

Plasmolysis and Deplasmolysis In Red Onion Cells



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Microscope view photos donated by Kiley Wells

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Introduction

The purpose of this experiment is to observe water movement in and out of cells and to better understand plasmolysis and deplasmolysis in red onion cells. When concentrated sucrose solution, which has less water potential than onion cells, is added to the surrounding environment of epidermal red onion cells, plasmolysis occurs. If this process is reversed, it is called deplasmolysis. Deplasmolysis can be observed by adding pure water to the outer environment of the onion cells. During deplasmolysis, the protoplast within the cell swells to its original size as water is drawn into the cells. These observations can be used for comparison to these processes in other plant cells.

Materials

1 red onion
Microscope
Microscope slide and cover slip
Pipettes
20 mL of deionized water
20 mL of 2.5 M sucrose solution
Razor blade

Procedure

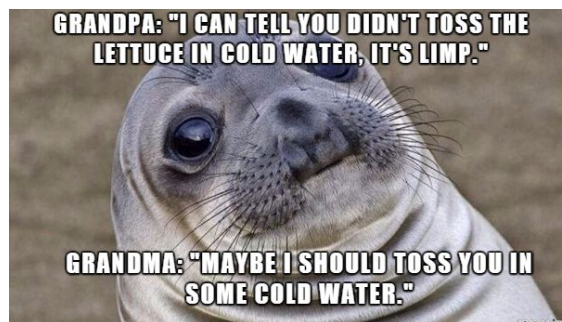
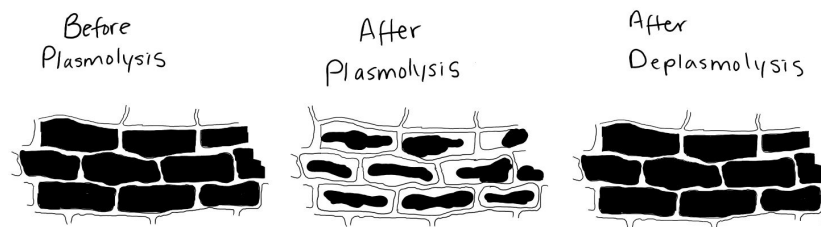
1. Peel off the outer scales from a red onion exposing the inner purplish bulb
2. Using the bulb, cut out a small section of tissue with a razor blade and make an incision through this tissue to obtain a thin slice of the epidermis
3. Place the epidermis tissue on a microscope slide with 2 to 3 drops of water and place a coverslip on the sample
4. Observe and record what is shown under low power and note the coloration and size of the vacuole.
5. Add 2-3 drops of 2.5 M sucrose to the tissue sample at one side of the coverslip
6. Quickly observe the shrinkage of the protoplast within the cells

7. Deplasmolyse the cells by adding water back to the tissue sample in the same manner the sucrose solution was added
8. Observe protoplast expansion.

Results and Discussion

Figure 1 is a drawing showing the onion cell in three different states throughout the experiment. Before being introduced to the hypertonic sucrose solution, the onion cell is turgid and full which can be seen in the left most representation of the cell (Figure 3). Once the onion cells are introduced to the hypertonic sucrose solution the cell undergoes plasmolysis (Figure 4). The plasmolyzed cell appears much less turgid with a shrunken vacuole that looks deflated, this can be seen in the center representation in Figure 1. Once the onion cells are introduced to pure water again, a hypotonic solution, the undergo deplasmolysis and return to a fully turgid state (Figure 4). This deplasmolyzed state can be seen in the far right drawing of Figure 1 and is almost identical to the onion cells original appearance.

Figure 1: Red onion cell reactions to plasmolysis and deplasmolysis



Conclusion

In conclusion overall as a class/group we learned a great value of patience. Why? Not only were we responsible to finish the plasmolysis lab but also review numerous websites on MERLOT that must be Bidlack approve. MERLOT is a great learning website that provides the visitor with a broad spectrum of materials to teach and be taught. Most of the websites were very interactive and entertaining that allows the visitor to enhance their knowledge based on the subject of interest. Reviewing these websites gave us the opportunity to better understand what goes on behind the scenes of an academically credible website. I think, next time to ease the mood of our class doing scientific reviews, a glass of Merlot to review MERLOT. Carter would be more than happy to provide the wine.

After reviewing two website a piece per student (to lessen the workload for Dr. Bidlack), we worked on the primary lab. The primary lab taught us as a group about plasmolysis. Under a light microscope we were about to see an onion cell before and after plasmolysis. It was very intriguing to see the movement of water in and out be dependent on the present of sugar. Cool stuff! Super short and sweet lab.

Pictures

Figure 2: Red onions cells prior to plasmolysis.



Figure 3: Red onion cells after plasmolysis

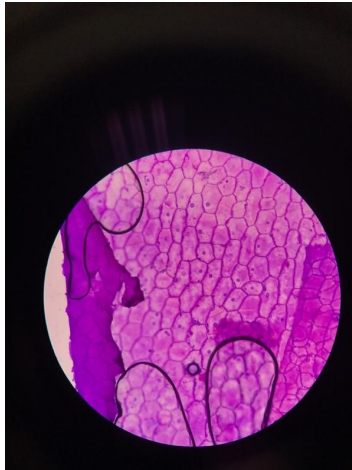


Figure 4: Red onion cells after deplasmolysis

