

## DNA Isolation from Strawberries

Developed by Diane Sweeney

[http://www.caseciw.org/first\\_light\\_case/horn/strawberries/strawbdnproc.html](http://www.caseciw.org/first_light_case/horn/strawberries/strawbdnproc.html)

### Teacher Background

This is a simple, effective protocol for spooling DNA. Ripe strawberries are an excellent source for extracting DNA because they are easy to pulverize and contain enzymes called pectinases and cellulases that help to break down cell walls. And most important, strawberries have eight copies of each chromosome (they are octoploid), so there is a lot of DNA to isolate.

The purpose of each ingredient in the procedure is as follows:

**Shampoo or dishwasher soap** helps to dissolve the cell membrane, which is a lipid bilayer.

**Sodium chloride** helps to remove proteins that are bound to the DNA. It also helps to keep the proteins dissolved in the aqueous layer so they don't precipitate in the alcohol along with the DNA.

**Ethanol or isopropyl alcohol** causes the DNA to precipitate. When DNA comes out of solution it tends to clump together, which makes it visible. The long strands of DNA will wrap around the stirrer or transfer pipet when it is swirled at the interface between the two layers.

### Notes on Materials and Recipes

- Use Ziploc™ freezer bags rather than sandwich bags, as they are thicker.
- Fresh or frozen strawberries can be used. Be sure to thaw the frozen berries at room temperature. Bananas or kiwi fruit can also be used but yield less DNA.
- Use non-iodized table salt or laboratory-grade sodium chloride.
- 95% ethanol or 91 or 100% isopropyl alcohol can be used to precipitate the DNA. Isopropyl alcohol can be purchased from a pharmacy. Whichever you use, make sure it is ice cold by placing in an ice-water bath or in the freezer.

### DNA Extraction Buffer

- 100 ml (3/8 cup) shampoo (without conditioner) or 50 ml dishwasher detergent
- 15 grams sodium chloride (2 teaspoons)
- water to 1 liter

# DNA Isolation from Strawberries

## Student Directions

### Materials per student group

- 1-3 strawberries (about the volume of a golf ball). Frozen strawberries should be thawed at room temperature.
- 10 ml DNA Extraction Buffer (soapy salty water)
- about 20 ml ice cold 91% or 100% isopropyl alcohol
- 1 Ziploc™ bag
- 1 clear test tube
- 1 funnel lined with a moistened paper towel
- 1 coffee stirrer or transfer pipet

### Directions

1. Remove the green sepals from the strawberries.
2. Place strawberries into a Ziploc™ bag and seal shut.
3. Squish for a few minutes to completely squash the fruit.
4. Add 10 ml DNA Extraction Buffer (soapy salty water) and squish for a few more minutes. Try not to make a lot of soap bubbles.
5. Filter through a moistened paper towel set in a funnel, and collect the liquid in a clear tube. *Do not* squeeze the paper towel. Collect about 3 ml liquid.
6. Add 2 volumes ice cold isopropyl alcohol to the strawberry liquid in the tube. Pour the isopropyl alcohol carefully down the side of the tube so that it forms a separate layer on top of the strawberry liquid.
7. Watch for about a minute. What do you see? You should see a white fluffy cloud at the interface between the two liquids. That's DNA!
8. Spin and stir the coffee stirrer or transfer pipet in the tangle of DNA, wrapping the DNA around the stirrer.
9. Pull out the stirrer and transfer the DNA to a piece of saran wrap or clean tube. The fibers are thousands and millions of DNA strands.
10. To view in a microscope, put the glob on a clean slide and gently tease/stretch apart using 2 toothpicks or dissecting pins. The fibers will be easier to see in the teased-apart area.
11. Rinse your funnel. Put the Ziploc™ bag and paper towel in the garbage.