

The amount of cell division in the *Allium cepa* root tip cell

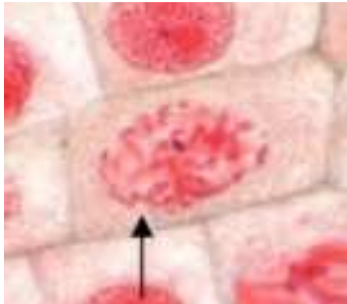

Mitosis is the main part of cell division. It is a process where a single cell divides resulting in two identical cells, each containing the same number of chromosomes and genetic content as that of the original cell. It consists from four phases respectively:


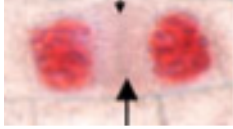
- Prophase
 - Formation of chromosomes
 - Disappearance of the nuclear envelope
- Metaphase
 - Chromosomes align along the equator of the cells
- Anaphase
 - Chromosomes are split into two sister chromatids by spindle fibers and are pulled to the poles of the cell
- Telophase
 - Two new nuclei are formed and the cytoplasm undergoes division

This experiment will show us how many of the cells undergo division in an area of the root tip. It is important to know how fast plants can grow, in order to determine how long does it take them to develop, and as well this experiment could be used on corn roots, to know when people can plant them and as well harvest them.

Procedure:

1. Set up the microscope with the sample
 - a. Pick a thin layer of the onion root tip
 - b. Put it on the slide
 - i. Make sure the sample does not bend/fold
 - c. Put one drop of water
 - d. Cover the slide
2. Pick an area a little bit above the onion root tip
 - a. The cells at the root tip cannot be seen, so an area higher is picked
3. Count all of the cells with a visible nucleus
4. Identify and count the cells that undergo a certain phase of mitosis

Phase	Example
Prophase	
Metaphase	

Anaphase	
Telophase	

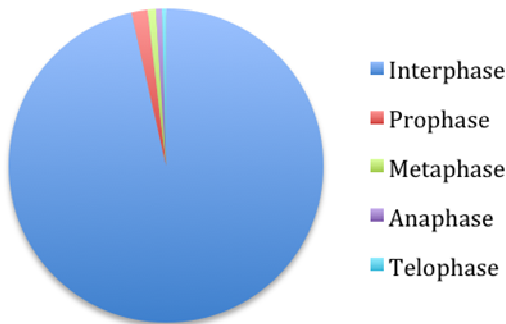
5. Estimate the number of cells that undergo interphase
 - a. All cells without the cells undergoing mitosis
6. Pick an area above the previous area and repeat steps 3-5
 - a. The area should be exactly above the area before

Data

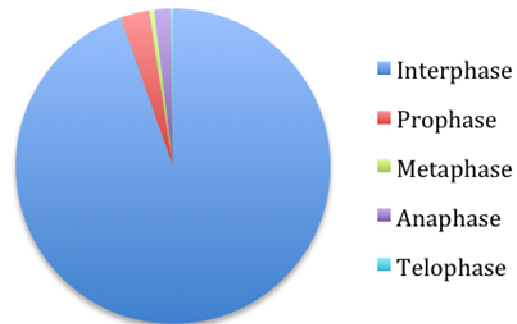
# of cells (individual data data)			# of cells (group average)		
Phases	View #1	View #2	Phases	View #1 avg	View #2 avg
Interphase	461	351	Interphase	263.3	182.6
Prophase	8	11	Prophase	51.4	25.86
Metaphase	4	2	Metaphase	7.7	5.3
Anaphase	3	6	Anaphase	5.6	4.7
Telophase	2	1	Telophase	3.1	1.9
Total	478	371	Total	294.7	195.2

The data presented is individual data and the group's average. Seven other people did the same lab at the same time and their results are used for comparison

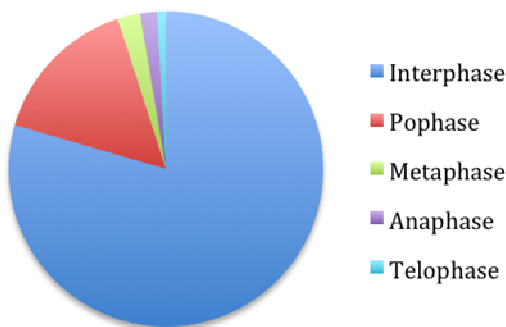
Ind. View #1



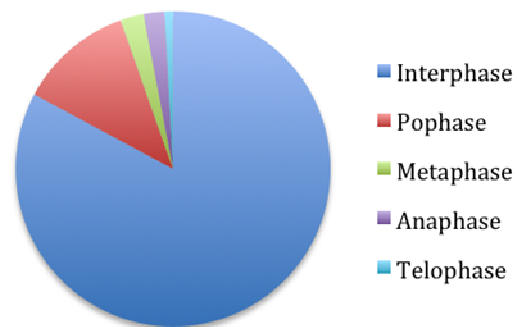
Ind. View #2



View #1 Group Avg



View #2 Group Avg



Certain errors could have caused these differences in the results, which could be:

- Error in counting
- Picking different areas
 - Some people could have picked right above the root tip
 - Some people could have gone up further than the others
- Miss of cells in telophase, but considering them to be two cells in interphase
- Bad sample
 - Some of the cells had no clear nucleus, so those cells were discounted
- Considering certain cells as cells in incorrect phases

Improvements:

- One person could have picked the areas for everybody
- Changing from a bad sample to another one
- Excluding raw data that does not fit the pattern and affects the group average greatly
- Counting mechanism
 - Counting each and every cell is slow

- Another mechanism would be counting the number of rows, counting the amount of cells in 1/5 of them, multiply by 5

Conclusion

Cells with clear nucleuses were observed. Cells were arranged in rows; most of them had a rectangular shape, some were close to a shape of a square. There was a big amount of the ones in interphase, and small amounts of the ones in mitosis. Cells were in different phases of mitosis or in interphase and were distinguished clearly.

Even though the data through the group was various, the expectations were proven correct. The order of cells in different phases was in this: interphase, prophase, metaphase, anaphase and telophase. These results were caused by the different amount of time needed for each phase.