Strawberry DNA Extraction

Easy Strawberry DNA extraction protocol

(thanks to Genspace)

Note, we have a video demo of this here

What you'll need (per person):

- 2+ juicy strawberries
- 1/4 teaspoon of Table salt (NaCl) – not too much!
- 1 teaspoon dishwashing detergent
- 1/4 teaspoon Meat Tenderizer
- Half glass water
- 1-Qt Ziplock baggie
- Disposable coffee filter
- Plastic funnel (to hold filter)
- 91% Isopropanol rubbing alcohol, chilled
- A tall drinking glass
- A thin wooden stick (used to fish out your DNA)

Instructions:

Step 1: Drop the strawberries into a ziplock baggie.

Step 2: Add the detergent, meat tenderizer and salt.

Step 3: Seal the baggie, squishing the strawberries in the baggie with your hands for about 5 minutes until you have the consistency of a smoothie

Step 4: Open the baggie and add some water. Shake it up a little.

Step 5: Place your filter in the funnel and place this in the glass. Now pour the contents of the baggie (the squished strawberry mixture) into the filter.

Step 6: Let the contents drip through the filter into the glass. It should look milky pink. Be patient! If the filter is working too slowly, you can gently squeeze it, but not to hard or it may break.

Step 7: Holding the glass at an angle, very slowly pour the chilled rubbing alcohol down the side into the strawberry mixture. You want to pour it slow enough so that a layer of the clear alcohol forms on top of the pink layer underneath, since the alcohol is less dense than the water layer containing the strawberries. If you pour too quickly you won't see this layer form, so remember to do it slowly. Pour enough alcohol so that you have at least a 2 inch layer on top.

Step 8: Now set your glass down. You should start to see a wispy white layer start to form between the bottom pink layer and the clear alcohol on top. It should take about a minute or more to develop. It will start to look like a small ball of cotton. Sometimes it looks like many small pieces of cotton. Give it some more time and it will gently rise to the surface. This is the strawberry's DNA starting to precipitate!

Step 9: Using your thin wooden stick, you can now fish out the DNA. It will be rather "stringy" since DNA molecules form long chains. These types of molecules are known as "polymers".

Questions and Answers:

Why use strawberries?

Strawberries are octoploid, meaning that their cells each have eight duplicate copies of each chromosome. This gives the cells a lot of DNA, which means it is easier to extract a large amount of DNA that is visible to the naked eye.

What's the table salt for?

DNA is a large molecule that is very negatively charged. Since like charges repel one another, we need to neutralize the charges on the DNA by using the positively charged Sodium ions from salt. This will help the DNA to clump together in the isopropanol.

What about the detergent?

Cells are surrounded by a layer of special lipid molecules. These are very similar to fat. The detergent helps to break apart this protective layer of the cell. This promotes the release of the cells contents, including the DNA.

Meat tenderizer, what's that for?

Meat tenderizer contains a type of protein called a protease that chops up other proteins. This also helps to release the DNA, since in a cell it is found '" wrapped up" with proteins called histones. The protease in meat tenderizer also helps to protect the DNA once it has been released from the cell by chopping up other proteins which in turn chop up DNA. These are called DNAses.

And the 91% rubbing alcohol?

The DNA, in the presence of salt, is not soluble in alcohols, which are weakly polar, such as isopropanol. This is why the DNA forms a visible clump. It prefers to stick to its own molecules rather than mix (dissolve) in the alcohol.

What does this process show?

This is the basic protocol for extracting DNA from a cell. Once we have extracted it, we can PCR it to create more copies (amplify it) and then analyze it with a sequencer to determine what the DNA represents.