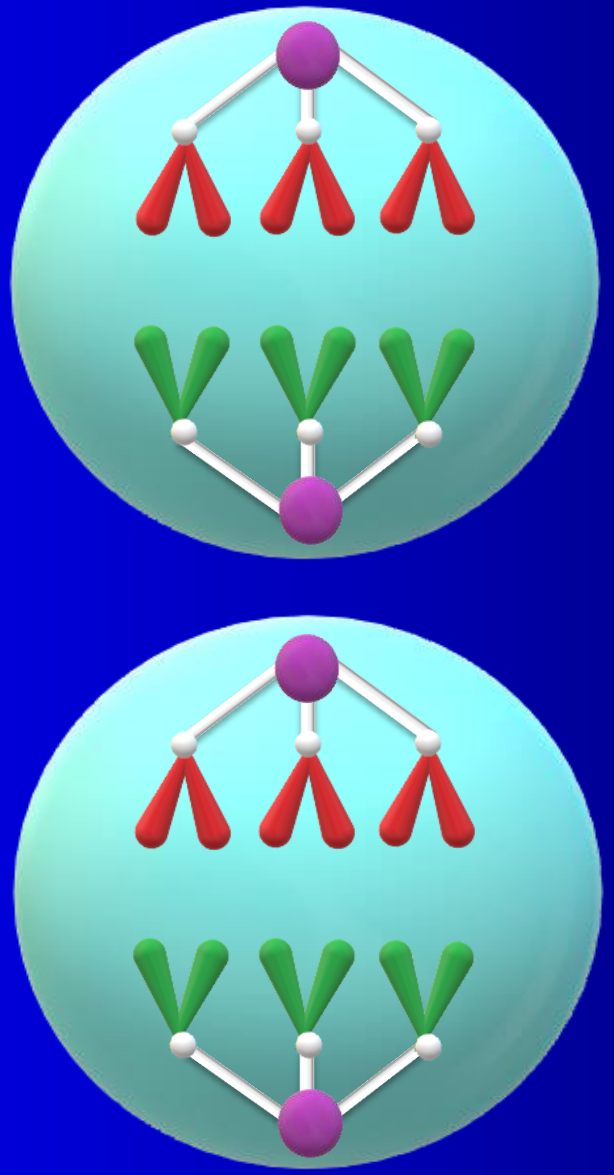
Contraction of Spindle Fibres

Splitting of Centromeres

Movement of Chromosomes towards the opposite poles.

B. John Ebenezer

Anaphase-II



Contraction of Spindle Fibres

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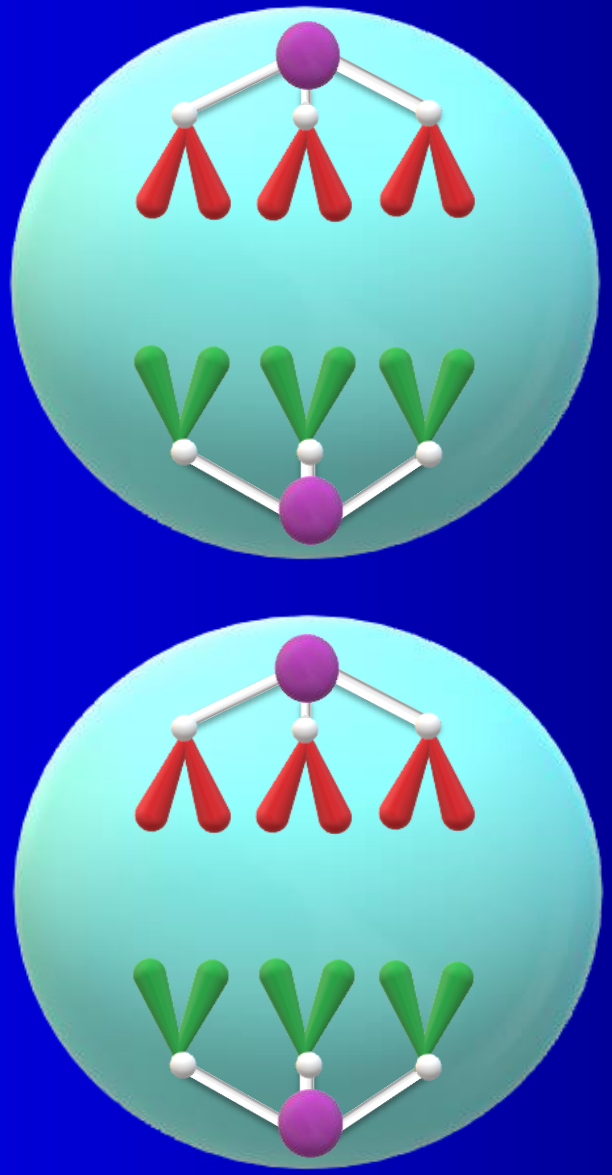
B. John Ebenezer

Anaphase-II



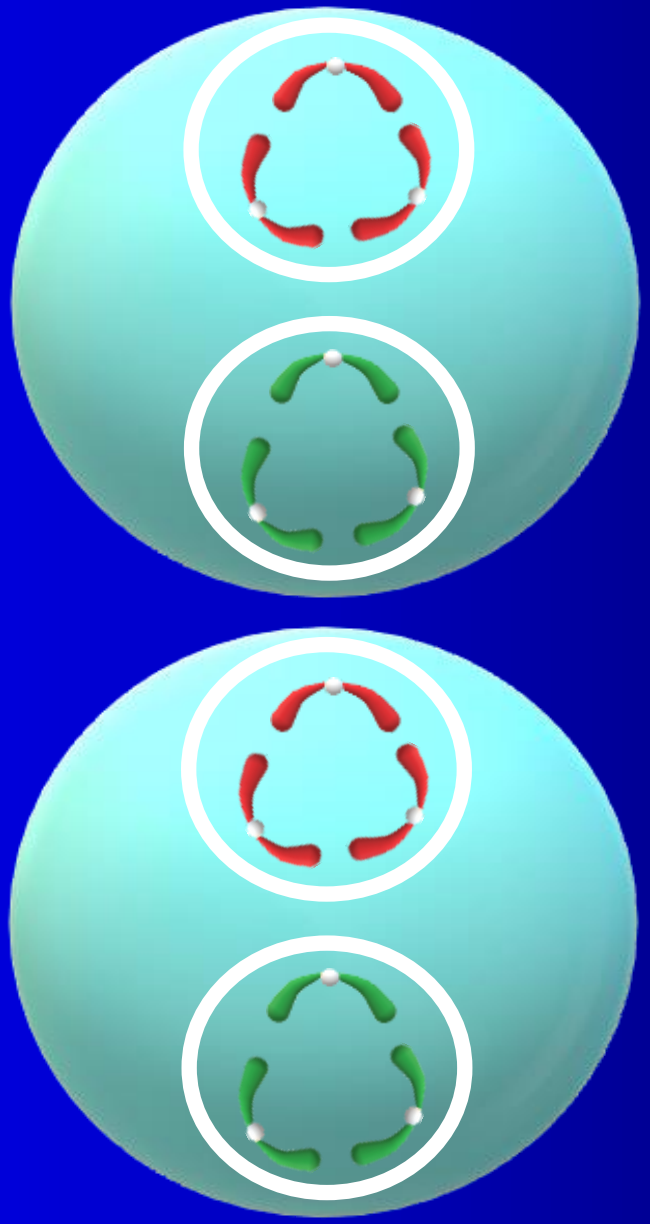
Contraction of Spindle Fibres

Splitting of Centromeres

Movement of Chromosomes towards the opposite poles.

B. John Ebenezer

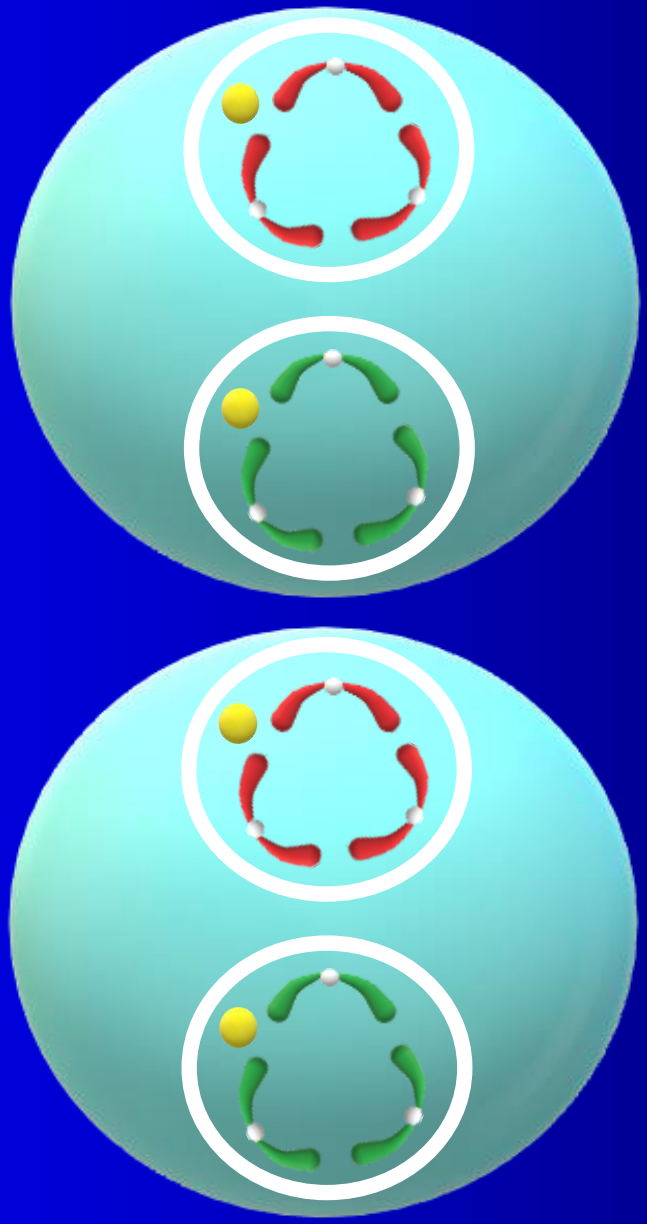
Telophase-II



Reappearance of Nuclear Membrane

B. John Ebenezer

Telophase-II



Reappearance of Nucleolus

B. John Ebenezer

Cytokinesis

Cytokinesis

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Which gradually extends towards the

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B. John Ebenezer

Cytokinesis

In animal cell,

constriction of cytoplasm starts

at the periphery of the cell which deepens

gradually towards the center of the cell and

divides the cell into two.

B. John Ebenezer

Four daughter cells are formed at the end of Meiosis-II

Each daughter cell has half the number of chromosomes.

The daughter cells become gametes.

B. John Ebenezer

Four daughter cells are formed at the end of Meiosis-II

Each daughter cell has half the number of chromosomes.

The daughter cells become gametes.

B. John Ebenezer

Significance of Meiosis

1. Meiosis occurs only at the reproductive cells.
2. Four daughter cells are formed at the end of meiosis.

   Each daughter cell has half the number of chromosomes and form haploid gametes.
3. It maintains the same number of chromosomes in sexually reproducing organisms.
4. Crossing over between paternal and maternal chromosomes causes exchange of genes which leads to recombination and variations among the offsprings.

B. John Ebenezer


Thank You
God Bless You!