

## Strawberry DNA Extraction Lab

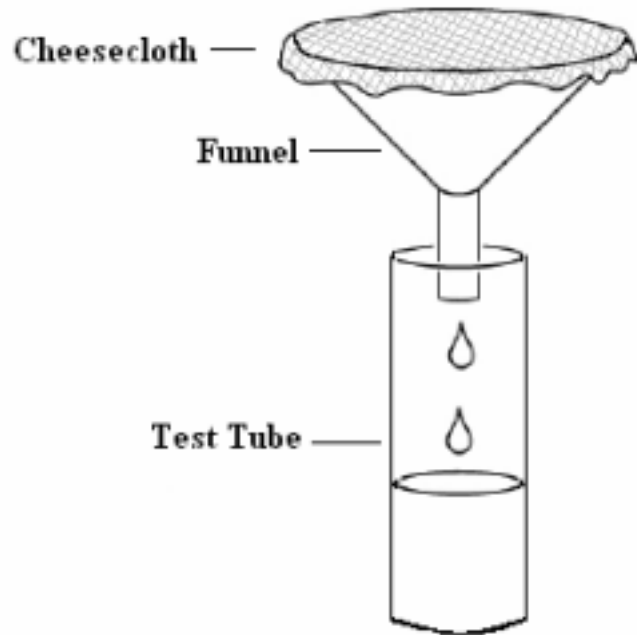
### Background:

Almost every cell in a human, except sperm and egg, are diploid, with two copies of each chromosome. Every cell in a strawberry contains eight copies of each of its chromosomes, making strawberries octoploid. That means they contain lots of DNA for us to extract.

The extraction of DNA uses our knowledge of chemistry. Ripe strawberries themselves produce an enzyme to break down cell walls. Detergents break down the phospholipid cell membrane. Filtering removes cell organelles, broken cell walls, membrane fragments and other cell debris. The result will be a red colored solution containing DNA and other small dissolved molecules such as sugars and proteins. When cold ethanol (an alcohol) is layered on this solution, molecules of ethanol repel the DNA molecules, and the DNA clumps together. A ropelike clump of many DNA molecules forms that is large enough to see with the naked eye.

### Procedure:

1. Place one strawberry in a Ziploc bag.
2. Smash/grind up the strawberry using your fist and fingers for 2 minutes. Be careful not to break the bag!!
3. Add the provided 10mL of extraction buffer (salt and soap solution) to the bag.
4. Knead/mush the strawberry in the bag again for 1 minute.
5. Assemble your filtration apparatus as shown to the right. If you don't have cheesecloth, you can use a coffee filter.
6. Pour the strawberry slurry into the filtration apparatus and let it drip directly into your test tube.
7. Slowly pour cold ethanol into the tube.
8. Dip the loop or glass rod into the tube where the strawberry extract and ethanol layers come into contact with each other.



## Conclusions & Analysis (Food for thought...)

It is important that you understand the steps in the extraction procedure and why each step was necessary. Each step in the procedure aided in isolating the DNA from other cellular materials.

1. In the box below, draw lines matching the procedure with its function:

Procedure	Function
Filter strawberry slurry through cheesecloth	To precipitate DNA from solution
Mush strawberry with salty/soapy solution	Separate components of the cell
Initial smashing and grinding of strawberry	Break open the cells
Addition of ethanol to filtered extract	Break up proteins and dissolve cell membranes

- Describe what the DNA looked like
- What did mashing the strawberry release, which helped digest and break down the strawberry?
- Describe the appearance of the strawberry after two minutes of smashing.
- What organic macromolecule did the detergent destroy?  
What part of the cell contains a lot of this macromolecule?
- What materials were caught in the cheesecloth?
- DNA dissolves in water, but not in ethanol. Explain what happened when the ethanol came in contact with the strawberry extract during the DNA extraction.
- A person cannot see a single cotton thread 100 feet away, but if you wound thousands of threads together into a rope, it would be visible much further away. How is this statement analogous to our DNA extraction?
- In order to study human genes, scientists must first extract the DNA from human tissues. Would you expect the method of DNA extraction for human DNA to be the same as the method you used to extract DNA from strawberries? What would be the same, what would be different?
- List two possible scientific questions that could be explored by studying strawberry DNA.
- As mentioned in the background, strawberry cells are octoploid, while banana cells are triploid. Which do you predict will yield a greater quantity of DNA, 5 g of strawberry tissue or 5 g of banana tissue? Explain your reasoning.