DNA Extraction

Materials

Clear Gatorade, or salt water (1 teaspoon of salt in a cup of water)

Dixie Cup	Test tube
Dishwashing Liquid	Pipet (optional)
Rubbing Alcohol	Vial (optional)

1. Chill the rubbing alcohol in ice.
2. Pour a squirt of dishwashing liquid in the test tube with water (1 part dishwashing liquid to 3 parts water).
3. Take about 20 mL of Gatorade in your mouth and swish it around. Do not swallow!
4. Spit the Gatorade into a clean cup.
5. Pour the Gatorade into the test tube with the dishwashing liquid. Place your thumb over the top of the test tube gently rock back and forth for a couple minutes.
6. Add a teaspoon of the rubbing alcohol to the test tube. Let it sit for a few minutes.
7. You should see the DNA separate out. If desired, use the pipet to place the DNA in a vial.

What's Going On?

Cheek cells are collected as you swish the Gatorade, or salt water, around in your mouth. The detergent breaks open the fatty molecules that make up the membrane of the cells and helps to remove any proteins that may be associated with the DNA. The DNA is then released into the solution.

DNA cannot dissolve in the rubbing alcohol, so it precipitates out as white strands. Although the double helix structure is not visible to the naked eye, this is the same procedure that is used to analyze DNA in labs.

Did you know?

If you took all the DNA from a single cell and laid it end to end, it would be about 2 meters long!

California ScienCenter

Edible DNA

Materials
2 Licorice Sticks
Miniature Colored Marshmallows, 6 of each color
10 Toothpicks

Your DNA Sequence:

A A A G T C T G A C

Bases Coding:

Adenine (A) = Pink

Cytosine (C) = Orange

Guanine (G) = Green

Thymine (T) = Yellow

What to Do:

1. Each colored marshmallow represents a chemical base on the DNA strand. Pick out the ones that match your sequence.

2. The licorice will be the backbone of your DNA. For each letter in the sequence, stick a toothpick through that color marshmallow and then stick the toothpick in the licorice. Try to space the toothpicks evenly.

3. Each chemical base pairs up with another one. **A** always pairs with **T** and **G** always pairs with **C**. Put the missing pairs on the toothpicks. Then stick the other piece of licorice on the toothpicks.

4. Twist the DNA slightly to make a double helix!

What is DNA?

DNA stands for deoxyribonucleic acid. DNA is mostly located in the nucleus of cells. Pretty much anything that is alive has DNA. DNA is a double helix shape and can replicate itself. Base pairs in the DNA attach to a sugar-phosphate backbone. The four chemical bases in DNA are adenine (A), thymine (T), guanine (G) and cytosine (C). The bases always pair up the same way (A with T and C with G) to form a base pair. The order, or sequence, of the base pairs determines how the organism is built. In all people, more than 99 percent of the sequence will be the same.

Once the investigator has extracted the DNA, a process called gel electrophoresis is used to separate out repeating segments of base pairs, according to length. Markers are put into place to bind with segments of the bases. Bases that do not bind with a marker are rinsed out of the sample. The binders used are radioactive and photographic film darkens the marked segments. You are left with a picture that looks like a bar code. DNA profiles are lined up to compare where the repeating segments are in the sequence.