Experiment Title: "DNA Extraction"

Purpose: To study DNA.

Background/Literature:
We researched in books to find out about DNA. DNA is the molecule that governs heredity. We are interested in DNA because HIV use DNA to replicate. We learned that DNA wrap around Carbon Nanotubes. Our junior mentor helped us do the experiment.

Equipment:

Filter Paper
Measuring Test Tube
Thermometer
Pipettes
Plastic utensils – like knife and fork
Clear cup
Measuring cups
Funnel
Laundry Detergent
Timer
Salt
Ice Cubes
Denatured Alcohol (Chilled overnight in freezer)
Banana (or other fruit or an onion)
Multiwalled Carbon Nanotubes

Procedure:

1. Peel, Cut, then mash a banana (or other fruit) in a pyrex measuring cup.
2. Add ½ cup of warm tap water and 5 ml detergent to fruit and stir.
3. In a bowl, add hot and cold water to get water at 50° C.
4. Place measuring cup with fruit and detergent mixture in the 50° C water.
5. Wait 12 minutes – adding hot water to keep the water at 50° C water.
6. Prepare a second bowl with ice cubes and tap water.
7. After 12 minutes place the measuring cup with fruit and detergent mixture into the ice bath.
8. Wait 5 minutes stirring the fruit occasionally.
9. Put filter paper in a funnel and put it in a clear cup.
10. After 5 minutes, pour the fruit-detergent solution into the filter paper.
11. Wait for the solution to collect in the cup below – this solution is called the supernatant. DNA is in the supernatant. The material in the filter include cell walls and other cellular debris.
12. Use a pipette to transfer supernatant into the clean tube – fill about half way.
13. Add a pinch of table salt.
14. Put two pipettes of chilled denatured alcohol into a 10 ml tube.
15. Use a clean pipette to drip the chilled alcohol down the side of the tube onto the solution.
16. Put the cap on the tube and seal it.
17. Place the capped tube into the ice bath or into the freezer.
18. Wait at least 10 minutes (or overnight) to precipitate DNA.
19. Look at the DNA under a microscope.
20. Add some Carbon Nanotubes in isopropyl alcohol (DNA do not dissolve in IPA) and look at that mixture under a microscope.

Experiment Photos

Mash a banana. Add detergent and hot water.

Prepare a bowl of water at 50° C.

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Put the banana-detergent mixture in the 50° C water for 12 minutes. Wait 12 minutes.


Use a pipette to transfer supernatant into the clean tube – fill about half way.

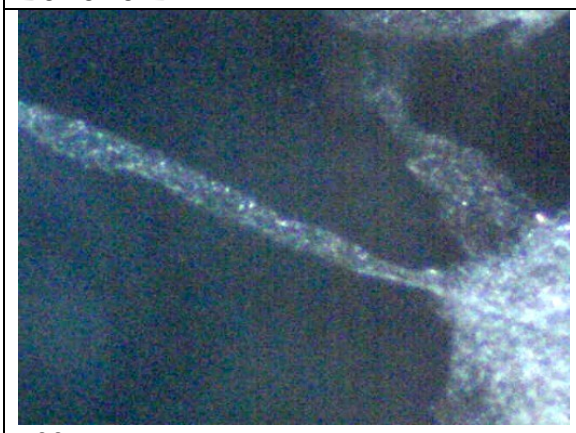
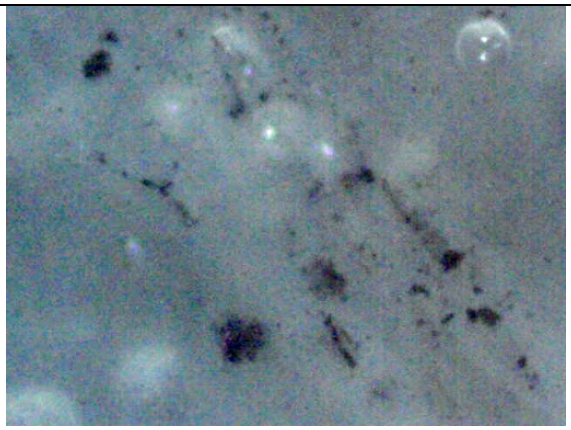
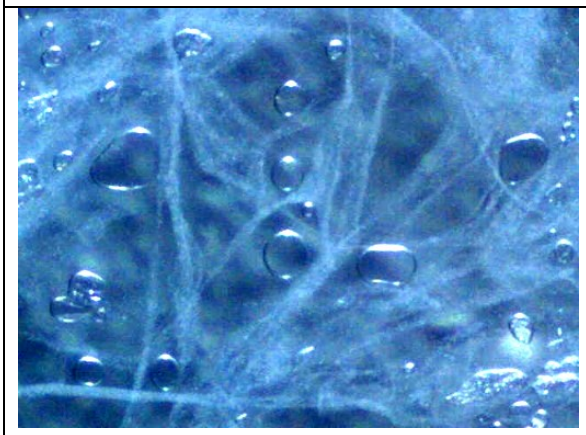
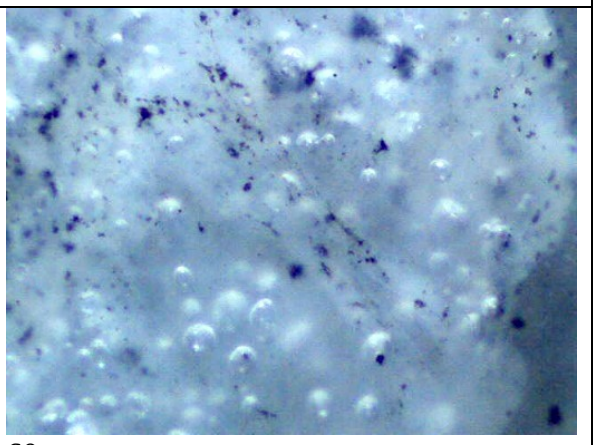

Add a pinch of salt.



Use a clean pipette to drip the chilled alcohol down the side of the tube onto the solution. Cap and place capped tube in ice bath for at least 10 minutes.

Add Carbon Nanotubes. Look at the results under the microscope.

Experiment Results:

Banana DNA	**DNA with Carbon Nanotubes**
 200 x	 200 x
 60 x	 60 x

Conclusions:

We were able to extract DNA from a banana and observe the strands under our microscope. We observed that some of the carbon nanotubes formed linear features aligned with the DNA strands. It appeared that DNA did attract the CNT. We also observed the carbon nanotubes clumping together.