



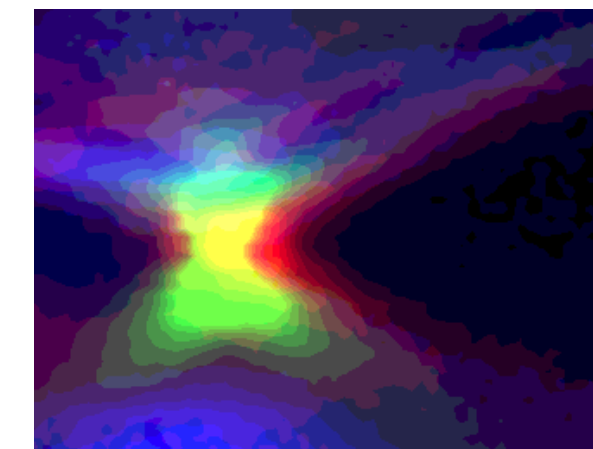
Arabidopsis plant

# CO<sub>2</sub> : FRIEND OR FOE TO PLANTS ?

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## INTRODUCTION AND OBJECTIVE

Our task was to study the effects of carbon dioxide on plant cells by determining the amount of mitochondria and chloroplasts in the cell. To do this, we used a fluorescence microscope to help us gather images. We also used 2D and 3D imaging programs to analyze our photos and measure the chloroplasts and mitochondria.

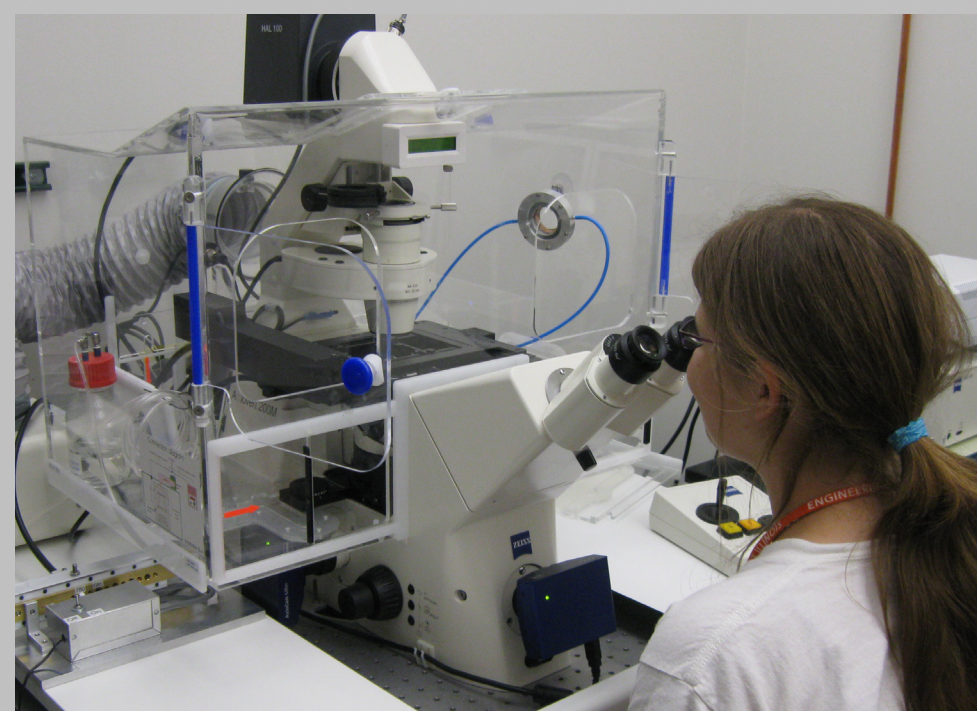
## MATERIALS AND METHODS

The materials involved in this project were the IGB Fluorescence Microscope: Zeiss Axiovert 200M, the Spinning Disk Confocal Microscope, the Axiovision 2D imaging program, and the Imaris 3D imaging program. The methods that we used were leaf dissecting (removing the epidermis) and the live sampling of an Arabidopsis plant.



Right: Fluorescence microscope

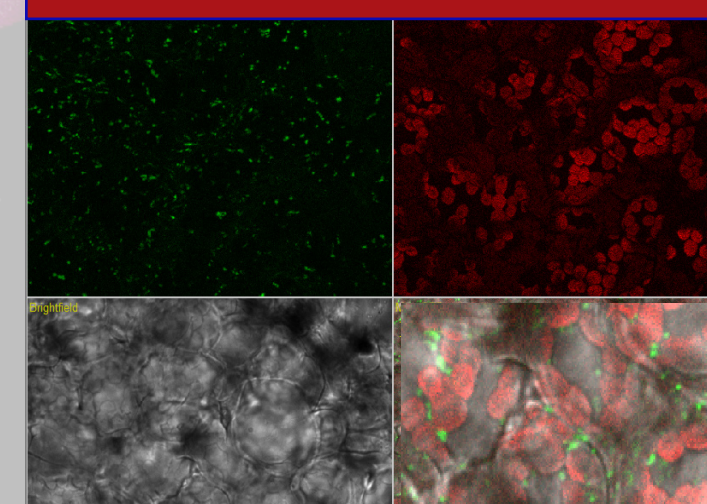
Left: Leaf dissection



## RESULTS

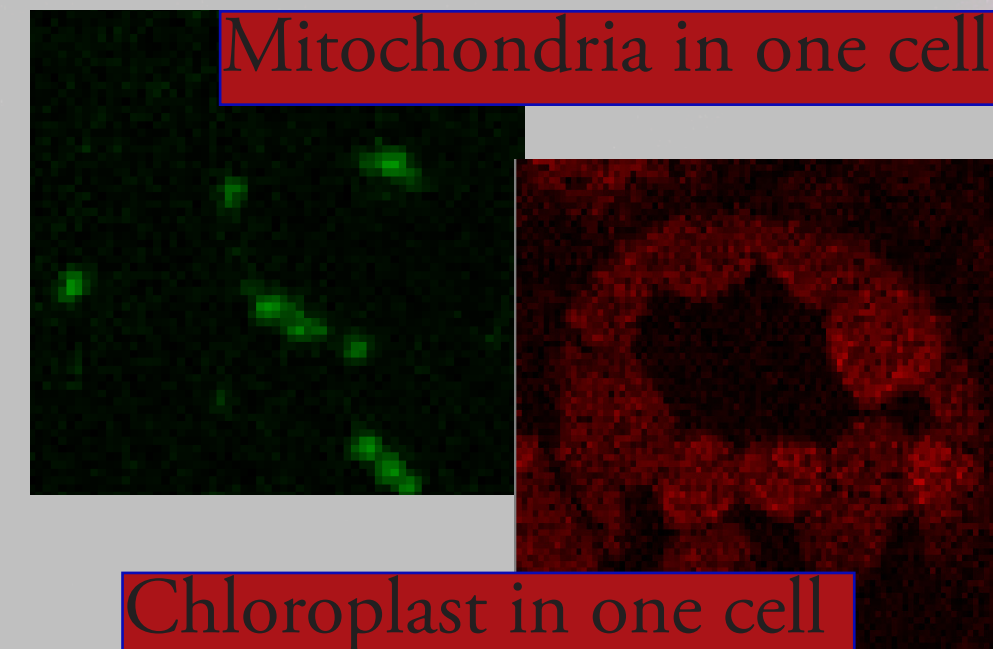
Positions/Sample	Mitochondria Area $\mu\text{m}^2$	Chloroplast Area $\mu\text{m}^2$	Cell Area $\mu\text{m}^2$	Mitochondria per Cell %	Chloroplast per Cell %
Ambient CO <sub>2</sub>					
Pos-1	188.13	144.30	725.21	25.94	19.90
Pos-2	65.91	192.55	1341.07	4.91	14.36
Pos-3	143.99	1097.60	1854.91	7.76	59.17
Mean	132.68	478.15		12.87	31.14
Elevated CO <sub>2</sub>					
Pos-1	79.51	345.51	2343.15	3.39	14.75
Pos2	30.72	212.18	2258.80	1.36	9.39
Pos-3	54.54	512.28	1272.21	4.29	40.27
Mean	54.92	356.66		3.01	21.47

Cells in one position



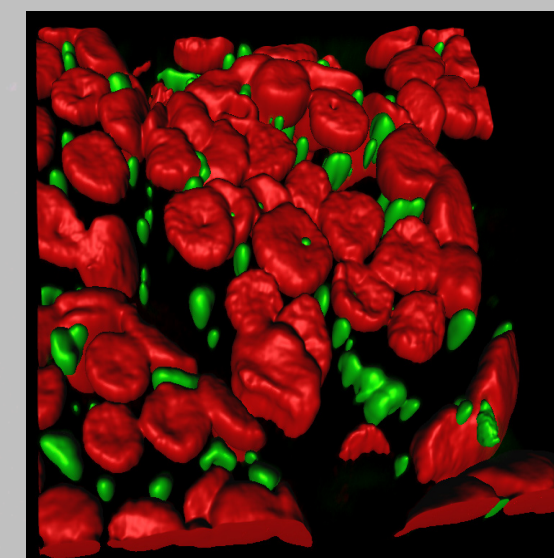
Choose one cell

Mitochondria in one cell



Chloroplast in one cell

3D image of a cell showing mitochondria and chloroplasts



## DISCUSSION AND CONCLUSION

From the information in the data table, it seems that in the elevated CO<sub>2</sub> samples, there were fewer mitochondria and chloroplasts than in the ambient CO<sub>2</sub> samples. This might lead us to believe that more carbon dioxide leads to fewer mitochondria and chloroplasts in a plant cell, but the results are inconclusive because we only tested three positions in two different leaves. Consequently, this experiment is inconclusive and the results are not reliable. To make this a better experiment we should test more samples from multiple leaves in both ambient and elevated conditions.



## ACKNOWLEDGMENTS

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