

Bio 101 Assignment No 1 Solution

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Due Date 8-6-2022

Q.1 Explain the events of Meiosis I

(5 marks)

Ans

The Events of Meiosis I

After Interphase I meiosis I occurs after Interphase I, where proteins are grown in G phase and chromosomes are replicated in S phase. Following this, four phases occur. Meiosis I is known as reductive division, as the cells are reduced from being diploid cells to being haploid cells.

1. Prophase I

Prophase I is the longest phase of meiosis, with three main events occurring. The first is the condensation of chromatin into chromosomes that can be seen through the microscope; the second is the synapsis or physical contact between homologous chromosomes; and the crossing over of genetic material between these synapsed chromosomes. These events occur in five sub-phases:

- **Leptonema** – The first prophase event occurs: chromatin condenses to form visible chromosomes. Condensation and coiling of chromosomes occur.
- **Zygonema** – Chromosomes line up to form homologous pairs, in a process known as the homology search. These pairs are also known as bivalents. Synapsis happens when the homologous pairs join. The synaptonemal complex forms.
- **Pachynema** – The third main event of prophase I occurs: crossing over. Nonsister chromatids of homologous chromosome pairs exchange parts or segments. Chiasmata form where these exchanges have occurred. Each chromosome is now different to its parent chromosome but contains the same amount of genetic material.
- **Diplonema** – The synaptonemal complex dissolves and chromosome pairs begin to separate. The chromosomes uncoil slightly to allow [DNA](#) transcription.
- **Diakinesis** – Chromosome condensation is furthered. Homologous chromosomes separate further but are still joined by a chiasmata, which moves towards the ends of the chromatids in a process referred to as terminalization. The nuclear envelope and nucleoli disintegrate, and the meiotic spindle begins to form. Microtubules attach to the chromosomes at the kinetochore of each sister chromatid.

2. Metaphase I

Homologous pairs of chromosomes align on the equatorial plane at the center of the cell. Independent assortment determines the orientation of each bivalent but ensures that half of each chromosome pair is oriented to each pole. This is to ensure that homologous chromosomes do not end up in the same cell. The arms of the sister chromatids are convergent.

3. Anaphase I

Microtubules begin to shorten, pulling one chromosome of each homologous pair to opposite poles in a process known as disjunction. The sister chromatids of each chromosome stay connected. The cell begins to elongate in preparation for [cytokinesis](#).

4. Telophase I

Meiosis I ends when the chromosomes of each homologous pair arrive at opposing poles of the cell. The microtubules disintegrate, and a new nuclear membrane forms around each haploid set of chromosomes. The chromosomes uncoil, forming chromatin again, and [cytokinesis](#) occurs, forming two non-identical daughter cells. A resting phase known as interkinesis or interphase II happens in some organisms.

Q.2 Write down the differences between Prokaryotic and Eukaryotic Cells (5 marks)

Ans

Main Difference – Prokaryotes vs Eukaryotes

Prokaryotes and eukaryotes are the two organizational levels of living organisms on earth. The main difference between prokaryotes and eukaryotes is that prokaryotes do not have membrane-enclosed organelles whereas eukaryotes have membrane-enclosed organelles. The genetic material of prokaryotes can be found in a specific location of the cytoplasm, which is called nucleus. But in eukaryotes, DNA is organized into a membrane-enclosed organelle called nucleus. The other organelles in eukaryotes are mitochondria, chloroplast, endoplasmic reticulum, Golgi apparatus, and lysosomes. Prokaryotic organisms include bacteria and cyanobacteria. Eukaryotic organisms include animals, plants, fungi, algae, and protozoa.

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