Mitotic Chromosome And Cell Cycle

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Background To The Mitotic Cell Cycle

Mitotic can be defined as the type of eukaryotic cell division that creates two daughter cells with similar genetic elements as their parent cell. Cells behave almost the same way when they replicate and therefore, chromosomes replicate the same during the S phase to make sure that each daughter cell formed as a copy of the chromosome. However, the cell cycle is the series of stages or events that occur in a cell to cause its division and duplication of the cell DNA as well. However, the mitotic cell cycle is composed of metaphase, anaphase, prophase, Cytokinesis, and telophase. According to Larsen (2012, p.10), each of these phases is essential to the mitotic cell cycle, and at each stage, there is an event that occurs to facilitate the formation of daughter cells. For instance, at metaphase, the chromosome aligns themselves along the plate of metaphase of the spindle of the apparatus (Larsen, 2012, p. 12).

The Prophase stage is important to the cell cycle since it is the phase where the nuclear membrane breaks into pieces to form several small nucleolus and vesicles disintegrate. This is the phase whereby the mitotic spindle is formed for mitotic cell duplication, which allows the mitotic to form two daughter cells. As stated by Lersen (2012), the cell cycle is essential because it prevents the division of the cell when it is not required to occur, and it makes the division of the cell take place when it is needed. Therefore, cell division is essential for cells to grow and divide in multicellular organisms. Mitosis is important because it ensures that there is continuity of genetics by making sure that it creates a copy of DNA. It makes sure that the DNA is taken by carried by keeping the same number of chromosomes carried from one cell to another. Therefore, mitosis takes place in the skin, bones, and muscles, and immediately after the mitosis is complete, a daughter cell is formed.

Studies have established that phases of the cell cycle can take different times to complete a complete cycle. Bettitta, Yigin, and Kiriaki (2015) noted that normally human cell has 24 hours of cycle time, and the G1 phase is likely to take about eleven hours, the G2 phase will take about four (4) hours, the S phase eight (8) hours and M phase is also likely to take about one (1) hour. However, other types of cells can divide very rapidly though yeasts can go through all four stages of cell division. The most important thing is that the chromosome condenses during the mitotic cell cycle. The shape and the degree of compaction of chromosomes undergo several changes at the interphase immediately after they enter the mitosis, which further condenses and individualizes to form a chromosome (Buttitta, Yiqin, & Kiriaki, 2015).

According to Antonin and Heinz (2016), once the chromosome is segregated by the spindle, the chromatin is reignited to reform its interphase structure fit, which can be competent for DNA transcription and replication. The molecular mechanism of mitosis then condenses and decadence to reform its interphase structure (Antonin & Heinz, 2016). It is proper to note that the chromosome replicates during the S phase, and therefore, it changes its structure when it condenses and decondenses to regain a new shape.

Data Analysis

The experiment was completed in the laboratory using toluidine blue and a dye that binds to DNA to give an accurate result. The experience result indicates that the cell of the untreated root has the lowest number of mitotic indexes. Though untreated root has the highest number of cells at the interphase the cells continue to reduce as the cells of untreated root go through the cell cycle. From the result, it seems Organophosphate treated roots have the highest mitotic index of 7.9, followed by Baby treated roots with a mitotic index of 7.2. This means that the cell takes more time at the interphase stage compared to others like Metaphase and Telophase.

	Cell in	Cell in	Cell in	Cell in	Cell in	Mitotic
	Interphase	Prophase	Metaphase	Anaphase	Telophase	Index
Data	60	30	10	5	2	43.5
Untreated root	1882	49	24	31	11	5.8
Manure Treated root	1800	51	27	37	9	6.4
Organophosphate treated roots	1210	42	20	31	10	7.9
Baby treated Roots	1584	53	23	32	16	7.2

Table 1: Experiment result of cells cycle on various components

Stages of Mitosis	Number of times in Eyepiece	Size of cell in each stage

Interphase	14.5	14.5X0.01= 0.014
Prophase	0	0X0.001= 0
Metaphase	1	1X0.001 = 0.001
Anaphase	1	1X0.001 = 0.001
Telophase	2	2X0.001 = 0.002

Table 2: Size of cell in each stage of the cell cycle (x 100 magnification)

Data Interpretation

The present experience demonstrates the change in DNA at every stage of the cell cycle. Based on the observation of the five datasets, it is evident in the prophase cell cycle; chromatin starts to gather together and form chromosomes. The nuclear size of chromosomes and density are noticed and later dispersed. It, therefore, means the interphase has gone nuclear membrane, but in the prophase, the nuclear membrane is broken. A closer observation of the interphase and prophase from the test conducted reflects the fact that in interphase, the mitosis of the cell occurs several times. The experiment indicates that at metaphase the chromosomes have collected at the center of the cell. It means the chromosomes are being prepared to move to the opposite side of the pole. This is why, at metaphase, there is a chromosome at the center of the cell, and a closer look at t figure 3 of the metaphase will confirm.

However, the five datasets are compared using Fisher's exacts test to confirm whether the proposed value is different from the values obtained from the experience. In this case, the Fisher exact test is supposed to test the hypothesis that the duration of each cell cycle depends on the content of the cell. It is also supposed to confirm if the hypothesis is true that the cells that are divided mitotically are larger than normal cells and check whether the higher the percentage of cells that are divided in one phase, the longer duration the cell takes on every phase. However, the p-value is used to evaluate how best the data supports the hypothesis. It is used to compare the data collected and the accuracy of the data, which, therefore, confirms the result obtained from the experience. According to Larsen (2012, p.12), the p-value is a probability that restricts certain principles in observation data, and therefore, in this experience, the p-value is (0.05), which was used to conduct the test.

The experiment indicates that the size of the cell changes as the cycle continues. However, Table 2 indicates the size of cells in every phase. The result shows that the size of cells in every stage increases from interphase to telophase (Gogoi, Saurav, Sayak, & Mohammad, 2016, p. 32). It means the sizes of the cells that are undergoing interphase are usually tinny compared to the size of cells at other stages, which are approximately 0.001. It is because chromosomes, when in the cells, are always uncoiled and not divided as well. And since the cell size of the chromosomes cannot be verified because, at prophase, there is no prophase cell.

The data collected is different from the control data because the experiment discovered that the cell cycle time depends on the size of the cell and the content as well. It is discovered it is similar to control data because the number of cells in every dataset is different and the way it is reflected in the result from the experience. (Gogoi, Saurav, Sayak, & Mohammad, 2016, p. 21).

Based on the result obtained, it is evident the three fertilizers catalyze the reaction and, therefore, increase the mitosis of the cells. It is discovered that the manure-treated root has a mitotic index of 5.8, which is the lowest, while the organophosphate-treated roots have a mitotic index of 7.9, the highest among the three fertilizers, and Baby has a mitotic index of 7.2. This means that manure-treated root is not a fertilizer, and therefore, it does not have an organic element. Organophosphates are the best fertilizer since it has the highest mitotic index and the highest number of cells at the interphase. The manure Treated roots are not working despite the fact that they had the highest number of cells. They still register the lowest mitotic index, and from experience, it is clear that onion roots do not react quickly to manure compared to organophosphate and Babybio-treated roots.

Bibliography

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Appendix 1 Experiment result