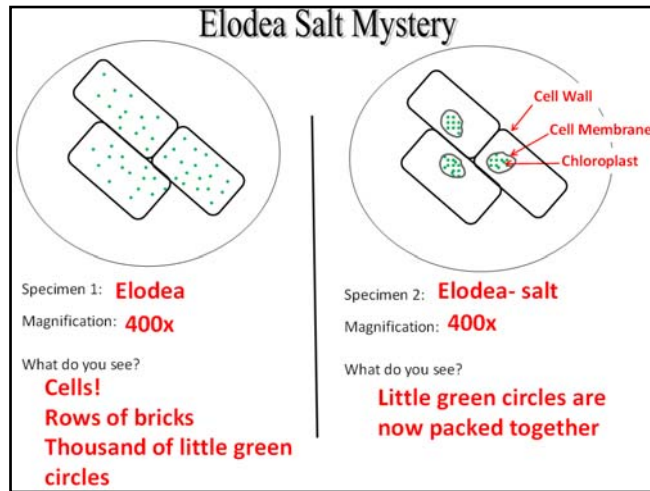


## Teacher Notes- “Elodea Salt Mystery”

Elodea is one of the most observed live specimen under the microscope. And for good reason- it’s stunning! Elodea is perfect to observe while you’re covering cells because it’s a plant that has only has 2 things you can see- the cell wall and the chloroplast. Those 2 also happen to be the only 2 things that plant cells have that animal cells do not.

If you’ve never done this with your students, then you might be wondering what the big deal is. Sure, this lesson is aimed at helping students see real plant cells up close and how different they are from animal cells. But it’s presented step-by-step for your benefit, so you can have confidence when you do this lesson.



**Materials per student/small group:** Student Handout (see last page), microscope, dropper, beaker, salt, slide, cover slip, green coloring pencils, towel, Elodea, pretzels (optional)

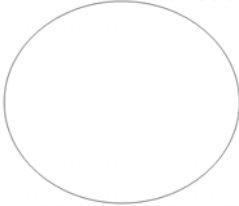
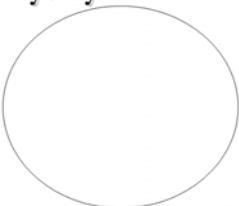
### Beforehand:

- To get Elodea, call your a local aquatics store (where fish are sold). I paid \$2.99 for four sprigs that I now keep growing in my freshwater aquarium at home.
- Practice this the day before! There is *no* better way to prepare than to do this yourself.
- During the lesson have an extra microscope setup for yourself up front. As you go through the lesson, do the activity along with your students. This will help make your instructions be more clear, and make it easier for students to follow.
- Go through the PowerPoint (see last page) and make any changes you want-add/remove/change labels and statements. Also check out the list of image links at the end. Insert images of Elodea into the PowerPoint to make it stronger. It’s helpful, when students are getting their first view of Elodea to get confirmation, by seeing a picture on the screen, what they’re supposed to be seeing.
- Prepare salt water- 10%-15% is ideal. To make 10%, dilute 5 grams salt in 45 mL of water. This will be enough to last all day.

1. At the beginning of class, go through microscope prep with students, if necessary. If they’ve never touched

microscopes before, they can still do this lesson. Today is not about learning the parts of the microscope. If they just listen and do what you say, everyone will be fine.

2. Give students a copy of the Handout (see last page).

Elodea Salt Mystery	
	
Specimen 1:	Specimen 2:
Magnification:	Magnification:
What do you see?	What do you see?

3. Make Elodea slides: At front of room, have the slides, Elodea, and cover slips. After students get in groups of 2 or 3, have one per group come get a slide, then see you for a small piece of Elodea (1/4 leaf is plenty). After you add two drops of aquarium water, have them cover with a cover slip.

You could have done all this yourself, or with a couple of student helpers. But students love making slides, and this helps them see and understand where the specimen came from (a big plus).

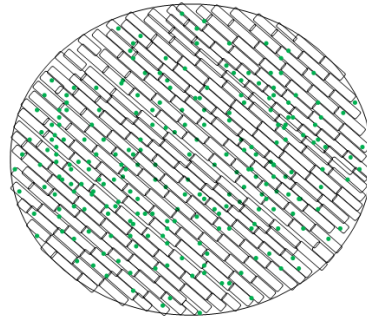
4. Have students put their slide on microscope stage and clip it down. Bring the Elodea into focus on low power (*red- 40x. The objective magnifies the image 4x, and the eyepiece another 10x.  $4 \times 10=40$* ). Then switch to medium power (*yellow- 100x*), and use fine focus to adjust clarity.

Depending on your microscopes, you may or may not want to go to high power. Your best view may be on medium.

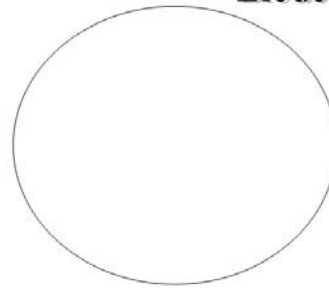
5. Give students a couple of minutes to just observe and react to what they see in the microscope. Don't rush this part. **\*Critical-** clarify what a cell is- each box or square is a cell. *Not* each little green circle (many think this!). That's the purpose of slide #1 on the PowerPoint- so you can point to each little box and say, "**THIS** is a cell, and so is this and this. Each little box is a cell. See these little green circles? They are not cells." Be very clear and deliberate.
6. If you've been studying cells very long, someone may be wondering- "where is the nucleus"? Unfortunately the nucleus, vacuole, mitochondria, and other organelles are just too small to see in these cells. The only 3 parts we can actually see are the cell wall, cell membrane, and chloroplasts.

To see a nucleus, you could stain cheek cells tomorrow-have students scrape the inside of their cheek with a toothpick, wipe on a slide, add a drop of iodine, and cover with a slip. You'll see the little cells (this time blobs, not square, since these are animal cells), each with a little dot in the middle. That's the nucleus.

## Elodea Salt Mystery



## Elodea Salt Mystery



Specimen 1: **Elodea**

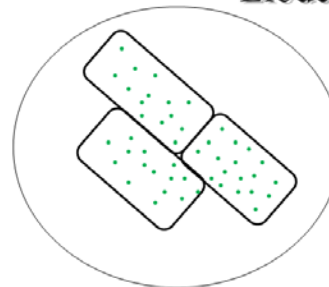
Magnification: **400x**

What do you see?

7. On the Student Handout, record the “Specimen 1”, “Magnification”, and “What do you see?”. Use PowerPoint prompts to guide your students through this.

8. Students will now make a drawing of the Elodea in the large circle on the handout. Instead of drawing tens or hundreds of cells, let’s just draw a few representative cells, as shown. Start with the cell walls.

## Elodea Salt Mystery



Specimen 1: **Elodea**

Magnification: **400x**

What do you see?

**Cells!**  
**Rows of bricks**  
**Thousand of little green circles**

9. After the cell walls are drawn have students draw the chloroplast using green colored pencils. Notice they’re evenly spread out inside the cell. That’s going to change soon.

\*Tip- hand out the green coloring pencils **AFTER** they’ve drawn the cell walls!! If you hand out green pencils earlier than this, they’ll use them to draw everything, not just the chloroplast. Not good.

10. Now onto part 2 of the lesson-salt. Before adding salt to the Elodea, ask students what salty pretzels do to their mouth (dries it out). You can even give each student a few pretzels so they can experience this. Ask what salt might

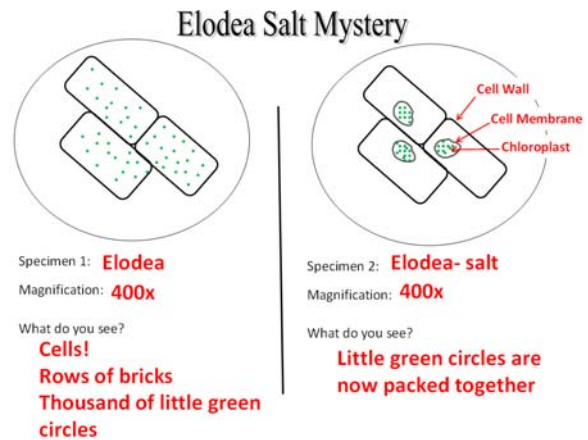
do to our plant cells (dry it out).

11. Have students bring their slides to you. Then remove the cover slip, dab away the fresh water on the slide with a towel, add a few drops of the 10% salt solution, and bring back into focus under microscopes. Students should see very noticeably that all the chloroplasts now look bunched up in the middle of the cells. This is called plasmolysis. The salt dried it out.

12. On the handout, record the particulars for “Specimen 2”. Use PowerPoint prompts.

Also have students label the 3 structures—cell membrane, wall, and chloroplast.

13. Record the Summary statements at the bottom of the handout.



### Summary

- **ALL living things are made of cells**
- **Plant cells have 2 things that animal cells do not have:**
  1. **cell wall**
  2. **chloroplast**

**During Photosynthesis, the Chloroplast converts sunlight into sugar**

Afterwards- Clean the lenses and stage to remove any salt that might be on it. Do this before the salt has a chance to dry- it's much harder to get off then.

### Extensions

- Cheek cell lab (stain with iodine). “Hey, our cells aren't boxy, and don't have little green circles in them!”

## Watch it happen

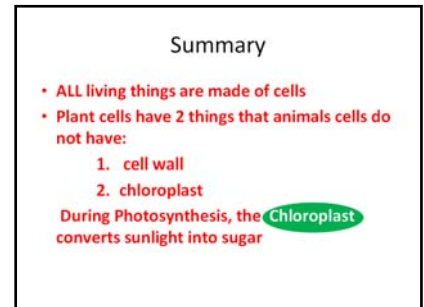
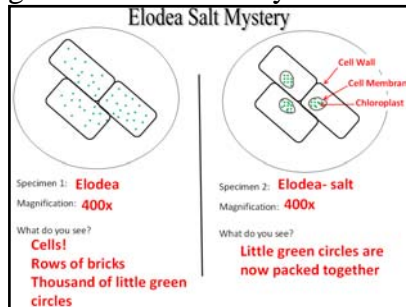
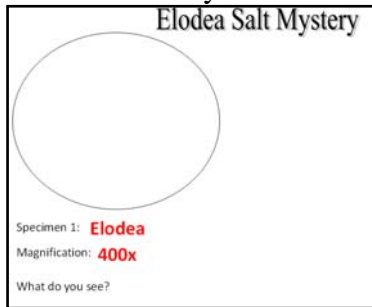
- [http://www.youtube.com/watch?v=VK-\\_YHakvho](http://www.youtube.com/watch?v=VK-_YHakvho)
- [http://www.exploratorium.edu/imaging\\_station/activities/classroom/Elodea\\_explorations/ca\\_Elodea\\_explorations.php](http://www.exploratorium.edu/imaging_station/activities/classroom/Elodea_explorations/ca_Elodea_explorations.php)

## Images of Elodea

- [http://www.google.com/images?um=1&hl=en&client=firefox-a&rls=org.mozilla%3Aen-US%3Aofficial&biw=1280&bih=610&tbs=isch%3A1&sa=1&q=Elodea+cell&aqi=&aql=&oq=&gs\\_rfai=](http://www.google.com/images?um=1&hl=en&client=firefox-a&rls=org.mozilla%3Aen-US%3Aofficial&biw=1280&bih=610&tbs=isch%3A1&sa=1&q=Elodea+cell&aqi=&aql=&oq=&gs_rfai=)
- [http://www.ndpteachers.org/perit/biology\\_image\\_gallery1.htm](http://www.ndpteachers.org/perit/biology_image_gallery1.htm)  
<http://www.und.nodak.edu/dept/jcarmich/101lab/lab4/lab4.html>

Come back and visit [InteractiveScienceTeacher.com](http://InteractiveScienceTeacher.com) to upgrade this lesson with:

**PowerPoint-** lead your students through the lesson click-by-click



## Student Handout

