

Name:

Date:

Period:

Biology: DNA Extraction

Background

DNA is the genetic material for nearly all organisms. DNA, or deoxyribonucleic acid, is found in the nucleus of eukaryotic cells, and is made up of nucleotides (the building blocks of nucleic acids). DNA of all organisms is generally the same; the only major difference is the sequence of base pairs of the nucleotides (adenine, guanine, cytosine, and thymine). In this experiment, you will extract the DNA from a fruit (strawberries or a kiwi) and you will be extracting human DNA from cheek cells. To do this, you will have to break open the individual cells, break the nuclear membrane, and force the DNA to condense into a form where we can see it (not a chromosome). The procedure you will follow is similar to the procedure that scientists do in laboratories. However, in a real laboratory, scientists must be very careful to avoid contamination.

Extracting Fruit DNA

Materials:

Strawberries or Kiwi	Disposable zip lock baggie	6% NaCl solution
25% liquid dish soap	Plastic pipettes	70% (or greater) Ethyl Alcohol
Coffee stirrer or wire		

Procedure:

- 1) Place 2-3 strawberries or pieces of Kiwi into a plastic baggie- close the baggie
- 2) Smash the fruit inside the baggie until it is a uniform pulp.
- 3) Open the baggie and add 5 ml of salty water, close the bag, mix and mash.
- 4) Open the baggie again and add 5 ml of soapy water, close the baggie and GENTLY mix the contents. YOU MUST AVOID BUBBLES AS MUCH AS POSSIBLE!
- 5) Gently pour 10 ml of alcohol down the edge of the baggie to cover the fruit-salt-soap mix. A layer of alcohol should form above the mix.
- 6) Observe what is happening at the alcohol-fruit interface.
- 7) Gently spool the material onto a stirrer and observe under a microscope.

Extracting Human DNA

Materials:

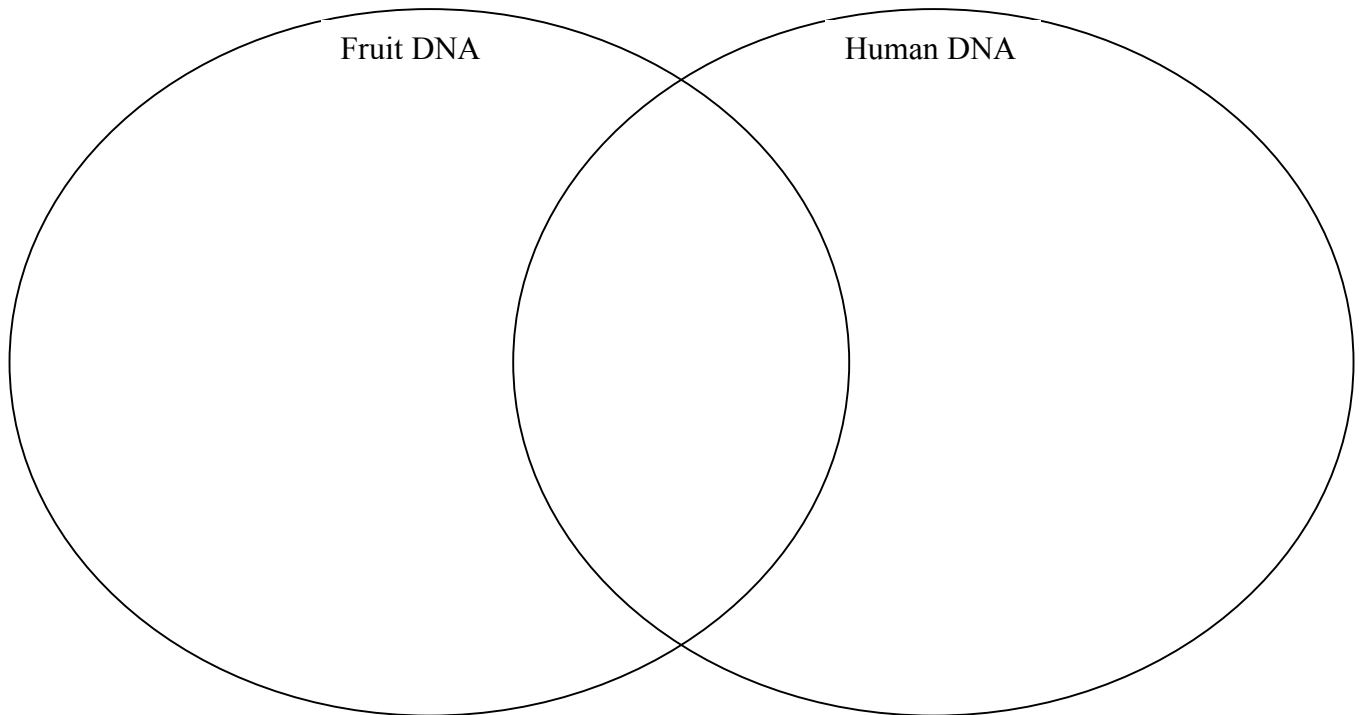
test tube	hot water bath	cold water bath	microfuge test tube
pipe cleaner	masking tape	6% NaCl solution	pipettes
25% liquid dish soap	meat tenderizer	ice cold 95% ethanol	parafilm

Procedure:

- 1) Add 5 ml of detergent solution to a test tube
- 2) Gently scrape the *right* side of your mouth for 30 seconds with a pipe cleaner or stir stick. Swirl the pipe cleaner in the detergent to remove as many cells as possible.
- 3) Gently scrape the left side of your mouth for 30 seconds with the other half of the pipe cleaner. Swirl in the detergent (do NOT put the pipe cleaner with detergent on it in your mouth).
- 4) Incubate your test tube in the hot water bath for 5 minutes (use masking tape to mark your test tube).
- 5) After the 5 minutes add 0.2 grams of meat tenderizer and 2 ml of the NaCl solution to your test tube.
- 6) Seal the top of your test tube with a piece of parafilm and invert *gently* 5 times.
- 7) Incubate at 55° C for an additional 10 minutes.
- 8) Transfer the test tube to the cold water bath for an additional 3 minutes
- 9) Add, slowly and carefully, 2-3 mL of ice code ethanol to your test tube. You, or a lab partner, should be holding the test tube at a 45° angle.
- 10) A white layer will form between the lower layer and the clear ethanol layer. DO NOT STIR THE LAYERS TOGETHER! The white layer you are seeing is your DNA!
- 11) You can carefully remove the layer of DNA with a pipette and transfer it to a microfuge test tube.
- 12) Centrifuge if available to allow you to better view your sample of DNA.

Data

1. Compare and Contrast human DNA with the fruit DNA, include how the samples were obtained.



2. Explain the role each of these materials played in the extraction of the DNA:

- Dish soap:
- Meat tenderizer (breaks apart proteins, think about the structure of DNA):
- Alcohol:

Analysis Questions: Write your answers in complete sentences!

- 1) The soapy water allows you to destroy the _____, which are made up of lipid bilayers. It is a necessary step because DNA is located in the _____ of a cell.
- 2) What do you think would happen if you did not add the soapy water? Explain.
- 3) How did the DNA from the fruit compare to the DNA from a human?
- 4) Why do you think the samples looked different from each other?
- 5) Salt helps condense (shrink and clump) the DNA, but we cannot see it until we add alcohol. The alcohol draws the DNA out of the solution and causes it to clump! What did the precipitated DNA look like?
- 6) Why do you think the human DNA extraction is more complicated than the strawberry DNA extraction?
- 6) How does this way of looking at DNA differ from how we have looked at DNA so far? Is it what you expected?

Conclusion:

The purpose of this lab was to...

In summary, we extracted strawberry DNA by...

We extracted human DNA by...

In our results, the human DNA looked like.

The strawberry DNA looked like.

The difference between human and strawberry DNA....

Possible sources of error in this lab were....