BIOL 1301-01 Introduction to Biology

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Learning Journal 3

**Question: In your readings, you learned about cellular division in both plant and animal cells. While they are similar in many ways, some key differences occur late in the mitotic division. Describe the similarities and differences between the cytokinesis mechanisms found in animal cells versus those in plant cells. Compose your work and submit to your Learning Journal.**

1. Similarities in Cytokinesis

Both animal and plant cells undergo cytokinesis at the end of the cell cycle, where a parent cell splits into two daughter cells. The main purpose of this stage is to complete cell division after an equal distribution of genetic information. In both types of cells, cytokinesis relies on the formation of a contractile ring composed of proteins such as actin and myosin. This ring contracts around the center of the cell, physically dividing it into two parts.

2. Differences in Cytokinesis

However, the specifics of this process differ markedly. In animal cells, the contractile ring constricts the cell membrane from the inside, pinching the cell in the middle to divide it into two. This process is possible because animal cells have flexible cell membranes.

On the other hand, plant cells have a rigid cell wall, which prevents them from dividing in the same way. Instead, vesicles originating from the Golgi apparatus gather at the center to form a cell plate, which creates a new cell wall. This cell plate grows from both sides until it fully separates the two daughter cells. This process results in the formation of a new cell wall containing cellulose, completing the cell division.

3. Implications

These differences in mechanisms have significant implications for the structure and function of the cells. The flexible method of division in animal cells allows for a variety of cell shapes and sizes, facilitating tissue diversity and complexity. In contrast, the rigid cell division mechanism in plant cells, due to their cell walls, provides support and protection, enhancing the plant's ability to withstand environmental stresses.

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References

1. Openstax. (2024). *Biology*. https://openstax.org/books/biology/pages/preface