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Opinion

A Brief Discussion about Cytoplasmic Division

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ABOUT THE STUDY

Interphase, nuclear division and cytoplasmic division are the three main phases of a single cell cycle. In all living creatures, cell division is a critical process. DNA replication and cell expansion occur simultaneously during cell division. Activities such as cell division, DNA replication, and cell development must be synchronized to ensure proper division and production of progeny cells with intact genomes. The cell cycle is a process through which a cell replicates its genome, synthesizes other cell parts, and eventually splits into two daughter cells. Cell proliferation (in terms of cytoplasmic expansion) is a continuous process whereas, DNA synthesis occurs just once during the cell cycle.

Cytoplasmic Division

Mitosis (M), the final step of the cell cycle, can be viewed using a decent light microscope with the correct procedures. Cytokinesis or cytoplasmic division, divides the original cell, organelles and contents into two roughly equal halves.

Animal cells

The original cell now has two daughter nuclei that are roughly opposite in poles. During anaphase, a circle of microfilaments forms at right angles to these nuclei and stretches around the cell's diameter. This ring of microfilaments, known as a contractile ring, includes actin (a muscle protein) and begins to contract as the daughter nuclei reappear in telophase. This contraction pinches the cell around the middle as it tightens, generating a furrow ring that deepens as the contraction continues. The cleavage furrow eventually tightens to the point where the original cell can split into two daughter cells. After a brief break, these cells re-enter the G1 phase and can begin the cell cycle all over again.

Plant cells

Plant cells have extra protection in the form of cellulose-fortified walls that surround them. These are sturdily constructed buildings that are difficult to distort. Plant cells do not change form in the final stages of the cell cycle, and as they enter telophase, they are roughly the same size as they were at the start of M. Small membrane-bound sacs or vesicles, begin to develop during telophase and line up at right angles to the daughter nuclei all across the cell's centre. All of the components required to manufacture a new cell wall are present in these vesicles. These cell wall precursors were produced in the plant equivalent of the Golgi apparatus (called a dictyosome in plant cells for some reason), bundled into vesicles and transported to the cell's central area. Smaller vesicles begin to fuse into larger and larger vesicles during telophase, and eventually, they all fuse, forming a continuous structure called a cell plate that runs the length of the cell from wall to wall. Membrane (next to the cytoplasm) and cell wall materials make up the cell plate (in the centre). The original cell is divided into two new daughter cells as a result of this action. These daughter cells have identical genetic content and can now re-enter the G1 phase after a brief break.

CONCLUSION

Mitosis is the division of the nucleus that occurs soon before cell division or cytokinesis. Cell chromosomes condense and, the spindle assembles throughout this multistep process. As the spindle microtubules recede toward opposing poles of the cell, the duplicated chromosomes attach to the spindle, align at the cell equator and migrate apart. The parent cell separates into two complete daughter cells after each set of chromosomes is enclosed by a nuclear membrane.

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