Banana DNA Extraction

(or "How to Make the Best Banana Smoothie Ever")

DNA is a nucleic acid located in the cell's nucleus. It is found making up the genetic material and is bound to several types of proteins. The nuclear and the cell membranes are a tough protective barrier, made of lipids and proteins, which need to be eliminated in order to release the DNA. It is very important that the directions be followed carefully to ensure good results. The process of extracting DNA from a cell is the first step for many laboratory procedures in biotechnology. The scientist must be able to separate DNA from the unwanted substances of the cell gently enough so that the DNA does not denature.

Protocol

1. Cut one average sized banana into pieces approximately 3 cm thick and place them in the blender. Add enough 2% NaCl solution to cover them and process until liquefied.
2. Obtain two test tubes small enough to fit opposite one another in the centrifuge and fill them with the banana mixture. Centrifuge on high for about 2 min.
3. Each group should end up with about 20 mL of supernatant. If you do not have enough, repeat the centrifugation step using more banana mixture.
4. Pour the supernatant into a large test tube. Add 1 mL of 0.5% pepsin solution (it has been acidified with HCl).
5. Add 40 drops of Woolite detergent.
6. Place the tube in the water bath at 55ºC and mix the contents of the tube gently for 5 s every 30 s for 5 minutes. The supernatant will become partly digested and should become clear in this step. If it does not become clear, don't worry.
7. Carefully add one volume of ice cold alcohol down the side of the tube so that the alcohol remains in a layer above the supernatant. Let it stand in an ice water bath until the white DNA appears in the alcohol layer. Sometimes, it precipitates right away as you add the EtOH.
8. If no DNA (or very little) appears, use a wooden splint to gently stir the mixture until the DNA begins to appear at the interface of the ethanol and suspension. Twist the splint to spool the DNA sample on to the splint. If the DNA were to be preserved, it could be transferred to a new tube containing 95% ethanol and stored indefinitely in the freezer.
9. Make some qualitative observations of the DNA on the wooden splint.

Questions

1. What was the purpose of the salt solution used in the beginning step?
2. What is the purpose of sodium dodecyl sulfate (SDS) in the procedure.
3. Why was pepsin used?
4. What protects the DNA?
5. Why was ethyl alcohol used in the protocol?
6. a) Why was banana used?
   b) Why was the banana in a blender?
7. If Bacterial cells were being used, could the same process be used to extract the DNA?