

Do-It-Yourself DNA obtained from www.sciencebuddies.org

Materials and Equipment

- Measuring cup
- Measuring spoons
- Isopropyl rubbing alcohol, 70% (1/2 cup)
- Salt (1/2 tsp.)
- Water
- Dishwashing liquid (1 tbsp.); Liquid detergent you use for hand washing dishes (e.g., Dawn®)
- Glass or small bowl
- Cheesecloth
- Funnel
- Tall drinking glass
- Strawberries (3)
- Re-sealable plastic sandwich bag
- Test tube or small glass jar, e.g., spice jar or baby food jar
- Bamboo skewer or other thin rod. They are available at grocery stores. Alternatively, you can use a toothpick if your test tube or small glass jar is no taller than a toothpick.
- Lab notebook

Experimental Procedure

1. Chill the rubbing alcohol in the freezer. (You will need it later.)
2. Mix ½ teaspoon salt, 1/3 cup water, and 1 tablespoon (tbsp.) dishwashing liquid in a glass or small bowl. Set the mixture aside. This is your extraction liquid.
3. Line a funnel with the cheesecloth. Put the funnel's tube into a tall drinking glass, as shown in Figure 1 below.



Figure 1. After lining the funnel with cheesecloth, put the funnel's tube into a tall drinking glass.

1. Remove the green stems from three strawberries, put the strawberries in a plastic, re-sealable sandwich bag, and push out all the extra air. Seal the bag tightly.
2. With your fingers, squeeze and smash the strawberries for 2 minutes.
3. After this the strawberries should look like Figure 2 below.



Figure 2. After smashing the strawberries for two minutes, they should look like the ones in this image.

4. Add 3 tbsp. of the extraction liquid you made in step 2 to the strawberries in the bag. Push out all the extra air and reseal the bag.
 1. The liquid detergent will help break the strawberry cells open, allowing the DNA to spill out.
 2. The salt helps create an environment where the different strands of DNA can gather together in a clump, making it easier for you to see them.
5. Squeeze the strawberry mixture with your fingers for 1 minute.
 1. Do you notice any differences in the mixture after mixing it for 1 minute?
 2. After this the strawberries should look like Figure 3 below.



Figure 3. After smashing the strawberries with the extraction liquid for one minute, the mixture should look like the one in this image.

6. Pour the strawberry mixture from the bag into the funnel. Let it drip into the glass until there is very little liquid left in the funnel (i.e., only wet pulp remains).
 1. You may need to be patient as it can take some time for the liquid to filter through the cheesecloth.

This activity guide was developed by Angela Olvera as part of the Latham Science Engagement Initiative at the University of Iowa.

2. Be sure not to let any pulp go around the cheesecloth and end up in the drinking glass below. If this happens, you will need to pour the liquid through the cheesecloth again, into a new drinking glass.
7. Throw away the cheesecloth and the strawberry pulp inside. Pour the contents of the glass into the test tube or small glass jar so it is 1/4 full.
8. Tilt the test tube or jar and very slowly pour 1/4 cup of cold rubbing alcohol down the side.
 1. The alcohol should form approximately a one-inch deep layer on top of the strawberry liquid.
 2. If you have a small test tube or jar you will not need all of the alcohol.
 3. Do not let the alcohol and strawberry liquid mix.
 4. The DNA collects between the two layers. DNA does not dissolve in alcohol. When alcohol is added to the mixture, the rest of the mixture, except for the DNA, stays in solution, while the DNA *precipitates* out into the alcohol layer.
9. Study the mixture inside of the test tube or jar. The strawberry DNA will appear as gooey clear/white stringy stuff. Do you see anything in the jar that might be strawberry DNA? If so, where in the jar is it?
 1. *Hint:* You know that the DNA precipitates into the alcohol layer, so that is probably where you will see some DNA.
 2. Record your observations in your lab notebook.
10. You can collect the DNA with a skewer or other thin rod. Dip the bamboo skewer into the test tube to where the alcohol and strawberry layers meet. Pull up the skewer. You should find some whitish, stringy stuff on the skewer, which is DNA containing strawberry genes! Did it work?

Record your observations in your lab notebook.

https://www.sciencebuddies.org/science-fair-projects/project-ideas/BioChem_p015/biotechnology-techniques/strawberry-dna#materials