ΕΚΠΑΙΔΕΥΤΗΡΙΑ ΦΡΥΓΑΝΙΩΤΗ 1953

Onion Cells

Cristina Farmaki PROBLEM no.12
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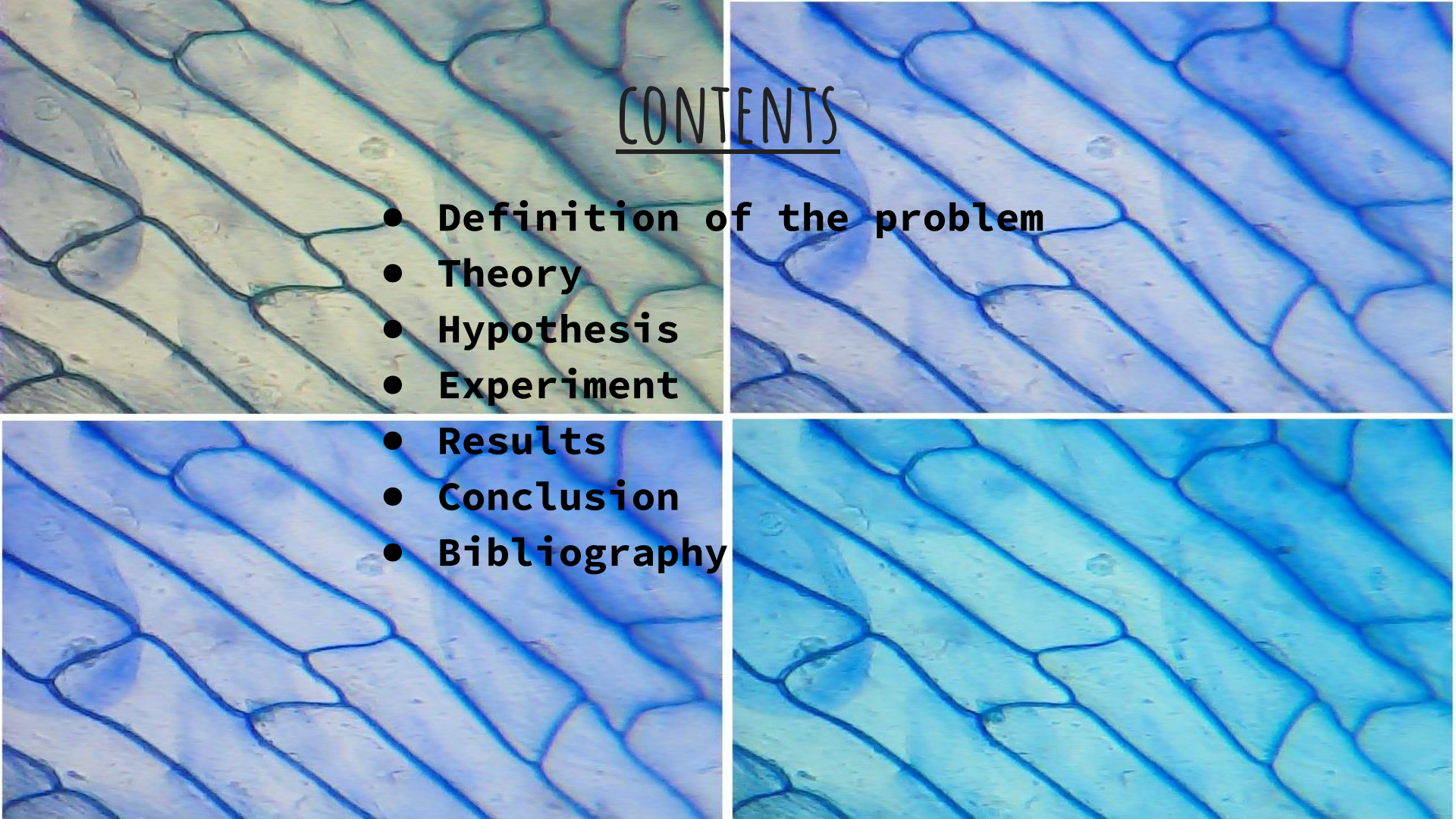

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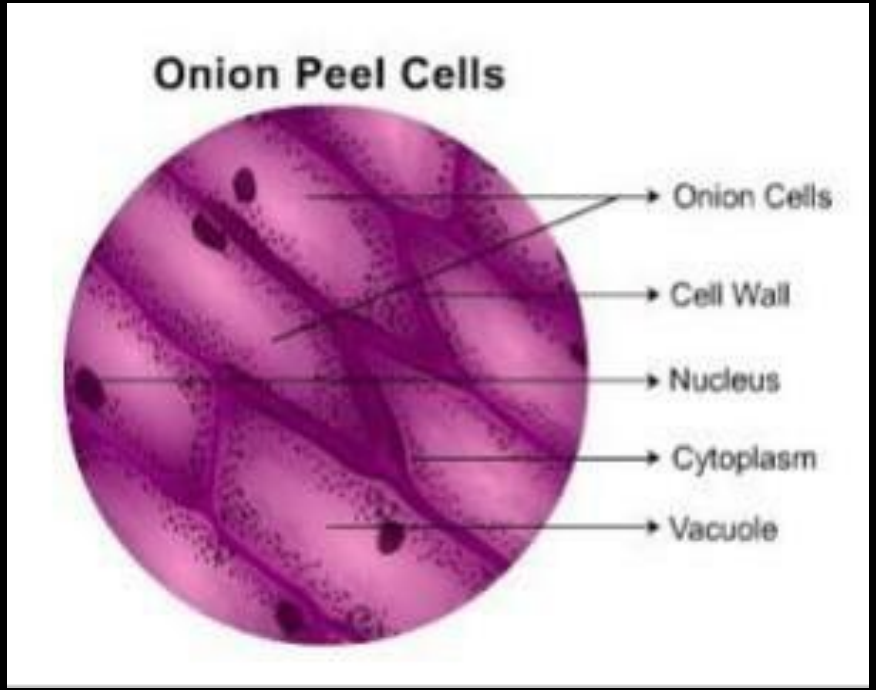
Definition of the problem

- *The problem is based on the effects that a variety of salts has on the onion cells structure*
- *We have to observe and record those effects so that we have a right conclusion to support*

Theory

- Salt is the common name used for NaCl, *chloride sodium*
- An onion cell is structured by the *cell wall*, *cell membrane*, *nucleus*, *cytoplasm* and *vacuole*.
- The *nucleus* is present at the periphery of the cytoplasm. The *vacuole* is prominent and present at the centre of the cell.



How are plasmolysis and osmosis defined

Plasmolysis

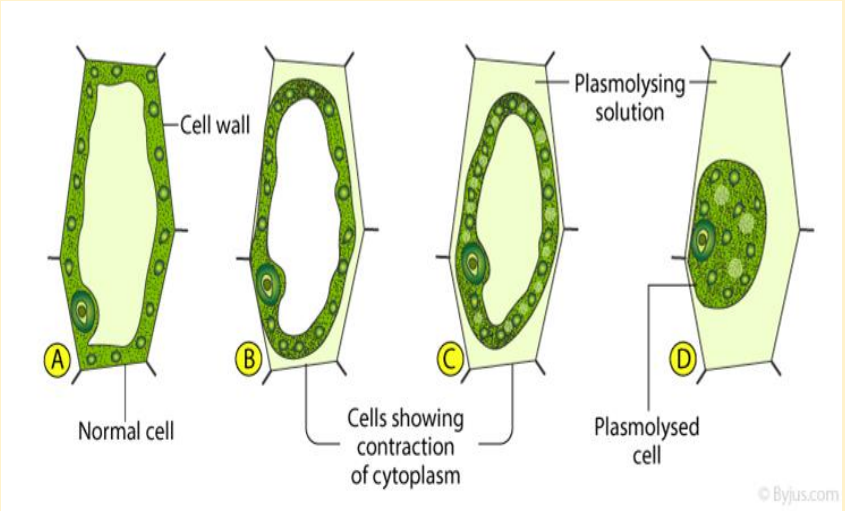
Plasmolysis is the process in which cells lose water in a hypertonic solution. The reverse process, deplasmolysis or cytolysis, can occur if the cell is in a hypotonic solution resulting in a lower external osmotic pressure and a net flow of water into the cell.

Osmosis

Osmosis is the movement of water through a semipermeable membrane from a region of high concentration to a region of low concentration, tending to equalise the concentrations of the water. Osmosis is passive transport, meaning it does not require energy to be applied.

Hypothesis

1. The onion cells will lose water due to the fact that they are in a hypertonic solution(plasmolysis-osmosis)



2. Our second hypothesis concerns the possibility of having different effects on onion cells based on the variety of the salts.

The experiment

The experiment

For the experiment, we were asked to observe and record the effects of a variety of salts on the onion cells structure. There are 12 kinds of salt.

1. Table salt
2. Sea salt
3. Himalayan salt
4. Black Hawaiian salt
5. Red Hawaiian salt
6. Kosher salt
7. Flake salt
8. Black salt (kala namak)
9. Smoked salt
10. Pickling salt
11. Celtic sea salt
12. Fleur de sel

We were able to use 5 of them: table salt, sea salt ,Himalayan salt, flake salt and fleur de sel

The experiment

- We choose to select *two kinds* of onions, a red one but also a white one.
- We cut through the onions leaving *four pieces*, two center ones and two sides ones.
- We measure the diameter of each onion (both 9cm)and proceed to place them in salt solution in different cups

- We place one piece of onion in each cup and adding different amount of salt solution in them.
- First we added *100ml* with *no salt*
- Second we added *100ml* water with *5gr of salt*
- Third we added *100ml* water with *10gr of salt*
- Lastly we added one piece of onion with *no water just salt*

A PHOTO FROM THE EXPERIMENT

The experiment

We took measurements on the *weight* of some pieces for example;

A *center* piece weights *77gr* and a *side* piece *57gr*

This way we can make conclusions in what was the *weight loss* for the onions

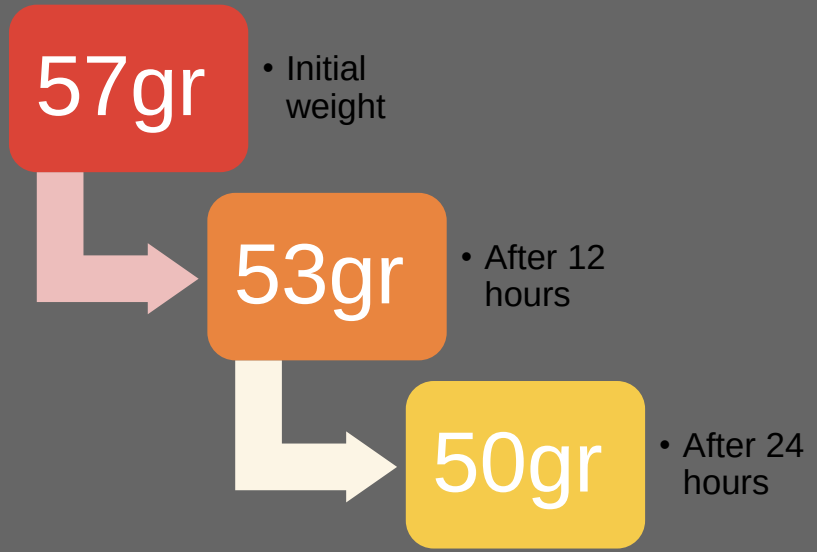
To have a clear view on the effects that salt solution has on onions, we watch the onion pieces *every 12 hours* in *two days.*

Results

After 2 days of observing we have noticed the following effects...

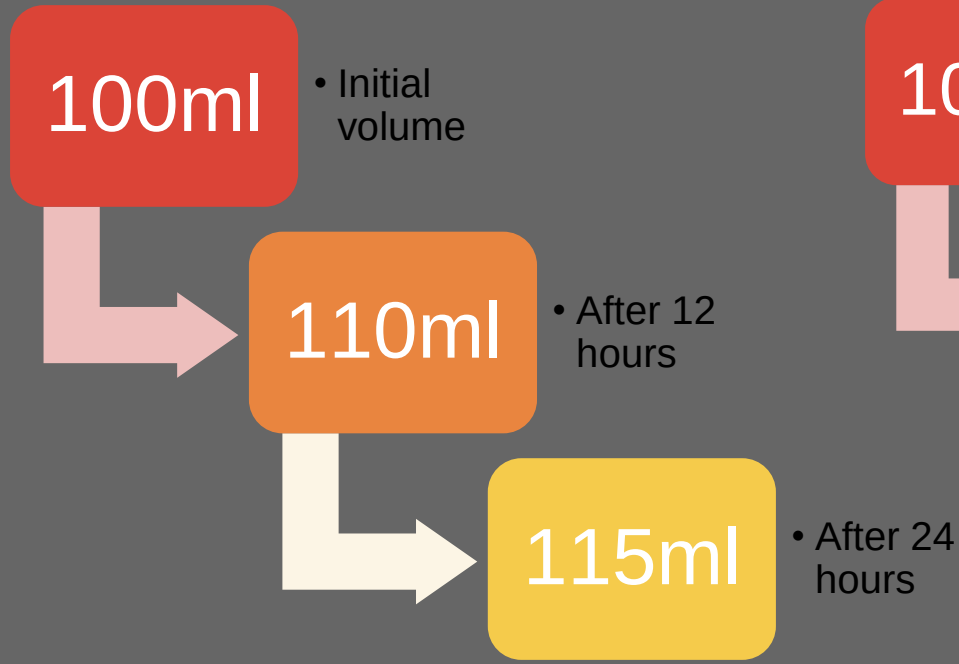
First sample (center piece on 100ml w/ 10 gr salt)

Second sample (side piece on 100ml w/ 5 gr salt

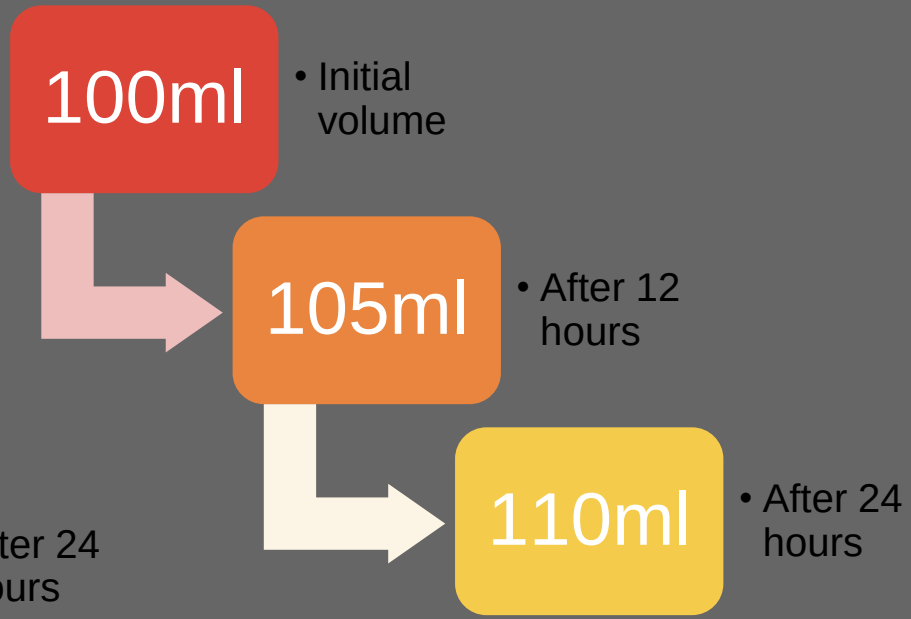


*Conclusions based on the weight of the pieces

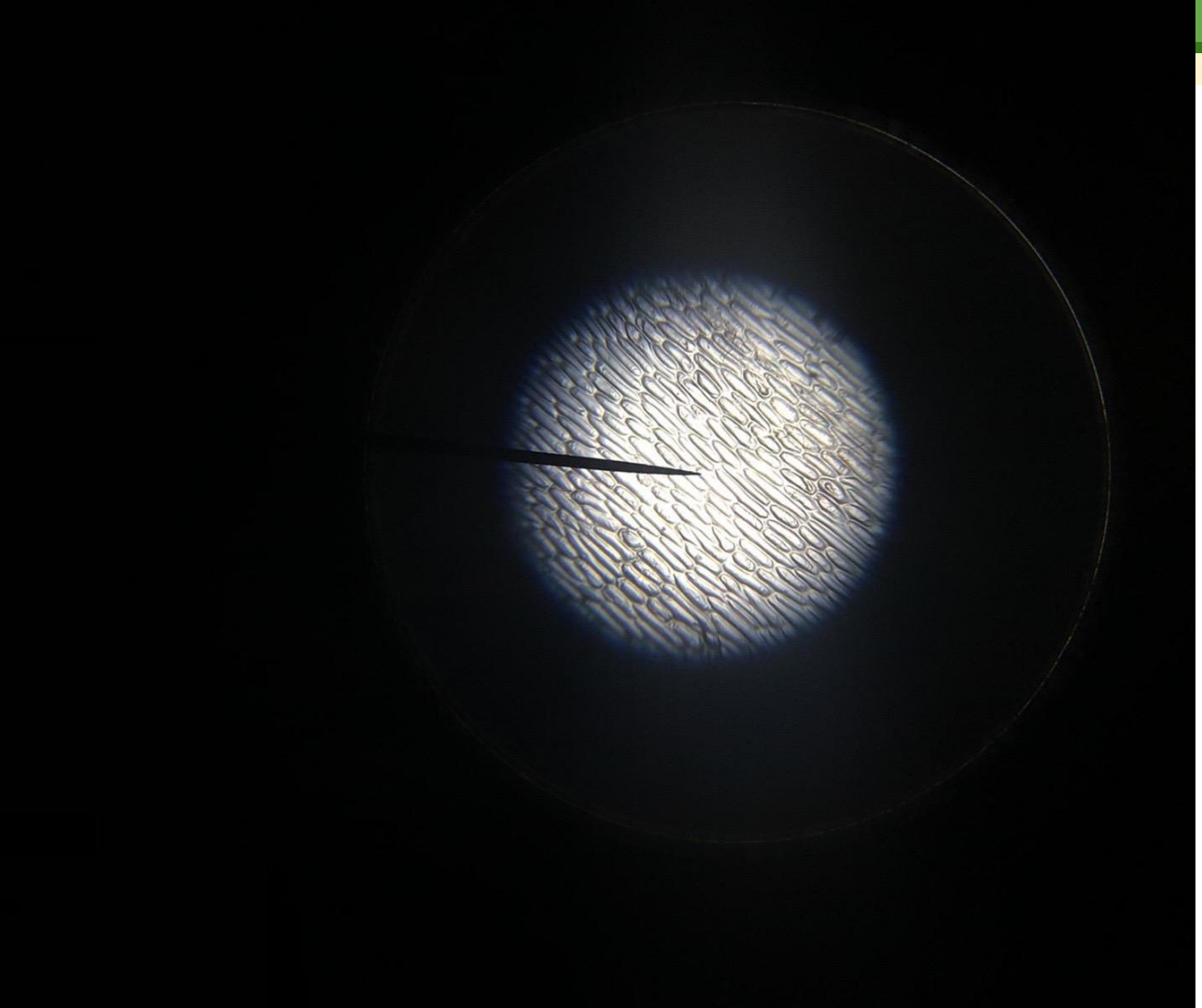
First sample (center piece on 100ml w/10gr salt)



Second sample (side piece on 100ml w/10gr salt)



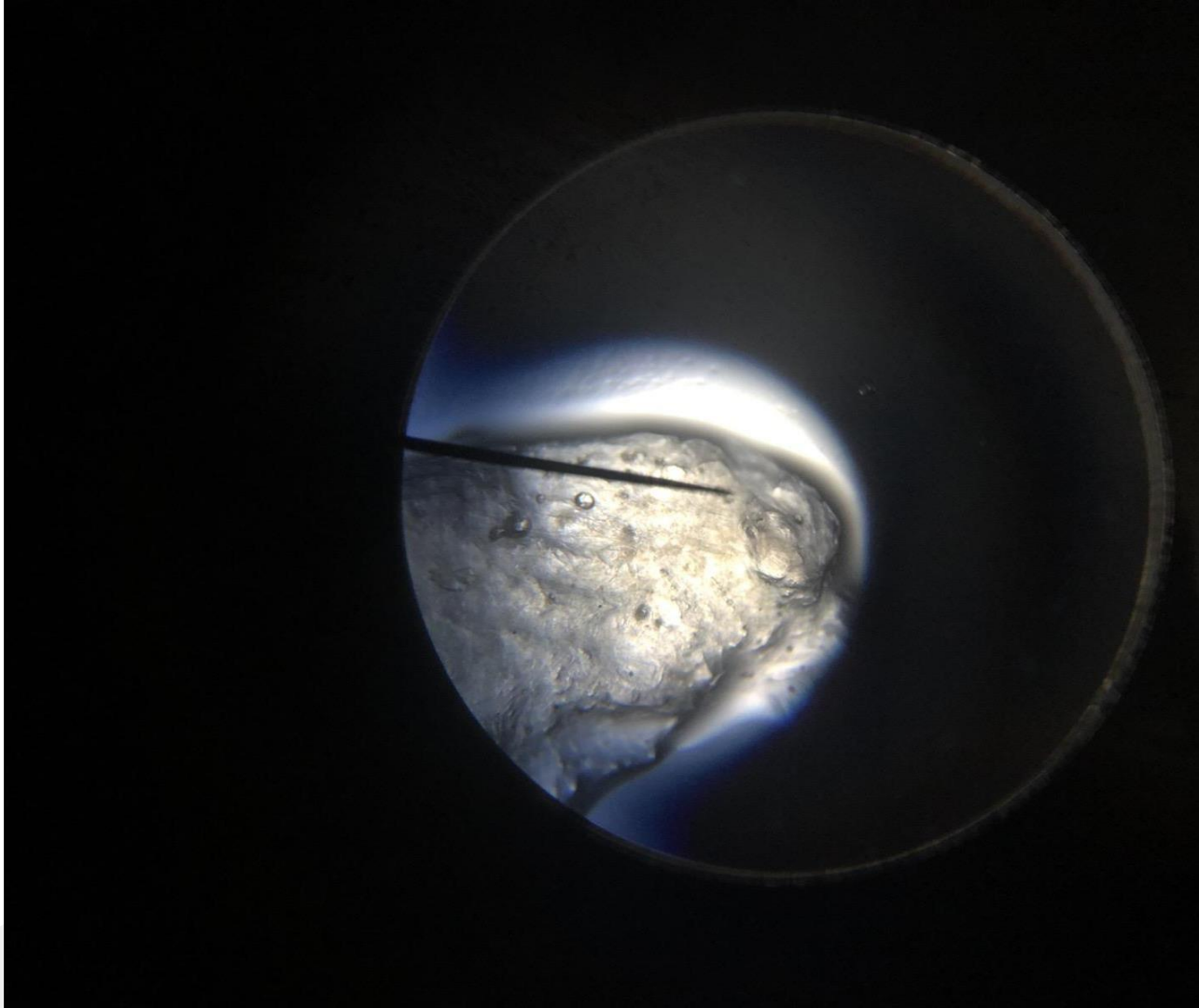
*conclusions based on the volume of water



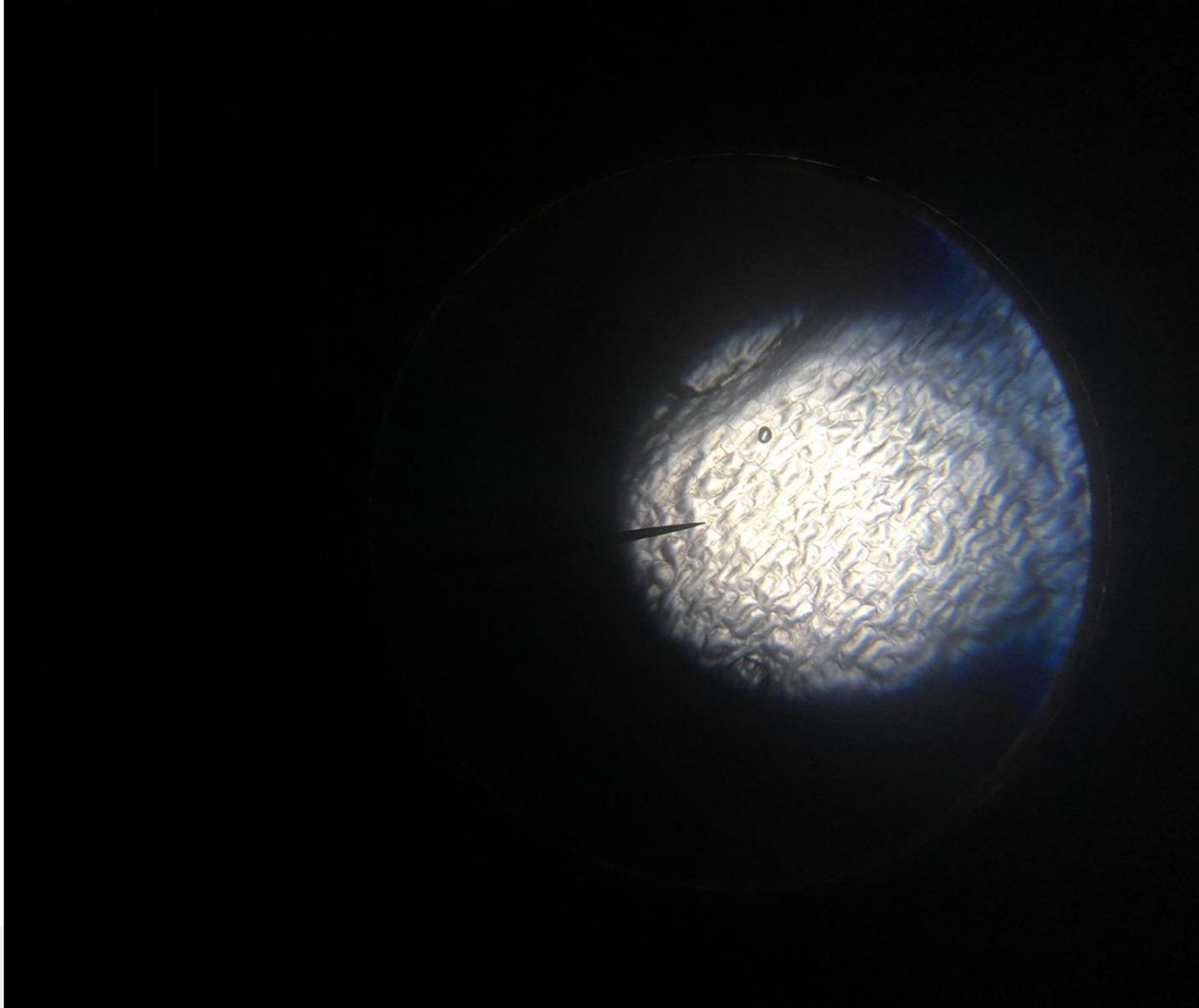
These are some pictures of our lab's microscope

picture of a fresh onion's cells

CELLS OF AN ONION ON THE EFFECTS OF PLASMOLYSIS (100ML WITH 10GR SALT)



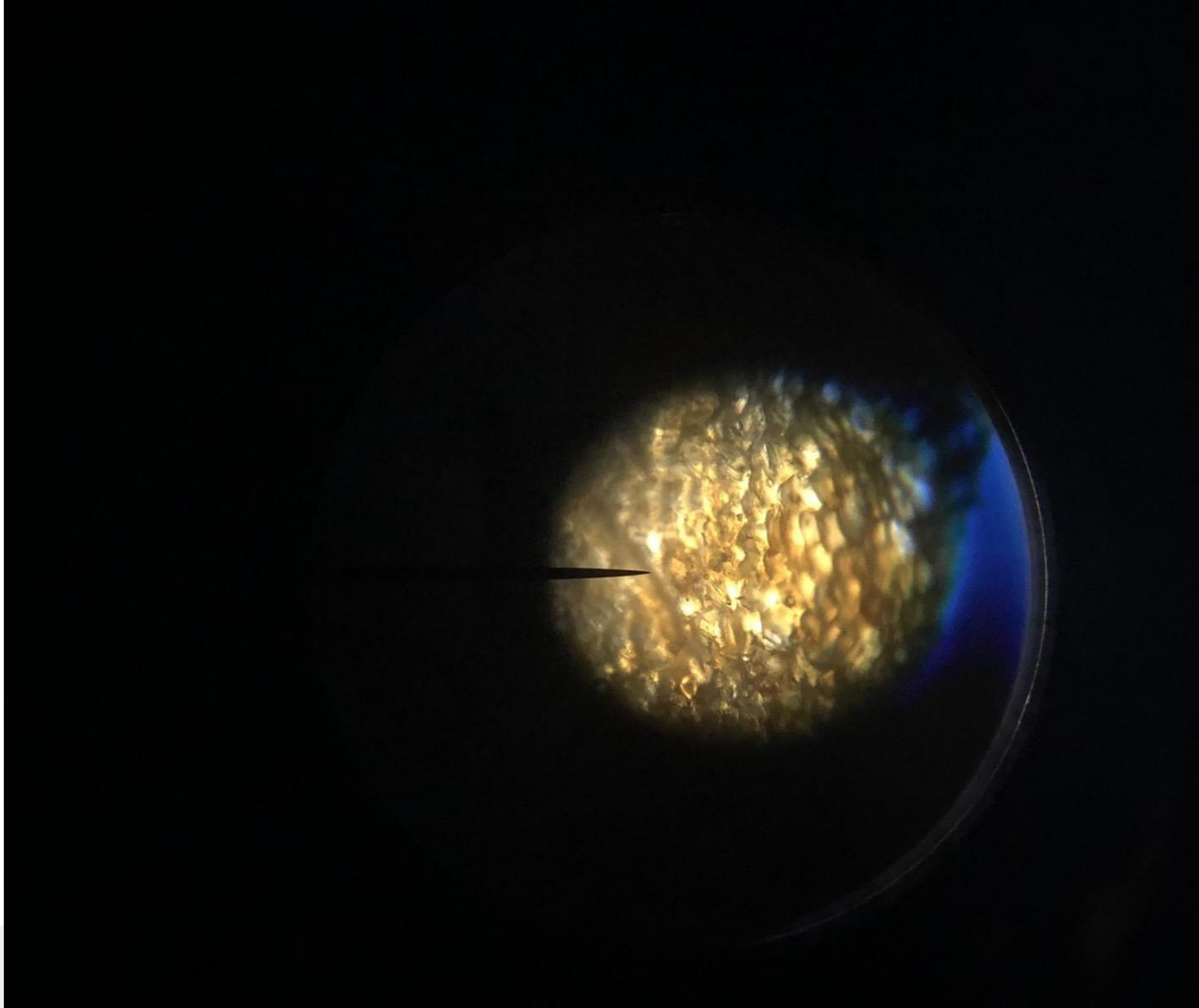
ONION CELLS ON THE EFFECTS OF PLASMOLYSIS (100ML WITH 5GR OF SALT)



Samples compared to each other

ONION CELLS ON THE EFFECTS ON PLASMOLYSIS WITH LUGOL FOR A BETTER VIEW

ONION CELLS WITHOUT THE EFFECT OF PLASMOLYSIS WITH LUGOL FOR A BETTER VIEW



Taking into consideration all the above we have proved that...

This experiment helped us learn about the osmosis phenomenon which had some incredible and unexpected results on onion cells

The effect of osmosis and plasmolysis made the onion cells (being in salt solution) not to absorb but to expel water due to to the fact that the are on a hypertonic solution.

Also with water leaving the cell we have noticed a weight loss on the onion.

Moreover something that is worth mentioning is that on the samples with more gr of salt the ml gain was more noticeable than the other samples.

Furthermore the differences between the effects each salt had was quite few, disproving our second hypothesis.

Lastly the samples that we placed only with salt but no water expelled 5 ml of cell water. So we see that even solid salt can effect onion cells.

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Thank you all for your time and attention

fryganiotis team

Appendix

Possible errors

- *Divergence on the process of measuring the salt and onion weight or the water volume*
- *Placing the samples in only one temperature (heat-cold)*
- *Using five kinds of salt*