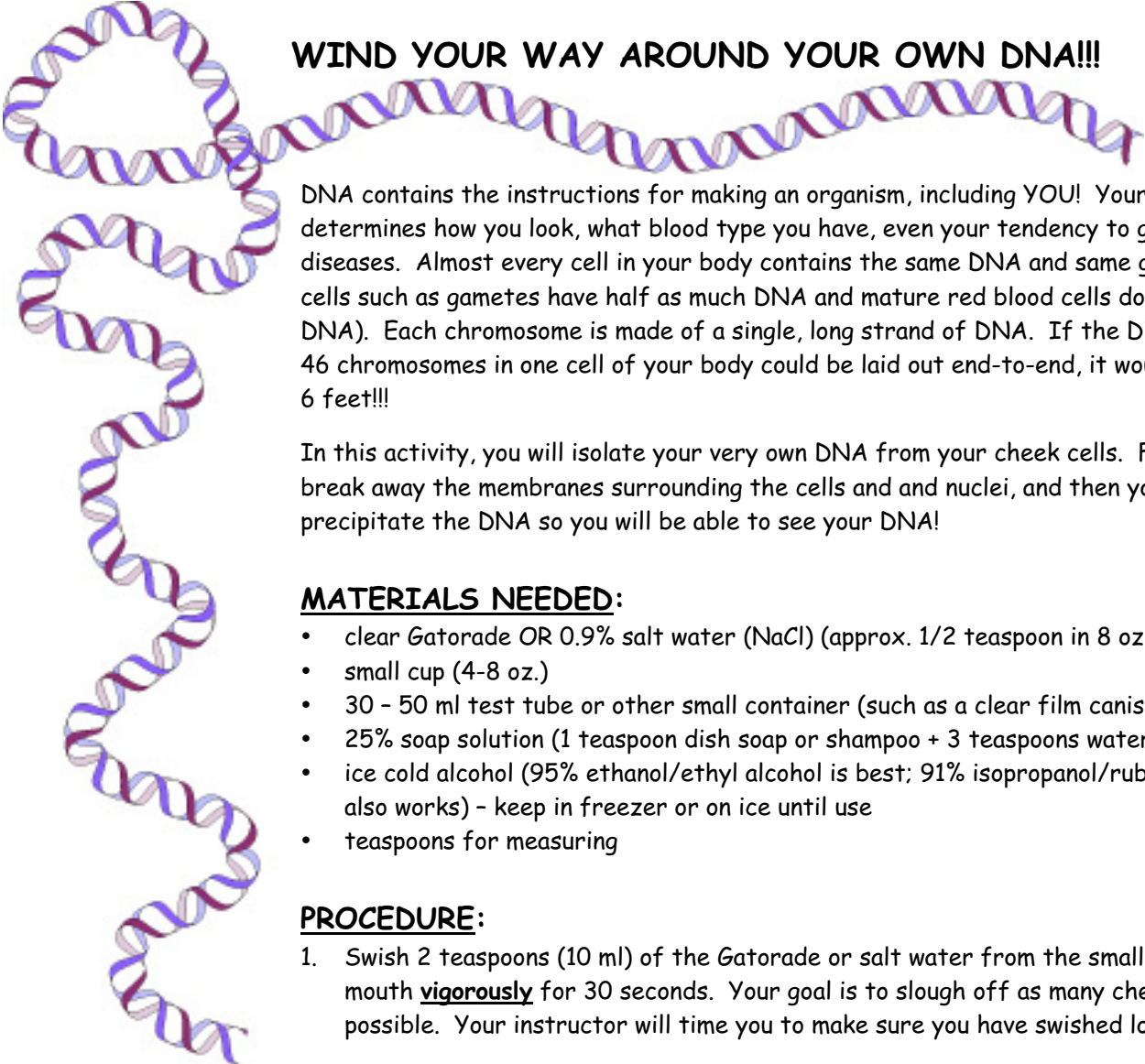


WIND YOUR WAY AROUND YOUR OWN DNA!!!



DNA contains the instructions for making an organism, including YOU! Your DNA determines how you look, what blood type you have, even your tendency to get some diseases. Almost every cell in your body contains the same DNA and same genes (some cells such as gametes have half as much DNA and mature red blood cells don't have any DNA). Each chromosome is made of a single, long strand of DNA. If the DNA from the 46 chromosomes in one cell of your body could be laid out end-to-end, it would measure 6 feet!!!

In this activity, you will isolate your very own DNA from your cheek cells. First, you will break away the membranes surrounding the cells and nuclei, and then you will precipitate the DNA so you will be able to see your DNA!

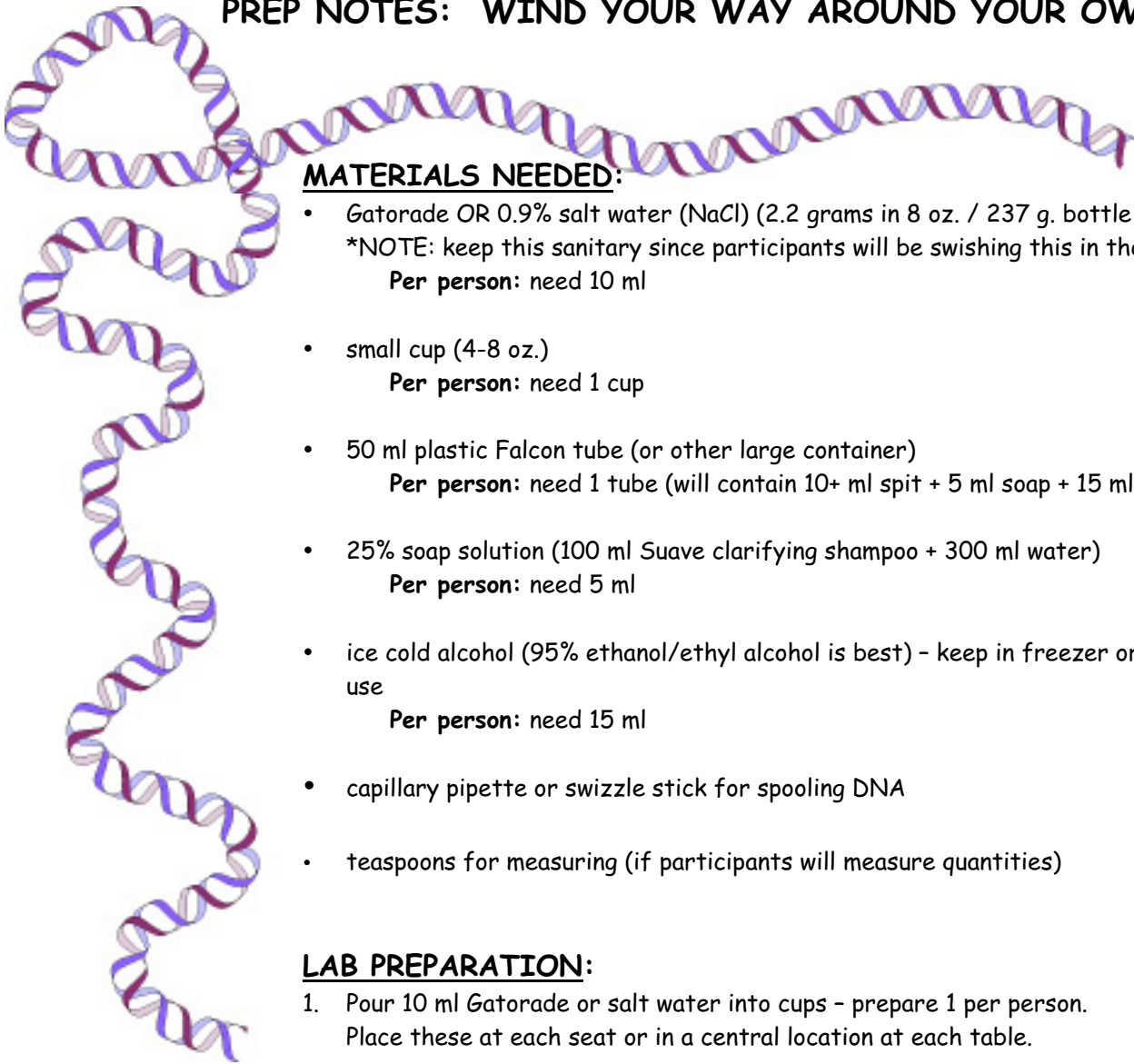
MATERIALS NEEDED:

- clear Gatorade OR 0.9% salt water (NaCl) (approx. 1/2 teaspoon in 8 oz. water)
- small cup (4-8 oz.)
- 30 - 50 ml test tube or other small container (such as a clear film canister)
- 25% soap solution (1 teaspoon dish soap or shampoo + 3 teaspoons water)
- ice cold alcohol (95% ethanol/ethyl alcohol is best; 91% isopropanol/rubbing alcohol also works) - keep in freezer or on ice until use
- teaspoons for measuring

PROCEDURE:

1. Swish 2 teaspoons (10 ml) of the Gatorade or salt water from the small cup in your mouth **vigorously** for 30 seconds. Your goal is to slough off as many cheek cells as possible. Your instructor will time you to make sure you have swished long enough.
 2. Spit the water with cheek cells back into the small cup.
 3. Pour this solution into a tube containing 1 teaspoon (5 ml) of soap solution.
 4. Gently mix this solution for 2-3 minutes. Try to avoid creating too many bubbles. *The soap solution breaks the cell membranes that are made up of fats - just like soap breaks down grease on your dishes!*
 5. Tilt the tube of soap solution/cells. Pour 2-3 teaspoons (10-15 ml) of ice cold alcohol (EtOH) down the side of the tube so that it forms a layer on top of your soapy solution. **DO NOT MIX THIS!!**
 6. Let the tube stand for 1 or 2 minutes.
 7. The white clump that you see is **YOUR DNA!!!!** Research laboratories use a similar procedure to isolate and study DNA from different organisms.
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PREP NOTES: WIND YOUR WAY AROUND YOUR OWN DNA!!!



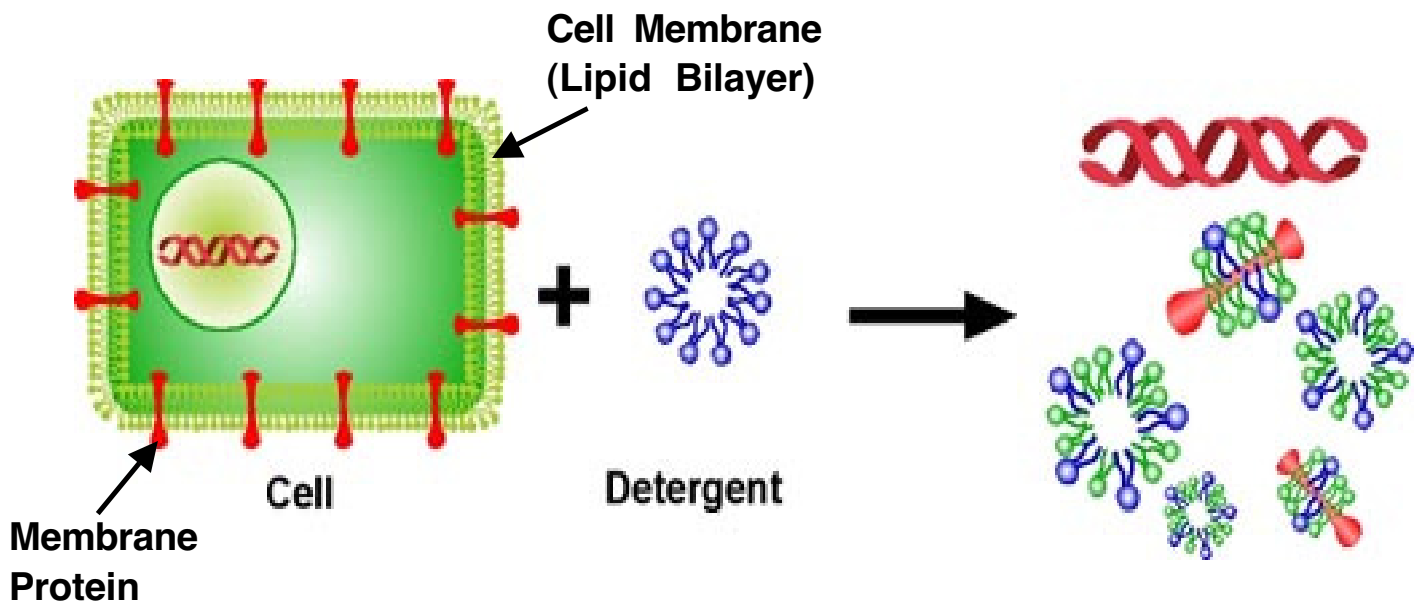
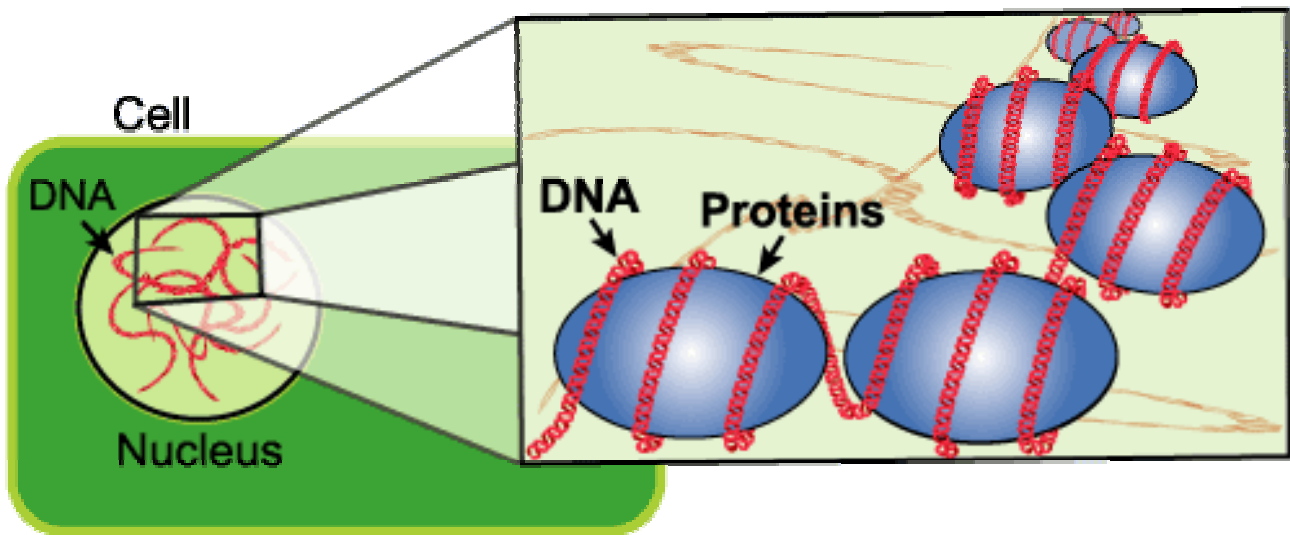
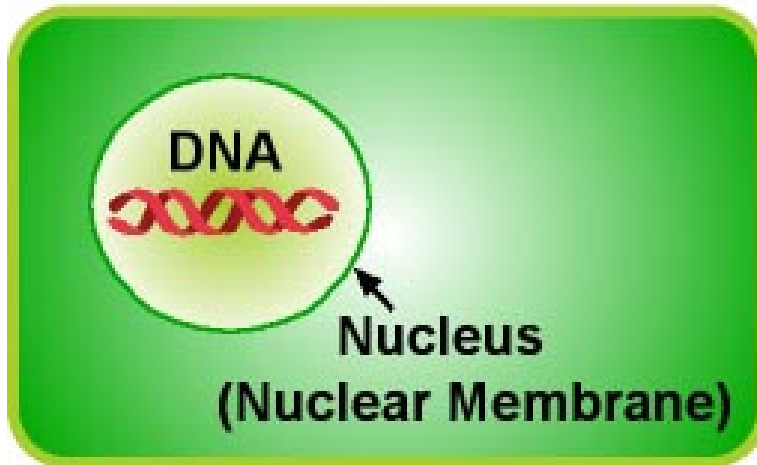
MATERIALS NEEDED:

- Gatorade OR 0.9% salt water (NaCl) (2.2 grams in 8 oz. / 237 g. bottle of water)
*NOTE: keep this sanitary since participants will be swishing this in their mouth.
Per person: need 10 ml
- small cup (4-8 oz.)
Per person: need 1 cup
- 50 ml plastic Falcon tube (or other large container)
Per person: need 1 tube (will contain 10+ ml spit + 5 ml soap + 15 ml EtOH)
- 25% soap solution (100 ml Suave clarifying shampoo + 300 ml water)
Per person: need 5 ml
- ice cold alcohol (95% ethanol/ethyl alcohol is best) - keep in freezer or on ice until use
Per person: need 15 ml
- capillary pipette or swizzle stick for spooling DNA
- teaspoons for measuring (if participants will measure quantities)

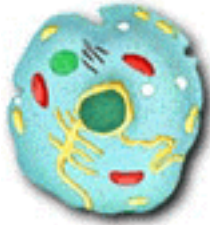
LAB PREPARATION:

1. Pour 10 ml Gatorade or salt water into cups - prepare 1 per person. Place these at each seat or in a central location at each table.
2. For each person, prepare a 50 ml plastic tube containing 5 ml soap solution. Place these tubes in a rack or 100 ml beaker in a central location at each table.
3. Have a freezer or ice chest prepared with film canisters containing the ethanol.
4. Write the simplified procedure on the board.
5. **Be prepared with a stopwatch or clock with minute hand to time swishing. Have everyone start swishing at the same time ("bottoms up"!) and stop when YOU tell them to stop.**
6. Prepare a waste container for liquid waste. Participants should handle their own disposal to limit exposure to fluids.
7. Have capillary tubes or stirrers (or toothpicks) available for spooling DNA.

Cell Membrane



A BRIEF KEY TO BASIC GENETICS



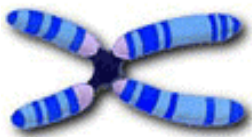
A HUMAN CELL

Each of the 100 trillion cells in the human body (except red blood cells) contain the entire human genome — all the genetic information necessary to build a human being. This information is encoded in over 3 billion base pairs, subunits of DNA. (Egg and sperm cells each contain approx. 1.5 billion basepairs of DNA.)



THE CELL NUCLEUS

Inside the cell nucleus, 6 feet of DNA are packaged into 23 pairs of chromosomes (one chromosome in each pair coming from each parent).



A CHROMOSOME

Each of the 46 human chromosomes contains the DNA for hundreds or thousands of individual genes, the units of heredity.



A GENE

Each gene is a segment of double stranded DNA that holds the recipe for making a specific molecule, usually protein. These recipes are spelled out in varying sequences of the four chemical bases in DNA: adenine (A), thymine (T), guanine (G), and cytosine (C). The bases form interlocking pairs that can fit together only one way: A pairs with T; G pairs with C.



A PROTEIN

Proteins, which are made of amino acids, are the body's workhorses — essential components of all organs and chemical activities. Their function depends on their shapes, which are determined by the estimated 40,000 genes in the cell nucleus.