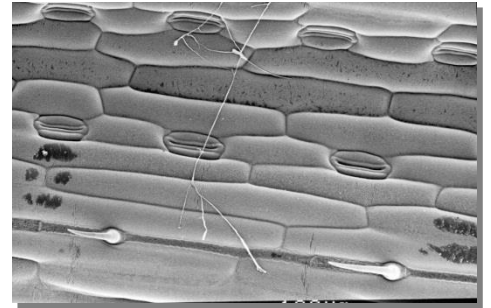
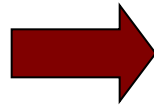


Wheat Germ DNA Glop

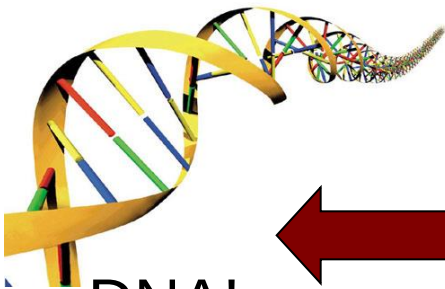
Extraction



Wheat
Germ



Wheat Cell



DNA!

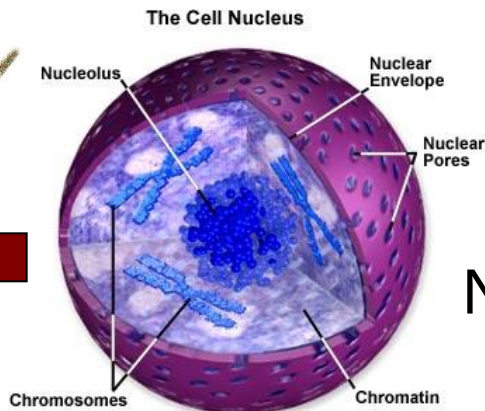
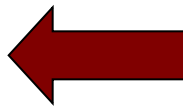
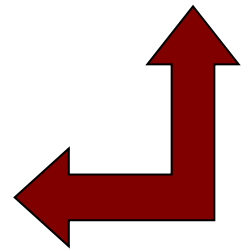


Figure 1

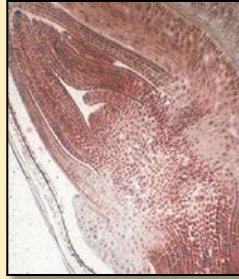


Nucleus

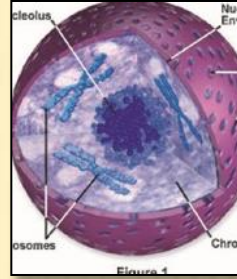
Wheat Germ DNA Glop Extraction



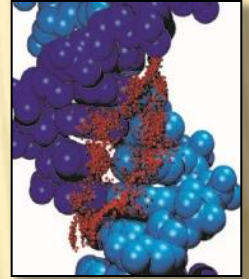
Wheat



Cells



Nucleus

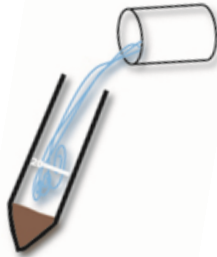


DNA

1. Take one tube containing 1 gram of wheat germ.



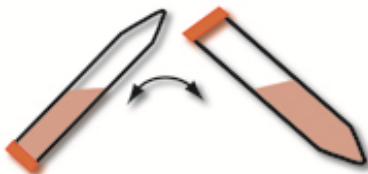
2. Pour water into the tube up to the 20 mL mark on the tube.



3. Shake the tube for 3 minutes. Then add 1 small soap tube into the wheat germ tube.

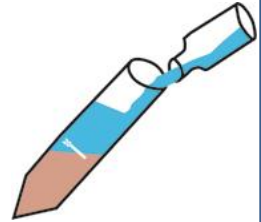


4. Gently rock the tube for 3 minutes. Try not to make any bubbles.

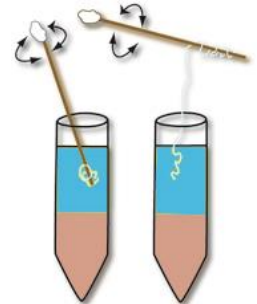


5. With the tube at an angle, gently pour alcohol in the tube up to the 35 mL line.

Do not shake!!



6. Do you see some white glop in the top layer? Take a swab and try to remove the glop with the wooden end. **Try scooping, spinning and twirling it, but do not stir.**



7. Once you have collected some glop on the stick, put the glop into a small clear tube. This can be your own sample of DNA to take home!



Questions to ask while conducting the Wheat Germ DNA Glop Wheat Germ

"Please read the destruction sheet, and look at the four photos across the top."

What part of the wheat do we eat?

Do we eat the roots, the stems, the leaves, or the flowers? Or do we eat the seed?

If you slice the seed real thin and look at it under a microscope, what do you see?

If you look in the cells what is the big round thing you may see?

If you look in the nucleus you may see chromosomes, and what are chromosomes made up of?

What does **extract** mean? Does that mean we're going to make DNA?...or does it mean we're gonna pull DNA out?

When you go to the dentist and the dentist **extracts** a tooth, has the dentist made a new tooth or has the dentist merely pulled out an existing tooth?

After each step, ask the people to stop, pop the top, and smell the stuff. And put your finger in the stuff to feel how it feels. Does the feeling change?

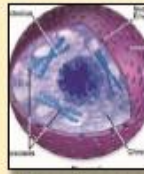
Wheat Germ DNA Glop Extraction



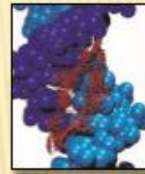
Wheat



Cells



Nucleus



DNA

The mark indicated 20 what? About how big is 1 mL?

While shaking for 2—3 minutes, you can go through the recipe/cookie parable if you didn't start with that (next page). Otherwise, talk with the learners about their ideas of what DNA is.

Can you guess what the green/blue goo is? What is the purpose of adding it to the water and wheat germ mixture?

1. Take one tube containing 1 gram of wheat germ.

2. Pour water into the tube up to the 20 mL mark on the tube.

3. Shake the tube for 3 minutes. Then add 1 small soap tube into the wheat germ tube.

4. Gently rock the tube for 3 minutes. Try not to make any bubbles.

5. With the tube at an angle, gently pour alcohol in the tube up to the 35 mL line. **Do not shake!!**

6. Do you see some white glop in the top layer? Take a swab and try to remove the glop with the wooden end. **Try scooping, spinning and twirling it, but do not stir.**

7. Once you have collected some glop on the stick, put the glop into a small clear tube. This can be your own sample of DNA to take home!

Why does the alcohol stay separate from the water?

Show them how to use a wooden Q-tip to gently swirl the fine white threads in the blue; encourage them to "Stay up in the blue, don't go down in the goo" with their wooden sticks.

BioTrek - University of Wisconsin Biotechnology Center Outreach Program

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Adapted by: Melissa Breunig and Cassandra Immel

Written by: Tom Zinnen, zinnen@biotech.wisc.edu

03/2010

Key Information to include in the presentation

Is DNA something you can actually see, work with, handle, and pull out from ordinary living things, including foods such as wheat germ?

Pondering Points...

- Given the choice between having a plate full of cookies and the recipe card for cookies, which would you take, and why?
- If you have cookies, can you eat them right away? Do you avoid having to go through the work of making them? But once they're gone, can you make more?
- If you have the recipe, what do you have? Ingredients? Oh? Is there a pile of flour on the recipe card? So do you have ingredients, or do you have information about the ingredients? Is it a powerful thing to be able to store, retrieve, edit, copy and share recorded information, whether it's a recipe, a DVD, or DNA?

So why do we study DNA? Because DNA is like the genetic recipe card for living things: it's the stuff that carries the information.

The glop is only partly DNA; it also contains protein and carbohydrates.

The key thing: is DNA something so small you can't work with it? Or is something that you can collect enough to be able to see?

Speaking Points

Introduction:

All the different facilities in the Biotech center are directly related to knowing and understanding genetics. You can get careers working in research labs, at biotech companies, genetic counselors, and in facilities such as those found in the UW Biotechnology Center.

Today, we are going to Extract DNA from Wheat Germ. This exploration station highlights some of the areas that can be focused on with a degree in genetics or molecular biology.

How is Wheat germ DNA Extraction directly related to genetics on the large-scale view of things such as a career in genetics and projects such as the Human Genome Project?

The basic methodology is true for all DNA extraction, so any place that needs to see or work with DNA has to extract it. When looking at gene expression and proteins, it is key to understand what role DNA plays in those processes. Currently, there is a lot of talk about the \$1000 genome. Where any person can get his or her entire genome sequenced for only \$1000. One of the big industries that could arise from the \$1000 genome is genome interpretation, or being able to look at those four base pairs and explain to people what the information is telling them.

Wheat germ is the embryo part of the wheat grain. Why use only the embryo?

Embryo is the part that actually contains genetic material. The starch and bran are just to nurture and protect, respectively, the new plant.

Where is the DNA in the embryo? The Cell

Where in the cell? The nucleus

How are we going to get to the nucleus?

Follow along with the instructional sheets:

We first add water.

What does the water do?

Swells the cells to make it easier to break down. Water goes in through the proteins and causes turgor pressure.

We then add soap, AKA detergent, what does that do?

It creates little holes in the cell membrane and wall. This allows for water to move freely into the cell and eventually causing the cell to explode. Similar to putting too much air in a balloon.

Now that it is all mixed, can you see the DNA? Where is it?

Add the alcohol slowly to ensure it doesn't mix with the DNA glop at the bottom of the test tube. Now what do you see? What is that white stuff in the blue alcohol layer?

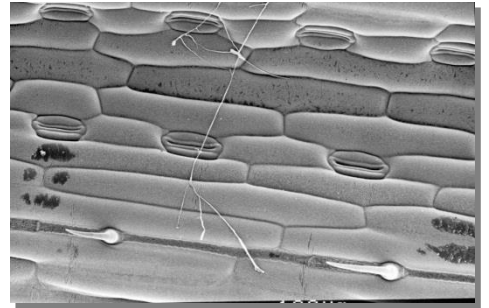
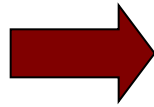
DNA. It is soluble in water, but not soluble in alcohol due to the $-OH$ group on alcohol; therefore, DNA precipitates in ethanol.

Wheat Germ DNA Glop

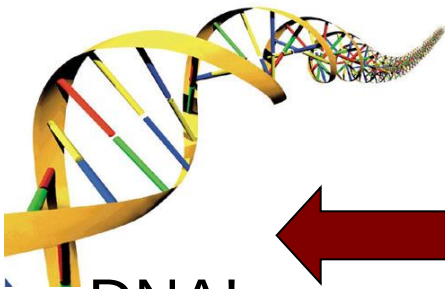
Extraction



Wheat
Germ



Wheat Cell



DNA!

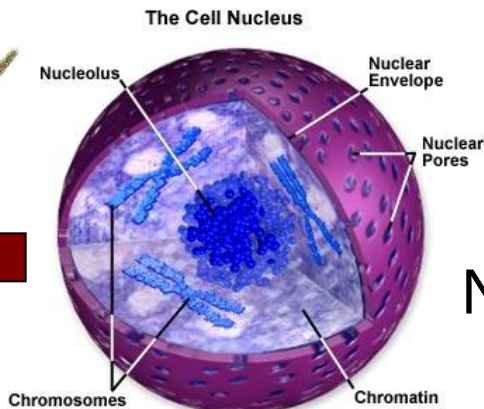
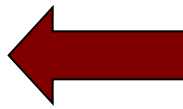
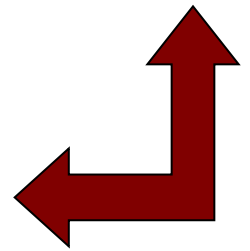


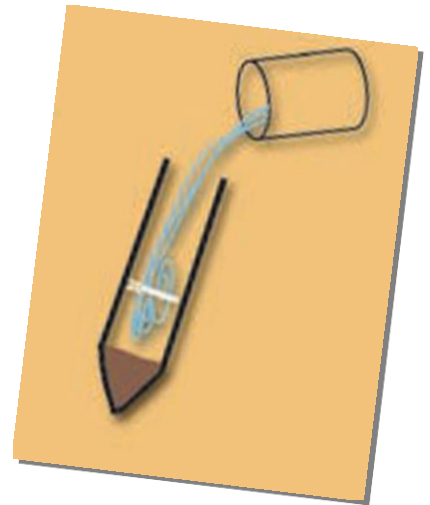
Figure 1



Nucleus

Wheat Germ DNA Glop Extraction **Step 1**

Pour Water into
the Wheat Germ
Tube up to the 20
mark and shake
for 3 minutes.

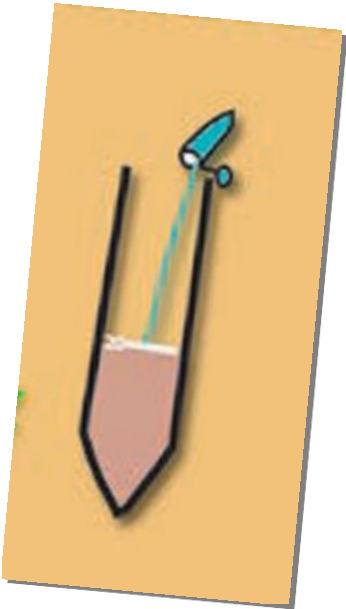


Make sure the top is on tight!

What does the 20 mean?

Why are you adding water to the
wheat germ?

Wheat Germ DNA Glop Extraction Step ↺



Add one soap tube
and rock gently for
3 minutes.

*Make sure the top is on tight!
Try not to make any bubbles!*



Wheat Germ DNA Glop

Extraction

Step 3

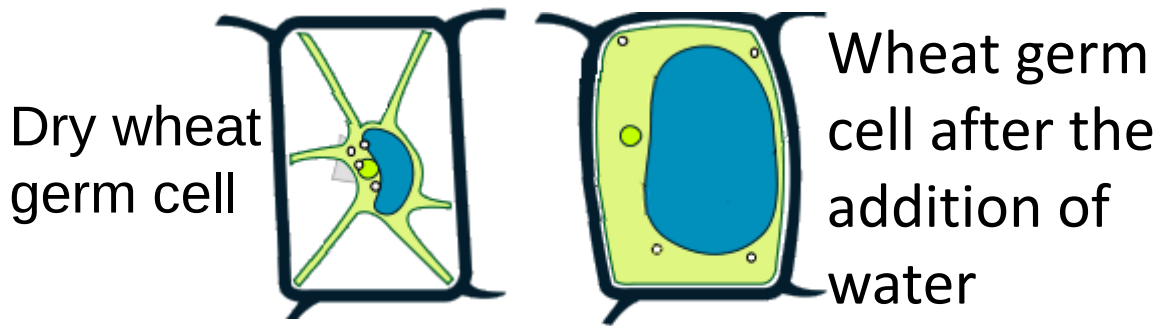


With the tube *at an angle*, gently pour alcohol into the tube up to the 35 mark. **DO NOT SHAKE!!!**

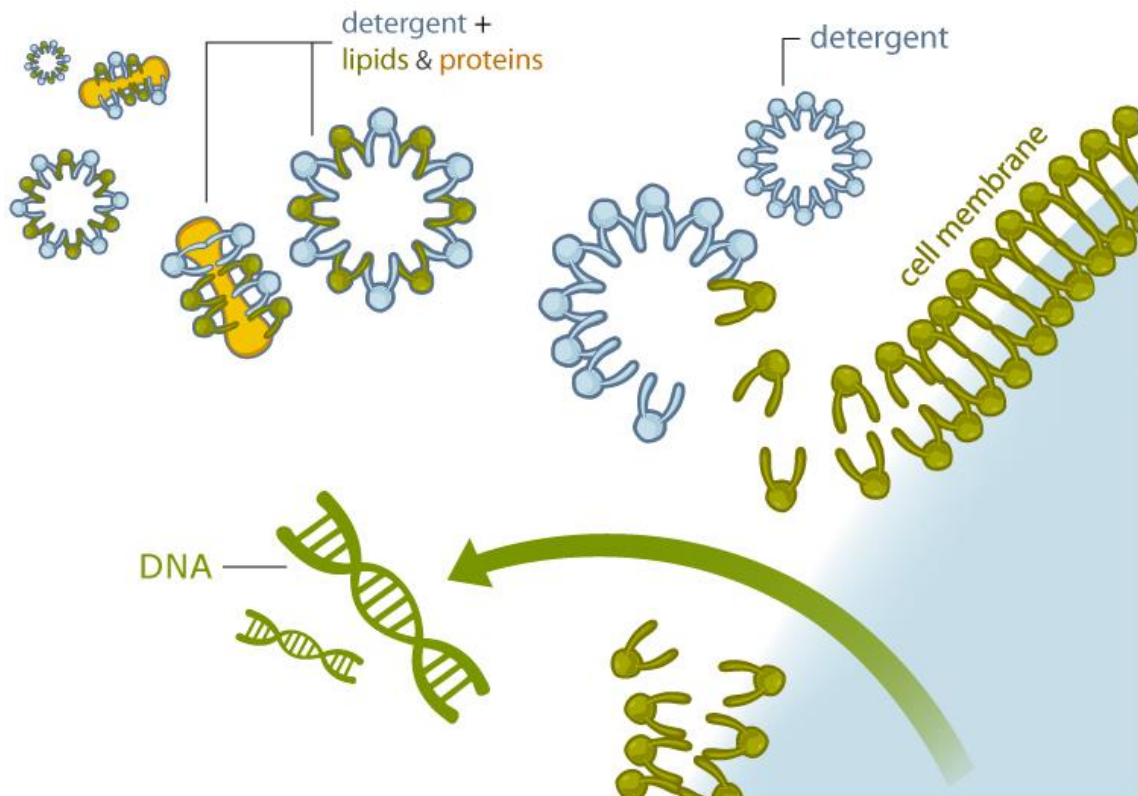
Do you see anything in the tube?

Use the wooden end of the giant Q-tip to remove the white glop. You can put some glop into a clear tiny tube to keep as a souvenir.

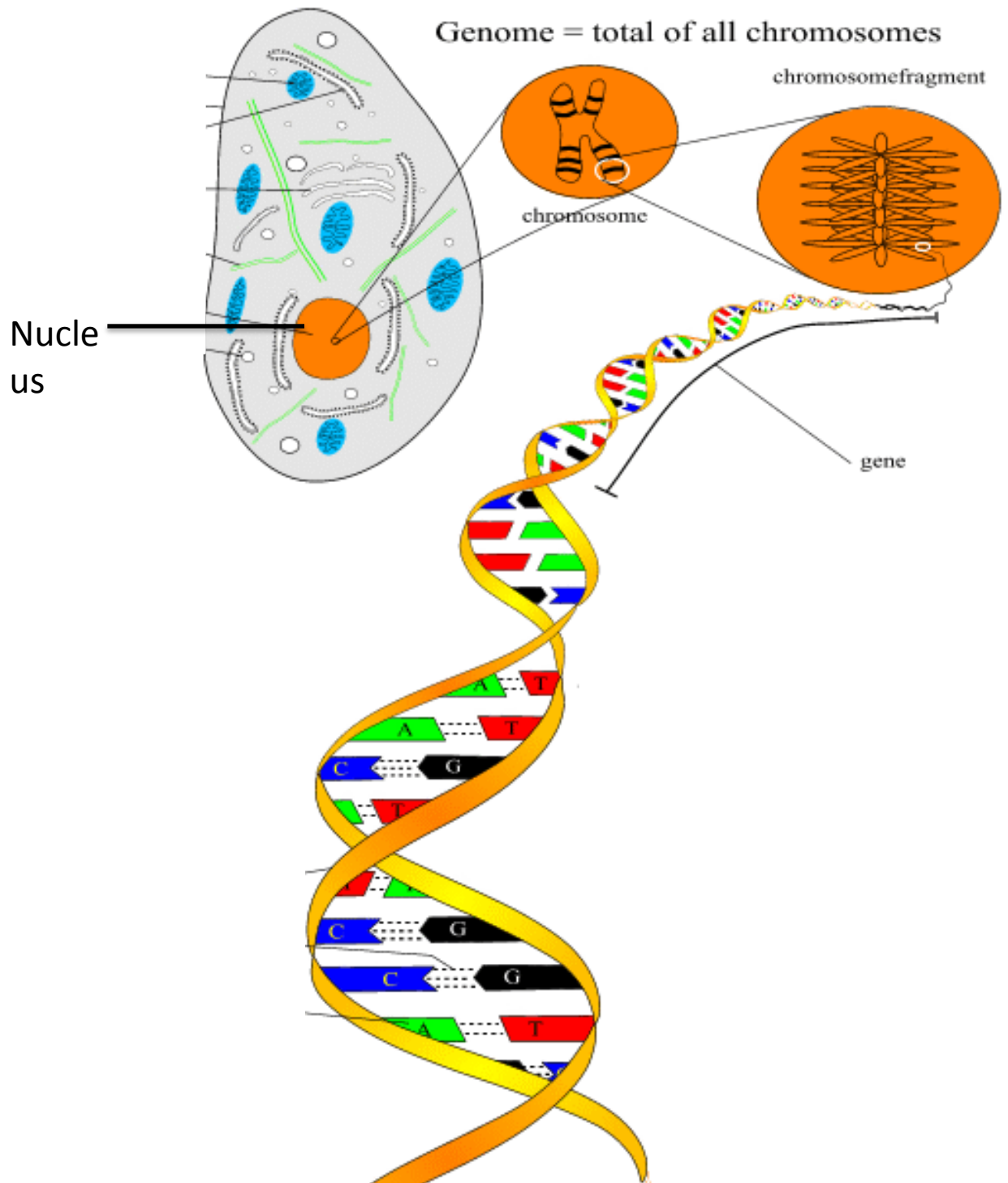




Cell is swelled which increases the gap space between the phospholipids. This makes it easier for the detergent to grasp onto those lipids



Genetic Science Learning Center. "Why Did I Add Detergent To My Pea Soup?." [Learn.Genetics](http://learn.genetics.utah.edu/content/labs/extraction/howto/detergent.html) 6 February 2012
<<http://learn.genetics.utah.edu/content/labs/extraction/howto/detergent.html>>



Can you see the DNA in your test tube?
Where is it?

Cross Section of a Wheat Seed

