

Plant Cell Dissection
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This dissection was modeled after an 'alien autopsy' video – the idea is that you have just made an astounding discovery and you are trying to determine what it is and what are the contents inside.

General Tips:

- Pasta is DNA – long pasta is linear DNA (within the nucleus) and the small circular soup pasta is the circular DNA found within chloroplasts and mitochondria.
- The glass beaker is the cell wall
- plastic bags are the cell membrane (shopping bag), Nuclear membrane and Smooth and Rough ER – continuous (produce bag) and the Ziploc is the central vacuole
- Cell components
 - Grapefruit (nucleus)
 - Tomatoes (mitochondria)
 - Limes (chloroplasts)
 - Whole Allspice (large ribosomal subunits) + peppercorns (small ribosomal subunits) * note – you can use just allspice to act as an individual ribosome if desired. These will independently adhere to the plastic produce bag making your rough ER.
 - Whole Cloves – can be used to model the nucleopores (pores in the nuclear membrane) also helps to secure the produce bag to the grapefruit.

Materials:

To deal with the mess:

- Gloves
- Paper towels
- Clothing cover (lab coat or other) – IT WILL GET MESSY!

To help with the presentation:

- Computer projector and webcam

Large glass beaker (2-3L)

Large watch glass (fits on top of glass beaker)

Plastic shopping bag

Plastic produce bag (can get at any grocery store produce department)

Med-Large Ziploc bag

Grapefruit

Long noodles (linguini, spaghetti, etc.)

Small circular soup noodles

Small limes (Key limes work well but aren't always available) ~ 2-3
Cherry or small Roma tomatoes ~ 2-3
Whole allspice (4-5 Tbsps)
Whole peppercorns *
Whole cloves
Cherry

Gelatin (8-16 packages/cell – see gelatin solution)

Directions:

Gelatin solution:

1. Follow the package directions but use ~1/3-1/2 less liquid depending on how firm you want your cytoplasm to be.
2. The amount of liquid depends on the number of things you're planning to put inside your cell and the total volume of the beaker.

Nucleus, Chloroplast and Mitochondria:

1. Cook the small circular soup pasta and long noodles according to directions, cool.
2. You need to hollow out the limes, grapefruit and tomatoes. First carefully make a small incision and then scoop out the insides using a small spoon or strawberry huller. Try to keep as much of the outside skin intact.
3. Once as much of the material is removed as possible put some of the soup noodles into the limes and tomatoes and place the long noodles into the grapefruit. If you like you can also insert a cherry into the grapefruit to act as the nucleolus.

Making the cell:

1. Place the shopping bag inside the glass beaker. You will continue to add the contents of the cell into the plastic bag inside the beaker. Place one of each of the chloroplasts and mitochondria inside.
2. Add some of the gelatin solution.
3. Fill the Ziploc with water, close tightly, and place on top of the organelles.
4. Add some additional gelatin solution.
5. Place the nucleus inside the produce bag, securing with whole cloves inserted through the bag into the grapefruit skin if desired. Place the nucleus/nuclear membrane/ER inside the cell.
6. Sprinkle ribosomes (either whole allspice + peppercorns or just allspice) into the cell – SEE NOTE.
7. Add remaining gelatin solution and place in the refrigerator at least 12-24 hours.
8. Place watch glass on top for transport/storage.

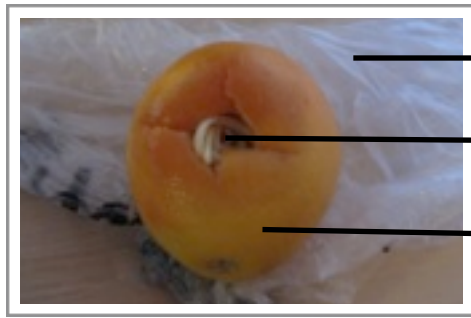
NOTE: As the gelatin solidifies you will need to stir it occasionally (ideally about every 30-45 minutes for the first few hours) to distribute the ribosomes within the cell.



Cell membrane
(large plastic bag
- shopping or produce)

Cell wall
(glass beaker)

1. Early Cell



Nuclear membrane
and ER (produce bag)

Linguini (linear DNA)

Grapefruit (nucleus)



Allspice (ribosomes)

2. Construction of the nucleus, nuclear envelop and ER.



Tomato (with circular noodles
inside) - mitochondria



Limes (with circular noodles
inside) - chloroplasts

3. Finished Cell!